YOU WORKED HARD,

SHOW CMU case IT!

COLORADO MESA UNIVERSITY TECH

PROGRAM

FRIDAY, APRIL 26, 2024
12–5:30PM
CMU Main Campus
1100 North Avenue • Grand Junction
coloradomesa.edu/showcase

FIFTEENTH ANNUAL
STUDENT SHOWCASE
COLORADO MESA UNIVERSITY

STUDENT SHOWCASE KICKOFF EVENT

Friday, April 26, 2024
12–12:30pm

University Center, Meyer Ballroom

FREE GIFT FOR ATTENDING THE SHOWCASE KICKOFF EVENT!

HOW TO IMPROVE YOUR COMMUNITIES, LOCALLY AND GLOBALLY

Nicole Kain,

Board President, Foundation for Cultural Exchange

Foundation for Cultural Exchange (FCE) was founded by Colorado Mesa University alumni in 2004 to foster international exchange between Grand Junction and its sister city in El Salvador, El Espino. FCE emphasizes the importance of global citizenship and the power of cross-cultural connections by delving into the importance of community engagement, pursuing international opportunities and nurturing diverse relationships. Nicole will also cover avenues for students and community members to work for the betterment of their communities, locally and globally.

Foundation *for* CULTURAL EXCHANGE

SPONSORED BY THE ALPHA CHI HONOR SOCIETY, COLORADO GAMMA CHAPTER

Alphi Chi Leadership:
Mollie Kelley, Claire Watson

Faculty Sponsors:
Morgan Bridge, Holly Oberle

FIFTEENTH ANNUAL
STUDENT SHOWCASE
COLORADO MESA UNIVERSITY

KICKOFF EVENT

12–12:30pm
University Center,
Meyer Ballroom

MAIN EVENT

Presentations, Posters, Performances, Demonstrations and Exhibits

1–4pm
CMU Main Campus

CELEBRATION EVENT

Celebrate your work with food and beverages. Network with local businesses!

4:30–5:30pm
University Center,
Meyer Ballroom

ABOUT STUDENT SHOWCASE

The Student Showcase highlights student works involving creativity, discovery, research, innovation and/or entrepreneurship through sessions by undergraduates and graduate students at Colorado Mesa University and CMU Tech. The Student Showcase builds on classroom experience and is a venue where students can share their work with faculty, student peers and community members. Students participating in this campus-wide forum have distinguished themselves as scholars.

Table of Contents

Index of Presenters

D

E

F

G

M

N

O

P

Q

R

S

T

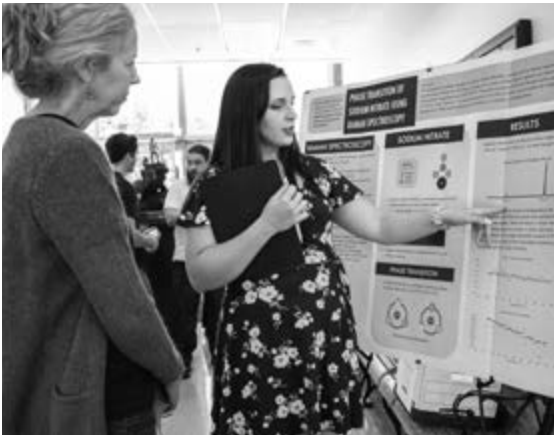
U

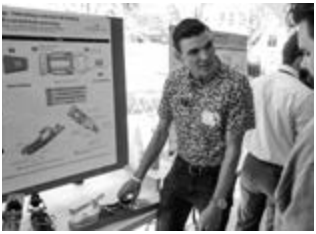
V

W

Y

Z





LOCATIONS:

CTL: Center for Teaching and Learning (located in Tomlinson Library)
DH: Dominguez Hall
Delta Field Sidewalk
EH: Escalante Hall
FA: Jac Kephart Fine Arts Building
HH: Houston Hall
HS: Health Sciences Building
Love Recital Hall (located in MPAC)
MC: Maverick Center
MPAC: Moss Performing Arts Center
The Plaza
Robinson Theatre (located in MPAC)
South Plaza
TL: Tomlinson Library
UC: University Center
WS: Wubben Hall and Science Center

Sessions

Listed alphabetically by department and then numerically by track.
See back cover for a campus map with locations.

Art — Art and Design — Track 1A

Facilitator: Julia Crocetto

LOCATION	TIME	TYPE	STUDENT(S)
LOSS			
FA 214	2:45–3pm	art	Riley Siebels
LIFE WITH PAIN			
FA 214	3–3:15pm	art	Andrea Hollinger
FORM, COLOR, AND LINE			
FA 214	3:15–3:30pm	art	Shonda Hill
THE DRAGON			
FA 214	3:30–3:45pm	art	Mercedes Wills

Biological Sciences — Biology Posters — Track 2A

Facilitator: Paul Hampton

LOCATION	TIME	TYPE	STUDENT(S)
SENSITIVITY & SPECIFICITY ANALYSIS IN USING KALEIDOSCOPE PRO TO DETECT PIKA CALLS			
WS Courtyard	2-4pm	poster	Devan Williams
EFFECTIVE USE OF DIGITAL MEDIA TO INCREASE ENGAGEMENT ACROSS A NETWORKED CURE COMMUNITY			
WS Courtyard	2-4pm	poster	Annalise Holte
PATTERNS OF STRESS IN AN ISOLATED POPULATION OF AMERICAN PIKAS (OCHOTONA PRINCEPS)			
WS Courtyard	2-4pm	poster	Karli Weatherill

ECOLOGICAL DRIVERS OF VERTEBRAL PROPORTIONS IN SNAKES: INSIGHTS FROM COLUBRIDS
WS Courtyard 2-4pm poster Jeremiah Dreher

GENETIC MONITORING OF TAMARISK BIOCONTROL AGENTS (DIORHABDA SPP.) ALONG THE GILA RIVER USING MITOCHONDRIAL CO1 BARCODING
WS Courtyard 2-4pm poster Francisca Esquivel

Business — Energy

Track 3A

Facilitator: Steven Soychak

LOCATION	TIME	TYPE	STUDENT(S)
HYDROCARBONS IN MEDICAL GRADE SUPPLIES AND EQUIPMENT			
DH 3rd Floor Hallway	2–3:45 pm	poster	Audrey Woodhouse
CALIFORNIA AND ECUADOR OIL			
DH 3rd Floor Hallway	2–3:45 pm	poster	Carl Cox
RENEWABLE ENERGY & FUTURE SUSTAINABILITY			
DH 3rd Floor Hallway	2–3:45 pm	poster	Charles Corkin
DEMAND FOR MINERALS ARE SPARKING FEAR			
DH 3rd Floor Hallway	2–3:45 pm	poster	Dominic Laurita
VEHICLE PROPULSION TECHNOLOGY ANALYSIS			
DH 3rd Floor Hallway	2–3:45 pm	poster	Eric Hofmann
UNDERGROUND POWER LINES			
DH 3rd Floor Hallway	2–3:45 pm	poster	Gus Campbell
FUSION REACTORS PROPELLING FUTURE SPACECRAFT			
DH 3rd Floor Hallway	2–3:45 pm	poster	Jacob Cook
ENERGIZING AMERICA			
DH 3rd Floor Hallway	2–3:45 pm	poster	Jarett Brown
SSLNG: POWERING RURAL COMMUNITIES			
DH 3rd Floor Hallway	2–3:45 pm	poster	Jazelyn Martinez
RETIRING COAL PLANTS INTO SMR PLANTS			
DH 3rd Floor Hallway	2–3:45 pm	poster	Kory Flansberg
CALIFORNIA'S HYDROCARBONS IMPORTS AND IMPACTS			
DH 3rd Floor Hallway	2–3:45 pm	poster	Riley Stefaniak
A CRITICAL ANALYSIS OF PROPOSED ENERGY TRANSITION			
DH 3rd Floor Hallway	2–3:45 pm	poster	Robert Bouley
ADVANCING THE INDUSTRY THROUGH AUTOMATED DRILLING.			
DH 3rd Floor Hallway	2–3:45 pm	poster	Samuel Berning
REDUCING GREENHOUSE GASES THROUGH COWS			
DH 3rd Floor Hallway	2–3:45 pm	poster	Slade Pike
FROM TRASH TO TREASURE: HARNESSING LANDFILL WASTE FOR RENEWABLE ENERGY WITH NATURAL GAS			
DH 3rd Floor Hallway	2–3:45 pm	poster	Trey Towndrow

Business — Data Analytics — Track 3B

Facilitator: John Snyder

LOCATION	TIME	TYPE	STUDENT(S)
EXAMINING SAFETY OF AUTONOMOUS VEHICLES ON US ROADWAYS			
DH 2nd Floor Hallway	2–3:45 pm	poster	Grant Novak, Andrew Ash, Kiara Strothers, Katey Threlkeld
EXPLORING THE SOCIOECONOMIC DYNAMICS OF PLASTIC POLLUTION			
DH 2nd Floor Hallway	2–3:45 pm	poster	Rocio Hernandez, Hope Strohmeyer, Cordey Mallo
FORECASTING HEALTHCARE SPENDING AND PHYSICIAN REQUIREMENTS AMIDST BABY BOOMER RETIREMENT WAVES IN THE UNITED STATES			
DH 2nd Floor Hallway	2–3:45 pm	poster	Sydney Mosby, Courtney Freeman, Jose Mendoza, Braden Lowe
PROBLEMS ARISING FOR RETIRING FARMERS IN COLORADO			
DH 2nd Floor Hallway	2–3:45 pm	poster	Tanner Korell, Collin Fitzgerald, Bryce Schust, Abraham Ruiz
EXPLORING THE IMPACT OF ATHLETIC PARTICIPATION ON ACADEMIC OUTCOMES			
DH 2nd Floor Hallway	2–3:45 pm	poster	Zach Russell, Jacie Andrew, Jorge Abreu, Samuel Goulet

Business — Hospitality Management — Track 3C

Facilitator: Britt Mathwich

LOCATION	TIME	TYPE	STUDENT(S)
OLIVE GARDEN MARKETING AND SALES PLAN			
DH 2nd Floor Hallway	2–3:45 pm	poster	Lauren Dwight, Jessica Dollar, Natalie Talbot, Kylie Watkins
ELEVATING HOSPITALITY: UNVEILING STRATEGIC INSIGHTS FOR THE HOTEL TELLURIDE			
DH 2nd Floor Hallway	2–3:45 pm	poster	Manda Turner, Jennifer Carta, Mhariagracia Elera-Marino, Morgan Watson
FIRST WATCH MARKETING ANALYSIS & PLAN			
DH 2nd Floor Hallway	2–3:45 pm	poster	Mollie Kelley, Olivia Linnebur, Melani Lewis, Brooklyn Reuwsaat
MARKETING & SALES PLAN FOR PRINCESS CRUISES			
DH 2nd Floor Hallway	2–3:45 pm	poster	Qwik Huff, Collin Lewis, Amy Macias Pantoja, Jacey May, Brooke Stevenson

Business — Marketing & Hospitality — Track 3D

Facilitator: Shiang-Lih Chen McCain

LOCATION	TIME	TYPE	STUDENT(S)

A GOOGLE CORPORATE EXCURSION TO YELLOWSTONE

DH 214	2:30–2:45 pm	oral	Kylie Watkins, Gino Gaglia, Megan Brown, Paul Vigil

SILENT AUCTION: HOPE UNLEASED

DH 214	2:45–3:00 pm	oral	Mikaela Igou, Ava Leicht, Rachael McLemore, Ella Harrison

SUGAR AND ICE PRE-GRAND OPENING BY AS YOU WISH EVENTS

DH 214	3:00–3:15 pm	oral	Vivian Wyckoff, Melani Lewis, Rylie McCann

EMPOWERING HEALTHCARE: TRANSFORMING BP MONITORING WITH SPK DIAGNOSTICS

DH 214	3:15–3:30 pm	oral	Abhilasha Ganguly

CUSTOMER SATISFACTION AT GRAND JUNCTION'S FEISTY PINT

DH 214	3:30–3:45 pm	oral	Willlam McClurg

Business — Issues in Business — Track 3E

Facilitator: Jessa Dearth

LOCATION	TIME	TYPE	STUDENT(S)

NONPROFITS, FRAUD AND INTERNAL CONTROLS

DH 212	2:30–2:45 pm	oral	Kyle Chu, Dillon Chapman, Isabel Royer, Benedict Nagy, Jazer Toews

SIAC INVESTMENT PORTFOLIO

DH 212	2:45–3:00 pm	oral	Mason Kochel, Dante English, Carissa Crawford, Alex Bruce, Paige Coble

SHOULD ORGANIZATIONS INVEST IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TECHNOLOGIES TO ENHANCE THE PREDICTIVE CAPABILITIES OF THEIR INFORMATION SYSTEMS FOR PROACTIVE ISSUE RESOLUTION?

DH 212	3:00–3:15 pm	oral	Mark Lenczycki

MODERNIZATION OF THE TUTORIAL LEARNING CENTER SYSTEMS

DH 212	3:15–3:30 pm	oral	Jennifer Rich, Tami Mittan, Zachary Russell, Logan Surace, Wyatt Raimer, Rocio Hernandez

ACCREDITATION STANDARD TOOL FOR DAVIS SCHOOL OF BUSINESS

DH 212	3:30–3:45 pm	oral	Mason Solmos, Ali Steppler, Samuel Goulet, Michael Bosch, Lance Fullenwider

CMU Tech — Teacher Education-Special Exhibit — Track 12E

Facilitator: Tammie Shoultz-McCole

LOCATION	TIME	TYPE	STUDENT(S)

THE DIFFERENT DEVELOPMENTAL STAGES OF ART IN YOUNG CHILDREN

DH 112	2–4pm	other	Amani Miller

PLAY VS. CURRICULUM-BASED CENTERS

DH 112	2–4pm	other	Ashleigh Siefken

SELF-REGULATION IN PRESCHOOL			
DH 112	2–4pm	other	Crista Zahniser
FINE MOTOR BENEFITS			
DH 112	2–4pm	other	Emily Phillips
UNLOCKING POTENTIAL: NAVIGATING THE EDUCATIONAL LANDSCAPE FOR CHILDREN ON THE SPECTRUM			
DH 112	2–4pm	other	Holly Sharp, Camryn Lang
WHY MATH IS IMPORTANT IN THE EARLY CHILDHOOD CLASSROOM			
DH 112	2–4pm	other	Jessie Burnell
THE EFFECTS OF SOCIOECONOMIC STATUS IN EARLY LEARNERS			
DH 112	2–4pm	other	Victoria Ramirez

CMU Tech — Culinary Arts

Track 14B

Facilitator: Wayne Smith

LOCATION	TIME	TYPE	STUDENT(S)
CAKE DECORATION			
CTL	1–4pm	art	Shii Maldonado
KNIFE STYLES AND MAINTENANCE			
CTL	1–4pm	other	Matt Hoisington, Rebecca Simler
BREADBASKET SHOWPIECE			
CTL	1–4pm	art	Macey Braun, Elizabeth Gerrard
THE COST AND CUTTING OF WEDDING CAKES EXPLAINED			
CTL	1–4pm	other	Ashley Leach, Amanda Stewart, Rachel Carpenter
BRIE'S BLISSFUL MOCKTAILS: CRAFTING ZERO ABV DELIGHTS			
CTL	1–4pm	other	Brieanna McGovern
ARE GRAND JUNCTION MANAGERS TRAINED ENOUGH TO MANAGE?			
CTL	1–4pm	poster	Sierrah Dixon
FERMENTED FOODS			
CTL	1–4pm	oral	Ginger Rich
CONVERGENT CUISINE AROUND THE WORLD			
CTL	1–4pm	oral	Falcon Hicks
MEAT FABRICATION			
CTL	1–4pm	oral	Corban Carruba, Zachariah Hamilton
HOW TO PREP DELICIOUS AND DECORATIVE B&B MEALS THAT GUESTS WILL LOVE			
CTL	1–4pm	other	Cassie Graumann
FINE ARTS MEET CULINARY ARTS			
CTL	1–4pm	art	Olivia Linnebur, Brenna Langfield
HOW PROTEIN REACTS TO HEAT			
CTL	1–4pm	oral	Dawson Fischer
MOCKTAIL BAR			
CTL	1–4pm	performance	Jody Alexander, Aharon Bustillos-Perez

CMU Tech — Digital Filmmaking

Track 14D

Facilitator: Joshua Meuwly

LOCATION	TIME	TYPE	STUDENT(S)
A SONG FOR PARKER			
UC, 222	2–4pm	other	Leobardo Marin Rivera
DEAR FATHER			
UC 222	2–4pm	other	Levi Kramer

CMU Tech — Machining

Track 14A

Facilitator: Michael Carlton

LOCATION	TIME	TYPE	STUDENT(S)
ANODIZATION CART			
Plaza	1–4pm	engineering	Jack Barefoot, Tanner Crenshaw, Blake Glover
LIGHTSABER PRODUCTION			
Plaza	1–4pm	engineering	Logan DeMers, Bristol Durham, Brennan Fritz, Blake Valiquet, Christine Hein, Connor Percival, Bryson Reddick
LIGHTSABER FIXTURING			
Plaza	1–4pm	engineering	Aaron Hall, Levi Ross, Mark Huska, Kenneth Waggoner
LIGHTSABER PRODUCTION			
Plaza	1–4pm	engineering	Giovanna Martinez, Isaac Hokanson, Maxwell Haynes, Harrison Dico-Jekot, Tanner Crenshaw, Blake Glover, Jack Barefoot

CMU Tech — Medical Office Assistant

Track 14C

Facilitator: Karrie Stanfill

LOCATION	TIME	TYPE	STUDENT(S)
SYPHILIS			
UC 213	1–4pm	poster	Lilly Polniak
INFANTILE SPASMS			
UC 213	1–4pm	poster	Mystic Cardinal
MS (MULTIPLE SCLEROSIS) DISEASE			
UC 213	1–4pm	poster	Mariana Contreras
ACUTE MYELOID LEUKEMIA			
UC 213	1–4pm	poster	Signe Peterson
HEDS INFORMAL			
UC 213	1–4pm	poster	Abbigail Wilson

KURU DISEASE
UC 213 | 1–4pm | poster | Wyatt Gentry

THE RELATIONSHIP BETWEEN THE EFFECTS AND LIVING CONDITIONS OF THE HANTAVIRUS
UC 213 | 1–4pm | poster | Joel Richards

HIV
UC 213 | 1–4pm | poster | Payton Heil

CHLAMYDIA
UC 213 | 1–4pm | poster | Cheyanne Drews

CREUTZFELDT-JAKOB DISEASE
UC 213 | 1–4pm | poster | Riley Carpenter, Wyatt Gentry

HUNTINGTON'S DISEASE
UC 213 | 1–4pm | poster | Adrianna Trujillo

EFFECTS OF EAR PRESSURE THERAPY AND BETAHISTINE TREATMENTS ON PATIENTS WITH MENIERE'S DISEASE
UC 213 | 1–4pm | poster | Shane Storey

Computer Science and Engineering — First Year Design — Track 4A

Facilitator: Sarah Lanci

LOCATION	TIME	TYPE	STUDENT(S)
DEVELOPMENT OF A SUSPENSION SYSTEM TEST BENCH			
Plaza	2–4pm	engineering	Dayson Torgerson, William Bockman, Alexander Spink, Axel Scholl
INSECT PICTURE PYRAMID: DEVELOPING AN INSECT CAMERA TRAP			
Plaza	2–4pm	engineering	Jonathan Ceja, Bryson Cranmer, Calvin Jacobson, Erich Fecke-Stoudt
WIND TUNNEL VAPOR SYSTEM			
Plaza	2–4pm	engineering	David Wooten, Samuel Hartley, Jorge Pacheco, Trey Anderson, Amanda Eastlake
DRONE QUIDDITCH QUAFFEL			
Plaza	2–4pm	engineering	Emilie Teel, Corbin McHerron, Calvin Thompson, Kylie Lange
THE DONKEY BOX			
Plaza	2–4pm	engineering	Dawson Pease, Tyler Saunders, Brendan Nowak, Colin Formanek
THE INVERTED PENDULUM FEEDBACK CONTROL DEMONSTRATOR			
Plaza	2–4pm	engineering	Ryan Knight, Ian McCollough, Logan Maier-Walford, Colin Duckworth, Ren Wilson
DEVELOPMENT OF MODEL ROCKET LAUNCHER			
Plaza	2–4pm	engineering	Truitt Lovato, Tyler Grow, Jordan Hanke, Henry Hanna

Computer Science and Engineering — First Year Design — Track 4B

Facilitator: Sarah Lanci

LOCATION	TIME	TYPE	STUDENT(S)
SKYWARD BOUND ON A BUDGET: THE DEVELOPMENT OF A MODEL ROCKET LAUNCH STAND			
Plaza	2–4pm	engineering	Noah Williams, Izaak Siefken, Tanner Spirek, Tyler Kopco
AUTOMATIC BACKSCRATCHER			
Plaza	2–4pm	engineering	Cesar Estrada, Adriel Vazquez, Kaydence Boyd
APPLYING PRESSURE: DESIGN OF A FRACTAL VISE			
Plaza	2–4pm	engineering	Michael Bucceri, Andrew Spencer, Owen McClain, Katie Shawver
THROTTLE ASSIST FOR SNOWMOBILE RECOVERY			
Plaza	2–4pm	engineering	Violet Wolitzky, Kendra Lemons, Magaly Luna, Phillip Hulst
MODULAR AUTOMATIC WATERING SYSTEM (MAWS)			
Plaza	2–4pm	engineering	Braeden Torres, Hayden VanGundy, Roberto Hernandez, Joshua McKee
HOBO SOLAR SHIELD FOR ENVIRONMENTAL RESEARCH			
Plaza	2–4pm	engineering	Collin Schrad, William Berkeley, Kai Stabolepszy, Collin Schrad, Yurii Sobovyi, Elena Lotz

Computer Science and Engineering — First Year Design — Track 4C

Facilitator: Sarah Lanci

LOCATION	TIME	TYPE	STUDENT(S)
MAGNETIC FERRIS WHEEL: THE APPLICATION OF OPPOSITE MAGNETIC POLES AND INDUCTORS			
Plaza	2–4pm	engineering	Christina Eckerson, Jarrett Gurule, Jacob Mintken, Brandon Farstveet
THE NEWTON'S CRADLE			
Plaza	2–4pm	engineering	William Mcglochlin, Luke Crabtree
NEW DESIGN FOR FIRE CURTAIN RELEASE MECHANISM IN ROBINSON THEATER			
Plaza	2–4pm	engineering	Jacob Brown, Alexander Bustillos, Wesley Ricaporte
A DANGEROUS SPACE FOR COMPUTERS			
Plaza	2–4pm	engineering	Nicholas Toutges, Chase Blaisdell, Calliann Ferguson, Hunter Kenney
REDESIGN OF THE AUTOMATED STROKE SENSOR			
Plaza	2–4pm	engineering	Zeke Magri, Evan Morrison, Reid Austin, Solomon Stern, Alexander Zappas

PLANETARY CENTER OF MASS DEMONSTRATION

Plaza	2–4pm	engineering	Dylan Campbell, Ashton Cook, Diego Perez, Maci Flanagan

Computer Science and Engineering — First Year Design — Track 4D

Facilitator: Sarah Lanci

LOCATION	TIME	TYPE	STUDENT(S)
PORTABLE STORAGE CART FOR THE UNHOUSED POPULATION			
Plaza	2–4pm	engineering	Drew Federspiel, Calvin Hazard, Trevor Hadaway, Benoit Hueber, Jeremiah Gault
UNHOUSED MULTI-PURPOSE STORAGE CART			
Plaza	2–4pm	engineering	Luke Chastain, Tanner Schwartz, Austin Schultz, Makayla Wayman, James Kundert
A BETTER CART FOR THE UNHOUSED			
Plaza	2–4pm	engineering	Max Smitten, Keegan Ashton, Catcher Jackson, Finnegan Bradbury, Zane Austin
MULTIFUNCTIONAL CART DESIGNED FOR UNHOUSED PEOPLE			
Plaza	2–4pm	engineering	Dylan Sanchez, Tristan Mandery, Levi Schamper, Joseph Pagel, Lucas Noel

Computer Science and Engineering — Open Design — Track 4E

Facilitator: Michelle Mellenthin

LOCATION	TIME	TYPE	STUDENT(S)
MARS ROVER			
Plaza	2–4pm	engineering	Jake Thompson, Corbin McHerron
MOCK ROVER			
Plaza	2–4pm	engineering	Emilie Teel, Alyssa Jackson, Joshua Thomas
DEVELOPMENT OF A MIG-ADAPTED METAL ADDITIVE MANUFACTURING MACHINE			
Plaza	2–4pm	engineering	Jackson Lyon, Ryan Burdi
GROOT ROVER			
Plaza	2–4pm	engineering	Urian Gonzales, Tyler Brake, Matheus Laperriere Pimenta
HACC AUTOMATED GRAFITTI BOT			
Plaza	2–4pm	engineering	Casen Allmon, Adam Blackstock, Christian Manera, Holden Lefke
H.E.R.B.E.R.T.			
Plaza	2–4pm	engineering	Andrew Mcguan, William Lue, Brandon Evans, Kaden Hine
LOKI AUTONOMOUS ROVER			
Plaza	2–4pm	engineering	Chad Nilsen, Corbin Hill, Nick Saunders

Computer Science and Engineering — Senior Design

Track 4F

Facilitator: Chris Penick

LOCATION	TIME	TYPE	STUDENT(S)
BONSAI MAGIC ZIPLINE BRAKE			
Plaza	2–4pm	engineering	Tucker Wiltse, Jacob Allen, Taylor Cottam
FRIENDS OF THE MUSTANGS			
Plaza	2–4pm	engineering	Sergey Eggers Benson Wu, Erich Riedel
AUTOMATIC FISHING LINE WRAPPING MACHINE			
Plaza	2–4pm	engineering	Tyler Meyers
MIRCO-DROPLET TESTING APPARATUS			
Plaza	2–4pm	engineering	Kevin Backstreet, Peter Shearer, Wade Rose
ELECTRICAL IMPEDANCE TOMOGRAPHY			
Plaza	2–4pm	engineering	Keegan Erickson, Jonathan Kleppinger, Diego Sena
HIGH-RESOLUTION ART SCANNER DEVELOPMENT			
Plaza	2–4pm	engineering	Alex Campbell, Brett Edwards, Aidan Mobley
ENGINEERING A NEW, TOOL-LESS LICENSE PLATE BRACKET FOR THE QUIKRSTUFF MACH 2 BIKE RACK			
Plaza	2–4pm	engineering	Nickalaus Clemmer, Jeremy Cooper, Lauren Lackman
SAMPLE DYE POT MODERNIZATION			
Plaza	2–4pm	engineering	Vanessa Romano, Jackson Lyon, Dustin Foster
ROBOTIC ARM EXHIBIT			
Plaza	2–4pm	engineering	Grant Majors, Chantelle Hobbs, Crystle Querol
SAVING TIME BY ANNEALING ACRYLIC WITH VISIBLE LIGHT RADIATION			
Plaza	2–4pm	engineering	Lane Woodrich, Greyson Wagner, Leif Lantz
QUIKRSTUFF MACH 2 UTILITY TRAY ADD ON			
Plaza	2–4pm	engineering	Kyle Taylor, Vicente Trevino, Jacob Seger
BIOCHAR INJECTION SYSTEM			
Plaza	2–4pm	engineering	Skylar Tubbs, Enrique Merlos, Mar Y El Torres
TEAM WAPONI - BUG TRAP			
Plaza	2–4pm	engineering	Athena Branch, Levi Lawrence, Rylee Shayne O'Neill
MECHANIZED WALKER FOR INDIVIDUALS WITH PARAPLEGIA			
Plaza	2–4pm	engineering	Madelyn Schmidt Caleb Williamson, William Vrooman
COORSTEK BIOCERAMICS MANUFACTURING AND TESTING LABORATORY			
Plaza	2–4pm	engineering	Angel Enrique, Gabriel Martinez, Jesse Blank

USFS SITE PLAN
Plaza 2–4pm engineering Ashley Buchanan, Vaughn Beeson, Harrison Tusberg, Wojciech Jaroszynski

MACK WASTWATER LAGOON
Plaza 2–4pm engineering Luca Flann, Kalum Klausner, Felipe Busellini, Connor Lehto

Computer Science and Engineering — Student Club — Track 4G

Facilitator: Michelle Mellenthin

LOCATION	TIME	TYPE	STUDENT(S)
STEEL BRIDGE			
Plaza	2–4pm	engineering	Ashley Buchanan, Vaughn Beeson, Nolan Morse, Kyle Noah, David Wooten
MESA MOTORSPORTS FSAE			
Plaza	2–4pm	engineering	Dylan Palmquist, Hector Diaz, Wyatt Earnest, Cameron Mueller, Aidan O'Riordan

Computer Science and Engineering — Object Oriented Programming — Track 4H

Facilitator: Ram Basnet

LOCATION	TIME	TYPE	STUDENT(S)
THE GAME OF CHESS			
EH 128	1–1:15pm	oral	Ellena Schmitt, Bryleigh Koci, Walker Edwards
USING OBJECT ORIENTED PROGRAMING TO RECREATE THE BOARD GAME STRATEGO IN PYTHON			
EH 128	1:15–1:30pm	oral	Jordan Dehmel, Kate Eckhart, Nathaniel Barnaik
PACKARD POWER RANKINGS			
EH 128	1:30–1:45pm	oral	Christopher Brandt, Kyle Verbrugge, Bryan Bonilla Garcia
MINESWEEPER MANIA: THE MINESWEEPER SOLVER			
EH 128	1:45–2pm	oral	Mia Weber, Brandon Kamplain
EXPLORING OBJECT-ORIENTED PROGRAMMING THROUGH GAME DEVELOPMENT: A CASE STUDY ON CONNECT 4 IN PYTHON			
EH 128	2–2:15pm	oral	Austin Saylor, Kyle Remmenga, Kian Highland
OPTIMIZING A SPORTS GAME TRACKER AND PREDICTION WEB APP FOR ENHANCED USER EXPERIENCE			
EH 128	2:15–2:30pm	oral	Daniel Fishbein, Clayton Hodges, Peter Campbell
GUARDWELL - AN IDLE TOWER DEFENSE GAME			
EH 128	2:30–2:45pm	oral	Owen Bartels, Kevin Hedman, Mauricio Posadas, Lauren Lewis

Computer Science and Engineering — Machine Learning — Track 4I

Facilitator: Ram Basnet

LOCATION	TIME	TYPE	STUDENT(S)
MALWARE ANALYSIS: USING MACHINE LEARNING METHODS TO CLASSIFY MALWARE AND MALWARE TYPE			
EH 128	2:45– 3pm	oral	Abraham Avila
MACHINE-LEARNING SYSTEM TO RECOGNIZE HANDWRITINGS			
EH 128	3– 3:15pm	oral	Mauricio Posadas
SPAM EMAIL DETECTOR			
EH 128	3:15–3:30pm	oral	Connor Thomas, Logan Humbert
IMAGE REGISTRATION WITH RESIDUAL NETWORKS			
EH 128	3:30–3:45pm	oral	Warin Watson
FACIAL ATTENDANCE SOFTWARE			
EH 128	3:45–4pm	oral	Shawn Barletta, Renee Rudderow

Computer Science and Engineering — User Interface Design — Track 4J

Facilitator: Warren MacEvoy

LOCATION	TIME	TYPE	STUDENT(S)
NOTE-TAKING MOBILE APP: DEVELOPMENT AND DESIGN			
EH 132	1–1:15pm	oral	Logan Humbert
GAME BALANCE APPLICATION			
EH 132	1:15–1:30pm	oral	Dillon McDermott
UI ABSTRACT - GEOTASKER			
EH 132	1:30–1:45pm	oral	Clayton Hodges
ACHIEVING THE CYBERSECURITY MATURITY MODEL CERTIFICATION			
EH 132	1:45–2pm	oral	Levi Smith
WINTER SPORTS HELPER			
EH 132	2–2:15pm	oral	Connor Thomas
FEAIDBACK			
EH 132	2:15–2:30pm	oral	Anthony Hunter
TIRE SHOP WORK FLOW IMPROVEMENT BY USER INTERFACE DESIGN			
EH 132	2:30–2:45pm	oral	Carlos Ortiz
TRANS VOICE TRAINING APP			
EH 132	2:45– 3pm	oral	Kate Eckhart
PHOTOGRAPHER PORTFOLIO DESIGN			
EH 132	3– 3:15pm	oral	Justin Garces

Computer Science and Engineering — Software Engineering — Track 4K

Facilitator: Warren MacEvoy

LOCATION	TIME	TYPE	STUDENT(S)
THE GIFT PROJECT			
EH 132	3:15–3:30pm	oral	Riley Primeau, Abraham Avila, Christopher Brandt, Nicholas King
SKY PEAK DATA BURN PROJECT			
EH 132	3:30–3:45pm	oral	Sebastian Medina, Peyton Grattino, Trinity Johnson, John Masopust V
MYSHROOMLOG			
EH 132	3:45–4pm	oral	Rhianon Hoisington, Lauren Lewis

Health Sciences — Evidence-Based Practice in Nursing — Track 5A

Facilitator: Linda Cummins

LOCATION	TIME	TYPE	STUDENT(S)
ADMINISTRATION OF MELATONIN IN ACUTE CARE			
UC, First Floor	2-4pm	poster	Baily Bronson, Megan Sherman, Alexa Riebel, Taryn McGinnis
THE PROTOCOLS FOR LEVOPHED			
UC, First Floor	2-4pm	poster	Autumn Edgerton
STERILE TECHNIQUE IN WOUND CARE			
UC, First Floor	2-4pm	poster	Olivia Crone, Kimberly Castillo, Stevie Barrick, Manuel Santiago
OPIOIDS VS. MEDICINAL DRUGS			
UC, First Floor	2-4pm	poster	Elena Arrieta
ORAL CARE IN THE ICU			
UC, First Floor	2-4pm	poster	Katlyn Wooding
PATIENT OUTCOMES: SUPPLEMENTAL VS STAFF NURSES			
UC, First Floor	2-4pm	poster	Colynn Abramson, Liliana Gonzalez, Abigail Tanksley, Justin Fraser
SUSTAINING NURSING EXCELLENCE: A COMPREHENSIVE APPROACH TO STAFFING RETENTION			
UC, First Floor	2-4pm	poster	Madison Hofland
CHRONIC ILLNESS CORRELATION WITH NIGHT SHIFT NURSING			
UC, First Floor	2-4pm	poster	Grace Breneman, Kacie Meraz, Abigail Tusing, Lendy Ponce De Leon Portillo
THE EFFECTIVENESS OF CHEMICAL RESTRAINTS USED ON PSYCHIATRIC ADULT PATIENTS			
UC, First Floor	2-4pm	poster	Taylor Herbert, Austin Tanksley, Madison Hollingworth, Lyndsey Stetzel
CATHETER ASSOCIATED URINARY TRACT INFECTIONS			
UC, First Floor	2-4pm	poster	Shyanne Horn, Ann Crockett, Cody Wentz, Hope Pollard
ARE HORMONAL CONTRACEPTIVES LINKED TO CANCER?			
UC, First Floor	2-4pm	poster	Stephanie Lemelin Belvill, Danielle Salcedo, Adrienne O'Loughlin, Sierra Shaw-Navarro, Victoria Martinez

EDUCATION ON PHYSICIAN-ASSISTED SUICIDE

UC, First Floor	2-4pm	poster	Miriam Gonzalez, Michelle Medina, Kindra Barela, Cassidy Seiff

Health Sciences — Nursing Research: Practice — Track 5B

Facilitator: Lucy Graham

LOCATION	TIME	TYPE	STUDENT(S)
SAVING LIVES: ENHANCING RECOGNITION OF HUMAN TRAFFICKING WITH NURSING EDUCATION			
UC, First Floor	2-4pm	poster	Kathryne Ellis, Morgan Cramer, Kailee Kannenberg, Janna Lee, Elizabeth Mee
SKIN-TO-SKIN AND MENTAL HEALTH FOR MOTHERS			
UC, First Floor	2-4pm	poster	Jazlyn Shelton, Olivia Hinton, Mekinsey Sage, Samantha Castellanos
PTSD IN NURSES			
UC, First Floor	2-4pm	poster	Rachael Guenther, Sydney Reinoehl, Traci Ochoa, Savina May
CTRL + ALT + DELETE: SOCIAL MEDIA?			
UC, First Floor	2-4pm	poster	Shyliea Clark, Alaina Bakken, Sierra Angel, Audrey Schulz
VAGAS VOYAGE: EXPLORING THE DEPTHS OF DEEP STIMULATION			
UC, First Floor	2-4pm	poster	Grace Johnson, Avalon Brinton, Isabella Dobbs, Rachel Tennant
CHRONICLES OF CONTRACEPTION: WHAT'S THE RISK OF STROKE AND CANCERS?			
UC, First Floor	2-4pm	poster	Harrison Kolar, Mia Nofzinger, Jennifer Jarrin, Mallory Borchers
THE DIRECT IMPACT OF NURSE-TO-PATIENT RATIOS ON NURSES' HEALTH			
UC, First Floor	2-4pm	poster	Savannah Hoisington, Cipriana Dacuma, Kamryn VonBurg, Mya Kelley
CITY DOCS VS COUNTRY CARE: THE HEALTHCARE HOEDOWN			
UC, First Floor	2-4pm	poster	Ally Drews, Adriana Vargas, Lana Zander, Guadalupe Marquez
NURSING BURNOUT AND PATIENT SAFETY			
UC, First Floor	2-4pm	poster	Bronwyn Duffy, Sydney Utech, Moran Heydenberk, Hannah Kuta
INJURIES MAY BE ACCIDENTS, OUR CHOICES ARE NOT			
UC, First Floor	2-4pm	poster	Patric Bridge, Cora Goodwin, Eduardo Rubio, Aaron Dollar
SOURDOUGH BREAD, CAN IT BE HEALTHY?			
UC, First Floor	2-4pm	poster	Danielle Bishop, Jerrika Velasco, Christine Capistrant, Maria Rodriguez Montano
MIND MATTERS: EXPLORING MENTAL HEALTH IN CHRONICALLY ILL CHILDREN			
UC, First Floor	2-4pm	poster	Savannah Bergman, Rachel Meeks, Amy Hassell, Grace Nissen

UNVEILING TRUTH: NURSES RESPONSE TO IPV

UC, First Floor	2-4pm	poster	Diana Palma Gutierrez, Paola Gurrola Lopez, Tayler Copeland, Andrea Flores

Health Sciences — Nursing Informatics — Track 5C

Facilitator: Jennifer Radomski

LOCATION	TIME	TYPE	STUDENT(S)
NANOHEALERS: PRECISION MEDICINE IN BREAST CANCER REVOLUTION			
UC, Second Floor Atrium	2-4pm	poster	Emilee Chavira, Paige Tindall, Paulina Bustillos, Zoe Jameson
BUILDING BETTER BREATHS: 3D BIOPRINTING LUNGS			
UC, Second Floor Atrium	2-4pm	poster	Ashlee Lindemann, Chloe Kring, Lisa Scott, Megan Ford
INCUBATION CREATION			
UC, Second Floor Atrium	2-4pm	poster	Savannah Burrow, Mikayla Grant, Maddison Burge, Angela Davis, Rocio Ramos
CRAFTING TOMORROW'S MOBILITY: INNOVATIONS IN 3D-PRINTED PROSTHETICS			
UC, Second Floor Atrium	2-4pm	poster	Lily Helzer, Laura Richardson, Manuel Lipic, Taylor Eubanks, Reese Norton
WHEN NURSING SCHOOL IS ALL FUN AND GAMES			
UC, Second Floor Atrium	2-4pm	poster	Hope Theander, Hannah Giauque, Chloe Pickford, Laila Marquardt, Hope Theander
VACUUM-ASSISTED BIRTHS: SAFE OR RISKY?			
UC, Second Floor Atrium	2-4pm	poster	Kyler Galena, Elizabeth Jacks, Justin Lynn, Ashley O'Daniel
EMPOWERING HEALTH: WEARABLE WONDERS IN MEDICINE			
UC, Second Floor Atrium	2-4pm	poster	Yaritza Mendoza-Holguin, Melissa Countryman, Julia Lawrence, Matthew Haut
REIMAGINING THERAPY: EXPANDING MENTAL HEALTH TREATMENT WITH VIRTUAL REALITY			
UC, Second Floor Atrium	2-4pm	poster	Laurel Frick, Brooke Crosley, Makenzie Congleton, Caroline Monroe, Henry McAlvanah
LIMBLESS TO LIMITLESS			
UC, Second Floor Atrium	2-4pm	poster	Rachel Gilbert, Caylin Boardwine, Richard Culp, Brisa Barcenas, Rachel Gilbert

Kinesiology — Undergraduate — Track 6A

Facilitator: Nate Bachman

LOCATION	TIME	TYPE	STUDENT(S)

THE EFFECTS OF ACUTE FATIGUE ON EXECUTIVE FUNCTION IN DIVISION ONE MOUNTAIN BIKERS
MC 115 2:30–4pm poster Dillan Ritmiller

EFFECTS OF MENTAL FATIGUE ON PUTTING PERFORMANCE IN RECREATIONAL MALE GOLFERS
MC 115 2:30–4pm poster Samuel Shaver, Zachariah Bradley

EFFECT OF DIFFERENT EXERCISE ENVIRONMENTS ON SWEAT METRICS IN CROSS-COUNTRY ATHLETES
MC 115 2:30–4pm poster Gilon Dierks, Reese Fledderjohn

APPLICATION OF BLOOD FLOW RESTRICTION DURING ISOKINETIC DYNAMOMETRY AND ITS EFFECT ON MUSCLE TORQUE AT THE KNEE JOINT
MC 115 2:30–4pm poster Rylee Taylor, Spencer Olson

DIFFERENCES IN AND BETWEEN MALE AND FEMALE COLLEGIATE CYCLISTS ON SWEAT SODIUM CONCENTRATION AND SWEAT RATE IN VARYING TEMPERATURES
MC 115 2:30–4pm poster Ruby Ryan, Reese Fledderjohn

EARLY SEASON INJURIES IN DIVISION II CROSS-COUNTRY ATHLETES
MC 115 2:30–4pm poster Beau Thornton, Caitlin Lawson

BLOOD LACTATE AND HEART RATE RESPONSE IN BI-SKI INSTRUCTORS DURING HANDS ON ASSISTANCE WITH DIFFERENT SIMULATED BODY WEIGHTS
MC 115 2:30–4pm poster Emma Stone, Jillian Anderson

UNVEILING THE UNEXPLORED: PERFORMANCE COACHING IN FORMULA 1
MC 115 2:30–4pm poster Connor Lolley

EFFECTS OF ENVIRONMENTAL TEMPERATURE ON SWEAT METRICS WITHIN COLLEGIATE CYCLISTS
MC 115 2:30–4pm poster Reese Fledderjohn, Ruby Ryan

CHARACTERISTICS OF EXPIRED GASES DURING BREATHWORK
MC 115 2:30–4pm poster Andrew Noble, Jorja Cooper

Kinesiology — Undergraduate OREC305 — Track 6B

Facilitator: Sarah Schrader

LOCATION	TIME	TYPE	STUDENT(S)
FINS OF FREEDOM: EXPLORATION OF A VETERAN SCUBA PROGRAM			
DH211	1–1:15pm	oral	Adam Vasquez, Michael Acker, John Walgast, Andrew Fazackerley
OUTDOOR LODGING RENTAL BUSINESS			
DH211	1:15-1:30pm	oral	Brad Hodges, Wyatt Davis, Megan Lederman, Kara Brown
BLIND CONCEALMENT LID			
DH211	1:30–1:45pm	Oral	Trey Schwerdtfeger, Lucas Kowalczuk
ARCTIC THREADS TECHWEAR - A NEW CHAPTER IN COLD WEATHER CLOTHING			
DH211	1:45–2pm	oral	Dominic Craig, Cayden Baine, Ryley Mosher, Justin Beemer
A NEW APPROACH TO TRUCK TOPPERS			
DH211	2–2:15pm	oral	Trevor Pike, Ryan Pless, Brady Porter

Kinesiology — Undergraduate OREC396

Track 6C

Facilitator: Sarah Schrader

LOCATION	TIME	TYPE	STUDENT(S)
SLOPE READY STORAGE: CREATING A SKI RACK FOR EUREKA! MCCONNELL SCIENCE MUSEUM			
DH211	2:15–2:30pm	oral	Victoria Cloutier, Mary Metherd, Michael Acker
SUSTAINABLE TOURISM ON THE TAYLOR RIVER			
DH211	2:30–2:45pm	oral	Brad Hodges, Trey Schwerdtfeger, Lyndsey Aguilar, Bradly Hodges
SKATE FORWARD: REVITALIZING COMMUNITY ENGAGEMENT FOR RAMPS AND ALLEYS			
DH211	2:45– 3pm	oral	Thomas Hellyer, Thomas Hellyer, Dominic Craig, Kara Brown
SHADING THE FUTURE			
DH211	3– 3:15pm	oral	Bryce Templeton, Wyatt Davis, Morgan McNair
RURAL RENAISSANCE			
DH211	3:15–3:30pm	oral	Torin Lackmann, Shannon Feran, Carter Burnham
CLEANING UP LANDFILLS ONE GEAR SHOP AT A TIME			
DH211	3:30–3:45pm	oral	Trevor Pike, Ethan Au, Ronald Miyagishima
LET'S TAKE A TRIPOUTSIDE			
DH211	3:45–4pm	oral	Julia Congdon, Samuel Godwin, Adam Vasquez

Kinesiology — Graduate OT

Track 6D

Faciliator: Nate Bachman

LOCATION	TIME	TYPE	STUDENT(S)
SCOPING REVIEW: RESPONSIVE FEEDING IN THE PEDIATRIC POPULATION			
MC 115	2:30–4pm	other	Elizabeth Moore, Alma Luis Guzman, Zane Followell, Kendall Bessette
A SCOPING REVIEW OF ASSISTIVE TECHNOLOGY TO PROMOTE INDEPENDENCE IN PARENTS WITH DISABILITIES			
MC 115	2:30–4pm	other	Erin Salsbury, Barton Glasser, Logan Anderson, Ali Kazemi
A SCOPING REVIEW OF OCCUPATIONAL THERAPY GRADUATE STUDENTS' COMPETENCIES IN VARIOUS SERVICE DELIVERIES			
MC 115	2:30–4pm	other	Kiera Benson, Dana Morgan, Vivianna Garcia, Jennifer Berry
A SCOPING REVIEW ON TRACTOR SEATING FOR OPERATORS WITH SPINAL CORD INJURIES			
MC 115	2:30–4pm	other	Tyler Cole, Jacquelyn Coffman, Kara Farmer

A SCOPING REVIEW OF THE LITERATURE ON INCLUSIVE PRACTICES TO IMPROVE ACCESSIBILITY FOR MUSEUM VISITORS WITH VISUAL IMPAIRMENT
MC 115 2:30–4pm other Korbin Carr, Kacey Doner, Kaitlyn Mearing

SEX EDUCATION STRATEGIES FOR AUTISTIC INDIVIDUALS
MC 115 2:30–4pm other Brock Martin, Mica Jenrette, Wyeth Watts

GO BABY GO: UTILIZING THE POWER OF INTERDISCIPLINARY COLLABORATION
MC 115 2:30–4pm poster Sammy DeYoung, Hailey Emanuel, Athena Johnson, Gabriela Santana Meraz, Kolten Strait, Abraham Avila, Ryan Randall

Kinesiology — Graduate Athletic Training — Track 6E

Facilitator: Nate Bachman

LOCATION	TIME	TYPE	STUDENT(S)
DOES RUNNING BAREFOOT IMPROVE BIOMECHANICS IN ENDURANCE RUNNERS?			
MC 115	2:30–4pm	poster	Ashlynn Squires
MULLIGAN CONCEPT WITH REHABILITATION VERSUS REHABILITATION ALONE			
MC 115	2:30–4pm	poster	Irais Quiroz Becerra
CONCUSSION RETURN TO PLAY: REST VERSUS ACTIVE			
MC 115	2:30–4pm	poster	Dylan Nicholson
THE EFFECTS OF GRATITUDE JOURNALING ON STRESS IN COLLEGIATE ATHLETES			
MC 115	2:30–4pm	poster	Sydnei Littrell

Kinesiology — Graduate Sports Management — Track 6F

Facilitator: Nate Bachman

LOCATION	TIME	TYPE	STUDENT(S)
ADAPTIVE AND ACTIVE LIFESTYLE EXPO PARTICIPANT PERCEPTIONS			
MC 115	2:30–4pm	poster	Emma Shaddix, Laura Gutierrez
CULTIVATING INCLUSIVE EXPERIENCES: A COMPREHENSIVE EXPLORATION OF STUDENT-LED ADAPTIVE LIFESTYLE EXPO VOLUNTEER PERSPECTIVES AND PROFESSIONAL DEVELOPMENT			
MC 115	2:30–4pm	poster	Miranda Pruitt, Marshal Brose
STUDENT MANAGER PERSPECTIVE WITH AN ADAPTIVE AND ACTIVE LIFESTYLE EXPO			
MC 115	2:30–4pm	poster	Kyle Benjamin, Kirstin Williams

Languages, Literature and Mass Communication — Literature and Rhetoric Oral Presentations — Track 7A

Facilitator: Barry Laga

LOCATION	TIME	TYPE	STUDENT(S)
MEGAMIND: WOMEN'S ROLE IN SUPER RELATIONSHIPS			
EH 131	3– 3:15pm	oral	Isabella Hamann

LOCATING ALTERITY IN WILLIAM WORDSWORTH'S "NUTTING"			
EH 131	3:15–3:30pm	oral	Jude Bolick
HUMAN DUALITY— THE NECESSITY OF DYNAMIC EXISTENCE			
EH 131	3:30–3:45pm	oral	Tahirih Bochmann

Languages, Literature and Mass Communication — Creative Works — Track 7B

Facilitator: Randy Phillis

LOCATION	TIME	TYPE	STUDENT(S)
BLOODSHOT EYES			
EH 131	1–1:15pm	oral	Rylee Martin
OBITUARIES CLASSIFIED: A MORBID APPROPRIATION			
EH 131	1:15–1:30pm	oral	Kirra Trenholm

Languages, Literature and Mass Communication — Spanish Oral Presentations — Track 7C

Facilitator: Cecilia Battauz

LOCATION	TIME	TYPE	STUDENT(S)
ANALYZING VERBAL FLUENCY IN SECOND LANGUAGE LEARNERS OF SPANISH			
EH 131	2:30–2:45pm	oral	Caleb Garcia
CULUTRAL COMPENTENCE IN RADIOLOGIC SCIENCES			
EH 131	2:45–3pm	oral	Morgan Raimer

Languages, Literature and Mass Communication — Communication and Campus Life — Track 7D

Facilitator: Allison Morris

LOCATION	TIME	TYPE	STUDENT(S)
THE CMU BULLETIN			
EH 219	3–3:15pm	oral	Tiana Hayes, Tommy Thomas, Dillon Davis
RENOVATING THE LITERARY REVIEW			
EH 219	3:15–3:30pm	oral	Kirra Trenholm, Bethany Daigle, Maria De Los Angeles Martinez Jaramillo

Languages, Literature and Mass Communication — Social Issues and Mass Communication — Track 7E

Facilitator: Katie McClain

LOCATION	TIME	TYPE	STUDENT(S)
SELF-IMAGE			
EH 243	3:15–3:30pm	oral	Elizabeth Davis, Brooke Allen, Kristin Mercer, Colin Hillburn
CRRRRISPY BUSINESS			
EH 243	3:30–3:45pm	oral	Skyler Scott, Elizabeth Foote, Madison Robinson, Kylie Bentley, Klaus King

Mathematics & Statistics — Posters

Track 8A

Facilitator: Ed Bonan-Hamada

LOCATION	TIME	TYPE	STUDENT(S)
MODELING SUMMER DIURNAL TEMPERATURE RANGE IN THE SOUTHWESTERN UNITED STATES			
Delta Field Sidewalk	2–4pm	poster	Grant Novak
CONNECTIVITY ANALYSIS FOR RIVERS AND LAKES BASED ON GRAPH THEORY			
Delta Field Sidewalk	2–4pm	poster	Ashley Emery
THE ROLES OF MEMORY, PROBLEM-SOLVING, AND METACOGNITION IN LEARNING MATHEMATICS			
Delta Field Sidewalk	2–4pm	poster	Cara Laughlin
ORDER OF OPERATIONS AND COMMON MISCONCEPTIONS			
Delta Field Sidewalk	2–4pm	poster	Danielle Magyar
PARTITION TREES			
Delta Field Sidewalk	2–4pm	poster	Brett Marlowe
DEMYSTIFYING HIGH SCHOOL ALGEBRA THROUGH ABSTRACTION			
Delta Field Sidewalk	2–4pm	poster	Landon Hight
FRAILTY ASSESSMENTS: RISK IDENTIFICATION AND PREVENTING ADVERSE OUTCOMES			
Delta Field Sidewalk	2–4pm	poster	Sindre Brein
DIMENSION REDUCTION WITH RANDOM PROJECTION			
Delta Field Sidewalk	2–4pm	poster	Able Martinez

Music — Sampson Competition for Classical Musicians

Track 9A

Facilitator: Dirk Johnson

LOCATION	TIME	TYPE	STUDENT(S)
ARIA - HANDEL; THE LAST ROSE OF SUMMER - BRITTEN; VOCAL			
Love Recital Hall	1–1:10pm	performance	Brendan Krueger
SCÈNE DE BALLET, OP. 100 - DEBÉRIOT; VIOLIN			
Love Recital Hall	1:10–1:20pm	performance	Jessica Seibert
GRETCHEN AM SPINNRADE - SCHUBERT; GREEN - DEBUSSY; VOCAL			
Love Recital Hall	1:20–1:30pm	performance	Rainy Stokley-Graves
TOREADOR - BIZET; NOSTALGIA - CIMARA; VOCAL			
Love Recital Hall	1:30-1:40pm	performance	Sawyer Quint
ETUDE # 7 - CARCASSE; MINUET 1 - BACH; GUITAR			
Love Recital Hall	1:40–1:50pm	performance	Anthony Breaux
MESSIAH SELECTIONS - HANDEL; HAÏ LULL - VIARDOT; VOCAL			
Love Recital Hall	1:50–2pm	performance	Hannah Brown
WALTZ IN AB - BRAHMS; PRELUDE OP. 23 #5 - RACHMANINOV; PIANO			
Love Recital Hall	2–2:10pm	performance	Jake Harrison
CADENZA FOR 5 TIMPANI & BALLADE FOR MARIMBA - ZIVKOVIC; PERCUSSION			
Love Recital Hall	2:10–2:20pm	performance	Robert Reid

CELLO CONCERTO, MVT. 1 - ELGAR; CELLO
Love Recital Hall 2:20–2:30pm performance Nykyta Shulick

SONATINA OP. 55 #1 - KUHLAU; PIANO
Love Recital Hall 2:30–2:40pm performance Miriam Elkins

TRMPET SONATA, MVT. 1 - PLISS; TRUMPET
Love Recital Hall 2:20–2:30pm performance Nic MacLennan

Music — Walt Smith Competition for Jazz and Popular Styles — Track 9B

Facilitator: Chris McKim

LOCATION	TIME	TYPE	STUDENT(S)
CHAMA-RUM-NGOMA - ORIGINAL COMPOSITION			
Robinson Theater	1:20–1:30pm	performance	Robert Reid
LUKE HENDRYX PIANO TRIO			
Robinson Theater	1:30–1:40pm	performance	Luke Hendryx, Liam Monroe, Beau Decker
YESTERDAY BY THE BEATLES & LOST ON YOU BY LP			
Robinson Theater	1:40–1:50pm	performance	Chariot Schinsky
ORIGINAL ROCK COMPOSITION - ELECTRIC VIOLIN			
Robinson Theater	1:50–2pm	performance	Jessica Seibert
PORTRAIT OF TRACY, BY JACO PASTORIUS - PERFORMING ON ELECTRIC BASS			
Robinson Theater	2–2:10pm	performance	Liam Monroe
BODY AND SOUL - GREEN & HAYMAN			
Robinson Theater	2:10–2:20pm	performance	Brendan Krueger
SMITH COMPETITION			
Robinson Theater	2:20–2:30pm	performance	Anthony Breaux, Jackie Firestone

Music — Music Presentation — Track 9C

Facilitator: Bill Aikens

LOCATION	TIME	TYPE	STUDENT(S)
20TH CENTURY MUSIC STYLES: NATIONALISM			
MPAC 005	1:30–1:45pm	oral	Miriam Elkins
TRUMPET RELATED INJURIES			
MPAC 005	1:45–2pm	oral	Nic MacLennan

Physical and Environmental Sciences — Physics Poster — Track 10A

Facilitator: Freddy Witarsa

LOCATION	TIME	TYPE	STUDENT(S)
OBSERVING EXOPLANET CANDIDATES			
WS, first floor	2:30–3:45pm	poster	Victoria Jackson

IMPROVING ACCURACY IN RADIOEMBOLIZATION OF THE LIVER
WS, first floor 2:30–3:45pm poster Brandon Keller

ACCURATE MAGNETIC FIELD ESTIMATION USING QUANTUM SPIN PARTICLES
WS, first floor 2:30–3:45pm poster Andrew Griffenberg

MEASURING THE POLARIZATION OF FERROELECTRIC MATERIALS
WS, first floor 2:30–3:45pm poster Joshua Boeke

Physical and Environmental Sciences — Environmental Science Poster — Track 10B

Facilitator: Freddy Witarsa

LOCATION	TIME	TYPE	STUDENT(S)

UTILIZING DENDROCHRONOLOGY OF PONDEROSA PINE STAND TO DETERMINE POTENTIAL CLIMATE CHANGE REFUGIA IN BANGS CANYON RECREATION AREA
WS, first floor 2:30–3:45pm poster Lauren Brandt, Mary Hromadka

EVALUATING SOIL AND VEGETATION DYNAMICS OF A POST-TAMARISK REMOVAL SITE IN WESTERN COLORADO
WS, first floor 2:30–3:45pm poster Mary Hromadka, Noah Enoch, Alicia Giger, Lauren Brandt

INDIVIDUAL SIZE DISTRIBUTIONS AS A BIOMONITORING TOOL IN THE ARKANSAS RIVER, COLORADO
WS, first floor 2:30–3:45pm poster Nia Taubr

WATER CONSERVATION AND MANAGEMENT PLAN FOR A TRANSITION TO A MORE NATURAL LANDSCAPE IN A RESIDENTIAL AREA
WS, first floor 2:30–3:45pm poster Ashley Emery, Katherine Seiler, Hannah Przystup, Audrey Caso

EVAPOTRANSPIRATION COVER CONVERSION STUDY RECOMMENDATIONS AT THE DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO DISPOSAL SITE
WS, first floor 2:30–3:45pm poster Wyatt Coffman, Sophia Dow, Liam Murphy

Physical and Environmental Sciences — Chemistry and Biochemistry Poster — Track 10C

Facilitator: Freddy Witarsa

LOCATION	TIME	TYPE	STUDENT(S)

GOLD(III) COMPLEXES CONTAINING N-(8-QUINOLINYL)AMIDE LIGANDS: SYNTHESES AND COLOR DIFFERENCES
WS, first floor 2:30–3:45pm poster Julian Manila, Alexander Eckberg, Chloe Angello, Siya Salunke, Benjamin Stites

INBORN ERRORS OF METABOLISM: 3-METHYLGLUTACONIC ANHYDRIDE REACTIVITY TO HYDROLYSIS AND MITOCHONDRIAL PROTEINS
WS, first floor 2:30–3:45pm poster Chloe Schrader

SYNTHESIS OF (2E,4Z)-2,4-HEPTADIEN-1-OL AND (2E,4Z)-2,4-HEPTADIENAL
WS, first floor 2:30–3:45pm poster Fiona Richards

INVESTIGATION OF THE THERMAL DEGRADATION OF BEER BITTERNESS
WS, first floor 2:30–3:45pm poster Eli St Onge, Ellen Rickerd, Valentine Jeptoo, Jasmine Lovell

SYNTHESIS OF BIS-IMIDAZOLE COMPOUNDS AS FRAMEWORKS FOR MULTIDENTATE LIGAND SYSTEMS
WS, first floor 2:30–3:45pm poster Grace Forbes

Physical and Environmental Sciences — Physics Oral Presentation — Track 10D

Facilitator: Andres Aslan

LOCATION	TIME	TYPE	STUDENT(S)
INDIVIDUAL AND COLLECTIVE MOTION IN COLLOIDAL ACTIVE MATTER UNDER APPLIED ELECTRIC FIELDS: EXPERIMENTAL AND COMPUTATIONAL PERSPECTIVES			
WS 160	12:30-12:45pm	oral	Jordan Dehmel

Physical and Environmental Sciences — Geology Oral Presentation — Track 10E

Facilitator: Andres Aslan

LOCATION	TIME	TYPE	STUDENT(S)
MAGNETIC SURVEY OF POSSIBLE IGNEOUS INTRUSIONS IN THE RYAN PARK-PINON MESA AREA, NORTHWESTERN UNCOMPAHGRE PLATEAU, COLORADO AND UTAH.			
WS 160	12:45-1pm	oral	Emilio Topete
STRUCTURAL AND HYDROTHERMAL FEATURES OF RYAN PARK, NORTHWESTERN UNCOMPAHGRE PLATEAU, COLORADO AND UTAH			
WS 160	1–1:15 pm	oral	Addison Early
RYAN PARK-PINON MESA HYDROTHERMAL FLUORITE DEPOSITS			
WS 160	1:15-1:30pm	oral	Mackina Chamberlain
REVIEW OF SELECTED CRITICAL MINERALS: COPPER, TIN, AND TITANIUM			
WS 160	1:30-1:45pm	oral	Hunter Stewart
MAPPING AND CHARACTERIZATION OF MASS WASTING SITES ALONG THE COLORADO RIVER BLUFFS, GRAND VALLEY, WESTERN COLORADO			
WS 160	1:45-2pm	oral	Ethan Freeburger
ORIGIN OF A PALEOSOL AT THE CRETACEOUS-PALEOCENE BOUNDARY IN THE OHIO CREEK MEMBER OF THE WILLIAMS FORK FORMATION, SHALE RIDGE AREA, PICEANCE BASIN			
WS 160	2–2:15 pm	oral	Ben Chamberlain
DETRITAL SANIDINE 40AR/39AR DATING OF THE WEST ELK RIVER GRAVELS OF THE BLACK CANYON OF THE GUNNISON, CO: INSIGHTS ON POST-LARAMIDE PALEOGEOGRAPHY AND TECTONISM			
WS 160	2:15–2:30pm	oral	Coral Copenhaver
EVALUATION OF PETROPHYSICAL HETEROGENEITY WITHIN FLUVIAL ARCHITECTURAL ELEMENTS OF THE CRETACEOUS BURRO CANYON FORMATION, PICEANCE BASIN, COLORADO			
WS 160	2:30–2:45pm	oral	Liam Posovich

HYDROGEOLOGICAL AND HYDROGEOCHEMICAL ANALYSIS OF A GRAND MESA ALLUVIAL FAN NEAR WHITEWATER, MESA COUNTY, COLORADO
WS 160 | 2:45–3pm | oral | KennaLee Worster

THREE-YEAR SEASONAL MONITORING OF LADDER CREEK TO ESTIMATE SEDIMENT FLUX AND STREAM COMPETENCE USING DRONE ORTHOMOSAIC IMAGERY, MESA COUNTY, COLORADO USA
WS 160 | 3–3:15pm | oral | Graceanne Hanson

DRONE (SUAS) MULTISPECTRAL IMAGING OF HUMAN FOOTPRINTS FOR ENHANCED FORENSIC SITE INVESTIGATION
WS 160 | 3:15–3:30pm | oral | Janelle Pethick

Social and Behavioral Sciences — Posters I — Track 11A

Facilitator: Valeria Balogh

LOCATION	TIME	TYPE	STUDENT(S)
EFFECTS OF GENDER AND INFORMATION DISSEMINATION EFFECTS ON PRECONCEPTION HEALTH KNOWLEDGE, SELF-PERCEPTION, AND BEHAVIOR CHANGE AMONG COLLEGE STUDENTS.			
HH, outside	2–4pm	poster	Sarah Hirschman, James Walker II, Corynn Simon
GENERATIONAL TRANSMISSION OF ADVERSE CHILDHOOD EXPERIENCES			
HH, outside	2–4pm	poster	Aurora O'Connor, Chelsey Stock
DECISION MAKING STYLE AND EMOTIONAL INTELLIGENCE			
HH, outside	2–4pm	poster	Haley MacDonald
SOCIAL WORK WITHIN THE IMMIGRATION POPULATION AND WOMEN EXPERIENCING DOMESTIC VIOLENCE			
HH, outside	2–4pm	poster	Alexis Krepps, Abigail Solis
FOUNDATIONAL FIGURES IN THE FORMATION OF THE PSYCHOLOGY DEPARTMENT AT COLORADO MESA UNIVERSITY: AN INCLUSIVE HISTORICAL INVESTIGATION			
HH, outside	2–4pm	poster	Sam Parrill, Melissa Vargas
QUANTIFYING WORK MOTIVATIONAL GAINS BETWEEN GENERATIONAL COHORTS: A REGULATORY FOCUS FRAMEWORK			
HH, outside	2–4pm	poster	Jake Braun
SEEKING TRANSGENDER AND GENDER EXPANSIVE COMPETENCY IN SOCIAL WORK EDUCATION			
HH, outside	2–4pm	poster	Ashling Hallford
PSYCHOLOGICAL BENEFITS OF PUBLIC LAND USE			
HH, outside	2–4pm	poster	Haley MacDonald

Social and Behavioral Sciences — Posters II — Track 11B

Facilitator: Audrey Lumley-Sapanski

LOCATION	TIME	TYPE	STUDENT(S)

GROUNDWATER PUMPING AND THE THREAT OF INTERNATIONAL WATER SECURITY
TL, outside | 2–4pm | poster | Olivia Wick

HOOKUP CULTURE AT CMU
TL, outside | 2–4pm | poster | Josselin Sorto Leiva, Elias Cressler

THE EFFECTS OF DIABETES ON THE SKELETONS IN THE FIRS COLLECTION
TL, outside | 2–4pm | poster | Jack Bills

FIRS FIRST MEDICAL MYSTERY
TL, outside | 2–4pm | poster | Lexi Alexander

THE ECONOMIC IMPACT OF THE CAMINO DE SANTIAGO ON RURAL SPAIN: A GEOSPATIAL ANALYSIS
TL, outside | 2–4pm | poster | Gabrielle Arterburn

HISTORY OF THE PALISADE PEACH
TL, exhibit area | 2–4pm | poster | Tasalyn Anderson

Social and Behavioral Sciences — Psychology Oral Presentations — Track 11C

Facilitator: Kevin Kelley

LOCATION	TIME	TYPE	STUDENT(S)
COPING METHODS, SUBSTANCE ABUSE, AND SUICIDAL IDEATION IN A RURAL COMMUNITY AND UNIVERSITY			
HH 208	2:45–3pm	oral	Austin Leach, Preston Fluekiger, Brooke Erickson
THE IMPACT OF PHYSICAL ACTIVITY ON SYMPTOMS OF DEPRESSION & ANXIETY			
HH 208	3–3:15pm	oral	Alex Olson, Ella Dillon, Violet Detwiler
RELATIONSHIP OBSESSIVE-COMPULSIVE DISORDER (ROCD) SYMPTOMS IN AMERICAN UNIVERSITY STUDENTS: EXPLORING TIKTOK'S IMPACT ON EXTREME LOVE BELIEFS AND PREDICTING ROCD SYMPTOMS VIA ATTACHMENT STYLES AND MEDIA-USAGE VARIABLES			
HH 208	3:15–3:30pm	oral	Grace Thompson, Indica Machost
VIRTUAL MAKEOVER USE: MOTIVATIONS BEHIND THE SCREEN			
HH 208	3:30–3:45pm	oral	Natalie Brown, Sarah Krieghoff
PERCEPTIONS OF FIRST-GENERATION COLLEGE STUDENTS' TRANSITION: A QUALITATIVE STUDY			
HH 208	3:45–4pm	oral	Isabela Sanchez, Maya Mendoza

Social and Behavioral Sciences — Sociology and Social Work Oral Presentations — Track 11D

Facilitator: Megan Henley

LOCATION	TIME	TYPE	STUDENT(S)
DISPARITIES FACED BY IMMIGRANTS FROM NON-ENGLISH-SPEAKING COUNTRIES			
HH 209	2:45–3pm	oral	Raeann Mosqueda
YOUTH, PARENTS, AND REPRODUCTIVE HEALTH IN MESA COUNTY			
HH 209	3–3:15pm	oral	Gina Dezwaan-Martinez, Natasha Fox, Josselin Leiva, Jesse Pass

SHADES OF IDENTITY: EXAMINING THE INFLUENCE OF FAMILY AND SOCIAL CONTEXT ON MIXED RACE INDIVIDUALS
HH 209 3:15–3:30pm oral Morgan Geiger

EXPLORING BARRIERS TO ECONOMIC ASSISTANCE UPTAKE IN MESA COUNTY
HH 209 3:30–3:45pm oral Hailey Samyn, Elias Cressler, Keely Kelley, Sean Satchell, Kayla Miller

AN EXPLORATION OF "LOW-HANGING FRUIT" AROUND IMPROVING GRADUATION AND RETENTION RATES, AND A STUDENT'S SENSE OF BELONGING
HH 209 3:45–4 pm oral Michael Gibson

Social and Behavioral Sciences — Anthropology, History, and Environmental Sciences Oral Presentations — Track 11E

Facilitator: John Seebach

LOCATION	TIME	TYPE	STUDENT(S)
THE ARCHAEOLOGY OF KOREA AND JAPAN			
HH 104	2:30–2:45pm	oral	Christina Horn
FROM TELLER TO STELLAR			
HH 104	2:45–3pm	oral	Julia Wildman
THE EVOLUTION OF "JUST WAR" IN THE WEST FROM THE POST-CLASSICAL TO THE MODERN ERA			
HH 104	3–3:15pm	oral	Brianna Bolcato
SKELETAL PRESENTATION OF A MODIFIED SURGICAL TECHNIQUE			
HH 104	3:15–3:30pm	oral	Isabelle Marler
FIRS VISUAL DICTIONARY OF MEDICAL DEVICES			
HH 104	3:30–3:45pm	oral	Charles Curry
OVERFISHING — THE ENVIRONMENTAL CRISIS			
HH 104	3:45–4pm	oral	Torin Lackmann

Social and Behavioral Sciences — Political Science Oral Presentations — Track 11F

Facilitator: Holly Oberle

LOCATION	TIME	TYPE	STUDENT(S)
POST-COLONIAL MARXIST APPROACH TO INTERNATIONAL ADOPTION			
HH 105	2:30–2:45pm	oral	Sauvelyne Randel
CASE STUDY: AN ANALYSIS OF RAPID DEMOCRATIZATION IN TAIWAN			
HH 105	2:45–3pm	oral	Kyle Patten
GENIUS PLAYBOY BILLIONAIRE PHILANTHROPISTS - HOW HUMAN SECURITY BECAME A TOOL FOR AMERICAN HEGEMONY			
HH 105	3:–3:15pm	oral	Shayla Trowbridge
ON POLITICAL UPHEAVAL AND ETHNIC CLEANSING IN EGYPT AND SUDAN			
HH 105	3:15–3:30pm	oral	Rachel Baron
POSTSTRUCTURALIST THEORY AND ITS APPLICATION TO ISRAEL AND PALESTINE			
HH 105	3:30–3:45pm	oral	Sam Miller

EQUATORIAL GUINEA AND AUTHORITARIAN PERSISTENCE
HH 105 3:45–4pm oral Joe Williams

Teacher Education — Graduate Presentations — Track 12A

Facilitator: Devyn Elliott

LOCATION	TIME	TYPE	STUDENT(S)
EDUCATION, MOTIVATION, AND THE POWER OF CHOICE			
DH 104	3–3:15pm	oral	Micah Amborn
BUILDING RELATIONSHIPS TO SUPPORT STUDENTS WITH TRAUMA			
DH 104	3:15–3:30pm	oral	Laura Trusty

Teacher Education — Oral Presentations 1 — Track 12B

Facilitator: Amelia Baldwin

LOCATION	TIME	TYPE	STUDENT(S)
TEACHING STEAM IN AN INCLUSIVE CLASSROOM			
DH 111	1:30–1:45pm	oral	Avery Burks
BENEFITS OF BRAIN BREAKS			
DH 111	1:45–2pm	oral	Paige Franklin
FIELD TRIPS IN EDUCATION			
DH 111	2–2:15pm	oral	Tayah Carle
CLASSROOM PETS			
DH 111	2:15–2:30pm	oral	Taylor Stockemer
THE "A" IN STEAM			
DH 111	2:30–2:45pm	oral	Chris Gibson
NUTRITION: THE KEY COMPONENT OF SCIENCE THAT SCHOOLS ARE MISSING			
DH 111	2:45–3pm	oral	Katy Ghilarducci
MATH IS IMPORTANT TOO			
DH 111	3–3:15pm	oral	Palmer Lyons
HOW TECHNOLOGY AFFECTS THE CLASSROOM			
DH 111	3:15pm-3:30pm	oral	Payten Hodgin

Teacher Education — Oral Presentations 2 — Track 12C

Facilitator: Joanelle Morales

LOCATION	TIME	TYPE	STUDENT(S)
FAMILY MATTERS			
DH 110	3:15–3:30pm	oral	Avery Fitzgerald
EFFECTIVE TEACHING IMPROVEMENT PROJECT			
DH 110	3:30–3:45pm	oral	Stacy Trickel

DOWN SYNDROME
DH 110 | 3:45–4pm | oral | Maddie Fay

Teacher Education — Poster Presentations — Track 12D

Facilitator: Stephanie Stelljes

LOCATION	TIME	TYPE	STUDENT(S)
TOOLS OR TOYS			
DH 1st floor hallway	2–4pm	poster	Abby Guddat
LET'S TAKE THIS OUTSIDE...			
DH 1st floor hallway	2–4pm	poster	Audrey Jones
AUTISM SPECTRUM DISORDER AND UNIVERSALLY DESIGNED LEARNING			
DH 1st floor hallway	2–4pm	poster	Cristal Ferguson
CONNECTING MOVING WITH LEARNING			
DH 1st floor hallway	2–4pm	poster	Elise Aho
TEACHING KIDS ON THE SPECTRUM			
DH 1st floor hallway	2–4pm	poster	Kalli Chapman
UNIVERSAL DESIGN FOR LEARNING AND TEACHER BURNOUT			
DH 1st floor hallway	2–4pm	poster	Naomi Cook
EFFECTIVE TEACHING IMPROVEMENT PROJECT			
DH 1st floor hallway	2–4pm	poster	Sarah Pope
JOURNAL EXPERIMENTS			
DH 1st floor hallway	2–4pm	poster	Sophie Miyagishima

Theatre — Musical Theatre Performances — Track 13A

Facilitator: Mo Lamee or Ben Reigel

LOCATION	TIME	TYPE	STUDENT(S)
"IN MY OWN LITTLE CORNER"			
MET	1–1:12pm	performance	Emily Skinner
IT'S ALL IN MY HEAD			
MET	1:12–1:24pm	performance	Isabela Sanchez
THE EIGHT OF PENTACLES			
MET	1:24–1:36pm	performance	Catie Spann
TRYING SOMETHING NEW			
MET	1:36–1:48pm	performance	Maureen Martin
LULLABY OF BROADWAY			
MET	1:48–2pm	performance	Emily Weedon
ALL YOU WANNA DO			
MET	2–2:12pm	performance	Jake Lende
MARS			
MET	2:12–2:24pm	performance	Hao Tran

Theatre — Theatre Performances — Track 13B

Facilitator: Katherine Stepanek

LOCATION	TIME	TYPE	STUDENT(S)
NOVEMBER AIR: A ONE ACT PLAY ABOUT LIFE AND DEATH			
MET	2:40–2:52pm	performance	Phoenix Gallegos
A SELECTION FROM ROSENCRANTZ AND GUILDENSTERN ARE DEAD			
MET	2:52–3:04pm	performance	C.W. Hellen, Ian Rowzee, Austin Jensen, Noah Reedy
THE CHILDREN'S HOUR			
MET	3:04–3:16pm	performance	Emma Gregory, Ella Joseph

Theatre — Theatre Design/Tech Presentations — Track 13C

Facilitator: Katherine Stepanek

LOCATION	TIME	TYPE	STUDENT(S)
DON'T LET THE PIGEON DRIVE THE BUS LIGHTING DEMO			
MET	3:20–3:32pm	oral	Andrea Chavero
PYROTECHNICS IN THE ENTERTAINMENT INDUSTRY			
MET	3:32–3:44pm	oral	Teresa Guenther
THEATRE: WHAT'S THE BIG DEAL?			
MET	3:44–3:56pm	poster	Courtney Lyon

Theatre — Dance Presentations & Performances — Track 13D

Facilitator: Kathleen Diehl & Caitlin Mahon

LOCATION	TIME	TYPE	STUDENT(S)
THE ART OF ORAL TRADITION IN SOCIAL DANCES			
MPAC, dance studio	3:30–3:42pm	performance	Roxana Espinosa-Muniz
COLLABORATION AND COMMUNITY ENGAGEMENT IN DANCE MAKING			
MPAC, dance studio	3:42–3:54pm	performance	Mallory Christopher, Kara Farmer, Doran Kelsey, Caitlin Lawson, Izzy Lawson, Lauren Gram, Roxana Espinoza-Muniz, Molly Mitchell, Michelle Deuster
WEST AFRICAN DANCE ELEMENTS - YANKED MAKRU			
MPAC, dance studio	3:54–4:06pm	performance	Emily Weedon, Mallory Christopher, Roxana Espinoza-Muniz, Lauren Gram, Anna Johnston, Mina Langness, Jacob Lende, Hannah Smith, Catie Spann, Hao Tran

Theatre — Communication Studies Presentations I — Track 13E

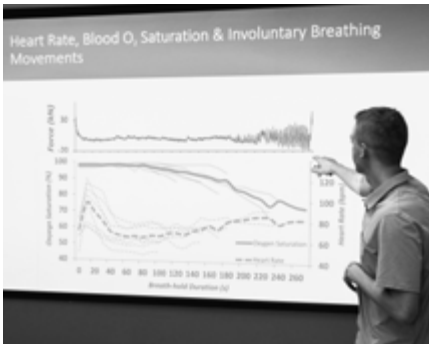
Facilitator: Tara Carleo

LOCATION	TIME	TYPE	STUDENT(S)
IGNITE CHANGE THROUGH THE PAGES OF BANNED BOOKS			
HH 138	1:15–1:30pm	oral	Kaila Harward
KIDS LIVING WITH BROKEN BODIES			
HH 138	1:30–1:45pm	oral	Lily Lightner
ESCAPING TOXIC FAMILIES			
HH 138	1:45–2pm	oral	Morgan Kice
THE GARLIC FESTIVAL SHOOTING FROM A MACRO LENS			
HH 138	2–2:15pm	oral	Joseph Deras

Theatre — Communication Studies Presentations II — Track 13F

Facilitator: Grace Lee

LOCATION	TIME	TYPE	STUDENT(S)
PROFITS AND PEOPLE			
HH 138	2:30–2:45pm	oral	Donovan Walton
YOU ARE USING THE F-WORD WRONG			
HH 138	2:45–3pm	oral	Kayla Bauer
UNDERSTANDING GOD'S METHODS THROUGH SCIENCE			
HH 138	3–3:25pm	oral	Malachi Yeager
PERCEPTION AND ITS EFFECTS ON ATHLETES			
HH 138	3:25–3:50pm	oral	Isaiah Cheeks



Abstracts

Listed alphabetically by department. Refer to Sessions section for times.

Art and Design

Title: **LOSS**
Presenter(s): Riley Siebels
Faculty Mentor: Evan Curtis
Track: 1A
Abstract: The project is about loss and abandonment through a photos series of empty places. The medium of Van Dyke photograph prints evokes a feeling of loss through the vintage aesthetics associated with its process: exposing silver nitrate, ferric ammonium citrate, and tartaric acid to light on paper to create a single photo. This project was created to explore the feeling of emptiness one experiences from the unexpected loss of a person. I tried to capture the absences of people in populated locations to convey a sense that something is missing. This is intended for people who love photography and have an open mind to tough subjects.

Title: **LIFE WITH PAIN**
Presenter(s): Andrea Hollinger
Faculty Mentor: Forrest Zerbe
Track: 1A
Abstract: The main idea for this project since I have chronic pain, I wanted to document it and feel at peace with my pain – it is not the enemy but something I live symbiotically with – I am going to have pain forever, but it does not have to be all consuming bad in my life. I revolve my world around managing pain that others don't see. What it is like to live with chronic illness? Background Information: Cerebral Palsy, also known as CP, is a neurological condition that makes the muscles overreact to stimuli so that your muscles are involuntarily tight and also create high or low muscle tone. It can cause comorbid conditions such as scoliosis or dislocation of any body part such as hips. Causes can be brain injuries in utero or after and have a wide range of severity. Larger implications: Pain does not have to be dealt with quietly and independently, someone will see you and be with you through the bad and the good. As I get older, the symptoms will get worse, consistent pain will be with me through every important moment I have, but I can't be upset by that.

Title: **FORM, COLOR, AND LINE**
Presenter(s): Shonda Hill
Faculty Mentor: KyoungHwa Oh
Track: 1A
Abstract: The relationship between an individual's experience and how it affects personality has always fascinated me. Working with clay has become the outlet for my thoughts about these relationships. I hand build exclusively so working with clay is a meditative process. The forms I create provide a blank canvas on which to explore color and line; my expression of life's experiences. I am always seeking to understand how color and line relate to each other within each composition. My current body of work ranges from many pieces put together to one piece with many parts. All of this to demonstrate the complexity of the individual. Circles, rectangles, and stripes have a re-occurrence in my work. Circles have become a

representation of experiences lived, rectangles a symbol of growth and stripes are the depiction of moving forward. The intention is to imbue each piece with a distinct personality as I also seek to understand the uniqueness of myself and those around me.

Title: **THE DRAGON**
Presenter(s): Mercedes Wills
Faculty Mentor: Julia Crocetto
Track: 1A
Abstract: While the Lunar New Year was still approaching, the intention was to create a piece which encapsulates the energy surrounding holiday celebrations while showcasing strong forms of modular design. Taking inspiration from lanterns used in Lunar New Year festivals combined with the clean lines of a tetrahedron and design constraints of balsa wood, the concept for The Dragon begins to take shape. Since the structure of the work relies heavily on wood craftsmanship, the use of softer planar elements such as paper, embroidery thread, pipe cleaners, and decorative red and gold trims are utilized to visually lighten the piece and create a sense of unity. To reconstruct the imagined movements of this mythological creature, each singular module is adhered to a plexiglass stand in an angled sweeping diagonal line. The placement of each pivoting, spined module implies an uninterrupted dynamic motion. The selected colors and patterns, alongside the dragon head's expressive details, provide a playful whimsical element. The Dragon moves beyond its three-dimensional form with boldness and levity to become an invitation to the celebratory spirit which surrounds Lunar New Year gatherings.

Biological Sciences

Title: **SENSITIVITY & SPECIFICITY ANALYSIS IN USING KALEIDOSCOPE PRO TO DETECT PIKA CALLS**
Presenter(s): Devan Williams
Faculty Mentor: Johanna Varner
Track: 2A
Abstract: Detecting population declines is key to conservation, and enlisting volunteers is an effective means of expanding monitoring programs. American pikas (Ochotona princeps) are small, climate-sensitive lagomorphs that are ideal for volunteer monitoring because they are charismatic and easy to identify. However, because pikas behave differently in marginal habitats, at range edges, and at low densities, volunteers may be less accurate at assessing occupancy precisely where declines are most likely to occur. In response, many participatory monitoring projects for pikas seek to collect bioacoustic data, but automated detection of pika calls has not previously been reliable. We used a cluster analysis in Kaleidoscope Pro to identify pika calls in recordings from the Columbia River Gorge in 2017-2019 and to determine optimal settings. Preliminary results suggest that this method has high sensitivity and that true pika calls can be easily distinguished from false positives by a trained volunteer. We also explored how pika call behaviors varied across habitats. Together, our results suggest that acoustic monitoring is an inexpensive and engaging way for participatory science programs to collect accurate occupancy data at range edges. This platform could also be leveraged to address questions about pika distribution, behavior, and activity levels in other habitats.

Title: **EFFECTIVE USE OF DIGITAL MEDIA TO INCREASE ENGAGEMENT ACROSS A NETWORKED CURE COMMUNITY**

Presenter(s): Annalise Holte

Faculty Mentor: Patrice Connors

Track: 2A

Abstract: Social media is a powerful avenue for researchers studying mammals to connect with peers, promote their organizations, and engage with students in the scientific community. Squirrel-Net is a network of educators and students involved in Course-based Undergraduate Research Experience (CURE) modules and has been actively investigating effective communication methods over the past three years. Our social media focus has been on fostering collaboration and research by connecting with diverse audiences. Through regular assessments of our Instagram, Facebook, and Twitter analytics, we have gained valuable insights into the strategies that elicit the highest levels of interaction and engagement. Here, we present approaches for effectively engaging with Squirrel-Net content across three platforms and multiple audiences, including connecting with instructors, students, and squirrel enthusiasts. Consistent posting several times per week has helped grow our active follower base while incorporating weekly reels on Facebook and Instagram has leveraged the algorithms of these platforms to reach new audiences. Finally, we offer recommendations for scientists and educators to communicate with diverse audiences through social media channels. Efficient use of digital media is an important tool for enhancing future engagement and awareness across all social platforms.

Title: **PATTERNS OF STRESS IN AN ISOLATED POPULATION OF AMERICAN PIKAS (OCHOTONA PRINCEPS)**

Presenter(s): Karli Weatherill

Faculty Mentor: Johanna Varner

Track: 2A

Abstract: American pikas (Ochotona princeps) are often considered a mammalian indicator of environmental change in alpine ecosystems because they have experienced climate-mediated declines in parts of their range. The La Sal mountains of south-eastern Utah harbor a unique population of pikas, in an isolated mountain range surrounded by low-elevation desert. Pikas here have received little systematic study, and isolated ranges are predicted to experience more-pronounced climate impacts compared to "mainland" ranges. We have conducted a mark-resight study of pikas in this range since 2018. Each year, individuals were trapped, marked with unique colored ear tags, and a scat sample was collected for analysis of fecal glucocorticoid metabolites (FGM), a metric of chronic stress. Hypothesized predictors of stress included food resources, microclimate, and physiological condition at capture. Consistent with previous hypotheses about how climate might affect pikas, we found that on a population level, pikas experienced higher stress in response to fewer days of snowpack and higher average August temperatures. Understanding how habitat factors affect stress is important to help managers identify tractable conservation targets for pikas and potentially other alpine species. This study also provides insight into the status of pikas in this population and mountain range.

Title: **ECOLOGICAL DRIVERS OF VERTEBRAL PROPORTIONS IN SNAKES: INSIGHTS FROM COLUBRIDS**

Presenter(s): Jeremiah Dreher

Faculty Mentor: Paul Hampton

Track: 2A

Abstract: Among vertebrates, snakes possess an exceptionally high number of vertebrae. While the total number of vertebrae in the spinal column has been associated with a variety of ecological characteristics, comparisons of the proportion of vertebral types have only recently been considered in an ecological context. In snakes, the heart is associated with a morphological boundary between anterior and posterior thoracic vertebrae. Evolutionary changes in the number of vertebrae in the anterior and posterior regions may be associated with the autecology of snakes. The objective of this project was to determine if evolutionary changes to vertebral proportions are associated with selected ecological factors. I measured the proportion of pre- and post-heart vertebrae of 50 species of colubrid snakes. For each species, I located the apex of the heart and counted the number of ventral scales anterior and posterior to the apex. Using these scale counts I tested if natural selection for traits such as habitat use, male-male combat, reproductive mode, prey type, and sexual dimorphism is acting on the regional body portions of snakes. Preliminary results indicate that habitat use and evolutionary relatedness are the primary factors influencing the proportion of pre- and post-apex vertebrae.

Title: **GENETIC MONITORING OF TAMARISK BIOCONTROL AGENTS (DIORHABDA SPP.) ALONG THE GILA RIVER USING MITOCHONDRIAL CO1 BARCODING**

Presenter(s): Francisca Esquivel

Faculty Mentor: Amanda Stahlke

Track: 2A

Abstract: The four tamarisk beetle species (Diorhabda spp.) introduced for biological control of invasive tamarisk (Tamarix spp.) continue to colonize into new areas of North America. It remains unknown if beetle species identity affects efficacy as biocontrol agents or nontarget impacts on the ecosystem. In areas where the federally endangered southwestern willow flycatcher (SWFL; Empidonax traillii extimus) and multiple beetle species co-exist, biocontrol evolution and species interactions could affect the recovery of SWFL which nests in tamarisk. Since 2021, we have been using genetic and genomic tools to monitor as D. carinulata has expanded west while D. sublineata has expanded east along the Gila River. These two species rarely form viable hybrids, one or the other could outcompete and become more dominant. The species composition matters because there may be differences in size between species, which could correspond to impact rates of tamarisk defoliation overall. To determine which species were present in the Gila River Basin in 2023 and to help determine how beetle species identity predicts efficacy or nontarget impact, we performed molecular identification (mt-CO1) of 178 beetles collected between May and August of 2023. We found that of the current 178 samples sequenced east of the San Carlos Apache Tribe Reservation, all were identified as D. sublineata, except for one D. carinulata. On the west side of the Reservation, no adults were observed. These results suggest that D. sublineata may become the dominant species along the Gila River, providing evidence for competitive exclusion. We compare these results to our previous work in a species contact zone along the Middle Rio Grande River. Our work complements a decade of genetic monitoring, improves our understanding of how species distributions of tamarisk biocontrol agents continue to evolve and what that evolution could mean for the future of SWFL.

Title: **HYDROCARBONS IN MEDICAL GRADE SUPPLIES AND EQUIPMENT**
Presenter(s): Audrey Woodhouse
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: In healthcare facilities, maintaining a high standard of service to support patients is paramount. This entails the use of medical-grade manufacturing and products to ensure a sterile and sanitized environment. Medical-grade plastic emerges as the primary material capable of meeting these stringent requirements. It possesses crucial properties, primarily derived from hydrocarbons, that render it biocompatible, nonpermeable, sterile, lightweight, and durable. These qualities are indispensable for a wide array of medical supplies essential for both routine procedures and critical interventions. However, with limited alternatives and the possibility of a decline in oil production, there looms a threat of scarcity in medical supplies, thereby driving up healthcare costs and compromising affordability. Sustaining oil and gas production becomes imperative to ensure the continued availability of hydrocarbon-based medical supplies, thereby safeguarding the health of communities.

Title: **CALIFORNIA AND ECUADOR OIL**
Presenter(s): Carl Cox
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: In South America, beneath the revered Amazon rainforest lies an abundance of oil, sought after by countries like Ecuador grappling with economic hardships. Ecuador, a leading oil exporter in the region, has drawn the attention of California, the foremost oil importer in the United States. This symbiotic relationship is fueled by Ecuador's oil, which closely resembles that previously produced in California, fitting seamlessly into the state's refinery infrastructure. However, this pact raises critical environmental concerns, particularly regarding the extraction's impact on the Amazon rainforest and its indigenous inhabitants. Moreover, California's continued reliance on imported oil perpetuates fossil fuel dependency, hindering strides toward sustainable energy solutions and exacerbating climate change. While economically beneficial, this partnership underscores the pressing need for balancing short-term gains with long-term environmental sustainability and indigenous rights will be the focus of this paper.

Title: **RENEWABLE ENERGY & FUTURE SUSTAINABILITY**
Presenter(s): Charles Corkin
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: The global push for renewable energy has sparked environmental, economic, and political debates. Establishing supportive policies to hasten the transition to a more sustainable energy future has become imperative worldwide. However, this transition raises crucial questions regarding the availability of resources and the appropriate methods of implementation. Concerns also linger about the consequences of swiftly transitioning to renewable energy, including whether the pace is too rapid. Despite the undeniable benefits of renewable energy, it's essential to approach the implementation process steadily and proportionally to production costs. Hastening implementation without regard for unsustainable costs could yield undesirable outcomes. Additionally, doubts persist regarding the

efficiency and cost-effectiveness of renewable energy solutions. This paper aims to provide an objective, honest, and unbiased analysis, dispelling misconceptions and biases in the public discourse. It seeks to offer realistic information on renewable energy, considering both its environmental impact and cost, to foster informed decision-making in energy policy and planning.

Title: **DEMAND FOR MINERALS ARE SPARKING FEAR**
Presenter(s): Dominic Laurita
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: The project investigation focuses on the escalating concerns surrounding the demand for minerals and its profound impact on indigenous communities. Specifically, I aim to scrutinize how Kobold Metals addressed the deficiency of indigenous input and the damage inflicted upon their lands. A pivotal aspect of this exploration is the principle of Free, Prior, and Informed Consent (FPIC), acknowledging the fundamental rights of indigenous communities to partake in decisions influencing their territories. Moreover, my investigation will extend to the dedicated advocacy efforts of indigenous leaders, compelling companies in the electric vehicle supply chain, such as Tesla, to honor and respect indigenous consent. The overarching goal is to vividly illustrate the imperative necessity of striking a harmonious balance between resource needs and indigenous rights. This equilibrium can only be achieved through meticulous and respectful engagement, meaningful consultation, and the integration of indigenous perspectives in the realm of resource development. The purpose of the project is to provide a comprehensive exploration of minerals to shed light on the growing apprehensions regarding mineral demand and its repercussions on indigenous communities, advocating for a conscientious and inclusive approach to resource development.

Title: **VEHICLE PROPULSION TECHNOLOGY ANALYSIS**
Presenter(s): Eric Hofmann
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: This project will examine the environmental implications of the 2024 Ford F150 vehicle propulsion options: hybrid, electric, and internal combustion. The focus lies on identifying and categorizing the necessary materials for production, assessing their availability, and tracing their origins. Environmental impact scores will be assigned to the F150 models, comprehensively evaluating their material makeup. The project adopts a data-driven, factual, and unbiased approach to enlighten consumers about each propulsion type and its corresponding environmental impacts. The resultant report will provide insights into the composition of each vehicle, the sources of its materials, its environmental footprint, and the evaluation methodology employed. Through the presentation of visually appealing and informative materials, this initiative aims to educate and foster discourse on propulsion technologies

Title: **UNDERGROUND POWER LINES**
Presenter(s): Gus Campbell
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: The United States of America faces significant challenges with power outages due to its geographical location, experiencing hurricanes on the East Coast, earthquakes on the West Coast, and tornadoes in the Midwest. These storms often damage power lines, leaving hundreds of thousands of

homes without electricity annually. For instance, the West Coast averages 10,000 earthquakes yearly, while the Midwest contends with an average of 1,200 tornadoes. One potential solution is the use of underground power lines, although cost has been a barrier to implementation. However, wrapping higher voltage power lines in plastic to prevent overheating could offer a cost-effective option. Government involvement would be necessary for such a large-scale project, ensuring proper installation. Many studies suggest that residents may prefer underground power lines due to their reliability, safety benefits for workers, and environmental considerations. Many countries such as Germany and Switzerland have successfully implemented underground power lines, providing a potential model for the United States to consider.

Title: **FUSION REACTORS PROPELLING FUTURE SPACECRAFT**
Presenter(s): Jacob Cook
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: With nuclear fusion gaining more attention in the energy world and recent advancements in technology, this showcase aims to discuss the potential to put a fusion reactor on a spacecraft. The United States has not been making efforts to explore space due to its high cost and lack of profitability. However, with the potential for high energy output through nuclear fusion, our spacecraft would have access to unlimited clean energy, allowing us to reuse the reactor and push our crafts further than ever. Nuclear fusion is a reaction in which two light nuclei merge to form a single, heavier nucleus. This process releases energy because the total mass of the resulting nucleus is less than the mass of the two original nuclei. The leftover mass is converted into energy, providing a significant amount of power. Since nuclear fusion powers our Sun and every star in the universe, it seems logical to harness this energy for our space exploration efforts, advancing civilization. This showcase aims to cover the requirements for capturing fusion energy, the potential benefits, and how space exploration would be transformed using this technology.

Title: **ENERGIZING AMERICA**
Presenter(s): Jarett Brown
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: The project "Energizing America" will explore the relationship between energy sources and the reliability of the nation's power grid, focusing on recent events such as California's blackouts and Texas' grid failure. It will delve into the cause-and-effect dynamics between renewable energy sources and grid stability, incorporating visual aids and statistics to illustrate the efficiency of renewable energy in America's power grid. Specifically, the research will examine challenges associated with wind turbines and solar panels, highlighting their resource-intensive production processes and reliance on natural gas. The study will emphasize the significance of natural gas in maintaining grid reliability and compare its effectiveness with other renewable energy sources. The purpose of the project is to educate the public on the importance of diverse energy sources in ensuring a sustainable and resilient power grid for the future.

Title: **SSLNG: POWERING RURAL COMMUNITIES**
Presenter(s): Jazelyn Martinez
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: The project focuses on investigating the potential role of small-scale liquified natural gas (ssLNG) in extending energy access to rural areas, specifically indigenous regions in the United States where 14 percent of households on Native American reservations lack adequate energy access. Traditional LNG infrastructure is not suitable for rural communities, prompting the need for a more innovative and accessible energy source like ssLNG. By utilizing case studies analysis, the project aims to explore the benefits of ssLNG in enhancing energy access and socioeconomic development in rural and remote areas, particularly reservations. The findings will be presented highlighting the potential of ssLNG to address energy security and flexibility challenges in indigenous communities.

Title: **RETIRING COAL PLANTS INTO SMR PLANTS**
Presenter(s): Kory Flansberg
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: U.S. coal plants are being retired to reduce emissions. Rather than decommissioning them, utilities could repurpose sites as small modular reactor (SMR) plants. SMRs provide safe, scalable, and cost-effective nuclear power generation to produce reliable, low-carbon baseload electricity. Retrofitting sustains local jobs and revenue while meeting climate goals. SMRs capitalize on existing infrastructure such as transmission lines, cooling towers, and staff with transferable skills. With training, personnel could easily transition from operating coal boilers to advanced reactors. SMRs also leverage existing electrical and industrial connections. Department of Energy analysis shows SMRs at retired coal plants can match previous workforce and production levels. Communities avoid economic losses from plant closures. The International Atomic Energy Agency advocates for SMRs to ease clean energy transitions by reusing fossil fuel sites. Policy reforms would enable SMR installations like updated siting regulations and licensing pathways. Repurposing decommissioned plants with SMRs makes environmental and economic sense. It sustains plant jobs, local tax bases, and power production through an affordable transition to advanced nuclear generation.

Title: **CALIFORNIA'S HYDROCARBONS IMPORTS AND IMPACTS**
Presenter(s): Riley Stefaniak
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: The state of California has set severe restrictions on the production of hydrocarbons. The high number of regulatory restrictions makes it nearly impossible to drill an economic well within the state. The goal was to reduce emissions by banning hydrocarbons, yet the consumption of hydrocarbons in the state has not lowered. The largest concern with this is that now instead of using local resources, resources are now imported from a variety of unregulated places, including Saudi Arabia, Iraq, the Amazon Rainforest, Ecuador, and more. Is using operations with little to no emission standards a better option for the world's environment? Through this visual and oral presentation, ethical standards, operational efficiency, and local impacts will be investigated. In addition, an evaluation of whether Colorado should continue their efforts in following California's emission goals will be considered along with how drilling bans would impact our state.

Title: **A CRITICAL ANALYSIS OF PROPOSED ENERGY TRANSITION**
Presenter(s): Robert Bouley
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: While analyzing the current world view of a proposed "green energy transition," this showcase will present the shortcomings and possible dangers to both national security and consumer well-being if a transition were to happen, with a focus on the deterrence of hydrocarbon extraction and use. Here we focus on the broad implications a transition to strictly renewable energy would entail and the stark reality of global energy poverty. Along with the paradox of how a transition aims for "more sustainable energy," while also focusing on banning one of our most sustainable energy sources in American oil and gas, while energy consumption is on a steep incline. Through a combination of visual aids and oral presentations, this showcase aims to show both the dangers and immorality that this proposed transition entails from both an ethical and an economic standpoint, using Germany as a case study to illustrate the repercussions that rapid disengagement from fossil fuels causes. As the unraveling of Germany's energy sector is a recent event, visual aids aim to present the sharp increase in energy costs in the country as well as an increase in the total cost of living caused by an energy transition in a modern developed country.

Title: **ADVANCING THE INDUSTRY THROUGH AUTOMATED DRILLING**
Presenter(s): Samuel Berning
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: Traditional drilling methods rely heavily on manual adjustments, often requiring operators to use microscopes for precise control. However, the advent of drilling automation holds promise for revolutionizing production across industries by offering enhanced accuracy, efficiency, and safety. This project investigates the feasibility of implementing automated drilling machines equipped with efficiency algorithms, sensors, and machine-learning technology to outperform conventional human-operated drilling techniques. These automated systems are designed to operate continuously with minimal human intervention, utilizing robotics and automated machinery to execute drilling tasks. The widespread adoption of automated drilling presents numerous advantages, including enhanced safety measures, expedited operational processes, heightened accuracy, and cost savings. While the oil and gas sector stands as a primary target for automated drilling, industries engaged in strip mining, deep well geothermal exploration, and construction can also reap significant benefits from similar technologies. Additionally, robots play pivotal roles in functions like plugging and abandonment. This project aims to spearhead advancements in the field by leveraging cutting-edge technologies to elevate productivity, safety standards, and cost efficiency.

Title: **REDUCING GREENHOUSE GASES THROUGH COWS**
Presenter(s): Slade Pike
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: Reducing greenhouse gas emissions has been a focal point in the climate change movement. The oil and gas industry has faced scrutiny for its contribution to these emissions, catalyzing the green energy future initiative. However, what if the key to reducing these gases lies not in cutting down oil production but rather in addressing the livestock industry? Livestock alone contributes to nearly fifteen percent of global

greenhouse gases, with cows playing a significant role. This presentation explores strategies for reducing greenhouse gas emissions within the bovine industry. Three primary solutions have emerged for the green bovine initiative. Firstly, there is the option of altering the feed from the conventional high-fiber grain that is typically given to cows. Secondly, an innovative approach involves inserting a device into cows' stomachs to capture methane emissions. Lastly, the no-meat movement presents an alternative avenue, potentially decreasing methane production by opting for meat-free diets or alternative protein sources.

Title: **FROM TRASH TO TREASURE: HARNESSING LANDFILL WASTE FOR RENEWABLE ENERGY WITH NATURAL GAS**
Presenter(s): Trey Towndrow
Faculty Mentor: Chelsie Miera
Track: 3A
Abstract: The smart process of trash removal is essential for resource conservation, environmental preservation, and public health. While landfills are commonly used for waste disposal, they pose environmental challenges due to the release of gases like methane and carbon dioxide during decomposition. However, landfill gas can be harnessed for energy production through systems like blower/flare (vacuum) systems. This not only helps manage waste but also generates energy for various applications. Despite the potential benefits, challenges such as technological feasibility, regulatory compliance, and economic constraints hinder efficient energy conversion. Strategic planning, policy interventions, and innovation are crucial for maximizing the benefits of this sustainable energy source. This project aims to identify solutions to these challenges and areas for improvement in the trash removal process and energy generation.

Title: **EXAMINING SAFETY OF AUTONOMOUS VEHICLES ON US ROADWAYS**
Presenter(s): Grant Novak, Andrew Ash, Kiara Strothers, Katey Threlkeld
Faculty Mentor: John Snyder
Track: 3B
Abstract: The rise of vehicles equipped with autonomous driving capabilities marks a significant advancement in transportation technology. However, concerns regarding their safety persist, prompting the need for a rigorous investigation into the factors influencing their performance. This project aims to explore various variables affecting autonomous vehicle performance, including weather conditions, vehicle make and model, autonomous driving capabilities, and additional features. Specifically, the research will focus on the safety implications of autonomous vehicles on US roadways, providing insights into their efficacy and potential challenges in real-world scenarios.

Title: **EXPLORING THE SOCIOECONOMIC DYNAMICS OF PLASTIC POLLUTION**
Presenter(s): Rocio Hernandez, Hope Strohmeyer, Cordey Mallo
Faculty Mentor: John Snyder
Track: 3B
Abstract: Plastic pollution, the accumulation of plastic items in the environment, poses a significant global challenge. Despite efforts to manage and dispose of plastic waste, inadequate waste management practices persist, leading to widespread pollution. This project aims to explore the socioeconomic implications of plastic waste pollution, including the costs associated with waste reduction and the role of population and wealth in generating pollutants. Using worldwide data, the research will identify priority areas for recycling programs and assess countries with the highest plastic waste

output. Time series analysis will track the increase in plastic production over the past 75 years, while geospatial models will map areas of concentrated plastic waste, informing targeted interventions and mitigation strategies.

Title: **FORECASTING HEALTHCARE SPENDING AND PHYSICIAN REQUIREMENTS AMIDST BABY BOOMER RETIREMENT WAVES IN THE UNITED STATES**
Presenter(s): Sydney Mosby, Courtney Freeman, Jose Mendoza, Braden Lowe
Faculty Mentor: John Snyder
Track: 3B
Abstract: According to data from the U.S. Centers for Medicare and Medicaid Services, healthcare expenditure in the United States soared to $4.5 trillion in 2022, equating to approximately $14,000 per person. With the impending retirement of the largest "baby boomer" generation, healthcare costs are anticipated to escalate further. This project aims to analyze trends in the average retirement age across the US since 1970 and forecast the corresponding increase in demand for medical services. Additionally, it will examine the expected growth in the number of medical professionals, factoring in age demographics and gender differentials, to sustain current levels of per capita medical care. By leveraging analytical and geospatial techniques, this research seeks to provide insights into future healthcare expenditure trends based on historical data analysis.

Title: **PROBLEMS ARISING FOR RETIRING FARMERS IN COLORADO**
Presenter(s): Tanner Korell, Collin Fitzgerald, Bryce Schust, Abraham Ruiz
Faculty Mentor: John Snyder
Track: 3B
Abstract: The aging demographic of farmers in the United States, with an average age of around 60 years, raises concerns about potential disruptions in agricultural productivity and food supply due to retirements. This research aims to identify specific crop supplies that could be impacted by retiring farmers, focusing on farming activities and farmer demographics in Colorado. Variables such as farming ownership, types of livestock and crops, and farmers' ages will be analyzed to understand potential vulnerabilities in the food supply chain. Utilizing 2022 data, this study will examine patterns and trends associated with retirements in the farming profession, offering insights into potential challenges faced by the aging farming community across different counties in Colorado.

Title: **EXPLORING THE IMPACT OF ATHLETIC PARTICIPATION ON ACADEMIC OUTCOMES**
Presenter(s): Zach Russell, Jacie Andrew, Jorge Abreu, Samuel Goulet
Faculty Mentor: John Snyder
Track: 3B
Abstract: The impact of athletic participation on the academic performance of university students is a complex and multifaceted topic that warrants investigation. This study seeks to understand this relationship, starting with an examination of Colorado Mesa University (CMU) before expanding to include other NCAA Division II institutions in Colorado and the broader Rocky Mountain Athletic Conference (RMAC). Key metrics such as the academic success rate (ASR) and graduation rate (GR), as reported by the NCAA, will be utilized to assess academic outcomes. Additionally, the study will explore various other variables that may influence academic success. Methodologies employed will include literature review, quantitative analysis, data mining, and data visualization. Challenges anticipated in this inquiry include navigating issues of individual privacy and accessing comprehensive data sets. Through rigorous analysis and thoughtful

consideration of these factors, this study aims to provide valuable insights into the interplay between athletic participation and academic achievement among university students.

Title: **OLIVE GARDEN MARKETING AND SALES PLAN**
Presenter(s): Lauren Dwight, Jessica Dollar, Natalie Talbot, Kylie Watkins
Faculty Mentor: Tevfik Demirciftci
Track: 3C
Abstract: Olive Garden's sales and marketing plan strives to bolster its market standing and boost revenue through strategic initiatives. The plan centers on enhancing the authentic Italian dining experience that Olive Garden is known for. By leveraging innovative digital marketing strategies, forging strategic partnerships, and offering customer-centric promotions, Olive Garden plans to strengthen its presence in the market. This includes targeting specific demographics and expanding into new markets to solidify its position as a top-tier Italian restaurant chain. The overarching goal is to exceed customer expectations, foster brand loyalty, and achieve sustainable business growth. Through a comprehensive approach that blends traditional and modern marketing techniques, Olive Garden seeks to not only attract new customers but also retain existing ones, building a strong foundation for continued success in the competitive restaurant industry.

Title: **ELEVATING HOSPITALITY: UNVEILING STRATEGIC INSIGHTS FOR THE HOTEL TELLURIDE**
Presenter(s): Manda Turner, Jennifer Carta, Mhariagracia Elera-Marino, Morgan Watson
Faculty Mentor: Tevfik Demirciftci
Track: 3C
Abstract: The Hotel Telluride is a charming boutique chalet nestled in the breathtaking San Juan Mountains of Telluride, Colorado, offering guests a European-inspired atmosphere. Our project centers on delving into the hotel's internal operations, harnessing our expertise in marketing and conducting thorough analysis to craft a comprehensive presentation focused on essential aspects of hospitality marketing and sales. Our exploration encompasses an examination of both internal and external forces impacting The Hotel Telluride, along with the formulation of potential marketing strategies and segmentation of target markets. Through this endeavor, our aim is to bridge theoretical knowledge acquired through coursework with practical application in a real-world setting, ultimately contributing to the enhancement of hospitality industry practices.

Title: **FIRST WATCH MARKETING ANALYSIS & PLAN**
Presenter(s): Mollie Kelley, Olivia Linnebur, Melani Lewis, Brooklyn Reuwsaat
Faculty Mentor: Tevfik Demirciftci
Track: 3C
Abstract: We will present a marketing and sales plan for First Watch. A restaurant focused on providing delicious breakfast food to the people in their local communities. We will analyze the company's environment, strengths, weaknesses, opportunities, and threats. We will provide information on First Watch's market including their target segmentation, market positioning, marketing objectives and goals, and a comparison of First Watch and their competitors. Finally, we will present our strategies, action plan, and a projected budget for the First Watch.

Title: **MARKETING & SALES PLAN FOR PRINCESS CRUISES**
Presenter(s): Qwik Huff, Collin Lewis, Amy Macias Pantoja, Jacey May, Brooke Stevenson
Faculty Mentor: Tevfik Demirciftci
Track: 3C
Abstract: Princess Cruises is well known throughout the world: Princess is the third-largest cruise line in the world! They are well known for their innovative and creative ships, onboard amenities, and over-the-top customer service. Focusing this project on cruises will not only broaden our knowledge of the cruise industry but also allow us to put our knowledge to work in marketing and analytics to create an accurate representation of the hospitality marketing and sales industry. Our project will consist of the following: an executive summary, SWOT analysis, environmental analysis, market analysis, objectives, action plans, etc. There will be a focus on internal and external forces, marketing strategies to enhance Princess Cruise Line's competitive advantages, and providing a budget to help advance Princess Cruises to appeal to target segments. This project enhances our knowledge of the topics and strategies we have learned in class so that we can apply what we have learned to real-life scenarios.

Title: **A GOOGLE CORPORATE EXCURSION TO YELLOWSTONE**
Presenter(s): Kylie Watkins, Gino Gaglia, Megan Brown, Paul Vigil
Faculty Mentor: Britt Mathwich
Track: 3D
Abstract: A-Listers Event Management Company will be putting on a corporate event for Google corporation managers. This event will be held in Yellowstone, Wyoming, at the Old Faithful Snow Lodge. They will be flying out managers from Google's main corporation sites including Florida, Washington, California, and Georgia; there will be a total of 50 people attending this event. This event will take place from April 25 to 27, therefore, it will most likely be warm since it is an outdoor event. Throughout this event corporate managers from Google will immerse themselves in a series of workshops and challenges that are fostered to develop teamwork, communication, and adaptive leadership skills. These workshops include networking between the corporate managers and bouncing ideas off each other on what management skills work well within each Google corporation site. The challenges will include an obstacle course with five events, each with different sizes of teams and activities. This will strive to diversify and grow coworker relationships, implement management skills, and provide a nice getaway/ break from stressful corporate jobs.

Title: **SILENT AUCTION: HOPE UNLEASED**
Presenter(s): Mikaela Igou, Ava Leicht, Rachael McLemore, Ella Harrison
Faculty Mentor: Britt Mathwich
Track: 3D
Abstract: This presentation will contain the event details regarding the creation of a silent auction which serves its main purpose of raising money for the Violence Free Colorado Charity. Intending to orchestrate both an engaging and meaningful experience for those who attend, the purpose is to educate attendees about the charity that will receive their bids. The event will feature items of value that will be generously donated by sponsors and the opportunity to bid in both a respectful and considerate manner. With the utilization of technology and the harmony of specific design and setup, the guest will be able to experience a bidding process that showcases items such as art pieces, immersive experiences, and exclusive services. The presentation of a combination of our main philanthropic purpose, community engagement, and event logistics will provide a clear understanding of the potential of a silent auction.

Title: **SUGAR AND ICE PRE-GRAND OPENING BY AS YOU WISH EVENTS**
Presenter(s): Vivian Wyckoff, Melani Lewis, Rylie McCann
Faculty Mentor: Britt Mathwich
Track: 3D
Abstract: With the goal of creating an income stream and a customer base, As You Wish Events, offers a pre-grand opening event strategy for Sugar and Ice's new site. The goal is to openly display the menu and prices, spread the word about the new location via flyers and social media, and attract local customers by learning about their preferences. We are taking steps to meet our clients' goals and objectives. For the client, a successful event, community involvement, and early brand recognition in the new location are all necessary for a return on investment. Regarding As You Wish Events, profitable event outcomes, networking possibilities, and content clients are expected returns. This detailed plan is in line with the overall goal of supporting Sugar and Ice's successful growth, guaranteeing the client's and the event planning team's happiness.

Title: **EMPOWERING HEALTHCARE: TRANSFORMING BP MONITORING WITH SPK DIAGNOSTICS**
Presenter(s): Abhilasha Ganguly
Faculty Mentor: Dongjun Rew
Track: 3D
Abstract: SPK Diagnostics aims to revolutionize blood pressure (BP) monitoring in the U.S. healthcare system by addressing major loopholes, including lack of transparency, high costs, difficulty finding a good doctor, lack of insurance coverage, and preventable medical errors. The company focuses on Ambulatory Blood Pressure Monitoring (ABPM) through a state-of-the-art wearable device, overcoming the limitations of traditional spot BP checks. SPK Diagnostics plans to provide ABPM devices on rent for 24 hours, offering a detailed BP report with diet and exercise recommendations. The company's mission is to make 24-hour BP monitoring easy, accessible, and affordable. The business strategy involves penetrating the market by targeting cardiologists and establishing ABPM as a gold standard of care for hypertension patients in the USA. The distribution strategy includes having a dedicated lab and an online platform for renting ABPM devices. The pricing strategy is based on penetration, with an initial lower cost to encourage adoption. The marketing plan emphasizes raising awareness among healthcare providers through advertising, personal selling, sales promotions, and communication.

Title: **CUSTOMER SATISFACTION AT GRAND JUNCTION'S FEISTY PINT**
Presenter(s): WilllIam McClurg
Faculty Mentor: Shiang-Lih Chen McCain
Track: 3D
Abstract: Feisty Pint has been shown to be an emerging bar-style restaurant in Grand Junction's downtown area. The enhanced incorporation of menu items made to order, as well as cocktail specials that accompany great happy-hour deals, shows why Feisty Pint has appeared as a respected restaurant in its location. In this study, customer satisfaction is the primary focus. The components of product quality, service quality, and atmosphere have been evaluated in regard to their influence on customer satisfaction at Feisty Pint. This study highlights the utilization of content analysis, which is put together with online reviews to gauge the degree of satisfaction of current customers at Feisty Pint. Marketing recommendations, as well as managerial implications were also implemented into the study to increase customer satisfaction.

Title: **NONPROFITS, FRAUD AND INTERNAL CONTROLS**
Presenter(s): Kyle Chu, Dillon Chapman, Isabel Royer, Benedict Nagy, Jazer Toews
Faculty Mentor: Gary Hypes
Track: 3E
Abstract: This project focuses on developing robust internal controls, tailored for nonprofit organizations to mitigate the risks of fraud. With a growing concern for transparency and accountability, in the nonprofit sector, effective internal controls play a pivotal role in safeguarding assets, ensuring compliance, and preserving donor trust through the analysis of common fraud schemes prevalent in nonprofits. This project aims to identify vulnerabilities and provide guidance on preventative measures for leadership groups within nonprofits. The deliverables of this project include a comprehensive video presentation and an informative brochure. The video presentation will serve as an educational tool highlighting the importance of internal controls and providing practical insights into implementing them effectively within nonprofit organizations. The brochure will offer concise comprehensive information, outlining key strategies, best practices, and case studies to aid nonprofits and fortify the internal control framework that they use to mitigate fraud. Ultimately this project endeavors to empower nonprofit organizations with the knowledge and resources necessary to proactively combat fraud by enhancing organizational integrity and fostering greater confidence amongst stakeholders.

Title: **SIAC INVESTMENT PORTFOLIO**
Presenter(s): Mason Kochel, Dante English, Carissa Crawford, Alex Bruce, Paige Coble
Faculty Mentor: Jacob Ongaki
Track: 3E
Abstract: The Student Investment Advisory Committee (SIAC), established in 2019, offers practical experience in learning portfolio management and applying ethical principles at Colorado Mesa University (CMU). SIAC and FINA 425 oversee a portfolio valued at $143,000, a gain of 43% (annualized returns of 7.4%) from the original investment of $100,000. The portfolio currently has a cash value of $27,000 to invest in and diversify the portfolio. This learning model demonstrates CMU's commitment to integrating theoretical knowledge with practical application, preparing students for successful careers in finance and investment. SIAC utilizes various models and market factors such as economic indicators, industry trends, and global events to inform our investment strategy, while adhering to U.S. market constraints. The portfolio incorporates student collaboration to diversify across cash, equities, and fixed incomes that reflect strategic risk management and periodic rebalancing while following portfolio parameters. The SIAC aims to outline various securities across multiple sectors that offer long-term growth opportunities. Some current holdings include Arista Networks, H&R Block, and several ETF's. Students are actively researching new securities to allocate funds to rebalance the portfolio; those favored by SIAC will be proposed to the board of trustees and invested during the current semester.

Title: **SHOULD ORGANIZATIONS INVEST IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TECHNOLOGIES TO ENHANCE THE PREDICTIVE CAPABILITIES OF THEIR INFORMATION SYSTEMS FOR PROACTIVE ISSUE RESOLUTION?**
Presenter(s): Mark Lenczycki
Faculty Mentor: Jeffrey Meese
Track: 3E
Abstract: This paper will address the issue of whether organizations should invest in Artificial Intelligence and Machine Learning technologies to enhance

the predictive capabilities of their information systems for proactive issue resolution. Artificial intelligence has been theorized, investigated, and developed since the dawn of computing. It is argued that all computing has some intelligence behind it, and it has only gotten more complex in recent years. Artificial intelligence can be useful in prediction and decision-making, however, it can be a detriment to human counterparts. Based on scholarly articles, this project presentation offers insight into organizational investment in Artificial Intelligence and Machine Learning technologies.

Title: **MODERNIZATION OF THE TUTORIAL LEARNING CENTER SYSTEMS**
Presenter(s): Jennifer Rich, Tami Mittan, Zachary Russell, Logan Surace, Wyatt Raimer, Rocio Hernandez
Faculty Mentor: John Snyder
Track: 3E
Abstract: This project aims to modernize the tracking and reporting systems for student learning activities at the Tutorial Learning Center (TLC) at Colorado Mesa University. This student-led group will improve efficiency and usability by cleaning up data, optimizing organization, and enhancing reporting features. For TLC's Microsoft-based systems, improvements will include streamlined manual entry, added error-checking features, and improved user interfaces. Deliverables include user-friendly instruction manuals and new system features to meet specific needs.

Title: **ACCREDITATION STANDARD TOOL FOR DAVIS SCHOOL OF BUSINESS**
Presenter(s): Mason Solmos, Ali Steppler, Samuel Goulet, Michael Bosch, Lance Fullenwider
Faculty Mentor: John Snyder
Track: 3E
Abstract: This project will build a what-if tool for the leadership team of the Davis School of Business to monitor compliance with accreditation standards. The tool will be built in Excel and utilize data from the accreditation template, which gives the current state of the variables and statistics monitored at the Davis School of Business. This application leverages the power of macros, conditional formatting, and form controls in Microsoft Excel. The inclusion of form controls enhances user experience by offering better data entry and manipulation. We believe this provides a simple way to ensure accreditation standards are met through the Davis School of Business.

CMU Tech — Culinary Arts

Title: **FINE ARTS MEET CULINARY ARTS**
Presenter(s): Olivia Linnebur, Brenna Langfield
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: This project will display how the techniques and principles typically associated with fine arts such as painting and design, can apply to the mediums and techniques of culinary arts and plating. The final presentation will include a plated dish specifically designed for the canvas of the plate. As an interdisciplinary study of art, we will present on the principles of fine arts, and apply them to cooking techniques rather than painting techniques. We will apply the principles of color, shape, etc., to the ingredients and tableware of the dish. This project is an exploration of how these two disciplines are alike and how they differ from one another, as well as how culinary adds a new depth and dimension of flavor compatibility to the fine art environment.

Title: **HOW PROTEIN REACTS TO HEAT**
Presenter(s): Dawson Fischer
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Cooking proteins such as beef, eggs, and chicken correctly is essential to the enjoyment of a meal. I am going to demonstrate what happens to eggs under the application of heat at different temperatures and time periods in an immersion circulator.

Title: **MOCKTAIL BAR**
Presenter(s): Jody Alexander, Aharon Bustillos-Perez
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Bartending can be a difficult job with a large sum of preparation. It's important to be able to listen, think, learn, and operate at a moment's notice, while maintaining quality service and a high-quality product. In this demonstration, Jody and Aharon will run through the procedures of setting up a bar station, as well as producing a couple of beverages that some of the audience may sample. Guests will also have the opportunity to converse with Jody and Aharon in order to demonstrate a high level of customer service. They also may request a beverage in order to demonstrate the ability to work and maintain calm while in a high-intensity situation. The concept behind this practical demonstration is to provide non-alcoholic beverages to guests with the following options: Blackberry Virgin Mojitos, Espresso Martini Mocktails, Blood Orange Mocktail Spritzers, Shirley Temple Mocktails, Sparkling Strawberry Cucumber Mocktails, and Spiced Minty Mango Mocktails.

Title: **FERMENTED FOODS**
Presenter(s): Ginger Rich
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Fermenting food has been used throughout history. It was a lifesaver before refrigeration in order to preserve food. Today we have the benefit of refrigeration, but fermentation can still be a very delicious way to transform our food and provide us with an incredible array of health benefits. Cheese, yogurt, pickles, and sourdough bread are just some of our favorite foods that go through some sort of a fermentation process. Fermented foods are not just something that can be bought in stores. In fact, it is quite simple to make many things in your own kitchen. You can utilize food that would otherwise go bad and be thrown out. You can save money and make your own yogurt or sauerkraut. Learning how to make sourdough bread and maintain a "starter" is a skill that can bring great joy and added health to you and your families lives as well as a wonderful hobby for yourself. I will be presenting samples of various fermented products. I hope to surprise, delight, and inspire you to add more of these products into your diet. Your gut will thank you!

Title: **MEAT FABRICATION**
Presenter(s): Corban Carruba, Zachariah Hamilton
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: It is important for people to know where the cuts of meat they buy come from on the animal. Having knowledge of this subject can help people save money, make better meals, and match the appropriate flavor profile and tenderness of a cut to the recipe they wish to prepare. It is extremely

helpful while shopping and planning. Choosing the right cut can influence your method, your recipe, and the total cost of your meal.

Title: **HOW TO PREP DELICIOUS AND DECORATIVE B&B MEALS THAT GUESTS WILL LOVE**
Presenter(s): Cassie Graumann
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Bed and breakfasts (B&Bs) are all about creating a unique atmosphere and experience. Innkeepers achieve this through the kind of service they provide. Food service is a huge part of B&Bs, and it can be hard to know what kind of food will impress and differentiate your business from others. The key to the second "B" is to know how to manage your time and create balanced menus that are creative, delicious, unique, and decorative. Through this oral presentation, you will learn how to effectively create an experience customers will never forget through the art of hospitality.

Title: **CAKE DECORATION**
Presenter(s): Shii Maldonado
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: The importance of cake decorating is to make a cake that is not only delicious but pleasing to the eye. Without any decoration, a cake is bland and boring to look at. There are many ways to decorate and many unique occasions that call for different decorations. I decided to do an exhibit of a decorated cake because I love decorating cakes and because it is what I want to do with my career. This project exemplifies how to decorate a cake and the different techniques used. I will be making a tiered cake with a basic design that involves a crumb coat, buttercream icing, shell board, and lettering.

Title: **KNIFE STYLES AND MAINTENANCE**
Presenter(s): Matt Hoisington, Rebecca Simler
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Equipment maintenance is an important part of keeping a kitchen functional, as well as improving efficiency and cutting cost. We will demonstrate how to properly sharpen a knife so everyone at home can keep their knives useful longer by knowing how to take care of them. While an oilstone is an investment, the price pales in comparison to that of replacing knives or paying for a sharpening service. There are many types of knives that are used in kitchens all over the world. No matter what kind of knife you have, a dull knife is more dangerous than a sharp one, which is why it is so important to know how to properly sharpen a knife. Many people think that to have a good chef's knife you must have an expensive, hand-crafted knife. There are plenty of good quality chef knives that are inexpensive and will last you years if you take the time and effort to take care of them. In this showcase, we will be demonstrating the use of an oilstone and steel for knife sharpening. We will also be a displaying many assorted styles of knives to show the different finishes, types of blades, and styles of handles. The variety of blades will also have their uses defined, highlighting the different styles of knives needed for specific purposes.

Title: **BREADBASKET SHOWPIECE**
Presenter(s): Macey Braun, Elizabeth Gerrard
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: The breadbasket is designed to present the idea that bread not only can be used as a form of food, but also as a form of art. For Student Showcase, I will demonstrate the ability to combine traditional bread baking techniques and artistic creativity. The showpiece will be a breadbasket filled with hand-crafted fruits and vegetables made solely out of bread. This project's purpose is to show that a simple loaf can become a work of art.

Title: **THE COST AND CUTTING OF WEDDING CAKES EXPLAINED**
Presenter(s): Ashley Leach, Amanda Stewart, Rachel Carpenter
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: In modern western culture, wedding cakes signify luck and unity of guests and the couple at the wedding. When it comes to cutting a cake to serve hundreds of guests, it can be a challenge to make equal clean slices while keeping the cake intact. We will be demonstrating exactly how it's done while keeping the cake elegant and beautiful. There are many ways to cut a wedding cake and within the demonstration we will touch base on the different ways to cut different-sized cakes. Wedding cakes recently have jumped in cost and have become a very hot topic within the baking community and those seeking cakes. During our demonstration we will provide samples of different cakes, explain cost, materials, and labor involved, to show why wedding cakes are so expensive. In the end, everyone can leave with a slice of tasty cake!

Title: **BRIE'S BLISSFUL MOCKTAILS: CRAFTING ZERO ABV DELIGHTS**
Presenter(s): Brieanna McGovern
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Join us for an exploration into the world of non-alcoholic mixology. This presentation will showcase the rising trend of zero alcohol by volume (ABV) spirits and feature live demonstrations on crafting sophisticated mocktails. One will gain insights into flavor pairing, garnishing techniques, and the cultural significance of alcohol-free options. Discover the art of creating satisfying and sophisticated beverages without the buzz, and learn how mocktails can be a delightful choice for any occasion.

Title: **ARE GRAND JUNCTION MANAGERS TRAINED ENOUGH TO MANAGE?**
Presenter(s): Sierrah Dixon
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Most people can relate in one way or another to an experience with a bad manager. In this study, Sierrah went to several different companies, from a variety of occupations, interviewing their employees on their experiences with their managers. She asked all the workers the same questions and tallied their answers, finding flabbergasting results. Are Grand Junction companies doing enough training with their managers before promoting? Are the people of Grand Junction getting the management and structure they deserve? Do people feel accepted and excited for each workday? What ways could and should companies improve their management styles? Through this study, she uncovers the raw and true facts about Grand Junctions workforce, how people in the workforce are really treated, and how to make the changes necessary to have a successful business.

Title: **CONVERGENT CUISINE AROUND THE WORLD**
Presenter(s): Falcon Hicks
Faculty Mentor: Wayne Smith
Track: 14B
Abstract: Throughout the world, there are many different races, cultures, traditions, and cuisine. While people may look around, only to see the differences, there are more similarities than you might think. Cases where diverse cultures have a similar type of cuisine or food preference are more common than not. Examples include, in India they have nan bread, in Mexico they have tortillas, Native Americans have fry bread. They are all the same concept, but with a different execution. In Africa, India, South America and Mexico many dishes involve a variety of chilis and a preference of bold flavors. In this demonstration, I want to bring attention to the similarities that diverse cultures share through cuisine.

CMU Tech — Digital Filmmaking

Title: **A SONG FOR PARKER**
Presenter(s): Leobardo Marin Rivera
Faculty Mentor: Sundial Hoffman
Track: 14D
Abstract: This film delves into the similarities of nature and music, following a grieving lover finding comfort through creative expression. The movement of the sun symbolizes the passage of time. This story provides a glimpse within how creativity becomes an outlet for suffering. On the technological side, the story was created over the course of the weekend, but the value is priceless. Its purpose was to highlight how the sunset is able to serve as an aesthetic scene. Using simple methods with minimal camera equipment, the conclusion is that a visually appealing film can be achieved without the use of extensive lighting or sound. The motivation for this project was driven by a love for music, a desire to capture a sunset's beauty, and the human behavior that is grief. It is necessary to display the different forms this grief can take, and how each is ultimately masking a deep sensation of loss. Some members may not be accepting of the visual representation of littering, but behind the scenes, the trash was picked up upon being thrown. Finally, the significance of this project is the ability to do this with 2 people, a sunset, and a passion for telling this story.

Title: **DEAR FATHER**
Presenter(s): Levi Kramer
Faculty Mentor: Joshua Meuwly
Track: 14D
Abstract: Now I must away with fleeting heart, remember my words unto you whilst we are apart.' A son's words to his recently passed father, Dear Father depicts the roles our parents play in our lives and how their legacies live on with us even after their lives conclude. Dear Father is a short film written, directed, and shot by Levi Kramer during his Associates of Applied Science in Digital Filmmaking. The film showcases the impacts of family on Levi's life and is the first in an anthological, episodic series. Following Dear Father is a collective body of work produced over the last few years of study at Colorado Mesa University. The demo reel encapsulates the working style of Levi Kramer and communicates the proficiency of the artist's ability to convey emotion, mood, and tone.

CMU Tech — Machining

Title: **ANODIZATION CART**
Presenter(s): Jack Barefoot, Tanner Crenshaw, Blake Glover
Faculty Mentor: Michael Carlton
Track: 14A
Abstract: Our task for Machining Technology 3 is anodizing the 50 plus aluminum grips for the light saber project. In order to accomplish it we need to create a system to quickly anodize a large number of parts in a limited amount of time. To do this we made a cart from purchased parts and materials we had available. The cart has everything needed for the anodization process, tubs for the lye bath, sulfuric acid, color, boiling water, hot plates, and a power supply. The process can take over an hour, so the cart is set up in a way to allow for multiple parts to anodize at the same time, this allows us to get more done within our given time.

Title: **LIGHTSABER PRODUCTION**
Presenter(s): Logan DeMers, Bristol Durham, Brennan Fritz, Blake Valiquet, Christine Hein, Connor Percival, Bryson Reddick
Faculty Mentor: Edward Dry
Track: 14A
Abstract: The intricate process of creating lightsabers requires dedication and focus while using computers, CNC machines, and trial and error to find the perfect program. In the machine shop, we were divided into teams to machine parts for building the lightsabers. Our teams used aluminum to create the grips of the hilts, and brass to create emitters and pommels. With the resources in the shop we hope to produce a total of 50 lightsabers. To ensure the lightsaber meets high quality standards, the teams checked each lightsaber individually and measured each part to meet all requirements. The lightsabers we created provided us with a hands-on learning experience, provided insight that would help in a workplace setting, and helped grow funds for scholarships and future projects like this.

Title: **LIGHTSABER FIXTURING**
Presenter(s): Aaron Hall, Levi Ross, Mark Huska, Kenneth Waggoner
Faculty Mentor: Michael Carlton
Track: 14A
Abstract: Job shop machining, partnered with machine technology III, and practical applications were employed to allow for a production run of 50 lightsabers. Our team focuses on work holding solutions by making the custom jaws and tools needed to make manufacturing lean and fast. To assist in the production of the brass and Mavroon lightsabers hilts, we program CNC machine tools for a quick and error free process. Our goal is to grow our understanding of how an efficient job shop operates and to implement what we have learned in the appropriate way.

Title: **LIGHTSABER PRODUCTION**
Presenter(s): Giovanna Martinez, Isaac Hokanson, Maxwell Haynes, Harrison Dico-Jekot, Tanner Crenshaw, Blake Glover, Jack Barefoot
Faculty Mentor: Edward Dry
Track: 14A
Abstract: In a galaxy far, far away with Jedis who keep the peace, Sith's who plot to overthrow them, teddy bear insurgents called Ewoks and a princess who flies through space, the lightsaber is the most iconic weapon to wield. This luminescent laser sword is our inspiration and constructing the weapon of a Jedi Knight is our mission. Utilizing an up-to-date manufacturing process

such as lean manufacturing, we collaborated between four manufacturing classes, researching, designing, and executing the custom build of 50+ lightsabers. Hours of CAM work done in both Feature Cam and Fusion 360, our team has designed and created programs for every aspect of each part involved in the process of manufacturing these lightsabers. Our signature colors are created from brass and anodized Mavroon, giving these lightsabers the ultimate Maverick touch. This project comes equipped with all the aesthetic qualities, light, sound, and motion detection that achieve the movie-like realism any fan would expect. As Obi-Wan Kenobi says, "This weapon is your life."

CMU Tech — Medical Office Assistant

Title: **SYPHILIS**
Presenter(s): Lilly Polniak
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: Syphilis affects 20 million new people each year. Although it is a quite common sexually transmitted disease, there are not very many effective treatments. The most effective solution is prevention. During the PICO research process, keywords and search terms were used to research this topic in the following databases: CINAHL and UptoDate. The following PICO question was formulated, "Do people with syphilis who receive rapid or point of care testing result in a reduction of further transmissions?" The results from the PICO research provided 60 full text articles from 2016-2023; more research will be needed to answer this PICO question.

Title: **INFANTILE SPASMS**
Presenter(s): Mystic Cardinal
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: This research project will explore infantile spasms in newborn females. It will answer the questions of: What are these spasms, what are the long-term effects, are there any interventions and is there a cure? Research was conducted using the Cleveland Clinic and DynaMed websites using the keywords: infantile spasms, epilepsy, and experience. From these websites, it was found that infantile spasms are locking of the knees to the chest, arms flung out, and that they occur when falling asleep or waking up. These symptoms all resulted in a form of epilepsy that typically occurs in babies under 12 months old. Cleveland Clinic has found that babies affected by infantile spasms often already have or will have developmental delays or developmental regression. Based on the PICO there is still more research that needs to be done.

Title: **MS (MULTIPLE SCLEROSIS) DISEASE**
Presenter(s): Mariana Contreras
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: This study explores MS (multiple sclerosis) disease. It is a brain, spinal cord, and optic nerve disease resulting in one or more episodes of neurologic dysfunction with a variable course of recovery and disease progression. Research on this disease comes to find that there is no cure. Symptoms can either increase over time or reduce when the individual enters adulthood between 20-50 years of age. However, there are several types of relaxation therapies that can decrease symptoms and reduce pain. With PICO's help, I will explain how a physical therapist can help with therapy and medication.

Title: **ACUTE MYELOID LEUKEMIA**
Presenter(s): Signe Peterson
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: How are patients affected with acute Myeloid Leukemia? Acute Myeloid Leukemia is a cancer in the bone marrow and blood cells. Acute Myeloid Leukemia represents about 1.2% of cancer cases in the United States in 2019. Using PICO strategies, the following keywords where developed: treatment, lasting impact, side effects, and adults. These keywords were searched in the following database: DynaMed, Essential Evidence Plus, Google Scholar (Journal of Clinical Oncology), and Up to Date. Following this research, this PICO question was asked: Do survivors of acute myelogenous leukemia who receive psychological interventions experience improved emotional well-being? Answering this question will require additional research.

Title: **hEDS INFORMAL**
Presenter(s): Abbigail Wilson
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: Ehlers-Danlos syndrome (EDS) is a rare genetic disorder that affects the body's connective tissues. Several diverse types of EDS present their own set of symptoms and severity levels. Among these, EDS Type 3, also known as hEDS, is characterized by joint hypermobility, skin hyperextensibility, and chronic pain, along with the possibility of secondary conditions. Diagnosis of hEDS can be challenging, as symptoms may vary widely from person to person. Based on the PICO research conducted, it has been established that treatment primarily focuses on managing symptoms, preventing complications, pain, and secondary conditions. It is estimated that hEDS affects 1 in 5,000 people worldwide.

Title: **KURU DISEASE**
Presenter(s): Wyatt Gentry
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: What is Kuru? Kuru is a self-inflicted disease and has a 100% fatality rate. It is a prion disease that targets the brain and its motor functions. There are only a few known cases of it occurring, and when it does, it happens in third-world cannibalistic countries like Papua New Guinea. There were only 30 out of 587 results found using the PICO research strategy about the topic. When researching an academic database, CINAHL, to find information about this disease, PICO assisted in formulating a question: In starving cannibalistic communities in third-world countries, does reducing pain with morphine or fentanyl help with this painful and deadly disease? With no cure, are heavy opioid pain killers the only course of action for end-of-life care?

Title: **THE RELATIONSHIP BETWEEN THE EFFECTS AND LIVING CONDITIONS OF THE HANTAVIRUS**
Presenter(s): Joel Richards
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: This study examines the effects of the disease known as the Hantavirus. This disease is defined as a severe respiratory disease caused by virus-containing particles within the droppings, urine, or saliva of infected rodents. Using the PICO assignment, the following sites were examined: CDC, UpToDate, and DynaMed. Results showed that the virus was most prevalent in the

southwest region of the United States with a confirmed 850 cases in that area alone. The study has also shown that the disease is guaranteed fatal if not discovered early on. From the research, the following PICO question was formulated: What is the relationship between the prevalence of the disease and the living conditions a person might be in? There were only 28 full-text results found from 2016-2023.

Title: **HIV**
Presenter(s): Payton Heil
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: Human immunodeficiency virus (HIV) is a virus that attacks the body's immune system. HIV is transmitted from person to person through body fluids (blood, breastmilk, semen and vaginal fluids). If left untreated it will lead to acquired immunodeficiency syndrome (AIDS). There is no cure for AIDS, but with proper medical treatment people with HIV can live long healthy lives. Using current medications, people can reduce the amount of HIV in their blood to levels that are undetectable.

Title: **CHLAMYDIA**
Presenter(s): Cheyanne Drews
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: Chlamydia is a sexually transmitted infection (STI) caused by the bacterium Chlamydia trachomatis. It is one of the most common bacterial STIs in the world, with millions of new cases reported each year. Chlamydia can infect both men and women; if left untreated, it can cause serious health complications such as infertility, chronic pelvic pain, and ectopic pregnancy. The infection can be easily treated with antibiotics, but many people who are infected do not experience any symptoms. This makes it more difficult to diagnose and treat. This project will provide an overview of the epidemiology, symptoms, diagnosis, treatment, and prevention of chlamydia, as well as highlight some of the ongoing challenges in addressing this important public health issue.

Title: **CREUTZFELDT-JAKOB DISEASE**
Presenter(s): Riley Carpenter, Wyatt Gentry
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: This study centers around the brain destroying prion disease, Creutzfeldt-Jakob Disease, or CJD. Using databases like DynaMed, UpToDate, CINAHL, and websites such as the World Health Organization and Mayo Clinic, data were collected to fulfill a PICO assessment. The question was such: What can be done for a person afflicted with CJD? Although there is a plurality of cases to pull from, not enough were in English or were decidedly too old to be considered reliable or relevant. Despite this issue, a conclusion was formed: Creutzfeldt-Jakob Disease is terminal with no known remedy or cure. Despite this bleak position, research is in motion to synthesize a prospective cure. More research is required to adequately complete the PICO process.

Title: **HUNTINGTON'S DISEASE**
Presenter(s): Adrianna Trujillo
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: Every year, hundreds of thousands of people lose their ability to perform everyday skills, and Huntington's disease is the cause behind it. A gene mutation that runs in families is created by the alteration of the protein called huntingtin. Not only is the gene passed down through genetics, but it also targets the age range of 35-44, which includes all genders. This disease also leads to damage of nerve cells that changes mentalities, leading in a decline in social skills, depression, and occasionally death. Through molecular genetic testing, a physical exam performed by a physician that tests cognitive and behavioral symptoms, concludes a straightforward diagnosis. Since Huntington's disease is passed down genetically, there is no cure, as well as no therapies that will help improve it. Most diagnosed with Huntington's disease use social support and physical activities such as walking and regular exercise to help control symptoms. Research has been supported and studied using the PICO assignment through the Mayo Clinic, DynaMed, Centers for Disease Control, and the National Institutes of Health. Evaluation of research has not been completed as part of this capstone project and requires additional research.

Title: **EFFECTS OF EAR PRESSURE THERAPY AND BETAHISTINE TREATMENTS ON PATIENTS WITH MENIERE'S DISEASE**
Presenter(s): Shane Storey
Faculty Mentor: Karrie Stanfill
Track: 14C
Abstract: Do treatments of Betahistine or ear pressure therapy improve gradual hearing loss in patients with Meniere's disease? Meniere's disease is a spontaneous disorder of the inner ear that is characterized by recurrent, spontaneous attacks of vertigo and fluctuating hearing impairment. Using the PICO method of research, resources such as DynaMed, Google Scholar, John Hopkins University, and the Mayo Clinic, ear pressure therapy was shown to help with side effects including pain and vertigo attacks. Evaluation of research was not completed as part of this Capstone Project and requires further research.

CMU Tech — Teacher Education

Title: **THE DIFFERENT DEVELOPMENTAL STAGES OF ART IN YOUNG CHILDREN**
Presenter(s): Amani Miller
Faculty Mentor: Tammie Shoultz-McCole
Track: 12E
Abstract: Early childhood covers the most important years of a child's life. There is so much that a child learns in their first 8 years of life including social, physical, and knowledge skills. Important skills they learn include imagination and creativity through art. Art is introduced to children at a very young age to encourage multiple skills and to think outside of the box. With visual arts, children can communicate their thoughts, feelings, and ideas onto material that reflects their gradual growth and development. There are different developmental stages of art from age 2 and up. This presentation will cover scribbling, pre-schematic, schematic, and drawing realism. As an educator and parent, it is important to learn these different developmental stages of art to apply the appropriate curriculum and activities for young children. This presentation will provide information to help adults understand where a child is within their creative development.

Title: **PLAY VS. CURRICULUM-BASED CENTERS**
Presenter(s): Ashleigh Siefken
Faculty Mentor: Tammie Shoultz-McCole
Track: 12E
Abstract: This presentation will attempt to answer the question 'What is the social and educational difference between play-based and curriculum-based child care?' As an early childhood teacher it is important to understand how students learn and the best approaches for learning and development. The presenter will share the foundation of play-based and curriculum-based learning experiences, what they look like in a classroom, and what knowledge a child gains from each. Teachers and parents benefit from understanding the learning that takes place through play, what each looks like and the benefits of each, so that they can decide which one will work best for the child or children.

Title: **SELF-REGULATION IN PRESCHOOL**
Presenter(s): Crista Zahniser
Faculty Mentor: Tammie Shoultz-McCole
Track: 12E
Abstract: Why is it important to learn self-regulation in preschool? Emotional self-regulation in the early years is necessary for behavior self-regulation. A child who is experiencing a strong emotion has a challenging time focusing their attention, holding back impulses, and finding flexible ways of problem-solving. A child who is stressed and struggling to resist the impulse to move or speak is different from a child who is calm and can think flexibly themself. Regulation can be a struggle for students entering kindergarten. Early Childhood Educators can teach preschoolers how to calm their bodies when they have an uncomfortable feeling. They can teach students to sit in circle time and focus their attention on the teacher by using visual cards and modeling the good behavior for the students. Learning to line up to go outside in a quiet and straight line, playing in learning centers, how to problem solve and share are all important skills. These help each student strive as they enter kindergarten. The presenter will discuss how each child learns in a unique way, and when educators can teach self-regulation daily in students' routines, it makes the transition easier for the kindergarten teachers to be able educate their students and have less challenging behaviors in the classroom.

Title: **FINE MOTOR BENEFITS**
Presenter(s): Emily Phillips
Faculty Mentor: Tammie Shoultz-McCole
Track: 12E
Abstract: What are long term benefits of fine motor skill development at an early age? There are many ways to practice fine motor skills at a young age. Fine motor development improves writing, cutting, eating, and much more. In early childhood, fine motor is incorporated in everything throughout the day and can help build skills for later in life. This project will show benefits and offer lessons and fun games to help improve fine motor skills. After viewing this project individuals will have an idea of ways to help incorporate fine motor instruction into their classroom along with knowledge of why it is important.

Title: **UNLOCKING POTENTIAL: NAVIGATING THE EDUCATIONAL LANDSCAPE FOR CHILDREN ON THE SPECTRUM**
Presenter(s): Holly Sharp, Camryn Lang
Faculty Mentor: Tammie Shoultz-McCole
Track: 12E

Abstract: Children on the autism spectrum present unique challenges and opportunities in the educational setting. This presentation explores effective teaching strategies tailored to meet the diverse needs of these learners. Structured teaching methods, such as visual schedules and routines, help provide predictability and support for students on the spectrum. A multi-sensory approach, incorporating visual aids, auditory cues, and tactile materials, helps with comprehension and teacher engagement with the children. Collaboration with educators, parents, and specialists, coupled with adaptability, enhances the effectiveness of interventions, ensuring a well-rounded and impactful education. This includes incorporating the child's interests and strengths into their curriculum to motivate and expand their learning. Effective teachers must possess flexibility and patience while implementing strategies to promote success. Today's educators must navigate the academic terrain and the social and emotional landscapes that impact a child's learning journey. Collaborating with fellow educators, parents, and specialists becomes crucial for a holistic approach to education. The adaptability of effective teachers extends beyond instructional techniques. Managing behaviors, which have become more prevalent in contemporary classrooms, requires a nuanced understanding of each child's needs. By using evidence-based practices, educators can empower children on the autism spectrum to thrive academically, socially, and emotionally.

Title: **WHY MATH IS IMPORTANT IN THE EARLY CHILDHOOD CLASSROOM**
Presenter(s): Jessie Burnell
Faculty Mentor: Tammie Shoultz-McCole
Track: 12E
Abstract: This project is addressing the question, "Why is math important in early childhood education?" Math can be an overlooked subject at the early childhood level because some people feel that math is not important until the elementary level. The goal of this project is to educate people on the importance of starting math as early as infancy so children are successful when they do get to the elementary level math. This presentation will explain what math looks like in the early childhood classroom, what is appropriate at different ages, and why it is important for math to be introduced to young children.

Title: **THE EFFECTS OF SOCIOECONOMIC STATUS IN EARLY LEARNERS**
Presenter(s): Victoria Ramirez
Faculty Mentor: Tammie Shoultz-McCole
Track: 12E
Abstract: Many stressors come with being a child in today's society. One that affects young children the most and is often beyond their control is socioeconomic status. This project aims to provide examples of how socioeconomic status affects young children. Sharing research that provides avenues educators may take to ensure that no child is left behind due to their family's low income. This presentation introduces what it means to be a low-income family and the struggles these children face, resources that may be helpful to parents and other educators, and ways we can support disadvantaged students in the classroom. This is a significant topic; educators must ensure that the children in the community have every chance to succeed.

Computer Science and Engineering

Title: **DEVELOPMENT OF A SUSPENSION SYSTEM TEST BENCH**
Presenter(s): Dayson Torgerson, William Bockman, Alexander Spink, Axel Scholl
Faculty Mentor: Sarah Lanci
Track: 4A
Abstract: The focus of this project was on the design and development of a suspension system test bench. The suspension system test bench was constructed of LEGO® and shows how suspensions respond to diverse obstacles. Resembling a treadmill, the system enabled attachment of varying obstacles for a stationary car to traverse. Propelled by a motor and/or hand crank, the treadmill featured dual tracks for different challenges, offering insights into tire reactions. This design showcased the functionality of suspension systems, promising an illustrative demonstration for students in a college-level component design course.

Title: **INSECT PICTURE PYRAMID: DEVELOPING AN INSECT CAMERA TRAP**
Presenter(s): Jonathan Ceja, Bryson Cranmer, Calvin Jacobson, Erich Fecke-Stoudt
Faculty Mentor: Sarah Lanci
Track: 4A
Abstract: AI technology, spanning various disciplines globally, serves as a valuable tool for insect identification in biology. The purpose of this project was to design and fabricate a pyramid-shaped, fully-automated insect camera trap to take clear photos of insects at regular time intervals in a rainforest to be identified with AI. This device attracted bugs to its interior, where concise photos were taken as the insects gripped the inner walls. A Raspberry Pi controlled the camera, stored pictures, and powered systems (lights and scents) to attract insects. The finished project is a functional prototype that can gather data in a rainforest for a 24-hour period, advancing AI recognition of insects.

Title: **WIND TUNNEL VAPOR SYSTEM**
Presenter(s): David Wooten, Samuel Hartley, Jorge Pacheco, Trey Anderson, Amanda Eastlake
Faculty Mentor: Christopher Penick
Track: 4A
Abstract: A wind tunnel smoke/vapor system emits small streams of smoke to help wind tunnel operators visualize airflow around the test object. The existing vapor system cannot produce multiple streams of visible vapor, is not stable, and is not compatible with the current fog machine. The design of the new system addresses these issues, a fog machine generates pressurized vapor which flows through high-temperature tubes into two rails which dispense the vapor through elongated nozzles. The vapor rails are adjustable and mounted to a bracket affixed to the intake shroud of the wind tunnel. The bracket design reduces airflow restriction into the wind tunnel and the removable vapor rails also improve airflow when the fog machine is not in use. The system generates up to five vertical streams and four horizontal streams so the airflow can be visualized from multiple angles. A black cover on the back of the test section of the wind tunnel provides a dark background enabling operators to better see the effects of the test object on the surrounding vapor.

Title: **DRONE QUIDDITCH QUAFFEL**
Presenter(s): Emilie Teel
Faculty Mentor: Victoria Chavez-Herrera
Track: 4A
Abstract: A robotics class at CMU required protective materials for their programmable drones. The purpose of this project was to design spherical housing for the drones to reinforce their durability and longevity. The housing was designed using 3D printed plastic materials and pentagonal and hexagonal surfaces to increase rigidity. It was made modular to allow for the housing to be printed in pieces and assembled into a larger form. Testing was done to determine shear forces that the housing could withstand as well as the ability for the drone to fly with the attachment. The design files were submitted to the professor of the class in order to allow for repeatability.

Title: **THE DONKEY BOX**
Presenter(s): Dawson Pease, Tyler Saunders, Brendan Nowak, Colin Formanek
Faculty Mentor: Victoria Chavez-Herrera
Track: 4A
Abstract: Feeding donkeys can be a tiring and annoying task due to having to refill and monitor the amount of hay accessible to the donkeys throughout the day. The purpose of this project was to fabricate an automatic feeder that dispenses hay to the donkeys throughout the day in order to limit the amount of time one needs to spend at the barn with the donkeys. Utilizing modern day technology, the design includes a system of shelves attached to an oval shaped belt to act as tread similar to that of a tank or snow machine. At certain time periods throughout the day the tread will rotate, dropping a singular flake of hay at a time. The hay is dropped onto a wedge in order to split the flake and separate out the hay to feed multiple donkeys at once. This process is repeated until the box runs out of hay. With this automated invention the owner of the donkey will only have to visit once per day to refill the box with hay.

Title: **THE INVERTED PENDULUM FEEDBACK CONTROL DEMONSTRATOR**
Presenter(s): Ryan Knight, Ian McCollough, Logan Maier-Walford, Colin Duckworth, Ren Wilson
Faculty Mentor: Christopher Penick
Track: 4A
Abstract: A First-Year Engineering Project team set out to create an inverted pendulum that can be used as a demonstration of the principles of physics. The inverted pendulum has endless applications in engineering, such as in aircraft stabilization and rocket launches. This project aims to innovate by constructing a LEGO-based device that utilizes torque generated by a motor-driven wheel to autonomously maintain the inverted pendulum vertical without external support. A Raspberry Pi serves as the controller, executing Python code to regulate the motor's operation via a feedback control algorithm. An inertial measurement unit precisely monitors the pivot arm's angle, providing real-time adjustments to the wheel's speed and motor-on duration, ensuring a return to a perpendicular position. The incorporation of the Raspberry Pi adds a layer of versatility, enabling adaptability to changes in arm height and wheel diameter while maintaining optimal functionality. This project explores fundamental principles of dynamic stabilization and offers an engaging and interactive learning experience, made possible through the creative use of LEGO components. In essence, this LEGO inverted pendulum project represents a dynamic fusion of technology and play, contributing to a comprehensive understanding of control theory in an accessible and captivating manner.

Title: **DEVELOPMENT OF MODEL ROCKET LAUNCHER**
Presenter(s): Truitt Lovato, Tyler Grow, Jordan Hanke, Henry Hanna
Faculty Mentor: Aaron Howell
Track: 4A
Abstract: Most products these days are becoming increasingly digitalized creating a very tech-heavy world. This includes programmable logic controllers. Programmable logic controllers (PLCs) are industrial computers, with various inputs and outputs, used to control and monitor industrial equipment based on custom programming. Team HAT was assigned to create a basic control panel using a PLC to launch model rockets with safety and efficiency in mind. The control panel requires a specific sequence of actions to be activated and launched. If not followed, the controller stops the rockets from launching, potentially putting the user in danger. To turn on the controller a key must be turned on to give the circuitry and PLC voltage. This is then unlocked with an emergency stop button, which allows the user to arm each rocket and fire away. The controller worked with efficiency and accuracy after being manufactured. The rocket launch controller was built with safety at the forefront of Team HAT's goals which allowed them to build a box that is functional and can be trusted.

Title: **SKYWARD BOUND ON A BUDGET: THE DEVELOPMENT OF A MODEL ROCKET LAUNCH STAND**
Presenter(s): Noah Williams, Izaak Siefken, Tanner Spirek, Tyler Kopco
Faculty Mentor: Sarah Lanci
Track: 4B
Abstract: The increasing popularity of model rockets has led to innovations in launch systems. This project focuses on the development of a model launch rocket rail for an engineering professor at CU-Boulder. It stands six feet tall with a square base and was crafted using 1010 aluminum. This sturdy material, combined with T-slot aluminum attachments, ensures the structural integrity of the rail while allowing it to be easily dismantled for transport in a car. This design not only demonstrated how the rail could be disassembled but also detailed every component of the final assembly. The completed project features a rail that can be segmented and reassembled, equipped with an adjustment mechanism and base legs that underwent troubleshooting for optimal functionality. To enhance durability and resistance to corrosion, the rail received a Cerakote finish. The entire construction process was meticulously documented to ensure its repeatability, resulting in a high-quality, customizable launch rail that fulfills the client's specifications.

Title: **AUTOMATIC BACKSCRATCHER**
Presenter(s): Cesar Estrada, Adriel Vazquez, Kaydence Boyd
Faculty Mentor: Victoria Chavez-Herrera
Track: 4B
Abstract: Through collaborative processes, a backscratcher has been designed using a simple motor and 3D-printed parts. It can attach to a variety of differently sized office chairs using easily adjustable straps, without impeding on the chair's comfort, allowing the user to adjust the position to target those 'just right' spots. Controls include an on/off button as well as two separate speeds for the user's preference.

Title: **APPLYING PRESSURE: DESIGN OF A FRACTAL VISE**
Presenter(s): Michael Bucceri, Andrew Spencer, Owen McClain, Katie Shawver
Faculty Mentor: Sarah Lanci
Track: 4B
Abstract: The goal of this project was to build a fractal vise that is capable of clamping unconventional objects, so that they can be worked on or manipulated in some way. A traditional vise is a very simple design that has been around for centuries, however, its shortfall is that it can't apply clamping forces to objects that aren't straight. Although fractal vises are currently in production, all of them come with a hefty price tag of $3000 or more. A fractal vise has the ability to clamp oddly-shaped objects by utilizing a system of cams that can rotate and form around the shape of the object that is being clamped. With these cams rotating and contouring to the shape of the object, the contact surface area is maximized. A fractal vise is fairly complex, with many parts that move and interact with each other. The design was first modeled using CAD software and later 3D printed. Upon assembling a successful prototype, the vise was machined out of aluminum. The finished vise is not only functional but offers an example of the application of dimensioning and tolerancing to ensure proper form, fit and function.

Title: **THROTTLE ASSIST FOR SNOWMOBILE RECOVERY**
Presenter(s): Violet Wolitzky, Kendra Lemons, Magaly Luna, Phillip Hulst
Faculty Mentor: Aaron Howell
Track: 4B
Abstract: Snowmobiles typically get stuck in snow when the vehicle loses momentum; it digs itself into the snow past its point of flotation. Generally, getting the snowmobile unstuck requires at least two people, one frontward pulling and the other steering and applying throttle until the snowmobile frees itself from the snow. This device replaces the need for additional assistance by automating throttle control. It utilizes a DC motor which is attached to a band to adjust the throttle tension, triggered by a button mounted on top of the throttle assist. The throttle is pulled back and rotated once activated. Once the device is activated there is a small delay to allow the rider to position themselves to pull the sled before a short burst of power is released, allowing for self-recovery. By enabling riders to safely and efficiently get unstuck, even when alone, the throttle assist enhances the snowmobiling experience, contributing to increased safety and enjoyment of the sport.

Title: **MODULAR AUTOMATIC WATERING SYSTEM (MAWS)**
Presenter(s): Braeden Torres, Hayden VanGundy, Roberto Hernandez, Joshua McKee
Faculty Mentor: Aaron Howell
Track: 4B
Abstract: Watering is the most critical cultural practice for plant care, but it also requires a lot of effort. Indoor cultivation of various plants requires control over soil moisture and plant hydration, a challenge when the caretaker is away. In response, the innovators designed a watering system that is adjustable to the client's needs and can be used in a living mural adjustable to different types of plants. The result was the Modular Automatic Watering System (MAWS) which is a dependent watering system that is compact and scalable. The system's core utilizes an ESP32 microcontroller, chosen for its Wi-Fi and Bluetooth combo chip. This feature enables users to receive email notifications, remote monitoring of plant health, system maintenance, and website integration. Moisture sensors placed in the driest location in a planter's pot continuously assess watering requirements according to the plant profile entered in the MAWS' website. Upon detecting soil moisture

that is out of range, drippers begin dispensing water until it is in range. The automatic watering when the plant is in need of water will grant the innovator's client the freedom to leave for Brazil for summer break and come back to healthy plants.

Title: **HOBO SOLAR SHIELD FOR ENVIRONMENTAL RESEARCH**
Presenter(s): Collin Schrad, William Berkeley, Kai Stabolepszy, Collin Schrad, Yurii Sobovyi, Elena Lotz
Faculty Mentor: Christopher Penick
Track: 4B
Abstract: The pika population may be affected by rising temperatures in Colorado. Dr Johanna Varner, of Colorado Mesa University's biology program, studies the condition of the pika population, which indicates the overall state of the environment in the Rocky Mountains. Snowpack over rocks allows pikas to live in constant temperatures through the winter, but melting snow could expose pikas to harsher cold temperatures. HOBOs are devices used to record the ambient temperature in the area, allowing scientists to track the temperatures seasonally. Unfortunately, solar radiation causes artificially high-temperature readings, making it necessary to shield the device. A previous solar shield design combatted these issues, but the original shields no longer fit due to changes in the design of the HOBO device. Team Pika created a new solar shield that protects the updated HOBO devices from solar radiation while being easily reproducible, durable, and portable for long treks to research sites. The shields also have easy access to the devices for battery replacement and temperature reading collection. This shield will allow scientists at Colorado Mesa University to study changing temperatures in pika habitats across the western United States.

Title: **MAGNETIC FERRIS WHEEL: THE APPLICATION OF OPPOSITE MAGNETIC POLES AND INDUCTORS**
Presenter(s): Christina Eckerson, Jarrett Gurule, Jacob Mintken, Brandon Farstveet
Faculty Mentor: Sarah Lanci
Track: 4C
Abstract: The purpose of this project was to design an engaging educational exhibit for EUREKA! that demonstrates the principles of magnetism through interactive play. This exhibit uses the repelling forces of identical magnetic poles to rotate a wheel, which in turn drives a crankshaft attached to a single piston. This piston, also magnetized, oscillates within a coil to intermittently light up a bulb, illustrating electromagnetic induction. The project is intended to inform children about the practical applications of magnets.

Title: **THE NEWTON'S CRADLE**
Presenter(s): William McGlochlin, Luke Crabtree
Faculty Mentor: Victoria Chavez-Herrera
Track: 4C
Abstract: The EUREKA! Science Museum is a children's science center that strives to teach people of all ages fundamental science with an emphasis on engaging children. Some particular concepts such as abstract ideas are better taught through interactive demonstrations. Some of the more difficult concepts for children to grasp is conservation of momentum and Newton's third law. There are many possible methods of demonstrating this law in a hands-on manner but it was chosen that a Newton's cradle would be the most efficient to teach the topic. This Newton's cradle is made in a durable manner directly utilizing wood and steel construction with pool balls as inertial masses and steel cables instead of the traditional strings with the whole assembly enclosed with holes through which to interact

with. To further deepen the experience a placard with two descriptions of Newton's third law was included: one simpler explanation and the another with a more refined college level explanation to adequately provide engagement for varying age groups. In all, Newton's cradle is the quintessential teaching tool for Newton's third law and provides an in-depth understanding in a hands-on manner.

Title: **NEW DESIGN FOR FIRE CURTAIN RELEASE MECHANISM IN ROBINSON THEATER**
Presenter(s): Jacob Brown, Alexander Bustillos, Wesley Ricaporte
Faculty Mentor: Victoria Chavez-Herrera
Track: 4C
Abstract: The fire curtain in Robinson Theater was formally released by cutting a cotton rope in case of an emergency. The goal of this project was to design a new release mechanism for the fire curtain that eliminates the method that used a rusty 60-year-old pair of shears. The new idea for the new mechanism utilizes a quick release system that allows for deployment with one motion and the ability to reload the system without the need to install a new length of rope to replace the cut section. Since the design moved to a single motion deployment, a high visibility paracord was implemented as the trigger to ensure there will be no accidental deployment. Ultimately, the design works great and can replace the old form of releasing the curtain with a more modern and safer design.

Title: **A DANGEROUS SPACE FOR COMPUTERS**
Presenter(s): Nicholas Toutges, Chase Blaisdell, Calliann Ferguson, Hunter Kenney
Faculty Mentor: Aaron Howell
Track: 4C
Abstract: In an era of increasingly computer-controlled systems, sending processors into space has become continually more common. Unfortunately these modules can be affected by cosmic rays, causing bitflip events – random changes to data stored in a computer's memory. Not much is known about the exact causes of this phenomenon, or more specifically, how to reduce the impact. This project was created to reduce that gap in knowledge. The team constructed a small, self-contained box packed with electronics to be sent 30km into the stratosphere, equipped with non-ECC (Error Code Correction) memory modules loaded with non-essential data. Once launched, the satellite continuously read that memory, looking for those bitflip events. After retrieval of the landed payload, the CMU Astronomy club analyzed the data for the results in which sequence is more susceptible to cosmic rays.

Title: **REDESIGN OF THE AUTOMATED STROKE SENSOR**
Presenter(s): Zeke Magri, Evan Morrison, Reid Austin, Solomon Stern, Alexander Zappas,
Faculty Mentor: Christopher Penick
Track: 4C
Abstract: The past spring saw the creation of a sensor to detect a pneumatic cylinder passing in front of it and count the number of times the cylinder extends to test the fluid power systems' capabilities. Though functional, the first iteration of the Automated Stroke Sensor has significant design flaws rendering it impractical for use. For example, the weak frame of the sensor and exposed electronic components makes it susceptible to damage, the battery cannot be changed without breaking the device itself or the battery, and the device has no way to reset the counter except turning it off and on. Along with these problems, there is significant room for improvement over the original design, such as utilizing the same T-slot mounting mechanisms as the pneumatic cylinders to facilitate their use together, improving the

sensor's position for greater range and reliability, and making the device more adjustable for use in different configurations. The goal of this project was to redesign the sensor to add these critical improvements for a user-friendly, durable, and practical version of the Automated Stroke Sensor.

Title: **PLANETARY CENTER OF MASS DEMONSTRATION**
Presenter(s): Dylan Campbell, Ashton Cook, Diego Perez, Maci Flanagan
Faculty Mentor: Aaron Howell
Track: 4C
Abstract: The aim of this model is to demonstrate the fundamental concept of center of mass. Center of mass is the point at which celestial bodies orbit around each other. When an object is more massive, the center of mass will be much closer to it than the other object due to Newton's Second law. This model is a beam on top of a thin support, balanced at the midpoint with two objects on either end. These objects can slide along the length of the beam. This reflects the center of mass property because the beam only holds the objects in perfect balance when the masses are properly spaced from each other. This model is beneficial to show students a physical example of this fundamental concept of motion.

Title: **PORTABLE STORAGE CART FOR THE UNHOUSED POPULATION**
Presenter(s): Drew Federspiel, Calvin Hazard, Trevor Hadaway, Benoit Hueber, Jeremiah Gault
Faculty Mentor: Jennifer Moore
Track: 4D
Abstract: The increase in the number of unhoused individuals in the Grand Junction community has become a pressing issue, with a notable 43% rise from 2019 to 2023. Those impacted often face difficulties managing their possessions in a manner that enables mobility and safety in their daily lives. Due to limited alternatives and available resources, unhoused individuals frequently resort to storage options ranging from impractical to illegal, such as shopping carts. Addressing this challenge requires solutions that prioritize legality, practicality, and modularity, offering a means for storing and transporting belongings while ensuring the security of valuable items. The solution is a durable cart equipped with essential features tailored to the needs of homeless individuals, including a cooler for medication and other necessities, as well as a detachable seat. This project aimed to significantly impact the lives of the unhoused population by providing them with a practical and secure means of storing their belongings, thereby enhancing their quality of life.

Title: **UNHOUSED MULTI-PURPOSE STORAGE CART**
Presenter(s): Luke Chastain, Tanner Schwartz, Austin Schultz, Makayla Wayman, James Kundert
Faculty Mentor: Jennifer Moore
Track: 4D
Abstract: The unhoused population in Grand Junction requires improved means to transport and store their belongings while also establishing shelter. Previous methods utilized by unhoused individuals, such as shopping carts, wheelchairs, and backpacks, have proven impractical and often conflicted with legal regulations. Recognizing this need, this mobile cart project was started with the objective of designing a user-friendly, highly maneuverable, and low-maintenance solution to ensure both the security of personal property and adherence to relevant laws. The cart developed by the engineers featured solid rubber caster wheels for easy transportation and durability. The frame incorporated a side panel that swings up, providing ample storage space and potential shelter

functionality. Noteworthy amenities include provisions for keeping water cool, areas to hang clothes, a solar-powered battery bank, and multiple shelves to help with organization, enhancing overall quality of life for users. The engineers conducted demonstrations to showcase the accessibility and storage capacities of the mobile cart solution, aiming to provide meaningful assistance to the unhoused community in Grand Junction.

Title: **A BETTER CART FOR THE UNHOUSED**
Presenter(s): Max Smitten, Keegan Ashton, Catcher Jackson, Finnegan Bradbury, Zane Austin
Faculty Mentor: Jennifer Moore
Track: 4D
Abstract: Grand Junction's unhoused rate is around 2% or ten times higher than the nation-wide average. HSO 27's design seeks to aid the unhoused population by supplying them with a personal cart that carries all their belongings securely. As compared to a shopping cart, the cart offers superior durability, safety, security, and maneuverability. Additionally, HSO 27's cart provides more unhoused-specific features like water storage, small electronics charging, a chair, and shelter. This project seeks to provide a resource to the unhoused population of the Grand Valley.

Title: **MULTIFUNCTIONAL CART DESIGNED FOR UNHOUSED PEOPLE**
Presenter(s): Dylan Sanchez, Tristan Mandery, Levi Schamper, Joseph Pagel, Lucas Noel
Faculty Mentor: Jennifer Moore
Track: 4D
Abstract: Within the Grand Junction community, there is a marginalized population who need accessible means for transporting and securely storing their belongings. This project addresses this need by devising a solution capable of accommodating essential amenities for unhoused individuals. The devised mechanism, constructed by Team Canada, employs a dolly fortified with metal to provide a protective housing for personal belongings. Termed as the CART, this device has a solar panel system to power essential appliances utilized by unhoused individuals. Furthermore, it incorporates a lock box feature to ensure the security of belongings stored within its compartment. Notably, the CART is designed to hold tent poles, thereby transforming it into a shelter when needed. This multi-functional approach contributes to its overall efficacy as a cost-effective solution tailored to meet the needs of unhoused people in Grand Junction, Colorado. The CART was a reliable and robust device that offered both secure storage for personal belongings and shelter, when needed, thereby providing a practical solution for addressing the challenges faced by the unhoused population within the community.

Title: **MARS ROVER**
Presenter(s): Jake Thompson, Corbin McHerron
Faculty Mentor: Michelle Mellenthin
Track: 4E
Abstract: This project presents the development of a lightweight, autonomous six-legged robot designed to compete in the Colorado Space Grant Consortium's Robotics Challenge. The purpose of the project is to demonstrate the feasibility of navigating Martian-like terrain while collecting environmental data. The robot, weighing only 2kg, integrates an ESP32 microcontroller, environmental sensor, six 12V DC motors, and three 3000mAh battery packs. Utilizing different 3D printing techniques, the team constructed a robust and agile robotic platform capable of traversing challenging landscapes autonomously using LIDAR. Targeted towards

engineers, researchers, and the Consortium, this showcase highlights the team's approach to designing and implementing a compact and efficient robotic system for Martian terrain navigation.

Title: **MOCK ROVER**
Presenter(s): Emilie Teel
Faculty Mentor: Michelle Mellenthin
Track: 4E
Abstract: The Colorado Space Grant Consortium's Robotics Challenge challenged this team with building a rover. The purpose of this project was to design an autonomous robot that can avoid obstacles and plot a path towards a goal. The design consisted of PVC pipes for the chassis, an esp32 for the computation and control, and a system of motor drivers, motors and batteries. The chassis was modular to allow for prototyping various geometries. The rover is a 6-wheeled design, with surface-mounted hardware. Testing was done to see the robot's viability to propel itself over sand and avoid obstacles in its path. The rover was submitted to the challenge and competed in the competition. The designers will demonstrate the capabilities of the robot.

Title: **DEVELOPMENT OF A MIG-ADAPTED METAL ADDITIVE MANUFACTURING MACHINE**
Presenter(s): Jackson Lyon, Ryan Burdi
Faculty Mentor: Sarah Lanci
Track: 4E
Abstract: Numerous additive manufacturing (AM) processes have emerged for crafting metallic components, with metal fused deposition modeling (FDM) standing out. This innovative AM technique fabricates three-dimensional (3D) parts by layering sintered metallic material. Metal FDM's distinct advantage lies in its ability to create geometries unattainable through traditional methods like subtractive manufacturing. However, the ownership and operational costs of metal additive manufacturing are substantial, exceeding $99,000 for entry-level metal FDM machines. This project introduces an economically efficient approach to additive manufacturing by integrating a metal inert gas (MIG) welder with 3-axis 3D printing technology. Employing a blend of computer-aided design (CAD) and computer-aided manufacturing (CAM), a plastic 3D printer was modified, replacing the plastic extruder with a MIG welder torch. The resulting MIG-adapted AM system deposits layers of molten metal onto a disposable platen, enabling the production of intricate geometries. The capabilities of the fabricated machine were determined through troubleshooting and testing, and the results were documented in a user manual. This documentation serves as a valuable resource for users, providing insights into optimal operation and potential challenges fostering the continued development and refinement of this economically efficient approach to metal additive manufacturing.

Title: **GROOT ROVER**
Presenter(s): Urian Gonzales, Tyler Brake, Matheus Laperriere Pimenta
Faculty Mentor: Scott Bevill
Track: 4E
Abstract: Rovers, which are programmed robots, have multiple functioning components that work collectively to accomplish a task. The rover designed for this project, termed Groot Rover, includes features such as a mecanum wheel design directed by four independent DC motors, a color-detecting camera, an ultrasonic range finder, and RF receiver. Hardware is secured to an aluminum chassis that is manufactured with slotted features to allow

flexible positioning. With its Arduino-based microcontroller, Groot Rover has the ability to target and pop balloons of a specific color while avoiding obstacles and navigating through its environment.

Title: **HACC AUTOMATED GRAFITTI BOT**
Presenter(s): Casen Allmon, Adam Blackstock, Christian Manera, Holden Lefke
Faculty Mentor: Scott Bevill
Track: 4E
Abstract: Three-dimensional (3D) gantry systems are increasingly being incorporated into modern day living with products like 3D printers, CNC machines, and other automated processes growing in popularity. These machines improve lives by creating a hands-free automated solution to a variety of problems. To address this technological advancement, the team set out to incorporate an automated solution to creating street art through the design and development of the Graffit Bot. The product demonstrates the use of a 3D gantry system capable of drawing an image on a vertical surface with a working area of 2.5ft x 2.5ft. By exploring the intersection between art and technology, this project aims to inspire artists, engineers, and technology enthusiasts.

Title: **H.E.R.B.E.R.T.**
Presenter(s): Andrew McGuan, William Lue, Brandon Evans, Kaden Hine
Faculty Mentor: Scott Bevill
Track: 4E
Abstract: This project entails the development of an autonomous rover with the capability to target and burst balloons of specified colors, while demonstrating obstacle avoidance, speed, and navigation precision. Key project requirements include adhering to a maximum weight limit of 2.5 pounds, ensuring durability to withstand a 12-inch drop, and implementing a fully enclosed non-projectile balloon-popping mechanism without containing exposed sharp edges. A custom-designed and fabricated rover that is fully autonomous and capable of reliably executing designated tasks will be on display.

Title: **LOKI AUTONOMOUS ROVER**
Presenter(s): Chad Nilsen, Corbin Hill, Nick Saunders
Faculty Mentor: Scott Bevill
Track: 4E
Abstract: This project aimed to design and construct an autonomous rover capable of detecting and popping specific-colored balloons. Design goals for the project included robustness, demonstrated by the rover passing a 12-inch drop test prior to each mission, weight, requiring a complete design weighing less than 2.5 pounds, and obstacle avoidance. The design developed by the team featured two independently-driven wheels, a color-recognizing camera, and a balloon-popping mechanism.

Title: **BONSAI MAGIC ZIPLINE BRAKE**
Presenter(s): Tucker Wiltse, Jacob Allen, Taylor Cottam
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: The Bonsai Magic Zipline Brake is a braking system for zip-lines. The Bonsai Magic Zipline Brake was designed for Bonsai Design, an outdoor recreation engineering firm that designs rope courses and zip-lines. This system will be utilized by zip-liners on every Bonsai zipline. The Bonsai Magic Zipline Brake allows for smooth and simple zipline braking using a lightweight disk slowed by varying magnetic fields. The braking system can gently stop a 50 to 300-pound rider moving 5 to 45 miles per hour within 70 feet. The

current zipline braking devices can be too harsh on the rider and take a long time to reset. This zipline braking solution will improve the user experience and decrease the time spent resetting the braking system.

Title: **FRIENDS OF THE MUSTANGS**
Presenter(s): Sergey Eggers, Benson Wu, Erich Riedel
Faculty Mentor: Christopher Penick
Track: 4F
Abstract: This project's purpose is to design a repeatable testing procedure that assesses the payload retention and aerodynamic/ballistic characteristics of the Pneu-Dart 1cc and 2cc medicinal darts. Dr. Warren MacEvoy, a member of the Friends of the Mustangs (FOTM) Darting Team and sponsor of this project, is concerned about the inconsistent ballistic performance of the darts. The creation of a repeatable scientific testing method allows Dr. MacEvoy to understand how to account for the unpredictable performance of the darts and share this information to other FOTM members. A high-speed camera is utilized to observe the dart's deceleration, spin rate, and validate the LabRadar chronograph. Validation of the LabRadar allows for the collection of more accurate deceleration data. The drag coefficient is calculated from the deceleration data and known ambient conditions. Spin rate is discerned by counting the dart's revolutions in the slow-motion footage. Payload retention is determined by filling the darts with dye prior to testing and looking for this dye on the target and/or surrounding areas. These testing results will be compiled into a single document and provided to FOTM volunteers to account for the unpredictable nature of the darts and ensure proper medicinal loads are delivered to the horses.

Title: **AUTOMATIC FISHING LINE WRAPPING MACHINE**
Presenter(s): Tyler Meyers
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: Innovative Textiles Inc., a local engineering firm, requested a device that can automatically wrap fishing lines around a motorized pulley and an idler roller assembly to improve production line efficiency. The most prominent skills to complete the design process included computer programming, computer-aided design (CAD), machining, circuit wiring, and product development processes. To satisfy customer requirements and determine which components were used in the design, engineering analyses and decision matrices were used for the preliminary designs, while concepts were refined through prototyping and testing. The main components used to create the automatic fishing line wrapping machine included a pre-built frame, a robotic arm, a pneumatic valve, and a simple circuit to power all the components. During this project, the engineering design team went through multiple phases completing the project definition, conceptual design, and product development.

Title: **MIRCO-DROPLET TESTING APPARATUS**
Presenter(s): Kevin Backstreet, Peter Shearer, Wade Rose
Faculty Mentor: Christopher Penick
Track: 4F
Abstract: The sponsor Dr. Schiffbauer is a visiting assistant professor of physics for CMU and is conducting research on water droplet evaporation. Micro-droplet evaporation is important in different industries and research, from macroscale to microscale, such as DNA mapping, biosensing, inkjet printing, thermal management, fuel preparation, and microelectromechanical systems (MEMS) fabrication. The purpose of this project is to design and fabricate a testing apparatus capable of measuring

the mass loss, contact angle, and temperature of 8 µL water droplets during evaporation while maintaining the temperature and humidity of the sample environment. An acrylic enclosure encapsulates the different systems needed to measure the droplet data, as well as a system to place the droplet on a heated substrate. The functional testing apparatus will help in better understanding the phenomenon that is micro-droplet evaporation.

Title: **ELECTRICAL IMPEDANCE TOMOGRAPHY**
Presenter(s): Keegan Erickson, Jonathan Kleppinger, Diego Sena
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: This project involves designing and developing an open-source Electrical Impedance Tomography (EIT) machine to make this non-invasive medical imaging technology more accessible to the public and university students. An EIT machine may be used for bedside monitoring of the cardiopulmonary function. The proposed machine applies low-amplitude alternating electrical currents into the body while surrounding electrodes measure the voltages, creating cross-sectional images that display electrical tissue properties or their variations. This initiative will advance EIT research and development of EIT technology. This project is sponsored by Dr. Talles Santos, an electrical engineering professor at the University of Colorado at Boulder and a former EIT researcher. The project aims to extend accessibility by employing cost-effective, open-source hardware, allowing for broader dissemination and collaboration. Despite Dr. Santos's prior experience in EIT machine development, there is currently no such equipment at Colorado Mesa University (CMU), where the project aims to establish a center for EIT technology development. The 2023-2024 senior design team is tasked with creating a fully open-source EIT machine with real-time imaging capabilities, using affordable components, and having good usability, marking the inception of CMU as a hub for EIT technology advancement.

Title: **HIGH-RESOLUTION ART SCANNER DEVELOPMENT**
Presenter(s): Alex Campbell, Brett Edwards, Aidan Mobley
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: A high-resolution art scanner was designed in conjunction with sponsor Dr. Warren MacEvoy, a professor of computer science at CMU. Dr. MacEvoy proposed the development of a high-resolution art scanner during the global lockdown due to the COVID-19 virus after observing a family member and artist in Brazil struggle to sell their paintings. By using a monochrome camera in parallel with three narrow-bandwidth LEDs (one red, one green, and one blue), a high-resolution rendering of a painting can be created with better color accuracy than by traditionally photographing a painting in a studio. The high-resolution art scanner was constructed by modifying a table-top CNC router to accommodate a monochrome camera and an array of narrow-bandwidth LED lights. Python scripts are used to send G-code instructions to stepper motors that drive lead screws to provide linear motion to the camera gantry and canvas bed allowing a painting to be photographed sequentially. Python scripts activate the camera, take photographs, and stitch individual photos together into large data file master images that are then colorized. A more refined digital rendering of the painting is then available to the artist to sell to art connoisseurs around the globe.

Title: **ENGINEERING A NEW, TOOL-LESS LICENSE PLATE BRACKET FOR THE QUIKRSTUFF MACH 2 BIKE RACK**
Presenter(s): Nickalaus Clemmer, Jeremy Cooper, Lauren Lackmanr
Faculty Mentor: Christopher Penick
Track: 4F
Abstract: To appeal to an international market and to provide an upgrade to existing customers, the Grand Junction, CO-based manufacturer of the Mach 2 bike rack, QuikrStuff, has asked the University of Colorado and Colorado Mesa University engineering senior class to design, build, and test a prototype of a new lighted license plate bracket that meets United States and European Union regulations. Domestic and international laws mandate that the rear license plate of a vehicle be displayed prominently at its rearmost point and illuminated after dark. Regulations also require that turn signals and license plate lights be positioned close to the rear of the vehicle. Many bike racks on the road obscure the license plate, turn signals, and brake lights, causing non-compliance with the law. While there are some exceptions for bike racks, not all states or countries outline exemptions. To be presented at this showcase is a license plate bracket prototype fully compatible with QuikrStuff's Mach 2 bicycle rack product line, is fully tool-less to operate, and meets all requirements to keep the vehicle operator legal on most roads.

Title: **SAMPLE DYE POT MODERNIZATION**
Presenter(s): Vanessa Romano, Jackson Lyon, Dustin Foster
Faculty Mentor: Christopher Penick
Track: 4F
Abstract: Western Filament Inc., in Grand Junction, CO, hosts an in-house dye facility for producing colored fishing line, with the process dyeing 42 to 60 spools at a time. Even when producing samples of a few spools, they use the production dye pots resulting in interruptions to production and material waste as the procedure remains the same regardless of the spool quantity in the dye pot. Western Filament has a sample dye pot machine for processing small sample batches, but it is nonoperational due to its lack of modern controls, damaged seals, and corroded components. The sample pot utilizes low-pressure steam to heat the process water containing the fibers and dyeing chemicals and hydraulic flow to ensure color saturation. The goal of this project is to modernize the sample dye pot by replacing unsalvageable components, rejuvenating others, and automating the process with remote-actuated components, a programmable logic controller (PLC), and a human-machine interface (HMI). The functionality and dye process should replicate that of Western Filament's other production dyeing machines. The anticipated outcome is a seamlessly integrated, automated sample dye pot that mirrors the performance of the production line, reducing waste and optimizing the color-testing process for improved overall productivity.

Title: **ROBOTIC ARM EXHIBIT**
Presenter(s): Grant Majors, Chantelle Hobbs, Crystle Querol
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: This project focuses on creating an interactive exhibit for the EUREKA! McConnell Science Museum. The exhibit is a 3D printed robotic arm, designed to offer an engaging educational experience in robotics and engineering. Controlled by nine buttons linked to an Arduino controller, the arm features four servo motors and one stepper motor. The engineering process involves stages such as conceptualization, prototyping, and iterative refinement, prioritizing durability, safety, and user-friendliness.

Drawing inspiration from established robotic arms, the design undergoes enhancements through testing to ensure optimal functionality for a young audience. Emphasizing experiential learning, the exhibit encourages active participation, problem-solving, and curiosity among children by allowing them to control and play with the robotic arm. Supported by supplemental resources and interactive demonstrations, the exhibit brings STEAM (Science, Technology, Engineering, Arts, and Mathematics) concepts to life, fostering a deeper understanding of robotics and mechanics. Beyond education, the 3D printed robotic arm inspires a passion for engineering, sparking curiosity about the potential of robotics in shaping the future. Ultimately, the project aims to cultivate a new generation of skilled and enthusiastic engineers and innovators ready to tackle tomorrow's challenges.

Title: **SAVING TIME BY ANNEALING ACRYLIC WITH VISIBLE LIGHT RADIATION**
Presenter(s): Lane Woodrich, Greyson Wagner, Leif Lantz
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: This engineering project will investigate the viability of annealing acrylic on an industrial scale using light radiation. This project is sponsored by Reynolds Polymer Technology, Inc. (RPT) in Grand Junction, Colorado. RPT primarily manufactures monolithic acrylic structures for some of the world's largest aquariums and zoos. To produce these large acrylic structures, RPT needs to anneal the acrylic in large convection ovens to alleviate internal stresses and improve structural strength. However, it can take days or weeks to anneal large pieces since the acrylic must reach an equilibrium temperature of 145°C (293°F) . This prolonged time in the oven leads to a bottleneck in the production process, resulting in lost revenue. Preliminary studies have shown that visible and near-infrared light can penetrate and heat the acrylic from the center out. Therefore, combining a light source with a convection oven could simultaneously anneal the acrylic from both the outside in and the inside out. The goal of this project is to investigate the viability of using a convection oven and a light source to decrease the time required for annealing acrylic.

Title: **QUIKRSTUFF MACH 2 UTILITY TRAY ADD ON**
Presenter(s): Kyle Taylor, Vicente Trevino, Jacob Seger
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: Overpacking a car to the point of obstructing windows or rendering the rearview mirror unusable is not conducive to safe travel. A QuikrStuff hitch-mounted utility tray addresses this issue, enabling travelers and campers to bring extra gear on their biking adventures. QuikrStuff came to life in 2020 in Grand Junction, Colorado, through Bryan Wachs and JT Westcott, who felt a calling to provide high-quality recreation products that are designed and manufactured in the U.S. This project involves designing and fabricating a utility tray prototype, thus creating a new product line for QuikrStuff. The tray must be capable of securely carrying up to 120 pounds of gear, integrate seamlessly with the existing Mach 2 bicycle rack, and require no tools to operate. The design involves several unique components, such as an extended trigger bar, new supporting side brackets, and the tray itself. Finite Element Analysis evaluated the design and identified potential failure points before committing to the fabrication of the prototype. Subsequent mechanical testing results informed any final necessary design changes. Ultimately, the project successfully provides a user-friendly modular solution that enhances biking adventures while ensuring safety and convenience.

Title: **BIOCHAR INJECTION SYSTEM**
Presenter(s): Skylar Tubbs, Enrique Merlos, Mar Y El Torres
Faculty Mentor: Christopher Penick
Track: 4F
Abstract: According to research conducted by the United States Biochar Initiative (USBI), soils amended with concentrated biochar columns increase water and nutrient retention in depleted soils. Biochar is a plant-based amendment produced by a process called pyrolysis, which is the heating of organic material in low-oxygen conditions. The resulting product is a dry, charcoal-like substance with porous qualities that can be added to soils to increase soil health. Michael Lobato, the owner of Lobato Farms LLC in Fruita, CO, recognized the need for a system capable of aerating and injecting biochar to be used in the agricultural industry. Currently, there are two known systems capable of doing this, known as Dryject® and Drill and Fill®. While there are systems capable of accomplishing this task, they are slow, wasteful, and inefficient. This project's objective is to create a system that is faster, more accurate, and optimized for agricultural use. To accomplish this, an aeration machine known as a Redexim Verti-Drain® has been retrofitted with a prototype biochar insertion system to test the efficacy of agricultural biochar use.

Title: **TEAM WAPONI - BUG TRAP**
Presenter(s): Athena Branch, Levi Lawrence, Rylee Shayne O'Neill
Faculty Mentor: Christopher Penick
Track: 4F
Abstract: Dr. Thomas Walla, a Colorado Mesa University (CMU) Biology Professor, along with a team of biologists that he leads, known as Team Waponi, is driven by the XPRIZE Rainforest competition. They are motivated to create a device to efficiently measure insect biodiversity in the Amazon rainforest. The insect trap, which can be hung from a tree and left overnight to capture data autonomously, incorporates a camera, light array, battery pack, and landing board for insects (primarily moths) to land on. The insect trap must be quick and easy to set up and disassemble requiring the individual components of the insect trap to be detachable and the insect board collapsable for easy portability. The onboard camera will collect pictures of the insects which will be used to calibrate an artificial intelligence software to identify the various moth species in nature using pattern-recognition techniques. The overarching goal of this project is to manufacture and install these insect traps throughout the rainforest so biodiversity metrics associated with different regions can be quantified and used to promote the preservation of the rainforests.

Title: **MECHANIZED WALKER FOR INDIVIDUALS WITH PARAPLEGIA**
Presenter(s): Madelyn Schmidt, , Caleb Williamson, William Vroomanan
Faculty Mentor: Francisco Castro
Track: 4F
Abstract: The purpose of this project is to design and build a lower-body exoskeleton for individuals with paraplegia. Similar products already exist and are sold commercially. However, this project aims to create a product that is more affordable than the current industry low, which is approximately $40,000. The exoskeleton should allow the user to stand from a seated position with manual controls and will not be used on inclined surfaces or for climbing stairs. Although exoskeletons are not seen as a necessity by many insurance companies, they do provide individuals with paraplegia with a variety of health benefits including both mental and physical health. This project has gone through various design iterations. This phase focuses on designing and creating an exoskeleton that is more compact and light-weight than the

current product designed by previous engineering students. Additionally, this phase will focus on creating a new stand-up feature since the current system is heavy and requires more complex controls.

Title: **COORSTEK BIOCERAMICS MANUFACTURING AND TESTING LABORATORY**
Presenter(s): Angel Enrique, Gabriel Martinez, Jesse Blank
Faculty Mentor: Christopher Penick
Track: 4F
Abstract: Technical ceramics are a viable material alternative for many industries, including the medical, aerospace, and energy sectors, due to the various material properties that can be tailored to meet application requirements. Such properties include a high strength-to-weight ratio, wear resistance, and, in the case of medical applications, biocompatibility. Despite their importance, the engineering curriculum at Colorado Mesa University (CMU) needs more coverage of manufacturing processes and test methods specific to technical ceramics. Sponsored by CoorsTek Bioceramics in Grand Junction, CO, this project proposes a cost-effective solution to address this educational gap by incorporating ceramic manufacturing and testing equipment into the Materials Laboratory within the Engineering Program at CMU. The laboratory will provide students with hands-on learning experiences, including manufacturing and testing alumina ceramic materials through sintering at elevated temperatures. Subsequently, students can assess material density and strength using a custom-designed density determination kit and an equibiaxial flexural strength test fixture. The project results demonstrate the laboratory's ability to produce alumina test samples safely. Ultimately, this laboratory addresses the existing knowledge gap, enabling future engineers at CMU to better understand, innovate, and contribute to advancements in the field of technical ceramics.

Title: **USFS SITE PLAN**
Presenter(s): Ashley Buchanan, Vaughn Beeson, Harrison Tusberg, Wojciech Jaroszynski
Faculty Mentor: Joel Sholtes
Track: 4F
Abstract: This civil engineering senior design project is a site plan for the U.S. Forest Service, who will have a 99-year lease on land owned by the Bureau of Land Management. The project is sponsored by Mesa County. The site needs a warehouse, office space and accommodations for 80 personnel, parking, a hydrant for filling water tanks, outdoor lighting, two RV pads, a boneyard for bulk supplies, electric vehicle charging stations, an equipment wash pad and loading ramp, horse corrals and tack room, shaded shelter areas for picnic tables, covered storage for various vehicles and equipment, a building in which to store fuel and flammables, solar panels, a retaining pond for stormwater control, and a fitness facility. The terrain on site features steep hills on one end, with natural stormwater channels meeting at the other end. There is a power station on site that must be avoided, and there are power lines running through the middle of the site that heavy equipment cannot drive under. The soil is poor, and any structures built on it will need to be protected from swelling soil. A schematic design was drawn in AutoCAD, a hydraulic analysis was conducted based on a 100-year flood event, a retention pond was designed, and all applicable regulations were considered.

Title: **MACK WASTEWATER LAGOON**
Presenter(s): Luca Flann, Kalum Klausner, Felipe Busellini, Connor Lehto
Faculty Mentor: Joel Sholtes
Track: 4F

Abstract: The town of Mack, Colorado had a wastewater lagoon that was leaking and had reached its maximum capacity. Consequently, a moratorium on development in Mack had been imposed. Mesa County's budget did not allow for the construction of a full-fledged wastewater treatment facility, so they planned to install a temporary lagoon that would be able to accommodate the growth of Mack and its surrounding area for the next 10 years. Approximately 15 acres of land adjoining the current lagoon were acquired for the new facility. The lagoon was designed, as well as an onsite service building and overall site layout; a cost estimate for the designed improvements was calculated as well.

Title: **STEEL BRIDGE**
Presenter(s): Ashley Buchanan, Vaughn Beeson, Nolan Morse, Kyle Noah, David Wooten
Faculty Mentor: Ulises Techera
Track: 4G
Abstract: Each year, the American Society of Civil Engineers hosts a student steel bridge competition. This year, the Civil Engineering Club has yet again made a bridge to compete against the participating schools in the region: University of Wyoming, Colorado School of Mines, South Dakota School of Mines & Technology, Colorado State University and the United States Air Force Academy. Depending on the performance of each team's bridges, CMU may also be competing in nationals against world-class engineering schools. For this competition, a bridge spanning 20 feet was designed, fabricated, and constructed in such a manner as to simulate a small-scale version of a real-world infrastructure construction project. The bridge is designed to be able to withstand 2,500 pounds and be assembled within 45 minutes. This bridge, as well as a poster explaining the design and fabrication process, will be presented.

Title: **MESA MOTORSPORTS FSAE**
Presenter(s): Dylan Palmquist, Hector Diaz, Wyatt Earnest, Cameron Mueller, Aidan O'Riordan
Faculty Mentor: Scott Kessler
Track: 4G
Abstract: Modeled as a collegiate engineering firm, Mesa Motorsports competes in the Formula SAE design series, presented by the Society of Automotive Engineers. Formula SAE is the largest collegiate design competition in the world, drawing more than 600 university teams from 20 countries. Each student team designs, fabricates, and competes with a small-scale formula-style race car in a series of race events and design reviews. Students have an opportunity to work with a project from conception through final production, preparing them for the fast-paced and technical environments which they may encounter during their careers. For the past two years, Mesa Motorsports has been working on a new vehicle, intended to replace the outdated design platform which the team has taken to seven previous competitions. The new vehicle features a modernized chassis design to reduce overall weight, a new Kawasaki Z650 parallel twin engine to provide consistent torque, 10-inch center-lock magnesium wheels to reduce unspring mass, and new suspension geometry to provide proper traction when cornering. These changes have been made in an effort to improve overall team performance at the Formula SAE Michigan event in May 2024.

Title: **THE GAME OF CHESS**
Presenter(s): Ellena Schmitt, Bryleigh Koci, Walker Edwards
Faculty Mentor: Ram Basnet
Track: 4H
Abstract: This project introduces a Pygame-based chess game with a structured class

system for each piece type, including Pawn, Bishop, Knight, Rook, King, and Queen. The Pawn class features a promotion function allowing it to transform into any non-King piece upon reaching the opposing board end. The game includes mechanisms for piece capture and checkmate detection, ending upon checkmate. A Player class manages player attributes, colors, available pieces, and forfeit options. This implementation showcases object-oriented design and advanced chess functionalities within a concise framework meeting all the technical requirements such as unittesting, UML diagrams, documentations, etc.

Title: **USING OBJECT-ORIENTED PROGRAMING TO RECREATE THE BOARD GAME STRATEGO IN PYTHON**
Presenter(s): Jordan Dehmel, Kate Eckhart, Nathaniel Barnaik
Faculty Mentor: Ram Basnet
Track: 4H
Abstract: Stratego is a board game in which two players command an army to try and capture the opposing player's flag or defeat every moveable piece. Each player's army has 40 pieces that they place on their side of the board as they please, with each piece having a different rank and some pieces having special abilities like full movement in one direction. When a piece attacks another piece, the piece with the lower rank is removed from the board, if the ranks are the same then both pieces are removed from the board. Exceptions are the Spy which can remove the Marshal, Bombs which can remove anything that attacks them, except Miners who are the only piece that can remove bombs. All of these rules can be done by setting up a base piece class which has child classes for each piece type. PyGame can be of help when displaying the game to the player, and object-based Python networking can be used for multiplayer. This project outlines the construction of an Object-Oriented Python implementation of Stratego.

Title: **PACKARD POWER RANKINGS**
Presenter(s): Christopher Brandt, Kyle Verbrugge, Bryan Bonilla Garcia
Faculty Mentor: Ram Basnet
Track: 4H
Abstract: This project for the Student Showcase is improving the Packard Power Rankings website. This website is used for tracking power rankings amongst various high school sports in Colorado, and college sports across the United States. This website does a great job at building a solid power ranking in each sport. However, there are several fundamental problems with the site which were worked on throughout this semester. First, several bugs within the site reduce performance, making the website run slowly for end users. Secondly, the user interface could use a substantial facelift, so that it's more inviting to end users. With thorough testing, progress was made to optimize the website's functionality and make the front-end more user-friendly. Changes were verbosely documented. After this semester, Packard Power Rankings will be one step closer to being used across Colorado as a reliable leaderboard website.

Title: **MINESWEEPER MANIA: THE MINESWEEPER SOLVER**
Presenter(s): Mia Weber, Brandon Kamplain
Faculty Mentor: Ram Basnet
Track: 4H
Abstract: The game Minesweeper is a quintessential puzzle game that challenges players to uncover a minefield without revealing explosives, guided only by numerical clues. This project is centered around a strict Object-Oriented Programming (OOP) design approach to algorithmically solve Minesweeper. The solver intelligently navigates the grid, relying on the algorithm to

make logical decisions and safely reveal empty spaces. The algorithm was designed with efficiency and optimization in mind and leverages pattern recognition and logical deduction to make informed decisions, ensuring the game is solved without resorting to guessing. The final product provides a visual, interactive platform, that illustrates the algorithm's decision-making processes in real-time and allows users to place the explosives on the grid themselves. The implications of this project extend beyond classic computer games, providing an opportunity to investigate the power of algorithmic logic in complex decision-making. Future investigations could use this project as a training set for more advanced machine-learning algorithms.

Title: **EXPLORING OBJECT-ORIENTED PROGRAMMING THROUGH GAME DEVELOPMENT: A CASE STUDY ON CONNECT 4 IN PYTHON**
Presenter(s): Austin Saylor, Kyle Remmenga, Kian Highland
Faculty Mentor: Ram Basnet
Track: 4H
Abstract: This project focuses on leveraging Object-Oriented Programming (OOP) principles to develop a game, specifically Connect 4, in Python. OOP emphasizes organizing code around data and objects rather than procedural logic. Through this endeavor, this group aims to deepen understanding of OOP concepts and their practical application in software development. The primary objective is to gain hands-on experience in implementing OOP principles to create a functional and interactive game. By choosing Python as the programming language due to its inherent support for OOP, the group aims to master both the language and the OOP paradigm simultaneously. The Connect 4 game will feature a graphical user interface allowing players to interact with the game board by strategically placing colored chips with the goal of forming a sequence of four chips in a row. This project serves as a platform to explore the versatility of OOP in creating diverse types of programs while honing each member's Python programming skills.

Title: **OPTIMIZING A SPORTS GAME TRACKER AND PREDICTION WEB APP FOR ENHANCED USER EXPERIENCE**
Presenter(s): Daniel Fishbein, Clayton Hodges, Peter Campbell
Faculty Mentor: Ram Basnet
Track: 4H
Abstract: This project aims to enhance the user experience of a sports game tracker/prediction web app, which is currently in production. The primary objective is to optimize the codebase and website load times, ensuring a seamless and responsive user experience for sports enthusiasts. The motivation stems from the increasing demand for real-time sports analytics and the need for a more efficient platform. By employing various methods such as server-side improvements, front-end enhancements, and database optimization, load times will be significantly reduced and overall performance improved. The team aspires to present results in the form of a more agile and user-friendly website capable of handling user requests and providing accurate predictions. The larger implications of the project include setting a new standard for sports analytics websites and contributing to the advancement of real-time data processing in the sports industry. The intended audience includes sports fans, analysts, and anyone interested in sports predictions and analytics.

Title: **GUARDWELL - AN IDLE TOWER DEFENSE GAME**
Presenter(s): Owen Bartels, Kevin Hedman, Mauricio Posadas, Lauren Lewis
Faculty Mentor: Ram Basnet

Track: 4H
Abstract: This project explores the intricacies of Object-Oriented Programming (OOP) through the development of a captivating tower defense game. Tower defense games are a popular genre in the realm of gaming, characterized by strategic placement of defensive structures to thwart incoming waves of enemies. In this project, the team delves into the principles of OOP to design a robust and extensible architecture for a game. Through the implementation of classes, inheritance, and other OOP principles, the team creates a flexible framework that facilitates the addition of new features and entities with ease.The showcase highlights the significance of abstraction in modeling various game elements such as towers, enemies, levels, and gameplay mechanics. By utilizing OOP concepts effectively, the team achieves modularity and maintainability, enabling seamless collaboration among developers and ensuring code scalability. This project takes advantage of Python's powerful library, Pygame, in order to display the logic and objects needed to create this game. Overall, the team demonstrates how OOP serves as a powerful paradigm for designing and implementing complex systems, as evidenced by the creation of an engaging and dynamic tower defense game.

Title: **MALWARE ANALYSIS: USING MACHINE LEARNING METHODS TO CLASSIFY MALWARE AND MALWARE TYPE**
Presenter(s): Abraham Avila
Faculty Mentor: Ram Basnet
Track: 4I
Abstract: In this machine learning project, a variety of different machine learning solutions to well-established datasets from the Canadian Institute for Cybersecurity (CIC) are explored. Specifically, the domain of malware was examined where a malignant or benign program was classified as well as categorized if it is was a malicious program. The preferred dataset used for these tasks is the CICMalMem-2022 made and provided by CIC. Testing methods are consistent with literature by testing the machine learning algorithms to first classify a binary classification task (Benign vs. Malignant) before testing the machine learning models on classifying the types of malwares (Ransomware, Trojan, Spyware, vs. Benign). The goal with this project is to determine the performance of each model, and determine the champion model that performed the best from the sought-out tasks.

Title: **MACHINE-LEARNING SYSTEM TO RECOGNIZE HANDWRITINGS**
Presenter(s): Mauricio Posadas
Faculty Mentor: Ram Basnet
Track: 4I
Abstract: The handwritten digit and letter recognition showcase aims to develop a machine-learning model capable of accurately recognizing handwritten digits (0-9) and letters (A-Z, both uppercase and lowercase) from images. This project explores the intersection of machine learning and computer vision to tackle a classic pattern recognition problem. The project follows a structured approach, starting with data preprocessing to prepare the dataset for model training. Various machine learning algorithms are implemented and trained on the dataset to achieve optimal classification performance. Through iterative experimentation and model refinement, the project focuses on improving accuracy, precision, and recall metrics to ensure robust and reliable recognition of handwritten characters.

Title: **SPAM EMAIL DETECTOR**
Presenter(s): Connor Thomas, Logan Humbert
Faculty Mentor: Ram Basnet

Track: 4I

Abstract: Driven by a fervor for machine learning, a group of two enthusiastic students embarks on a journey to delve deeper into the realms of Python-based machine learning. Recognizing the pervasive nuisance of spam emails, this project aims to develop a robust spam email detector program not only for personal enrichment but also with a keen eye towards potential clients or future employers. Leveraging the team's experience in Python, as well as libraries such as Pandas, NumPy, and scikit-learn, a comprehensive exploration of machine learning algorithms was envisioned. The methodology used encompassed a multifaceted approach. The team constructed a spam email detector that was subjected to rigorous testing and refinement through collaboration with clients, thereby gathering valuable insights into its strengths and weaknesses. Subsequently, at the Student Showcase the team will shed light on the efficacy of the resulting program and elucidate its operational mechanisms through live demonstrations. The technical strategy involves the implementation of distinct classes for email classification, employing diverse algorithms including Naive Bayes, Logistic Regression, among others. Through meticulous analysis, the team aims to ascertain the accuracy and efficiency of these algorithms, thereby facilitating informed decisions in algorithm selection. Additionally, the team strives to enhance user accessibility by integrating a graphical user interface, allowing seamless interaction whereby users can input emails for immediate spam detection.

Title: **IMAGE REGISTRATION WITH RESIDUAL NETWORKS**

Presenter(s): Warin Watson

Faculty Mentor: Ram Basnet

Track: 4I

Abstract: Image registration is about finding a spatial transformation that aligns one image with another. It is well researched and there are deep learning architectures designed for this kind of task (Spatial Transformer Networks). Residual Networks (ResNets) on the other hand are a type of Convolutional Neural Network (CNN) designed to be a powerful solution to image classification or detection. This project brings both ideas together by using ResNet as a feature extractor for images, adapting it to output the parameters of a spatial transformation, and training the network in a supervised manner with registered (aligned) paired images. The result is a deep learning solution to a simple image registration problem, and a step towards connecting the two ideas together.

Title: **FACIAL ATTENDANCE SOFTWARE**

Presenter(s): Shawn Barletta, Renee Rudderow

Faculty Mentor: Ram Basnet

Track: 4I

Abstract: In collaboration with Marc Fischer, this team endeavors to develop a lightweight facial recognition software adaptable for diverse environments. Emphasizing minimal resource utilization, the proposed software prioritizes accuracy and efficiency in facial recognition, extending its utility beyond classroom attendance. Ongoing coordination with Fischer ensures alignment with project objectives, facilitating adjustments to meet evolving needs. This project not only aims to deliver a scalable and versatile facial recognition solution but also enriches the team's expertise in software development.

Title: **NOTE-TAKING MOBILE APP: DEVELOPMENT AND DESIGN**
Presenter(s): Logan Humbert
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: Students often struggle to keep up with notetaking during lectures. Traditional word processors like Microsoft Word or Google Docs, while powerful, offer an abundance of features that can become distracting for the user. This project outlines the development and design of a streamlined mobile note-taking application. It prioritizes simplicity and efficiency for capturing essential class notes. The project will leverage Figma for interface design and prototyping, ensuring a user-friendly and visually appealing experience. The application will be built using the Flutter Software Development Kit, enabling the potential for cross-platform deployment to Android, desktop, and web environments. This approach aims to maximize accessibility for students across devices.

Title: **GAME BALANCE APPLICATION**
Presenter(s): Dillon McDermott
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: In the realm of game design it is important to be able to create balanced encounters. However, many game designers or enthusiasts lack the necessary expertise to playtest their own ideas. An application to help with this process could heavily impact the way encounters are crafted and evaluated. This project aims to streamline the playtesting process by providing a specialized app that both saves time and can promote a greater interest in game design amongst a wider audience. This abstract outlines the development and design journey of a user interface made for empowering users in creating balanced and engaging gaming experiences. Through a series of mockups and prototypes, this project demonstrates how the proposed application bridges the gap between concept and execution, facilitating a more intuitive and informed approach to game design.

Title: **UI ABSTRACT - GEOTASKER**
Presenter(s): Clayton Hodges
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: The GeoTasker project introduces an innovative application designed to revolutionize how individuals manage and complete daily tasks through geolocation technology. Addressing the challenge of optimizing productivity, GeoTasker enables users to create 'smart' task lists that are aware of both time and location. This project was motivated by the growing need for efficiency in the fast-paced modern lifestyle, where effective time management is crucial for personal and professional success. The application is grounded in Google Maps' demographic data, focusing on a target audience aged 16-34 while catering to older users. The GeoTasker app empowers users to streamline their schedules and serves as a platform for local businesses to connect with potential customers, highlighting the symbiotic relationship between commerce and convenience. The presentation will demonstrate GeoTasker's functionality, user engagement strategies, and potential future enhancements. The broader implications of GeoTasker lie in its potential to foster community engagement, support local economies, and improve overall quality of life.

Title: **ACHIEVING THE CYBERSECURITY MATURITY MODEL CERTIFICATION**
Presenter(s): Levi Smith
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: Managing cybersecurity policy to achieve Cybersecurity Maturity Model Certification (CMMC) 2.0 is increasingly critical for businesses. The conventional approach using text documents and spreadsheets, while functional, lacks intuitiveness and fails to efficiently link policies with the necessary "evidences" for compliance. Alternatively, enterprise-scale prebuilt solutions offer a comprehensive feature set but are prohibitively expensive for small business budgets. This project proposes the development of a web app designed to bridge this gap, offering an intuitive, solution for managing cybersecurity policy. By focusing on user-friendly interfaces for managers, IT personnel, and assessors, the app aims to streamline the process of achieving and maintaining CMMC 2.0 compliance. Key features will include streamlined evidence management, revision management, and a dashboard for compliance monitoring. The expected outcome is a significant simplification of the cybersecurity management process, enabling more effective compliance and enhancing the overall security posture of businesses.

Title: **WINTER SPORTS HELPER**
Presenter(s): Connor Thomas
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: People who are into winter sports such as snowboarding and skiing know that the conditions of the mountain play a big role in how a day will go, and that one should never miss a powder day! A website that showed the conditions of nearby mountains would be a blessing in the eyes of winter sports enthusiasts. That's why for this showcase project, a website that does just that is proposed. The goal for the website is to help people see how much snow a nearby mountain has and the weather conditions on the mountain. This project aims to have an easily interactable user interface (UI), with a product that will help out all winter sports enthusiasts.

Title: **FEAIDBACK**
Presenter(s): Anthony Hunter
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: FeAIdback, a novel web and mobile application, leverages image analysis and machine learning to rate the usability and UI design of apps through screenshots. It offers automated design assessments and user-driven ratings, providing valuable insights for developers and helping users discover superior apps. As a cross-platform solution, FeAIdback enhances app quality and user experience by merging technical evaluations with community feedback.

Title: **TIRE SHOP WORK FLOW IMPROVEMENT BY USER INTERFACE DESIGN**
Presenter(s): Carlos Ortiz
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: After working at a tire shop for over two years while in college, I have noticed an opportunity for an improvement in workflow. Errors and omissions occasionally show up which can be attributed to many reasons, but I feel a start to correcting mistakes can be made in creating clearer work orders. Currently when a vehicle needs work done the technicians know what work needs to be done by looking at a work order placed on a

tray in front of the vehicle. This work order that they look at is filled with useless information to them and is confusing to look at. A tablet containing a digital work order user interface that is clearer to read will help ensure that all the proper work is done. This project aims to create a technicians' user interface that will clearly outline what work will be done as well as what stock will need to be pulled. This will improve workflow and customer satisfaction in the tire shop.

Title: **TRANS VOICE TRAINING APP**
Presenter(s): Kate Eckhart
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: For many nonbinary and trans individuals, there is a desire to make their voice fit better with their chosen gender. To change your voice involves practicing changing things such as your pitch and especially your cadence. It is a process that takes months to years. This project proposes a phone app to assist with the process. This app would record and analyze the user's voice and quantify several variables to provide feeback and help them change their voice.

Title: **PHOTOGRAPHER PORTFOLIO DESIGN**
Presenter(s): Justin Garces
Faculty Mentor: Warren MacEvoy
Track: 4J
Abstract: Portfolio web sites for photographers are critical to their success. This is a presentation on the user interface design and development for a local photographer.

Title: **THE GIFT PROJECT**
Presenter(s): Riley Primeau, Abraham Avila, Christopher Brandt, Nicholas King
Faculty Mentor: Warren MacEvoy
Track: 4K
Abstract: The Gift is a mobile application designed to connect people in need with those willing to give. By leveraging the capabilities of Firebase and Firestore for authentication and robust database management, the Gift asks users to create an account and articulate their needs or offerings in their native language. User input is fed to a large language model that extracts the related information and translates it to English for use in the database. If a match is found between a request and an offer, the two users are connected, allowing them to coordinate an exchange. If no match is available, the large language model generates a response, informing them of other options. This application is engineered for growth and aspires to make a meaningful impact on those in need.

Title: **SKY PEAK DATA BURN PROJECT**
Presenter(s): Sebastian Medina, Peyton Grattino, Trinity Johnson, John Masopust V
Faculty Mentor: Warren MacEvoy
Track: 4K
Abstract: This project aims to analyze streaming media data consumption and performance metrics across various platforms over a cellular network. The objective is to provide Sky Peak Technologies with insights into streaming behavior, focusing on data usage, buffering, and load times. The data will be collected though emulated mobile environments and actual devices. Both will be tested at different resolutions and network conditions. The study will deliver a comprehensive report detailing consumption patterns and streaming performance, aiding in strategic decision-making.

Title: **MYSHROOMLOG**
Presenter(s): Rhianon Hoisington, Lauren Lewis
Faculty Mentor: Warren MacEvoy
Track: 4K
Abstract: The mushroom industry is currently experiencing a renaissance, driven by a recent fascination with mushroom cultivation. Despite this growing attention, there is a noticeable lack of resources focused on cultivating enthusiasts' skills. To address this, this team is developing MyShroomLog, an application aimed at facilitating the documentation of growth data, catering to both novices and experts. The mission of MyShroomLog is to standardize the record-keeping practices of mushroom cultivation, offering an intuitive interface that serves as a comprehensive toolkit for growth observation and analysis. Designed to deconstruct the complexities of mushroom cultivation, MyShroomLog provides personalized tracking and phase-specific insights, complemented by customizable care reminders. Overall, MyShroomLog seeks to provide easy-to-understand analytics that can be used to improve mushroom-growing skills, pioneering a new era in the community that fosters sustainability and environmental awareness. Through this application, the team aims to revolutionize practices by using personalized analytics to foster practical cultivation.

Health Sciences

Title: **ADMINISTRATION OF MELATONIN IN ACUTE CARE**
Presenter(s): Baily Bronson, Megan Sherman, Alexa Riebel, Taryn McGinnis
Faculty Mentor: Genell Stites
Track: 5A
Abstract: The purpose of this evidence-based project is to demonstrate that the administration of melatonin is an effective sleep aid, and to make recommendations for implementation into nursing practice. The group project topic of melatonin administration in acute care was selected because it is a popular over-the-counter medication used by the public and in medical facilities. The statement that guided this project was: Patients aged 65 years and older in an acute care setting, who receive melatonin as a sleep aid are more likely to fall asleep within one to two hours of administration than those patients who do not receive it. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to determine the effectiveness of melatonin for the 65 year and older population. Results will be synthesized from the available literature to determine recommendations for future use. Implications for the recommendation and how nursing practice will be affected or improved will be shared with nursing student peers.

Title: **THE PROTOCOLS FOR LEVOPHED**
Presenter(s): Autumn Edgerton
Faculty Mentor: April Arnhold
Track: 5A
Abstract: The purpose of this evidence-based project is to ensure that patients are placed on an appropriate floor/unit after transfer from the ICU on a Levophed drip and to make recommendations for implementation into nursing practice. The group project topic of Levophed drips was selected because patients are often transferred to a floor not equipped to handle this type of patient. The PICO(T) question that guided this project was: How can a safer protocol be created to ensure patient safety before transferring out of the ICU on a Levophed drip? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to

recommend changes in protocol to hospital administration. Results will be synthesized from the available literature to determine safer practices regarding Levophed drips. Implications for the recommendation and how nursing practice will be affected or improved will be shared with community members and healthcare teams.

Title: **STERILE TECHNIQUE IN WOUND CARE**
Presenter(s): Olivia Crone, Kimberly Castillo, Stevie Barrick, Manuel Santiago
Faculty Mentor: April Arnhold
Track: 5A
Abstract: The purpose of this evidence-based project is to discuss the benefits of using sterile technique during wound care and to make recommendations for implementation into nursing practice. The group project topic of wound care was selected because clean technique is the current standard for wound care, but sterile technique could be more effective to prevent infection. The thesis statement that guided this project was: Clients needing wound care have a reduced risk of infection when sterile technique is implemented. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to provide evidence that sterile techniques will reduce infection rates. Results will be synthesized from the available literature to determine if nursing recommendations and wound care protocol need to be changed. Implications for the recommendation and how nursing practice will be affected or improved will be shared in class and at Student Showcase.

Title: **OPIOIDS VS. MEDICINAL DRUGS**
Presenter(s): Elena Arrieta
Faculty Mentor: April Arnhold
Track: 5A
Abstract: The purpose of this evidence-based project is to reduce the usage of opioids in healthcare facilities and to make recommendations for implementation into nursing practice. The group project topic of reducing the usage of opioids in healthcare was selected because of the opioid crisis in America. The thesis statement that guided this project was: The introduction of medicinal medications into healthcare facilities for middle-aged patients (30-45) will decrease the usage of opioids. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to outline the effects of medicinal drugs to reduce the usage of opioid usage (understand current knowledge and practices). Results will be synthesized from the available literature to determine recommendations related to the project. Implications for the recommendation and how nursing practice will be affected or improved will be shared (to healthcare facilities).

Title: **ORAL CARE IN THE ICU**
Presenter(s): Katlyn Wooding
Faculty Mentor: Genell Stites
Track: 5A
Abstract: The purpose of this evidence-based project is to educate on the importance of oral care in ventilated patients and to make recommendations for implementation into nursing practice. The group project topic of oral care in the ICU was selected to decrease the number of incidences of ventilated acquired pneumonia in the ICU. The thesis statement that guided this project was: Ventilated patients in the ICU receiving oral care with chlorhexidine will have a decrease in incidents of ventilated acquired pneumonia within seven days. The Iowa model of evidence-based practice will guide this project. The goal of the literature

review will be to educate future and current nurses about the importance of oral care on ventilated patients in the ICU. Results will be synthesized from the available literature to determine implementation strategies to improve the oral care of ventilated patients. Implications for the recommendation and how nursing practice will be affected or improved will be shared among the LPN-BSN cohort and at Student Showcase.

Title: **PATIENT OUTCOMES: SUPPLEMENTAL VS STAFF NURSES**
Presenter(s): Colynn Abramson, Liliana Gonzalez, Abigail Tanksley, Justin Fraser
Faculty Mentor: Genell Stites
Track: 5A
Abstract: The purpose of this evidence-based project is to determine patient outcomes between staff nurses and supplemental nurses and to make recommendations for implementation into nursing practice. The group project topic of patient outcomes was selected because current health care workers have identified a difference in care between staff nurses versus supplemental nurses. The PICO(T) question that guided this project was: In the acute care setting, is patient outcomes higher with staff nurses opposed to supplemental nurses? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to review recent patient outcome scores. Results will be synthesized from the available literature to determine recommendation methods related to patient outcomes between staff and supplemental nursing. Implications for the recommendation and how nursing practice will be affected or improved will be shared amongst peers and at Student Showcase.

Title: **SUSTAINING NURSING EXCELLENCE: A COMPREHENSIVE APPROACH TO STAFFING RETENTION**
Presenter(s): Madison Hofland
Faculty Mentor: April Arnhold
Track: 5A
Abstract: The purpose of this evidence-based project is to evaluate benefits of retention programs vs. no retention programs in acute healthcare facilities and to make recommendations for implementation into nursing practice. The group project topic of effectiveness of retention programs was selected because it impacts nurse livelihood and workplace safety. The thesis statement was: Acute care nursing staff who participate in retention programs will show a decrease in staff turnover rate. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to determine the effectiveness of incentive programs. Results will be synthesized from the available literature to determine if incentive opportunities for nurses in a healthcare environment improves staff retention. Implications for the recommendation and how nursing practice will be affected or improved will be shared in a comprehensive study poster board to attendees of the CMU Student Showcase.

Title: **CHRONIC ILLNESS CORRELATION WITH NIGHT SHIFT NURSING**
Presenter(s): Grace Breneman, Kacie Meraz, Abigail Tusing, Lendy Ponce De Leon Portillo
Faculty Mentor: Genell Stites
Track: 5A
Abstract: The purpose of this evidence-based project is to inform the audience on the correlation of chronic illnesses in the night shift nurses and to make recommendations for implementation into nursing practice. The group project topic of chronic illness in night nurses was selected because there has been a notable increase in diseases in that population. The thesis statement: Night shift nurses will experience less chronic illness by working

shorter shifts compared to day shift nurses for the next 3 months. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to inform nurses of the risks that can occur on night shift. Results will be synthesized from the available literature to determine recommendations for improving the overall health of night shift. Implications for the recommendation and how nursing practice will be affected or improved will be shared with students and healthcare workers.

Title: **THE EFFECTIVENESS OF CHEMICAL RESTRAINTS USED ON PSYCHIATRIC ADULT PATIENTS**
Presenter(s): Taylor Herbert, Austin Tanksley, Madison Hollingworth, Lyndsey Stetzel
Faculty Mentor: Genell Stites, April Arnhold
Track: 5A
Abstract: The purpose of this evidence-based project is to evaluate chemical restraint effectiveness and to make recommendations for implementation into nursing practice. The group project topic of the effectiveness of chemical restraints was selected to evaluate the safety procedures already in place. The thesis statement that guided this project was: Adult psychiatric patients 18 years of age and older whom chemical restraints are used will have a decrease in patient injury in an acute setting. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to determine if chemical restraints are effective and humane for psychiatric patients in an acute setting. Results will be synthesized from the available literature to determine evaluation methods related to safety. Implications for the recommendation and how nursing practice will be affected or improved will be shared with healthcare providers and healthcare facilities.

Title: **CATHETER ASSOCIATED URINARY TRACT INFECTIONS**
Presenter(s): Shyanne Horn, Ann Crockett, Cody Wentz, Hope Pollard
Faculty Mentor: Genell Stites
Track: 5A
Abstract: The purpose of this evidence-based project is to decrease incidence of urinary tract infections following placement and maintenance of an indwelling catheter in residents of long-term care facilities and to make recommendations for implementation into nursing practice. The group project topic of catheter associated urinary tract infections was selected because these preventable infections occur frequently and policies vary from facility to facility. The thesis statement that guided this project was: the incidence of catheter associated urinary tract infections in adult patients residing in nursing homes decreases when indwelling urinary catheter replacements are performed every 90 days. The Iowa model of evidenced-based practice will guide this project. The goal of the literature review will be to evaluate current practices regarding indwelling catheter care. Results will be synthesized from the available literature to determine education, recommendations, and implementation of policies to prevent or limit to occurrence of catheter associated urinary tract infections. Implications for the recommendation and how nursing practice will be affected or improved will be shared with long-term care communities.

Title: **ARE HORMONAL CONTRACEPTIVES LINKED TO CANCER?**
Presenter(s): Stephanie Lemelin Belvill, Danielle Salcedo, Adrienne O'Loughlin, Sierra Shaw-Navarro, Victoria Martinez
Faculty Mentor: Alicia Geary
Track: 5A
Abstract: The purpose of this evidence-based project is to determine if hormonal contraceptives have a correlation to cancers and to make recommendations

for implementation into nursing practice. The group project topic of the use of hormonal contraceptives in women of childbearing age, 15-44, was selected because women should be educated on the risks of hormonal contraceptives. The thesis statement that guided this project was: Women of childbearing age from 15-44 years old who used nonhormonal contraceptives will have a decreased incidence of cancer. The Iowa model of evidence based practice will guide this project. The goal of the literature review will be to analyze current peer-reviewed research. Results will be synthesized from the available literature to determine if the current recommendation of hormonal contraceptive use is safe. Our recommendation would be to offer nonhormonal contraceptives as first line of contraceptive. The evaluation methods would be to collect data from peer-reviewed sources. Implications for the recommendation and how nursing practice will be affected or improved will be shared by increasing public awareness though OB/GYN clinics, Planned Parenthood, high schools, and health departments.

Title: **EDUCATION ON PHYSICIAN-ASSISTED SUICIDE**
Presenter(s): Miriam Gonzalez, Michelle Medina, Kindra Barela, Cassidy Seiff
Faculty Mentor: Alicia Geary
Track: 5A
Abstract: The purpose of this evidence-based project is to educate the general public on physician-assisted suicide and to make recommendations for implementation into nursing practice. The group project topic of physician-assisted suicide was selected to have a better understanding of individuals choices regarding physician-assisted suicide. The thesis statement that guided this project was: Education of the public regarding physician-assisted suicide will increase public awareness and understanding behind physician-assisted suicide. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to understand client decisions, gain knowledge, and educate the public on this topic. Results will be synthesized from the available literature to determine the best method to bring awareness to the general public.

Title: **SAVING LIVES: ENHANCING RECOGNITION OF HUMAN TRAFFICKING WITH NURSING EDUCATION**
Presenter(s): Kathryne Ellis, Morgan Cramer, Kailee Kannenberg, Janna Lee, Elizabeth Mee
Faculty Mentor: Mary Jo Stanley
Track: 5B
Abstract: The purpose of this evidence-based project is to explore the influence of prior training on human trafficking recognition by nurses compared to nurses who have received no training and to make recommendations for implementation into nursing practice. The group project topic of human trafficking recognition in nursing was selected because it is a global issue, and, as nurses, we recognize and help victims when they enter our care. The PICO(T) question that guided this project was: In registered nurses, how does receiving prior training on human trafficking recognition compared to no training influence the confidence in ability to recognize and report human trafficking victims? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to evaluate the effect of training on nurses and its effectiveness in helping nurses recognize trafficking victims. Results will be synthesized from the available literature to determine efficacy of training and evaluate the need for more training in human trafficking recognition and reporting for nurses. Implications for the recommendation and how nursing practice will be affected or improved will be shared via a poster presentation.

Title: **SKIN-TO-SKIN AND MENTAL HEALTH FOR MOTHERS**
Presenter(s): Jazlyn Shelton, Olivia Hinton, Mekinsey Sage, Samantha Castellanos
Faculty Mentor: Mary Jo Stanley
Track: 5B
Abstract: The purpose of this evidence-based project is to educate healthcare workers on the impact skin-to-skin contact (or kangaroo care) can make on both a mother and the baby and to make recommendations for implementation into nursing practice. The group project topic of benefits of skin-to-skin contact with infants was selected due to an interest in pediatric/NICU nursing. The PICO(T) question that guided this project was "In premature infants how does skin-to-skin contact after birth up to 2 months old compared to none support the mother and baby's mental health?". The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to assess barriers and benefits of kangaroo care as these techniques support mom and baby mental health. Results will be synthesized from the available literature to determine best care techniques for premature infants that include kangaroo care after birth, as well as support for mom and baby mental health. Implications for the recommendation and how nursing practice will be affected or improved will be shared via a presentation poster.

Title: **PTSD IN NURSES**
Presenter(s): Rachael Guenther, Sydney Reinoehl, Traci Ochoa, Savina May
Faculty Mentor: Lucy Graham
Track: 5B
Abstract: The purpose of this evidence-based project is to explore hospital organizations' responses to nurses experiencing PTSD or mental health issues. The group project topic of nurses and their emotional wellbeing was selected because this is relevant to healthcare workers and the career we are pursuing. The PICO(T) question that guided this project was: In nurses who work in hospital settings, how does routine employee assistance programs (EAP) visits compare to no routine EAP visits as part of employment affect rates of PTSD? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to evaluate if hospital-provided resources improve nurses with PTSD. Results will be synthesized from the available literature to determine recommendations and best practices. We will be sharing our results at CMU's Student Showcase event.

Title: **CTRL + ALT + DELETE: SOCIAL MEDIA?**
Presenter(s): Shyliea Clark, Alaina Bakken, Sierra Angel, Audrey Schulz
Faculty Mentor: Mary Jo Stanley
Track: 5B
Abstract: The purpose of this evidence-based project is to evaluate social media's influence on the mental health of adolescents and to make recommendations for implementation into nursing practice. The group project topic of the effect of social media on mental health was selected because social media is a common tool used by today's youth. The PICO(T) question that guided this project was: In adolescence, how does social media use compared to limited or absent social media use influence their mental health. The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to understand how social medial is affecting the mental health of the youth in our community. Results will be synthesized from the available literature to determine if changes in nursing practice are warranted. Implications for the recommendation and

how nursing practice will be affected or improved will be shared at Student Showcase.

Title: **VAGAS VOYAGE: EXPLORING THE DEPTHS OF DEEP STIMULATION**
Presenter(s): Grace Johnson, Avalon Brinton, Isabella Dobbs, Rachel Tennant
Faculty Mentor: Lynn Duncan
Track: 5B
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen because we wanted to explore the therapy option of an implanted stimulator and its potential for treatment. The results being shared describe how deep vagal stimulation applies to a range of neurological medical issues. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **CHRONICLES OF CONTRACEPTION: WHAT'S THE RISK OF STROKE AND CANCERS?**
Presenter(s): Harrison Kolar, Mia Nofzinger, Jennifer Jarrin, Mallory Borchers
Faculty Mentor: Mary Jo Stanley
Track: 5B
Abstract: The purpose of this evidence-based project is to investigate the incidence of stroke and/or cancers with the use of hormonal and nonhormonal contraceptives and to make recommendations for implementation into nursing practice. The group project topic of hormonal contraception and its relation to stroke and cancers was selected because there is much uncertainty around this topic relating to half of the world's population. The PICO(T) question that guided this project was: Do women of reproductive age taking a hormonal birth control compared to women of reproductive age taking a non-hormonal birth control have a higher incidence of cancers or stroke. The goal of the literature review will be to better inform us as future healthcare professionals about the correlation between birth control and breast cancer/stroke. Results will be synthesized from the available literature to determine appropriate patient education regarding birth control, recommendations regarding risks and benefits, and providing patient centered care. Implications for the recommendation and how nursing practice will be affected or improved will be shared through a poster at Student Showcase.

Title: **THE DIRECT IMPACT OF NURSE-TO-PATIENT RATIOS ON NURSES' HEALTH**
Presenter(s): Savannah Hoisington, Cipriana Dacuma, Kamryn VonBurg, Mya Kelley
Faculty Mentor: Lucy Graham
Track: 5B
Abstract: The purpose of this evidence-based project is to identify the impact of nurse-to-patient ratios among hospitals and its impact on the safety of nurses providing care. The group project topic was selected because, as student nurses, it is going to become a part of our everyday lives and impacts our careers significantly when considering safety. The PICO(T) question that guided this project was: "Among hospital nurses, how does a state with mandated nurse-to-patient ratios compared to states without them affect occupational safety of nurses?" The Iowa model of evidence-based practice guided this project. The goal of the literature review was to understand how mandated staffing laws affect floor nurses' safety. Results will be synthesized from the available literature to determine recommendation and implementation strategies. Implications for the

recommendation and how nursing practice will be affected or improved will be shared at CMU's Student Showcase.

Title: **CITY DOCS VS COUNTRY CARE: THE HEALTHCARE HOEDOWN**
Presenter(s): Ally Drews, Adriana Vargas, Lana Zander, Guadalupe Marquez
Faculty Mentor: Mary Jo Stanley
Track: 5B
Abstract: The purpose of this evidence-based project is to evaluate the differences in level of care between rural and urban healthcare settings and to make recommendations for implementation into nursing practice. The group project topic of urban vs rural healthcare outcomes was selected because we all care a lot about making sure everyone receives the best level of care. The PICO(T) question that guided this project was: In patients that are 50 years of age or older that are receiving treatment for cardiac conditions, how does rural vs urban healthcare affect quality of care and outcomes? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to compile information from different studies that will help us to understand current knowledge and practices. Results will be synthesized from the available literature to determine care deficits and ways that healthcare as a whole can evolve to serve more people. Implications for the recommendation and how nursing practice will be affected or improved will be shared via a poster presentation.

Title: **NURSING BURNOUT AND PATIENT SAFETY**
Presenter(s): Bronwyn Duffy, Sydney Utech, Moran Heydenberk, Hannah Kuta
Faculty Mentor: Mary Jo Stanley
Track: 5B
Abstract: The purpose of this evidence-based project is to evaluate the issue of caregiver burnout and nurse-to-patient ratios and make recommendations for implementation into nursing practice. The group project topic of caregiver burnout and patient safety was selected because it is a topic that will impact all of us as nurses. The PICO(T) question that guided this project was: In nurses experiencing caregiver burnout, does implementing nurse-to-patient ratios compared to no implementation result in improvement in patient safety? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to understand the current practices that could contribute to caregiver burnout and determine if proper staffing (nurse-to-patient ratios) could improve both caregiver burnout and patient safety. Results will be synthesized from the available literature to determine if implementing proper staffing (nurse-to-patient ratios) will improve burnout and patient safety. Implications for the recommendation and how nursing practice will be affected or improved will be shared via a poster presentation.

Title: **INJURIES MAY BE ACCIDENTS, OUR CHOICES ARE NOT**
Presenter(s): Patric Bridge, Cora Goodwin, Eduardo Rubio, Aaron Dollar
Faculty Mentor: Lucy Graham
Track: 5B
Abstract: The purpose of this evidence-based project is to understand the impacts of obesity as it relates to trauma and to make recommendations for implementation into nursing practice. The group project topic of obesity and mortality rates was selected because obesity is a nationwide epidemic and knowing more about its implications for trauma patients is relevant to nursing care. The PICO(T) question that guided this project was: "In adult trauma patients, ages 18-65 years old, are mortality rates higher in those who are obese (as defined as BMI>30) as compared to those who are not obese?" The Iowa model of evidence-based practice will guide this project.

The goal of the literature review will be to find evidence about the current effects of obesity on trauma patient mortality. Results will be synthesized from the available literature to determine how current obesity rates relate to mortality. Implications for nursing and how nursing practice will be affected or improved will be presented at CMU's Student Showcase.

Title: **SOURDOUGH BREAD, CAN IT BE HEALTHY?**
Presenter(s): Danielle Bishop, Jerrika Velasco, Christine Capistrant, Maria Rodriguez Montano
Faculty Mentor: Lucy Graham
Track: 5B
Abstract: The purpose of this evidence-based project is to investigate the consumption of different types of bread and the effect of post-prandial blood glucose and to make recommendations for implementation into nursing practice. The group project topic of diabetic nutrition on blood glucose levels was selected because we were interested in nutrition and how specific types of food can affect one's physical well-being. The PICO(T) question that guided this project was: Do adult diabetics who consume sourdough bread have a lower A1C than adult diabetics who consume various other types of bread? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to compare the outcomes of postprandial glucose levels after consuming different types of bread. Results will be synthesized from the available literature to determine recommendations for best practice. Implications for the recommendation and how nursing practice will be affected or improved will be shared at CMU's Student Showcase.

Title: **MIND MATTERS: EXPLORING MENTAL HEALTH IN CHRONICALLY ILL CHILDREN**
Presenter(s): Savannah Bergman, Rachel Meeks, Amy Hassell, Grace Nissen
Faculty Mentor: Lucy Graham
Track: 5B
Abstract: The purpose of this evidence-based project is to determine whether or not children who experience chronic childhood illness are more likely to suffer from mental health disorders, like anxiety and depression, and to make recommendations for implementation into nursing practice. The group project topic of childhood chronic illness and its relation to mental health disorders was selected because of a mutual interest in the pediatric population. The PICO(T) question that guided this project was: Are children 0-18 who have experienced chronic childhood illnesses, such as cystic fibrosis, cancer, and diabetes, at a greater risk for mental health disorders, like anxiety and depression, compared to those without a chronic illness? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to understand the current knowledge and practices surrounding mental illness in the chronically ill pediatric population. Results will be synthesized from the available literature to determine recommendations, implementation strategies, and evaluation strategies related to our question. Implications for the recommendation and how nursing practice will be affected or improved will be shared via poster presentation.

Title: **UNVEILING TRUTH: NURSES RESPONSE TO IPV**
Presenter(s): Diana Palma Gutierrez, Paola Gurrola Lopez, Tayler Copeland, Andrea Flores
Faculty Mentor: Lucy Graham
Track: 5B

Abstract: The purpose of this evidence-based project is to find evidence about how healthcare workers recognize and respond to violence against women and to make recommendations for implementation into nursing practice. The group project topic of recognizing and responding to intimate partner violence (IPV) in the emergency department (ED) was selected because this is a prevalent issue in today's world and ED nurses can be the first to recognize signs and symptoms of victims of violence. The PICO(T) question that guided this project was: In adult female patients within the emergency department, are routine screening tools for violence or IPV more effective compared to no screening tools in improving detection rates among victim? The Iowa model of evidence-based practice will guide this project. The goal of the literature review will be to understand current knowledge and practices. Results will be synthesized from the available literature to determine how nursing practice will be affected or improved and will be shared via a poster presentation.

Title: **NANOHEALERS: PRECISION MEDICINE IN BREAST CANCER REVOLUTION**
Presenter(s): Emilee Chavira, Paige Tindall, Paulina Bustillos, Zoe Jameson
Faculty Mentor: Lynn Duncan
Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen because nanotechnology is increasing in popularity in healthcare and further allows for cancer treatments to have improved outcomes for cancer patients. The results being shared describe how nanotechnology used as a method of treatment for breast cancer applies to current and future nursing practice. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **BUILDING BETTER BREATHS: 3D BIOPRINTING LUNGS**
Presenter(s): Ashlee Lindemann, Chloe Kring, Lisa Scott, Megan Ford
Faculty Mentor: Lynn Duncan
Track: 5C
Abstract: This project's purpose was to identify, describe, and apply emerging technology in healthcare relating to nursing practice. This topic was chosen because of the prevalence of respiratory diseases resulting in an increase in morbidity and mortality rates worldwide. Often, tissue transplantation is the only treatment option for patients with end-stage respiratory diseases, but the lack of donor organs and risks related to transplants make it undesirable. The results being shared describe how advancements in current technology in 3D printing have helped develop personalized, regenerative, reliable medicine and allowed an alternative for drug testing and disease modeling for professionals. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **INCUBATION CREATION**
Presenter(s): Savannah Burrow, Mikayla Grant, Maddison Burge, Angela Davis, Rocio Ramos
Faculty Mentor: Lynn Duncan
Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen due to concern for the high number of premature births that lead to high risks of mortality and severe lifelong complications including cerebral palsy, hearing and visual impairments, poor health, as well as impaired growth and development. The results being shared describe how 3D construction of placentas for premature infants applies to

a decreased risk of mortality and lifelong complications. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **CRAFTING TOMORROW'S MOBILITY: INNOVATIONS IN 3D-PRINTED PROSTHETICS**
Presenter(s): Lily Helzer, Laura Richardson, Manuel Lipic, Taylor Eubanks, Reese Norton
Faculty Mentor: Brady Russell
Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen because of the advancement of three-dimensional technology and the ever changing science of prosthetics related to adult orthopedic patients. The results being shared describe how science and technology work together to apply a creative and innovative future of medicine. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **WHEN NURSING SCHOOL IS ALL FUN AND GAMES**
Presenter(s): Hope Theander, Hannah Giauque, Chloe Pickford, Laila Marquardt, Hope Theander
Faculty Mentor: Brady Russell
Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen because nursing education requires hands on learning to help student nurses apply the knowledge that they learn in class to real world situations. Virtual and augmented reality has been proven to be an advantageous resource for students and instructors to utilize when opportunities for working directly with patients may not be feasible. During the COVID-19 pandemic, students were unable to meet in person and/or were not given the same opportunities regarding clinical experiences that students before and after them have had, and they struggled when they graduated and were faced with in-person nursing. If VR had been more accessible/prevalent, then they may have been more prepared after graduation. The results being shared describe how virtual and augmented reality applies to healthcare education. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **VACUUM-ASSISTED BIRTHS: SAFE OR RISKY?**
Presenter(s): Kyler Galena, Elizabeth Jacks, Justin Lynn, Ashley O'Daniel
Faculty Mentor: Brady Russell
Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen because vacuum-assisted births occur regularly in the healthcare setting, with use of both the vacuum extractor and either manual or electric pumps. The results being shared describe how benefits of vacuum-assisted births compares to the risks that it may present to newborns. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **EMPOWERING HEALTH: WEARABLE WONDERS IN MEDICINE**
Presenter(s): Yaritza Mendoza-Holguin, Melissa Countryman, Julia Lawrence, Matthew Haut
Faculty Mentor: Brady Russell

Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology of wearable medical devices such as ECG monitors, continuous glucose meters, and fitness watches in healthcare as it relates to nursing practice. This topic was chosen because it increases accessibility and availability to patients with new or chronic health conditions. The results being shared describe how advancements in technology allow for greater freedom and real time monitoring. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **REIMAGINING THERAPY: EXPANDING MENTAL HEALTH TREATMENT WITH VIRTUAL REALITY**
Presenter(s): Laurel Frick, Brooke Crosley, Makenzie Congleton, Caroline Monroe, Henry McAlvanah
Faculty Mentor: Lynn Duncan
Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen because of its potential to revolutionize therapeutic interventions and improve patient outcomes in mental health treatment. The results being shared describe how virtual reality technology applies to a diverse range of mental health disorders, offering insights into its effectiveness as a therapeutic intervention and its potential to enhance traditional approaches to treatment. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Title: **LIMBLESS TO LIMITLESS**
Presenter(s): Rachel Gilbert, Caylin Boardwine, Richard Culp, Brisa Barcenas, Rachel Gilbert
Faculty Mentor: Brady Russell
Track: 5C
Abstract: The purpose of this project was to identify, describe, and apply an emerging technology in healthcare as it relates to nursing practice. This topic was chosen because pediatric patients, specifically with traumatic or congenital upper limb deformities, are rapidly developing physically, requiring new prostheses at a higher incidence than adults. The results being shared describe how 3D printing prostheses is a cost effective, yet functional, alternative to improving function in pediatric patients with upper limb differences as they grow. Potential risks and benefits, policy changes, and current and/or future practice will be discussed.

Kinesiology

Title: **THE EFFECTS OF ACUTE FATIGUE ON EXECUTIVE FUNCTION IN DIVISION ONE MOUNTAIN BIKERS**
Presenter(s): Dillan Ritmiller
Faculty Mentor: Brent Alumbaugh
Track: 6A
Abstract: The effect of low to moderate intensity exercise on executive function is well documented in sedentary and recreational athletes. However, the impact of high-intensity exercise on EF in elite athletes is unclear. PURPOSE: To determine the effects of high-intensity cycling on EF in elite mountain bikers. METHODS: Eight male collegiate cyclists were recruited. Tests were performed on a cycle ergometer that was fit to each participant based on measurements of their mountain bike. Prior to testing, all subjects were given 30 minutes to familiarize themselves with the Stroop test, as

well as five Stroop tests completed immediately before the cycling trial. Baseline Stroop tests were randomized pre- or post-trial by flipping a coin. The subjects performed 10 minutes at 100% of their self-reported functional threshold power followed by four Stroop tests separated by five minutes. RESULTS: There was no difference (p>.05) between baseline and 0 minutes, 5 minutes, 10 minutes, and 15 minutes post high-intensity cycling. CONCLUSION: Elite mountain bikers do not exhibit impaired EF following high-intensity exercise. In previous research on recreational athletes, Stroop scores decreased after high-intensity exercise. This suggests that elite mountain bikers' EF is not affected in the same fashion as less trained individuals.

Title: **EFFECTS OF MENTAL FATIGUE ON PUTTING PERFORMANCE IN RECREATIONAL MALE GOLFERS**

Presenter(s): Samuel Shaver, Zachariah Bradley
Faculty Mentor: Brent Alumbaugh
Track: 6A

Abstract: Purpose: To quantify the effects of mental fatigue in distance offline, time to putt (TTP) and putts made compared to control. Methods: Eight recreational male golfers over two sessions; an experimental condition, where the golfers were administered a mentally fatiguing task (30 minute Stroop test), and a control session (30 minutes of self-selected music). After both sessions, participants completed a BRUMS questionnaire that was used to gauge mental fatigue level. The sum of scores for pre and post control and experimental conditions were collected and used in data analysis. Twelve putts were then completed from each one, two, and three meters from the hole. Results: BRUMS test results for fatigue were significantly different between control (1.75±1.58) and experimental (5.87±4.12) (p=.03). Similarly, BRUMS test results for vigor were significantly different between control (7.74± 3.88) and experimental (4.37±1.99) (p=.04). There was no significant difference in TTP or distance offline for the one, two, or three meter putts, or putts made overall from control to experimental (p>.05). Conclusions: The Stroop tests showed significant effects on mental fatigue and vigor. Mental fatigue showed no effects on distance offline or TTP.

Title: **EFFECT OF DIFFERENT EXERCISE ENVIRONMENTS ON SWEAT METRICS IN CROSS-COUNTRY ATHLETES**

Presenter(s): Gilon Dierks, Reese Fledderjohn
Faculty Mentor: Brent Alumbaugh
Track: 6A

Abstract: Purpose: To examine sweat rate (SR) and sweat sodium concentration ([Na+]) during exercise in male cross-country runners in different environments. Methods: Four male DII cross-country runners performed a 50-minute low-intensity exercise protocol in an outdoor (25.6°C, 11% humidity) and indoor (21.1°C, 29% humidity) environment. SR was calculated from pre- to post-exercise change in body mass. A sweat patch was used to measure regional sweat [Na+]. Results: Sweat metrics between the outdoor and indoor environment were significantly different ($p < .05$) in absolute SR (1.62 ± 0.18 L · h-1, 1.17 ± 0.13 L · h-1), SR relative to body mass (24.84 ± 2.58 ml · kg-1 · h-1, 17.95 ± 1.41 ml · kg-1 · h-1), and regional [Na+] (1672.50 ± 500.27 ppm, 1212.50 ± 288.04 ppm), respectively. There was significant correlation in SR relative to body mass and whole-body sweat (WBS) [Na+] for the outdoor and indoor environments (1298.74 ± 306.96 ppm, 1099.98 ± 260.54 ppm) respectively, as well as SR relative to body surface area and WBS [Na+] for both environments. Conclusions: Exercise in a warmer outdoor environment is associated with a higher SR and sweat [Na+] compared to an indoor environment.

Title: **APPLICATION OF BLOOD FLOW RESTRICTION DURING ISOKINETIC DYNAMOMETRY AND ITS EFFECT ON MUSCLE TORQUE AT THE KNEE JOINT**
Presenter(s): Rylee Taylor, Spencer Olson
Faculty Mentor: Brent Alumbaugh
Track: 6A
Abstract: Purpose: To identify how much the application of blood flow restriction (BFR) reduces muscle torque in order to provide an aid to others trying to prescribe exercise using BFR. Methods: Subjects will be recruited to perform two sessions, seven days apart, at the same time of day. In a randomized fashion, one session will contain BFR exercise and the other will be a control without BFR. BFR cuffs are inflated to each subject's personal pressure to reach 80% arterial occlusion. Each subject will complete a five-minute warmup on a stationary bike at a resistance between 25 and 50 watts or a self-selected resistance. The protocol consists of three submax concentric/concentric knee extension/knee flexion (CON/CON KE/KF) movements at 60 deg/s (accustomization). This is followed by a 30 second rest before three sets of three maximal CON/CON KE/KF movements with one minute rest between each. Results: It is hypothesized that muscle torque and muscle activation will drop at a relatively similar rate across all subjects when BFR is applied. Conclusion: This research could provide a relative scale for torque reduction when BFR is applied. Therapists and trainers could utilize this data as a tool to prescribe BFR exercise to their patients/clients.

Title: **DIFFERENCES IN AND BETWEEN MALE AND FEMALE COLLEGIATE CYCLISTS ON SWEAT SODIUM CONCENTRATION AND SWEAT RATE IN VARYING TEMPERATURES**
Presenter(s): Ruby Ryan, Reese Fledderjohn
Faculty Mentor: Brent Alumbaugh
Track: 6A
Abstract: Sweat rate (SR) and sodium loss from exercise have been shown to vary between individuals. Previous research has focused on developing normative data without accounting for environmental factors that may influence sweat metrics. The current study investigates the impact of different temperatures on sweat metrics in collegiate cyclists. Purpose: To examine the effect of different temperatures on SR and whole body sweat (WBS) sodium concentration ([Na+]) during prolonged low-intensity exercise with direct temperature changes in and between male and female collegiate cyclists. Methods: Three male and three female collegiate cyclists performed a 50-minute low-intensity exercise protocol (zone 2 specific pace) on a stationary cycle in three different temperature conditions of 20, 25, and 30 degrees celsius in a randomized fashion. SR was calculated from pre- to post-exercise change in body mass. A sweat-saturated piece of gauze was used to measure regional sweat [Na+]. Results: Both SR and WBS [Na+] concentration are predicted to vary within subjects and between sexes. We also hypothezie that there will be a significant correlation with sweat rate relative to body mass and WBS [Na+]. Conclusions: The results from this study can help athletes and coaches have a better understanding of SR and (WBS) [Na+] and how it changes between sexes and varying temperatures so that effective rehydration protocols can be esablished.

Title: **EARLY SEASON INJURIES IN DIVISION II CROSS-COUNTRY ATHLETES**
Presenter(s): Beau Thornton, Caitlin Lawson
Faculty Mentor: Nate Bachman
Track: 6A

Abstract: Purpose: To observe injury frequency and location of injuries amongst division II (DII) cross country athletes. Methods: Thirty-seven DII collegiate cross-country athletes volunteered for the study. Each participant completed a survey after each week of early season training, consisting of questions about injuries that were present during the week over a 5-week cycle. Results: In week 1, 58% of survey respondents were injured. Of those injured, 52% had no reduction in training, 33% had a reduction in training, and 14% could not participate due to injury. At week 5, 46% of survey respondents were injured. Of those injured, 18% had no reduction in training, 73% had a reduction in training, and 9% had no participation due to injury. Week 1 had 7 injuries causing reduced or no participation from lower leg injury (foot, ankle, shin, calf), 1 from knee injury, 2 from upper leg injury, and 2 from hip injury. Week 5 had 12 from lower leg injury, 0 from knee injury, 1 from upper leg injury, and 1 from hip injury. Conclusion: Early season running injuries are common in DII cross-country athletes. Future studies should investigate how early season injuries influence competition performance in this population.

Title: **BLOOD LACTATE AND HEART RATE RESPONSE IN BI-SKI INSTRUCTORS DURING HANDS ON ASSISTANCE WITH DIFFERENT SIMULATED BODY WEIGHTS**

Presenter(s): Emma Stone, Jillian Anderson

Faculty Mentor: Brent Alumbaugh

Track: 6A

Abstract: A bi-ski is a type of sit-ski used by individuals with various types of disabilities as a method of adaptive skiing. Hands-on assistance (HA) is a commonly used instructional strategy in which bi-ski instructors ski behind and guide the bi-ski to give individuals with more advanced disabilities the opportunity to ride without contributing to the overall movement of the ski. To the researchers' knowledge, there is no research that studies heart rate (HR) and lactate values of bi-ski instructors. Purpose: To compare HR and lactate values of experienced bi-ski instructors while performing HA with 180 lbs. versus 80 lbs. in the bi-ski. Methods: Two experienced bi-ski instructors each performed six runs. Three with 180 pounds and three with 80 lbs. in the bi-ski. Every run was performed on a blue square run at Powderhorn Mountain Resort. HR was measured using a chest monitor throughout the duration of each run. Lactate levels were analyzed before and after each run. Results: Researchers hypothesize that HR and lactate levels will increase with a heavier weight in the bi-ski. Conclusion: Results could inform bi-ski instructors of the demand associated with performing HA with 180 lbs. versus 80 lbs. in a bi-ski.

Title: **UNVEILING THE UNEXPLORED: PERFORMANCE COACHING IN FORMULA 1**

Presenter(s): Connor Lolley

Faculty Mentor: Nate Bachman

Track: 6A

Abstract: Formula 1 (F1) racing is a fast-paced sport where fractions of seconds often make the difference between victory and defeat. With high speeds and high risk at play, the physical demands of F1 racing are greater than many understand. Drivers can endure G-forces during a race comparable to fighter pilots and have reaction times on par with Olympic sprinters. Given these demands, performance coaching is necessary to keep drivers prepared and ready for each race during the long 10-month season. Performance coaches for higher-level athletes like this commonly work with the athletes directly to build strategies for competition, physical strength, and overall health to be at their highest potential to perform. Nonetheless,

this career field is widely unknown and unexplored as a potential future pursuit. The aim of this project is to investigate the F1 performance coaching career by examining the demands of F1 drivers, the role of the performance coach, and the requisite steps to work as a performance coach at the pinnacle of the racing world.

Title: **EFFECTS OF ENVIRONMENTAL TEMPERATURE ON SWEAT METRICS WITHIN COLLEGIATE CYCLISTS**
Presenter(s): Reese Fledderjohn, Ruby Ryan
Faculty Mentor: Brent Alumbaugh
Track: 6A
Abstract: Exercise-induced sweat rate (SR) and sodium concentration ([Na+]) have been shown to vary between individuals. Previous research has focused on developing normative data without accounting for environmental temperature, which may influence sweat metrics. The current study investigates the impact of different environmental temperatures on sweat metrics in a homogenous group of collegiate cyclists. Purpose: To examine the effect of environmental temperature on SR and [Na+] during a prolonged low-intensity exercise with direct temperature changes within male and female collegiate cyclists. Methods: Three male and three female collegiate cyclists will perform a 45- to 50- minute low-intensity exercise protocol in temperature conditions of 20, 25, and 30 degrees Celsius in a randomized fashion. SR will be calculated from pre- to post-exercise change in body mass. A gauze pad saturated with the subjects' sweat will be used to measure regional [Na+]. Results: We hypothesize that sweat metrics between the environmental temperatures will differ significantly within and between subjects. Conclusions: The results from this study will provide greater insight into the dynamic relationship between environmental temperature and sodium loss from sweat.

Title: **CHARACTERISTICS OF EXPIRED GASES DURING BREATHWORK**
Presenter(s): Andrew Noble, Jorja Cooper
Faculty Mentor: Brent Alumbaugh
Track: 6A
Abstract: Purpose: To quantify the effects of breathwork; specifically, breath retention time versus VECO2/VEO2, and PECO2 versus respiratory drive. Methods: Thirty recreationally active subjects over one session; an observational condition, where the subjects will perform breathwork while researchers collect data on expired gases, heart rate, and oxygen saturation. Results: We hypothesize that breath retention time will correlate with the ratio of VECO2/VEVO2, and that the rate that SPO2 % decreases during breath retention will correlate with heart rate. Conclusion: This study could give insight into what is occurring metabolically during breathwork. The results from this study could help explain why breathwork is effective in reducing anxiety and increasing relaxation in certain individuals.

Title: **FINS OF FREEDOM: EXPLORATION OF A VETERAN SCUBA PROGRAM**
Presenter(s): Adam Vasquez, Michael Acker, John Walgast, Andrew Fazackerley
Faculty Mentor: Tim Fry
Track: 6B
Abstract: A group of four students is designing and organizing a unique venture envisioned as a scuba diving program tailored to veterans with a disability. The project incorporates planning for a non-profit 501(c) (3) organization, underscoring a commitment to social cohesion by forging strategic partnerships with local entities such as the VA, CMU, and ScubaVentures Dive Shop. This project's key objective is to investigate this program's viability by formulating a business plan and communicating these points

with the proposed partners. The scuba diving program for veterans with disabilities aims to provide thrilling recreational opportunities and serve as a catalyst for empowerment and rehabilitation. By harnessing the therapeutic benefits of underwater exploration, participants can overcome physical limitations, build confidence, and forge lasting connections with fellow veterans and the community.

Title: **OUTDOOR LODGING RENTAL BUSINESS**
Presenter(s): Brad Hodges, Wyatt Davis, Megan Lederman, Kara Brown
Faculty Mentor: Tim Fry
Track: 6B
Abstract: Four Outdoor Recreation Industry Studies students have created a business plan for taking over a rental business; Four Seasons of Fun in Big Bear Lake, CA. The business plan explores changes to the current business model to ensure that the cabin can pay for itself and serve as passive income to the owners. The students utilized their extensive knowledge of the ski industry to improve upon the business plan. The strategies implemented include increasing the number of renters throughout the year, increasing the amount of income per rental, and minimizing management expenses. Some specifics explored in the business plan are incorporating technology into operations and management. They also plan on adding new partnerships with other small businesses to provide equal benefit for both parties. The business plan will show that this family-oriented rental business can offer a warm, welcoming experience to all. This will ensure that renters enjoy the beauty of Big Bear Lake, San Bernardino mountains, and make memories that last forever.

Title: **BLIND CONCEALMENT LID**
Presenter(s): Trey Schwerdtfeger, Lucas Kowalczuk
Faculty Mentor: Tim Fry
Track: 6B
Abstract: A pair of students majoring in Outdoor Recreation have revolutionized the concepts of concealment structures (hides) in the waterfowl industry. The students are avid waterfowl hunters and developed a revolutionary product that would significantly enhance hunters' success in the field. This presentation aims to use information accumulated from classes throughout the years to create a sustainable and market-ready piece of outdoor recreational equipment for avid hunters everywhere. Building off of one of the most innovative waterfowl hunting solutions in recent years, the Avian-X A-Frame, (introduced in 2012) hunters who pursue waterfowl know the importance of a good hide. Over the past 14 years, birds have become familiar with A-Frames from flying over them and looking inside the blind. To address this issue, we have designed a cover that can be flipped open when birds are nearby, providing additional concealment to the top of the A-Frame. Throughout this project, students will demonstrate the difference between a hide with a lid and one without. Additionally, the business plan will demonstrate a business model to successfully get the product through development, testing, and into the market.

Title: **ARCTIC THREADS TECHWEAR – A NEW CHAPTER IN COLD WEATHER CLOTHING**
Presenter(s): Dominic Craig, Cayden Baine, Ryley Mosher, Justin Beemer
Faculty Mentor: Tim Fry
Track: 6B

Abstract: Our team has created a business plan for an innovative clothing brand: Arctic Threads Techwear. This business plan is centered around the creation of reliable, functional, durable cold weather clothing applicable for all occasions. The ski industry is in need of a revamp of the clothing worn during cold weather recreation. We intend to create outdoor wear that embodies modern style while maintaining functionality in every condition. In recent years we've observed new ski attire brands become popular that market cheap clothing and fast production. Their goal is to push out as much product as possible as quickly as possible. Arctic Threads Techwear will change this trend by creating gear that is functional, reliable, and durable while also lasting a lifetime. As winter sport athletes we've tried and tested countless pieces of cold weather gear. We all see a need for change in both style and functionality. We will present product designs including features. We will explain how our gear sets us apart from competitors while maintaining functionality. We will change the way that winter sport athletes view snow gear by showing our customers that high quality, functional gear can be produced for a reasonable price and accessible to all.

Title: **A NEW APPROACH TO TRUCK TOPPERS**
Presenter(s): Trevor Pike, Ryan Pless, Brady Porter
Faculty Mentor: Tim Fry
Track: 6B
Abstract: A group of three students, majoring in Outdoor Recreation Industry Studies, have designed and organized an idea for a future business. This business will reside in the Outdoor Recreation Industry, specifically within Overlanding, Travel, and Camping. Entering the market with a specialized business strategy, this business will focus on customer relations, targeting niches, and providing exemplary quality. This product is designed as an innovative, quality camper shell that is compatible with recreators in any outdoor region. This product attempts to create a cheaper alternative to recreational vehicles (RVs) and current camper shells while embracing a more intentional design. This company will strive for a product that is lighter, simpler, and more user-friendly than competitive products. To accomplish this, the business will focus on three main qualities: price, ease of use, and quality. To attract customers, we enable exploration of the outdoors, without worrying about campsites or pitching tents. The motivation for this product stems from the steep price point associated with camper shells and the ability to innovate new designs. As camper shells are currently very expensive, this product will have a competitive advantage providing a new system of car camping while remaining affordable.

Title: **SLOPE READY STORAGE: CREATING A SKI RACK FOR EUREKA! MCCONNELL SCIENCE MUSEUM**
Presenter(s): Victoria Cloutier, Mary Metherd, Michael Acker
Faculty Mentor: Sarah Shrader
Track: 6C
Abstract: In partnership with the statewide Wright Collegiate Challenge, a group of students paired together with Eureka! McConnell Science Museum to face the challenge of designing and constructing a ski rack for a small bus. Eureka! McConnell Science Museum is a local nonprofit focused on creating passion for science in the youth of Western Colorado. An important aspect of their programming is the Environmental Institute, where students use hands-on experience in the outdoors to gain a deeper understanding of the world around them. During the winter months, they take groups of students to Powderhorn Mountain Resort to teach them how to ski. With the growing popularity of this program, Eureka! has been faced with a problem:

they need proper ski storage for transportation. A tight budget and special design needs made purchasing a pre-made rack an unavailable option. The group meticulously followed the entire design process, from drafting and prototyping to final construction, with a keen focus on achieving a sleek design that maximizes functionality. With this new and improved ski rack, Eureka! is able to more efficiently transport students ski gear, making their ski programming an overall smoother experience for both students and staff.

Title: **SUSTAINABLE TOURISM ON THE TAYLOR RIVER**
Presenter(s): Brad Hodges, Trey Schwerdtfeger, Lyndsey Aguilar, Bradly Hodges
Faculty Mentor: Sarah Shrader
Track: 6C
Abstract: In partnership with the statewide Wright Collegiate Challenge, a group of students were tasked with creating sustainable messaging and signs for Harmels on the Taylor, a resort located in Almont, Colorado. This location has been used since the late 1800's, initially serving as a rest stop for ranchers. Since then, the Reynolds family purchased the ranch in 2021 with the intention of providing guests with the experience of fishing on the Taylor River, along with many more recreational opportunities. Throughout the project, these students worked closely with the Assistant Operations Manager of the company to develop and implement sustainability signs on the property. This signage included the newly developed sustainability statements and goals to demonstrate the values of the brand. During the project, students utilized graphic design to expand the primary goal of the project from implementing physical signage, to also conveying the resort's values on a digital platform, through creating a new sustainability tab on their website for potential visitors to see. In addition to creating messaging and signs for the brand, the group also developed a Leave No Trace staff onboarding training, to ensure employees act in a manner that aligns with the values of the company.

Title: **SKATE FORWARD: REVITALIZING COMMUNITY ENGAGEMENT FOR RAMPS AND ALLEYS**
Presenter(s): Thomas Hellyer, Dominic Craig, Kara Brown
Faculty Mentor: Sarah Shrader
Track: 6C
Abstract: In partnership with the statewide Wright Collegiate Challenge, CMU students were challenged by Ramps and Alleys Clubhouse and Skate Shop to revamp their existing membership program as well as design a future event to help secure community-oriented funding from local residents and invested philanthropists. Ramps and Alleys is a small business located in Salida, Colorado that has a mission of improving their community by providing educational, recreational, and therapeutic activities while promoting healthy lifestyles and building positive relationships. Ramps and Alleys seeks to provide a safe and fun space for the youth of Chaffee County that is also accessible for everyone. With an interest in the community, local businesses, and an opportunity to compete in the Wright Collegiate Challenge, this CMU team selected the challenge proposed by Ramps and Alleys Clubhouse. Working with Stacy Falk of Ramps and Alleys, this team was able to produce content to establish future opportunities for funding and publicity for Ramps and Alleys and their community in the forms of a revamped membership program, a revitalized business pamphlet, and a plan for a future, possibly annual, fundraising event.

Title: **SHADING THE FUTURE**
Presenter(s): Bryce Templeton, Wyatt Davis, Morgan McNair
Faculty Mentor: Sarah Shrader
Track: 6C
Abstract: In partnership with the statewide Wright Collegiate Challenge, a group of students faced the challenge of creating a marketing plan, a fundraising strategy, and the design of a tradeshow booth to promote Raksa Optics' business growth in the upcoming years. It was essential for the challenge partner and the students that this growth occurred in a way that remained true to the company's core values, specifically focusing on providing sustainably made, high-quality sunglasses with positive social impacts extending beyond the company itself. These social impacts include a donation plan integrated into Raksa Optics' business model, where one pair of sunglasses is donated to a non-profit focused on transforming the lives of those suffering from cataracts for every pair sold. Throughout this challenge, the student team addressed the problems associated with starting a new company in a rural area. These challenges were overcome through the introduction of a spreadsheet containing potential events, the creation of an on-campus fundraising event, and an innovative design for a tradeshow booth to be used in future events. All of these solutions are integrated to form a successful marketing plan for this startup performance sunglass company.

Title: **RURAL RENAISSANCE**
Presenter(s): Torin Lackmann, Shannon Feran, Carter Burnham
Faculty Mentor: Sarah Shrader
Track: 6C
Abstract: In partnership with the statewide Wright Collegiate Challenge, a group of students created a comprehensive plan to increase brand awareness and popularity of the Rural is Rad movement. This movement was created to connect rural businesses to wider audiences and allow for smaller outdoor recreation businesses to thrive. It includes a network of rural brands in the outdoor industry that sell products or services to consumers. To achieve increased awareness, students created a bingo card challenge to highlight local rural businesses and recreation to increase a consumer base. Additionally, the group of students created a template for Rural is Rad business members, with the intention for the card template to be adapted to these specific local areas by showcasing their unique business and recreation opportunities. Students determined that the platform Instagram should be taken advantage of to communicate with members and consumers by showcasing tools such as the bingo card. Through increasing Rural is Rad's social media presence with the bingo card challenge, students dove into the specifics of business marketing. The group explored various marketing methods, such as local advertisements, communication channels, graphic designs, and target audiences to identify how to best capture new markets and customers.

Title: **CLEANING UP LANDFILLS ONE GEAR SHOP AT A TIME**
Presenter(s): Trevor Pike, Ethan Au, Ronald Miyagishima
Faculty Mentor: Sarah Shrader
Track: 6C
Abstract: In partnership with the Wright Collegiate Challenge, a group of students from Colorado Mesa University have partnered with Out&Back, an outdoor gear shop in Denver Colorado. The students were presented with the challenge of eliminating waste sent to landfills and establishing a system for repurposing unsellable gear. Many gear shops across the country have an abundance of unsellable items. The shops can either spend time and

money trying to fix them or throw them in landfills. The presented solution networks used gear shops with artists, non-profits, and small businesses in need of items or materials. By creating a webpage with partnered gear shops and interested receivers, relationships can be built to redirect items from landfills to creative people. This solution is designed to network collaborating parties and efficiently distribute unsellable items to them for repurposing. By collaborating and networking with gear shops and receiving parties, the students have created a scalable distribution system that allows Out&Back and other gear shops to shift their perspectives from "sellable" to "useable."

Title: **LET'S TAKE A TRIPOUTSIDE**
Presenter(s): Julia Congdon, Samuel Godwin, Adam Vasquez
Faculty Mentor: Sarah Shrader
Track: 6C
Abstract: The Colorado State Outdoor Recreation Office created the Wright Collegiate Challenge. This challenge partners industry professionals with university students around the state to solve practical industry challenges. This group of students from CMU, all majoring in Outdoor Recreation Industry Studies, was partnered with TripOutside. TripOutside is an online booking website for various human-powered outdoor expeditions in North America. The challenge proposed to the students was to design a marketing program to expand TripOutside's reach. The students designed a program that partners bloggers with TripOutside to promote the business and gain brand awareness and bookings. This method is known as affiliate marketing. The student team created a playbook full of outreach materials and affiliate guidelines. This playbook will help TripOutside attract bloggers by creating its affiliate marketing program and eventually broadening its customer base.

Title: **SCOPING REVIEW: RESPONSIVE FEEDING IN THE PEDIATRIC POPULATION**
Presenter(s): Elizabeth Moore, Alma Luis Guzman, Zane Followell, Kendall Bessette
Faculty Mentor: Jennifer Fortuna
Track: 6D
Abstract: Responsive feeding practices have been found to improve picky eating, food consumption, food exploration, and meal enjoyment in children. This approach allows for better development of independence and self-regulation during feeding. Although it is a growing practice area, few studies have addressed the importance of incorporating responsive feeding practices into feeding intervention. The purpose of this scoping review study is to explore existing literature on responsive feeding and the disciplines, outside of psychology, utilizing this approach with pediatric populations. Responsive feeding is shown to bring about better results in increasing food intake amongst children who have eating and feeding disorders. They feel they have more of a say in what they eat and therefore have more trust in their caregivers. Conversely, children who have experienced forced feeding and strict behavioral guidelines around meals tend to have decreased trust in their caregivers. They also may experience a further decline in interest in food and may decrease the number of foods they accept as part of their diet. This, in turn, can be detrimental to their overall physical and mental health.

Title: **A SCOPING REVIEW OF ASSISTIVE TECHNOLOGY TO PROMOTE INDEPENDENCE IN PARENTS WITH DISABILITIES**
Presenter(s): Erin Salsbury, Barton Glasser, Logan Anderson, Ali Kazemi
Faculty Mentor: Jennifer Fortuna

Track: 6D

Abstract: Being a parent is a challenging role for everyone. For parents who have a disability, this role can be overwhelming and isolating because of the unique sets of challenges they face, despite having the same goals and desires as other parents. Assistive technology (AT) can support people in their parental roles. Parents with disabilities often face barriers to accessing and using AT, including lack of knowledge, funding, and social stigma. The purpose of this scoping review is to explore what is known from the existing literature about parents with disabilities who use AT to engage in parenting occupations and identify what barriers exist to acquiring AT. Increasing understanding of how this population uses AT will provide insight into how occupational therapists and other health professionals can reduce barriers and support the role of parenting.

Title: **A SCOPING REVIEW OF OCCUPATIONAL THERAPY GRADUATE STUDENTS' COMPETENCIES IN VARIOUS SERVICE DELIVERIES**

Presenter(s): Kiera Benson, Dana Morgan, Vivianna Garcia, Jennifer Berry

Faculty Mentor: Jennifer Fortuna

Track: 6D

Abstract: Occupational therapy (OT) education programs produce competent students in a variety of service delivery approaches (e.g., one-on-one, telehealth, and group sessions). Students build competence through coursework and fieldwork. Assessing competence is challenging due to lack of a standardized curriculum. The purpose of this scoping review is to identify how entry-level competence is measured, compare what is being learned through classroom instruction versus fieldwork experiences, and identify how current OT programs prepare students for service delivery. To achieve competence for entry-level practice, students must learn foundational, creative, and scientific principles for OT practice. Wood (1995) used a weaving metaphor to explore the art and science of OT. Her concept is organized around the warping and wefting of weaving. Warp refers to thread held in tension on a loom. In OT practice, warp requires building rapport, empathizing, and helping others use their potential. Weft is the thread woven through the warp to create structure. In practice, this may include clinical skills, and applying research and theory to guide decision making. OT educators are the shuttles that guide weft through the warp on a loom. These threads inform and strengthen each other to reinforce the fabric of an OT student's professional identity.

Title: **A SCOPING REVIEW ON TRACTOR SEATING FOR OPERATORS WITH SPINAL CORD INJURIES**

Presenter(s): Tyler Cole, Jacquelyn Coffman, Kara Farmer

Faculty Mentor: Jennifer Fortuna

Track: 6D

Abstract: Approximately 300 farmers and ranchers acquire a spinal cord injury every year. Farmers with spinal cord injuries do operate agricultural machinery, exposing them to increased risk of injury to the skin, muscles, and bones. Poor manufacturing of tractor seating can restrict blood flow, cause skin breakdown, and lead to development of pressure ulcers. On average, a pressure ulcer takes approximately one month to heal. Costs of treating the full thickness pressure ulcer for an individual can easily reach $500,000. The consequences of time and money lost on a harvest could be devastating to the farm business. The purpose of this scoping review study is to summarize existing research on tractor seating modifications for farmers with spinal cord injury and increase understanding of how modified tractor seating may impact participation in farming for this population. Consequently, it is important for occupational therapists to understand the physiological

impacts tractor seating has on farmers with paraplegia to support their continued occupational participation.

Title: **A SCOPING REVIEW OF THE LITERATURE ON INCLUSIVE PRACTICES TO IMPROVE ACCESSIBILITY FOR MUSEUM VISITORS WITH VISUAL IMPAIRMENT**
Presenter(s): Korbin Carr, Kacey Doner, Kaitlyn Mearing
Faculty Mentor: Jennifer Fortuna
Track: 6D
Abstract: Museums are key educational resources in the community. Although physical spaces have been made more accessible for people with mobility impairments, many museums are not as welcoming to visitors with visual impairments (VI). Lack of accessibility creates barriers to inclusion for this population. Few studies have explored inclusive practices to improve accessibility for museum visitors with VI. This scoping review study aims to answer the following research questions: (1) What is known from the existing literature about inclusive practices for museum visitors with VI? (2) What are some common barriers to integrating inclusive practices into museum settings? (3) What suggestions do museums visitors with VI have for improving inclusive practices? Naturally, people with disabilities want to be included in museum experiences just like everyone else. Inclusive policies and practices are often developed by administrators who determine what people with disabilities want or need. People with disabilities tend to be excluded from the decision-making process when these perspectives should matter most.

Title: **SEX EDUCATION STRATEGIES FOR AUTISTIC INDIVIDUALS**
Presenter(s): Brock Martin, Mica Jenrette, Wyeth Watts
Faculty Mentor: Jennifer Fortuna
Track: 6D
Abstract: More than 5 million American adults have been diagnosed with autism. There is a common misconception that people with autism are uninterested in sex and intimacy. Young adults with autism often don't have access to this type of health information. Traditional sex education is not sufficient for this population. Sexuality and intimacy are important for one's overall health and well-being. Lack of appropriate resources creates barriers to participation for this population. The purpose of this scoping review is to summarize existing research, provide insight into knowledge gaps, and inform future research on sex education for young adults with autism. There is a common misconception people with ASD are uninterested in sex and intimacy; however, many have romantic and sexual desires. Thus, comprehensive sexual education is important for the sexual health and well-being of this population. Education should address the unique needs of people with autism. For example, difficulty communicating (verbally and non-verbal), being able to flirt, knowing someone is flirting with you and managing sensitivities to sensory input including the sights, smells, and sounds associated with sexual intimacy. Providing information to address these needs allows for informed decision making that improves the quality and safety of sexual intimacy.

Title: **GO BABY GO: UTILIZING THE POWER OF INTERDISCIPLINARY COLLABORATION**
Presenter(s): Sammy DeYoung, Hailey Emanuel, Athena Johnson, Gabriela Santana Meraz, Kolten Strait, Abraham Avila, Ryan Randall
Faculty Mentor: Victoria Hibler
Track: 6D

Abstract: Play is an essential part of childhood. Research has shown engaging in play promotes cognitive, motor, and social-emotional development in young children. Play also facilitates skills in problem solving, self-awareness, and communication. However, many children with disabilities face barriers that limit play, and therefore, impede skill development. For instance, lack of mobility can limit a child's ability to explore their environment and socialize with peers. Since 2015, Colorado Mesa University has been partnering with Family Health West to run Go Baby Go, a program that provides modified ride-on cars to young children with disabilities. This year, an interprofessional team of faculty and students from CMU's computer science, engineering, occupational therapy, and physical therapy programs have utilized their discipline-specific expertise to collaboratively modify a car for a local 5-year-old girl. With interdisciplinary problem-solving, the team was able to adapt the vehicle based on this child's interests, strengths, and needs. For example, due to this child's hypotonia which limits her ability to maintain functional reach and grasp, a PVC bar was installed on the steering wheel to improve driving control. Through working together and applying the unique knowledge of each discipline, the team increased this child's ability to engage in independent play.

Title: **DOES RUNNING BAREFOOT IMPROVE BIOMECHANICS IN ENDURANCE RUNNERS?**
Presenter(s): Ashlynn Squires
Faculty Mentor: Jeremy Hawkins
Track: 6E
Abstract: Scenario: Technology has had a significant impact on human performance, especially when investigating the evolution of the shoe. Today's carbon plated shoes allow elite athlete to harness forward momentum through the ground reaction forces in the shoe's technology. But are shoe designers doing too much? With the increase in stride length comes a higher risk for injury. Overstride increases heel striking, which slows the runner down and puts more stress through the structures of the body. Question: Does running barefoot improve biomechanics in endurance runners? Key findings: Barefoot running has physiological effects and improves biomechanics; which in return can help with improved performance in collegiate distance runners. Barefoot running can decrease stride length and change the joint angles at the ankle, knee, and hip while also minimizing ground reaction forces during the stance phase. Barefoot running also changes where runners land on their foot, making them more midfoot to forefoot which allows the body to run more efficiently. Bottom line: From this we can conclude that research suggests running barefoot for a brief period of time a couple days per week could improve running mechanics in collegiate distance runners.

Title: **MULLIGAN CONCEPT WITH REHABILITATION VERSUS REHABILITATION ALONE**
Presenter(s): Irais Quiroz Becerra
Faculty Mentor: Jeremy Hawkins
Track: 6E
Abstract: Scenario: Injury can alter the biomechanics of the way that joint is supposed to move to function properly with no pain. In the ankle specifically, lateral ankle sprains occur frequently. Clinicians use rehabilitation exercises to help patients with ankle injuries return to play and decrease the likelihood of a second injury. The Mulligan concept is a type of manual therapy that allows a clinician to align the joint correctly so that the patient is able to have proper joint movement and biomechanics while significantly reducing pain. Question: Is the Mulligan concept combined with rehabilitation exercises

better than rehabilitation exercises alone in decreasing symptoms of pain? Key findings: The Mulligan concept with rehabilitation consistently shows instant pain relief based on patient outcome measures as opposed to rehabilitation exercises alone. Bottom line: Although rehabilitation exercises (such as balance and strength training) show a reduction in pain after rehabilitation sessions, applying the Mulligan concept in conjunction with rehabilitation exercises maximizes the benefit of reducing pain immediately.

Title: **CONCUSSION RETURN TO PLAY: REST VERSUS ACTIVE**
Presenter(s): Dylan Nicholson
Faculty Mentor: Jeremy Hawkins
Track: 6E
Abstract: Scenario: One of the most common injuries in sports is a concussion. There are two common ways of rehabbing a concussion, one being rest with little to no exercise. Second and newest way being sub-symptomatic training, exercising while not increasing the severity of symptoms. Sub-symptomatic training is low impact cardiovascular training that elevates a patient's heart rate, most commonly using a stationary bike. Question: Does sub-symptomatic physical activity help individuals suffering from a concussion return to play at a faster rate than rest alone? Key Findings: Findings show that sub-symptomatic training can have a faster recovery time or have a similar recovery time to athletes who rest after suffering from a concussion. While not always decreasing return to play time, it does however decrease the time it takes for the athlete to become reacclimated to maximal training and has the athlete return to their normal much faster. No findings have shown a negative effect on return to play time in sub-symptomatic training. Bottom Line: Sub-symptomatic training has positive effects on athletes who have suffered a concussion and while not always decreasing time to return to play, it has no negative effects and should be considered when rehabilitating athletes who suffer from a concussion.

Title: **THE EFFECTS OF GRATITUDE JOURNALING ON STRESS IN COLLEGIATE ATHLETES**
Presenter(s): Sydnei Littrell
Faculty Mentor: Jeremy Hawkins
Track: 6E
Abstract: Scenario: Stress is a menace whose presence has been growing in the younger population. Collegiate athletes, specifically, seem to constantly have an excessive workload on their plates, causing them undue amounts of stress. In season, the NCAA allows twenty hours of time in sport, while only requiring one day off per calendar week. On top of this, athletes have a full course load to attend to. Question: Does gratitude journaling decrease stress, increase optimism, and increase gratitude levels in collegiate athletes who experience elevated stress levels compared to no form of journaling to cope with stress? Key findings: Gratitude journaling has positive effects on stress management in collegiate athletes, while also increasing optimism and feelings of gratitude. Adding a type of gratitude journaling into their daily lives is beneficial to cope with the different stressors collegiate student-athletes may face. Bottom Line: Gratitude journaling is a great method to help collegiate athletes manage stress and feel optimistic. Student athletes have been shown to respond positively to gratitude journaling methods when handling stress levels and have seen an increase in feelings of optimism as well.

Title: **ADAPTIVE AND ACTIVE LIFESTYLE EXPO PARTICIPANT PERCEPTIONS**
Presenter(s): Emma Shaddix, Laura Gutierrez
Faculty Mentor: Sloane Milstein

Track: 6F

Abstract: This presentation focuses on students not only hosting an event advocating for individuals with disabilities but also actively participated through volunteering. This poster highlights the comprehensive experience of skill development and professional readiness gained through student involvement in the event management process. Student involvement in the event is crucial for fostering awareness in the upcoming event and future events. Participating in the conference organized by students at Colorado Mesa University provides a valuable opportunity for on-campus students. By engaging with tailored presentations, exhibits, and experiences for those with physical disabilities, students gain a deeper understanding of individual lived experiences. By engaging with tailored presentations, exhibits, and experiences for those with physical disabilities, students gain a deeper understanding of individual lived experiences. Participant Perceptions: There is an expectation of 500 student participants, along with 30 activity providers and 30 exhibitors for the expo. Each student participating will have the opportunity to participate in events such as sitting volleyball, wheelchair basketball, sitting yoga, roll and stroll and other adaptive sporting events, keynote speakers and a number of panels. After the event and course conclude, participants will be provided with an anonymous post-event survey and course assessments, sharing their perspectives. The preliminary results will be available for the conference and presentation. The student voice will be conveyed through quoted excerpts from their reflective writings.

Title: **CULTIVATING INCLUSIVE EXPERIENCES: A COMPREHENSIVE EXPLORATION OF STUDENT-LED ADAPTIVE LIFESTYLE EXPO VOLUNTEER PERSPECTIVES AND PROFESSIONAL DEVELOPMENT**

Presenter(s): Miranda Pruitt, Marshal Brose

Faculty Mentor: Sloane Milstein

Track: 6F

Abstract: This project focused on the intersection of experiential learning and health promotion through the Adaptive and Active Lifestyle Expo, a student-led event emphasizing disability awareness in sports. Approximately 100 student volunteers participated, providing diverse perspectives on the expo's impact. The one-day event delved into the challenges and adaptations in the sporting realm for people with disabilities, fostering understanding among students, volunteers, and participants. Volunteers played a crucial role in promoting inclusivity, aiming to cultivate empathy, enhance communication skills, and increase community involvement. The project aimed to contribute to personal growth by nurturing qualities such as patience and flexibility, while simultaneously developing essential professional skills like adaptability and teamwork. Additionally, volunteering at the expo aimed to promote a culture of inclusivity, encourage advocacy for social change, and build meaningful connections, contributing to a more compassionate society. The methodology involved anonymous surveys for volunteers and support staff to evaluate the overall experience and success of the event, with preliminary results to be available at the conference. Volunteers were encouraged to share and discuss their insights on the unique blend of experiential learning and health promotion achieved through the Adaptive and Active Lifestyle Expo.

Title: **STUDENT MANAGER PERSPECTIVE WITH AN ADAPTIVE AND ACTIVE LIFESTYLE EXPO**

Presenter(s): Kyle Benjamin, Kirstin Williams

Faculty Mentor: Sloane Milstein

Track: 6F

Abstract: Increasing inclusivity for people with disabilities is imperative, both within universities and in daily life. To address this, Sport Management classes planned and organized an event aimed at educating students and faculty about the diverse needs of individuals with disabilities. Through engaging activities and presentations, participants gained insights into the daily challenges faced by people with disabilities. The event, titled the Adaptive and Active Lifestyle Expo, was executed in the spring of 2024, involving various tasks such as marketing, securing activity providers, and coordinating presenters. Activities featured at the event include adaptive sports, yoga, and climbing, complemented by a keynote speaker and an exhibitor fair showcasing organizations supporting individuals with disabilities. The overarching goal of the event is to enhance awareness of different disabilities among university students and the broader public. This poster presentation will explore the diverse experiences and perspectives of student managers involved in organizing the expo, with post-event results included.

Languages, Literature and Mass Communications

Title: **MEGAMIND: WOMEN'S ROLE IN SUPER RELATIONSHIPS**
Presenter(s): Isabella Hamann
Faculty Mentor: Barry Laga
Track: 7A
Abstract: In the DreamWorks movie Megamind, an alien supervillain by the same name eventually defeats his life-long nemesis Metro Man; however, victory is not satisfactory without someone to challenge it. As a solution, Megamind creates a new hero who's meant to challenge him: Tighten. Things do not go to plan, however, when Tighten turns evil and Megamind must step up to take him down. Reporter Roxanne Ritchi is the film's only leading female character, and she plays a very pivotal role as a central tool in the homosocial interactions of the superhuman leads, but what exactly is her role? Regarding male homosocial relationships, Eve Sedgwick explains that the "emerging patterns of male friendship, mentorship, entitlement, [and] rivalry" cannot be understood "outside of its relationship to women and the gender system as a whole" (1). The dominance of patriarchy is so ingrained into our society that it is impossible to think about a man's relationship to the world outside the context of that dominance. Men's interactions with other men are always characterized by systems of women's oppression. Sedgwick's theory is particularly applicable to Megamind because the film creates a kind of "love triangle" between Roxanne and the alternating 'hero' and 'villain' leads. By exploring the various ways Megamind, Metro Man, and Hal Stewart (Tighten) interact, we can begin to uncover why Roxanne and "the gender system as a whole" is so important to understanding male homosocial relationships (1).

Title: **LOCATING ALTERITY IN WILLIAM WORDSWORTH'S "NUTTING"**
Presenter(s): Jude Bolick
Faculty Mentor: Barry Laga
Track: 7A
Abstract: William Wordsworth's poem "Nutting" has consistently baffled readers due to its contradictory attitudes toward nature. While at the start of the poem, the narrator celebrates the natural world and urges readers to protect it, he later fails to follow his own advice as he decimates the same landscape he was just admiring. What is the purpose behind this sudden change of heart? Is "Nutting" about preserving or destroying nature? Can it be

about both? These are some of the questions I sought to answer in my essay, and to do so, I turned to Simon Critchley and his theory of using a double reading to locate alterity within a text. He explains that "It is the movement of traversing the text, which enables the reading to obtain a position of alterity or exteriority, from which the text can be deconstructed. The second moment brings the text into contradiction with itself, opening its intended meaning" (26-27). It is through this position of alterity that I analyze the poem and seek to explain the inconsistencies of Wordsworth's piece. I will present the argument that in "Nutting," Wordsworth advocates for the protection of nature while actively undermining his own message.

Title: **HUMAN DUALITY— THE NECESSITY OF DYNAMIC EXISTENCE**
Presenter(s): Tahirih Bochmann
Faculty Mentor: Barry Laga
Track: 7A
Abstract: Khalil Gibran first published The Prophet through Alfred A. Knopf in 1923 after many years of agonized laboring over its content and quality. The Prophet is a concise treatise on the nature of humanity as seen through the eyes of a poet prophet, and discussions on these topics held with people in the mythical land of Orphalese. The narrator's vagaries led critic Eugene Paul Nasser to question the foundation of Gibran's spiritual and philosophical claims within The Prophet, stating that "Gibran is neither at home in the old culture nor in the new, and an unresolved dualism vitiates much of the work when, as so often occurs, it pretends to resolution" (Nasser 24). But is Gibran's work truly just "an unresolved dualism" with no solid claims or well-defined boundaries of belief? Is the prophet narrator simply a vague and confused manifestation of Gibran's own warring psyche? Gibran's meticulously structured narrative, centered around associations between mortality and the divine as explored through variable perspectives focusing on the experiences that shape human life, reveals that such an argument misses the mark entirely— The Prophet urges us to accept that duality is the truth of the human spirit, that it is the resolution.

Title: **BLOODSHOT EYES**
Presenter(s): Rylee Martin
Faculty Mentor: Randy Phillis
Track: 7B
Abstract: These original works of poetry explore the experiences of trauma in the traditional sense, while acknowledging that intense emotional reactions can be pleasurable as well as painful. Several works will be performed by the author during the presentation.

Title: **OBITUARIES CLASSIFIED: A MORBID APPROPRIATION**
Presenter(s): Kirra Trenholm
Faculty Mentor: Randy Phillis
Track: 7B
Abstract: The piece being presented is a creative appropriation of an obituary as a classified job ad. The piece itself, written by the surviving member, explores the obituaries of four members of the same family having died in the same accident. Each obituary varies in length and tone, contributing to the story's overarching narrative regarding the writer's familial relationships. He goes into minor detail about his mother and her promiscuous life as a young adult. He writes about his relationship with his father—a hoplologist with an affinity for spears. He writes about his cousin—the radical hippy of the family. He writes briefly about his brother to represent their lack of a relationship. And then he gives a brief synopsis of his grandfather's life story as an infamous author who spent time in Southeast Asia. These

obituaries double as job ads for the reader to find replacements for his dearly departed family members, who all lived eccentric lives.

Title: **ANALYZING VERBAL FLUENCY IN SECOND LANGUAGE LEARNERS OF SPANISH**
Presenter(s): Caleb Garcia
Faculty Mentor: Tyler Anderson
Track: 7C
Abstract: When learning Spanish as a second language, it becomes clear that there are multiple forms of communication that need to be improved to reach fluency, including aural, verbal, and written. The mode of communication of interest in this investigation is verbal communication to express oneself to other speakers of the language. The purpose of this study is to share information and critique different strategies that enhance oral production of second language learners of Spanish at different levels of fluency in the language. Also within this concept, the idea of "fluency" within language will be explored. There are many debates as to what fluency means in second language learners, but within this investigation, definitions of fluency, and the more recent term proficiency, will be explored to examine the effectiveness of teaching methods to improve oral production in the Spanish language. Presentation will be in Spanish.

Title: **CULTURAL COMPENTENCE IN RADIOLOGIC SCIENCES**
Presenter(s): Morgan Raimer
Faculty Mentor: Laura Muñoz
Track: 7C
Abstract: This presentation will provide an overview for the concept of cultural competence as it applies to Latinos and cultural illnesses in the medical field. The specific cultural illnesses I'll be discussing include topics such as mal de ojo, empacho and limpias. I will also examine how cultural competence for Latinos can be applied directly to radiologic science careers. A comparison will be made of cultural competence training and effectiveness between various radiologic sciences programs. Presentation will be in Spanish.

Title: **THE CMU BULLETIN**
Presenter(s): Tiana Hayes, Tommy Thomas, Dillon Davis
Faculty Mentor: Allison Morris
Track: 7D
Abstract: Our project sprouted from the question, "What can we do to help foster social connection within our community?" To build greater social connection, we need to create easier ways to reach out to people and let them know what is going on at CMU. The CMU Bulletin is an idea that will highlight everything that happens around campus without having to search for or miss events. It is designed to be somewhere that is more public for the students and would be regularly updated. Students will be able to put anything they want on the Bulletin—things like club announcements, events, job opportunities, scholarships, and more. Everything can be put on this board, so students don't have to go searching for that one flyer they saw a week ago maybe in the English building. The Bulletin would be placed in an open, well-populated area, like the UC, so that anyone and everyone can see it. Students can then have access to information about different activities they can do that they might not even have known to existed. The CMU Bulletin is a way that we can bring our campus together even more.

Title: **RENOVATING THE LITERARY REVIEW**
Presenter(s): Kirra Trenholm, Bethany Daigle, Maria De Los Angeles Martinez Jaramillo
Faculty Mentor: TJ Gerlach
Track: 7D
Abstract: The Literary Review has been an annual literary and visual arts anthology at Colorado Mesa since 1972. Headed by students from across campus with a knack for editing and design, it produces its yearly anthology in spring to showcase any student's creativity and hard work. Accepting: prose, poetry, creative nonfiction, screenwriting, critical essay, and any form of visual art, the anthology seeks to represent CMU in all of it's many diverse lights. This year is a milestone, having just passed their 50th anniversary. So, with hard work and effort, this year's team sought to reinstate a sense of literary recognition and visual branding. The team worked to redesign the logo and color schemes in order to create a cohesion and representation of the organization. A style guide was created for the editing process in order to better create an editing standard to reflect modern day publishing standards. As a result of this work, The Literary Review achieved a record-breaking submission year that the anthology's team would like to showcase as a proud achievement and rebranding for the organization and students across campus.

Title: **SELF-IMAGE**
Presenter(s): Elizabeth Davis, Brooke Allen, Kristin Mercer, Colin Hillburn
Faculty Mentor: Kathryn McClain
Track: 7E
Abstract: This research project cohesively illustrates our journey of self-image through the ages and references materials, both print and image, to explore this concept at different stages of human development. After reading Kristen Radke's graphic novel Seek You: A Journey Through American Loneliness, we chose to explore"self-image" as a topic because we could all relate to it in diverse ways. We chose to do a short audiobook with accompanying images depicting various stages of 'self-image.' Kristin's section was on children and was chosen because she has a four-year-old son. A child's self-image is mostly defined and guided by their immediate family and caregivers. Brooke's age group was teenagers. She looks through the teenager's self-image based on their appearance and beauty standards. Addy's section was on adulthood. Self-image as an adult can be impacted by one's professional life and can therefore be visually demonstrated through art. Colin chose the elderly population because of his aging grandpa. He wanted to know how self-image could potentially affect his well-being. This presentation will provide insight into the research process and present our final audiovisual project.

Title: **CRRRRISPY BUSINESS**
Presenter(s): Skyler Scott, Elizabeth Foote, Madison Robinson, Kylie Bentley, Klaus King
Faculty Mentor: Kathryn McClain
Track: 7E
Abstract: Our student podcast series – CRRRRispy Business: CRISPR Gene Editing - delves into the conversation of CRISPR gene editing, unfolding its multifaceted implications through a five-episode exploration. Episode #1 lays the foundational knowledge by offering a comprehensive overview of CRISPR's scientific principles and mechanisms essential for understanding the subsequent discussions on its broader impacts. In Episode #2, we shift our focus to the potential beneficiaries of CRISPR treatments, examining perspectives, concerns, and affordability issues that could affect the widespread adoption of this groundbreaking technology. Episode #3 ventures into the medical domain with details on CRISPR's application

in healthcare as well as optimistic outlooks shared by many medical professionals regarding benefits for patient care. The narrative then takes a critical turn in Episode #4, where we probe into the ethical and clinical dilemmas faced by the scientific community; this episode scrutinizes the potential for biased outcomes in gene editing research and highlights the importance of transparency in scientific endeavors. Concluding the series, Episode #5 addresses the legal landscape surrounding CRISPR and identifies legislative responses as significant barriers to its accessibility in mainstream medical practice. Through an investigative lens, this episode reveals the complexities of legal frameworks that govern the future of CRISPR technologies. Together, these episodes weave a comprehensive narrative that not only educates but also stimulates thoughtful discourse on the transformative potential and challenges of CRISPR gene editing in society.

Mathematics & Statistics

Title: **MODELING SUMMER DIURNAL TEMPERATURE RANGE IN THE SOUTHWESTERN UNITED STATES**
Presenter(s): Grant Novak
Faculty Mentor: Erik Packard
Track: 8A
Abstract: In this project, we investigate the difference between daily high and low temperatures, also known as the diurnal temperature range. We use data to create a model that can accurately predict the daily diurnal temperature range during the summer for nearly any location in the southwestern United States. Our results indicate that weather factors are not the only reason why diurnal temperature range varies by location.

Title: **CONNECTIVITY ANALYSIS FOR RIVERS AND LAKES BASED ON GRAPH THEORY**
Presenter(s): Ashley Emery
Faculty Mentor: Enzo Wendler
Track: 8A
Abstract: In this project we use graph theory to investigate river systems. Different types of graph connectivity evaluation indices are analyzed. These indices can help determine if a river system is well connected, where the weakest link of the system lies, and whether a river's flow is satisfactory to maintain a healthy river system.

Title: **THE ROLES OF MEMORY, PROBLEM-SOLVING, AND METACOGNITION IN LEARNING MATHEMATICS**
Presenter(s): Cara Laughlin
Faculty Mentor: Ed Bonan-Hamada
Track: 8A
Abstract: We consider the importance of working memory in student development and the critical role that metacognition plays in the relationship between developing mathematical problem-solving skills and learning the deeper mathematics underlying those skills.

Title: **ORDER OF OPERATIONS AND COMMON MISCONCEPTIONS**
Presenter(s): Danielle Magyar
Faculty Mentor: Cathy Bonan-Hamada
Track: 8A
Abstract: In mathematics, educators see common misconceptions in adolescent learning. These misconceptions in mathematics include order of operations.

At a young age, students are taught basic order of operations, and they need this foundational skill to solve more complex problems as they continue into higher level mathematics. In this literature review, common misconceptions related to order of operations will be investigated in depth. Furthermore, strategies will be considered to prevent or avoid these common misconceptions.

Title: **PARTITION TREES**
Presenter(s): Brett Marlowe
Faculty Mentor: Ana Berrizbeitia
Track: 8A
Abstract: Each distinct sum yielding a natural number n is called a partition of n, and the partition function P(n) gives the total number of ways in which this can be done. Leonard Euler studied this problem in the 18th century, but a closed formula for P(n) has been sought after for centuries. These explorations have led to generating functions and recursive formulas, but no explicit formula has been found. We have developed a new approach in which we look at each partition as nodes in a tree diagram, and an algorithm determines the edges of the tree. Our new perspective has led to some fascinating results.

Title: **DEMYSTIFYING HIGH SCHOOL ALGEBRA THROUGH ABSTRACTION**
Presenter(s): Landon Hight
Faculty Mentor: Ana Berrizbeitia
Track: 8A
Abstract: High school math students often wonder how the math topics they are learning work together. The flow of algebra seems to be random in order, and, while it does utilize previously developed skills, the flow of high school algebra seems to be that of choice rather than nature. In this project, we investigate how select topics in high school algebra are taught and observe some of the shortfalls. We then consider the possibility of teaching those topics from a new perspective - category theory. We see how the lens of category theory can help students better understand three of the concepts taught in high school algebra.

Title: **FRAILTY ASSESSMENTS: RISK IDENTIFICATION AND PREVENTING ADVERSE OUTCOMES**
Presenter(s): Sindre Brein
Faculty Mentor: Richard Ott
Track: 8A
Abstract: Frailty is a phenomenon that has always been a part of the human aging process. Weakness, exhaustion, weight loss, and reduced mobility are all potential signs of developing frailty. Healthcare institutions worldwide have started implementing assessments of frailty to effectively determine the right course of treatment for individual patients. This approach has both sociologic and economic implications. By reducing the number of unexpected hospitalizations, we minimize cost and maximize quality of life for frail patients. Provided with data from Primary Care Partners of Grand Junction, CO, we investigate the potential connection between frailty and increased risk of adverse outcomes and create a basis for further research and development of predictive models.

Title: **DIMENSION REDUCTION WITH RANDOM PROJECTION**
Presenter(s): Able Martinez
Faculty Mentor: Cathy Bonan-Hamada
Track: 8A
Abstract: Random projection is a technique used in mathematics and statistics

to reduce the dimensionality of a set of data points. In this project, we compare random projection to partial component analysis and partial least squares methods of linear mapping. We also investigate how random projection relates to the Johnson-Lindenstrauss Lemma.

Music

Title: **ARIA - HANDEL; THE LAST ROSE OF SUMMER - BRITTEN; VOCAL**
Presenter(s): Brendan Krueger
Faculty Mentor: Caitlin Moore
Track: 9A
Abstract: As part of the Music Department's David and Juul Sampson classical performance competition and in conjunction with Colorado Mesa University's Student Showcase, I plan on singing a select Aria from George Fredric Handel's Opera 'Alcina' and an additional art song by Benjamin Britten. 'Semplicetto! A donna credi' from Alcina; G.F. Handel (1685 – 1759)'The Last Rose of Summer'; Benjamin Britten (1913 – 76).

Title: **SCÈNE DE BALLET, OP. 100 - DEBÉRIOT; VIOLIN**
Presenter(s): Jessica Seibert
Faculty Mentor: Brian Krinke
Track: 9A
Abstract: I will perform Scène de ballet, op. 100 by Charles Auguste de Bériot on the violin.

Title: **GRETCHEN AM SPINNRADE - SCHUBERT; GREEN - DEBUSSY; VOCAL**
Presenter(s): Rainy Stokley-Graves
Faculty Mentor: Caitlin Moore
Track: 9A
Abstract: Sampson Competition, Gretchen am Spinnrade was composed by Franz Schubert in 1814, using text from Goethe's Faust. It tells the story of Gretchen, who sits at the spinning wheel, contemplating her love for Faust while being overwhelmed by her emotions. Green was composed by Claude Debussy in 1886. It is part of the Arriettes oubliées song cycle based on poetry by Paul Verlaine. Green explores themes of joy and young love through the use of delicate melody, lush harmony, and text which evokes imagery of nature.

Title: **TOREADOR - BIZET; NOSTALGIA - CIMARA; VOCAL**
Presenter(s): Sawyer Quint
Faculty Mentor: Caitlin Moore
Track: 9A
Abstract: Toreador, Georges Bizet, 1838-1875; Nostalgia, Pietro Cimara, 1887-1967.

Title: **ETUDE # 7 - CARCASSE; MINUET 1 - BACH; GUITAR**
Presenter(s): Anthony Breaux
Faculty Mentor: Eric Nohe
Track: 9A
Abstract: Carcassi, Etude No 7; Bach, Minuet I.

Title: **MESSIAH SELECTIONS - HANDEL; HAÏ LULL - VIARDOT; VOCAL**
Presenter(s): Hannah Brown
Faculty Mentor: Caitlin Moore
Track: 9A
Abstract: Sampson Competition. First selection is Behold, A Virgin Shall Conceive & O Thou That Tellest from the English oratorio, Messiah, by George Frideric Handel (1685-1759). Second selection is Haï luli by Pauline Viardot (1821-1910).

Title: **WALTZ IN AB - BRAHMS; PRELUDE OP. 23 #5 - RACHMANINOV; PIANO**
Presenter(s): Jake Harrison
Faculty Mentor: Brian Krinke
Track: 9A
Abstract: I will be performing Brahms Waltz in A flat major Op. 39 No. 2 and Rachmaninoff Prelude Op. 23 No. 5 in g minor at the Sampson competition. As a biochemistry major and violin playing music minor, I thought the Sampson competition would be the perfect motivation to prepare a piano performance. The Rachmaninoff prelude is a challenging piece that I am currently learning. I first heard the prelude a few years ago, and it quickly became one of my favorite pieces of music. I am excited to be able to perform it. I look forward to the opportunity to perform in the competition.

Title: **CADENZA FOR 5 TIMPANI & BALLADE FOR MARIMBA - ZIVKOVIC; PERCUSSION**
Presenter(s): Robert Reid
Faculty Mentor: Darin Kamstra
Track: 9A
Abstract: For the Sampson Competition, I will be performing two works by Nebojsa Jovan Zivkovic: Cadenza for 5 Timpani and Ballade for Marimba. Composer Zivkovic is one of the worlds most performed composers for percussion music and a renowned performer.

Title: **CELLO CONCERTO, MVT. 1 - ELGAR; CELLO**
Presenter(s): Nykyta Shulick
Faculty Mentor: Jason Pegis
Track: 9A
Abstract: My selection is Cello Concerto No. 1 by Edward Elgar (1837-1934).

Title: **SONATINA OP. 55 #1 - KUHLAU; PIANO**
Presenter(s): Miriam Elkins
Faculty Mentor: Adrian Herrera Escobar
Track: 9A
Abstract: Kuhlau Sonatina Opus 55 No. 1 on piano.

Title: **TRUMPET SONATA, MVT. 1 - PLISS; TRUMPET**
Presenter(s): Nic MacLennan
Faculty Mentor: Jonathan Hinkle
Track: 9A
Abstract: This performance will take part in the Sampson Competition. My entry will be Movement I from the Sonata for Trumpet and Piano by Karl Pilss performed by Nicholas Maclennan on trumpet with Maxwell Reilly on piano. This movement is about 5 minutes in length.

Title: **CHAMA-RUM-NGOMA - ORIGINAL COMPOSITION**
Presenter(s): Robert Reid
Faculty Mentor: Darin Kamstra
Track: 9B
Abstract: The title of the piece I will perform for the Smith competition is 'Chama-rum-ngoma', a composition written by myself. I will be accompanied by Brendan Krueger on keyboard and Liam Monroe on bass guitar. This performance will feature drumset in a boppy manner.

Title: **LUKE HENDRYX PIANO TRIO**
Presenter(s): Luke Hendryx, Liam Monroe, Beau Decker
Faculty Mentor: Adrian Herrera Escobar

Track: 9B
Abstract: I will be performing in the Walter Smith Jazz Competition as the main feature of a piano trio. It will feature Liam Monroe on bass and Beau Decker on drumset. We will play 2 pieces, likely some jazz standards which will both total around 8 minutes long. The performance will be held in Robinson Theatre. The purpose of this competition is to exemplify the study of jazz music and style at CMU, and is intended to foster musical expression and creativity.

Title: **YESTERDAY BY THE BEATLES & LOST ON YOU BY LP**
Presenter(s): Chariot Schinsky
Faculty Mentor: Christopher McKim
Track: 9B
Abstract: I am applying for this competition because I deeply want to expand my horizons with music and perform. I would love to gain additional musical experience. Along with that, I would love to share my voice with the world and be able to convey a message through my performance. I believe many contemporary artists have a certain feel and story to tell, that many of us can relate to.

Title: **ORIGINAL ROCK COMPOSITION - ELECTRIC VIOLIN**
Presenter(s): Jessica Seibert
Faculty Mentor: Brian Krinke
Track: 9B
Abstract: My performance will feature a rock composition I wrote for 5 string electric violin (with a pedal board and vocals). I would be accompanied by male vocals, electric guitar, electric bass, and a drum kit.

Title: **PORTRAIT OF TRACY, BY JACO PASTORIUS - PERFORMING ON ELECTRIC BASS**
Presenter(s): Liam Monroe
Faculty Mentor: Timothy Emmons
Track: 9B
Abstract: I will be performing Portrait of Tracy, composed by Jaco Pastorius, on electric bass. There will be a few creative changes made to the piece, but the overall feel and general performance will represent the original idea and expressive attitude of the piece as it was written. It will demonstrate my technical capacity, and more importantly my ability to perform in an expressive and musical manner.

Title: **BODY AND SOUL - GREEN & HAYMAN**
Presenter(s): Brendan Krueger
Faculty Mentor: Adrian Herrera Escobar
Track: 9B
Abstract: As part of the Music Department's Walt Smith jazz performance competition and in conjunction with Colorado Mesa University's Student Showcase, I plan on doing a piano solo performance of the song 'Body and Soul', composed by Jonny Green (1908-89), with lyrics by Edward Heyman (1907-81).

Title: **SMITH COMPETITION**
Presenter(s): Anthony Breaux, Jackie Firestone
Faculty Mentor: Eric Nohe
Track: 9B
Abstract: How do you like me now? by Toby Keith; Amie, Pure Prairie League

Title: **20TH CENTURY MUSIC STYLES: NATIONALISM**
Presenter(s): Miriam Elkins
Faculty Mentor: Jason Pegis
Track: 9C
Abstract: Presentation about the Nationalism style of music in the 20th Century. What is it, how is it identified, etc. Which composers wrote in a Nationalism style, what countries are they from? How and why is this cool and different from the previous style of classical music that we all know from Mozart, Beethoven and Haydn that we all know and love?

Title: **TRUMPET RELATED INJURIES**
Presenter(s): Nic MacLennan
Faculty Mentor: Jonathan Hinkle
Track: 9C
Abstract: This presentation will cover various injuries related to trumpet playing and how proper technique helps to prevent these. Various incorrect playing techniques can lead to the development of injury, especially issues related to pressure and tension. Increased pressure of the mouthpiece against the lips can lead to injuries such as lesions or other deformations in the lips and teeth and can also lead to nerve damage along these areas. Trumpet playing is an intensely physical endeavor and due to that sufficient support and form is necessary to avoid damage or injury to the player. Increased strain can lead to physiological changes in the body, including spikes in blood pressure and tension in the throat, chest, and head. These issues can cause severe injury in extreme cases, as well as lasting health complications after years of misuse. The specific physical demands of the trumpet create many unique problems that should be dealt with accordingly to promote the safety and health of musicians.

Physical and Environmental Sciences

Title: **OBSERVING EXOPLANET CANDIDATES**
Presenter(s): Victoria Jackson
Faculty Mentor: Catherine Whiting
Track: 10A
Abstract: Exoplanet candidates are potential planets orbiting other stars whose existence has yet to be confirmed. Exoplanets are detected by a dip in the light emitted by a star, known as the transit method. Advancements in space telescopes, such as the Transiting Exoplanet Survey Satellite (TESS) and the Kepler Space Telescope, have allowed for highly precise detection of dips in these light curves. Ground-based observatories may then confirm the presence of an exoplanet through follow-up observations. We observed exoplanet candidates TOI-5371, TOI-3668 and TOI-3552 by using the Science Dome telescope at the Grand Mesa Observatory located in Whitewater, Colorado. The types of solar systems and stars by which these exoplanets form will be discussed, along with the transit light curves of these potential exoplanets.

Title: **IMPROVING ACCURACY IN RADIOEMBOLIZATION OF THE LIVER**
Presenter(s): Brandon Keller
Faculty Mentor: David Collins
Track: 10A
Abstract: This study compares methods of planning accuracy of TheraSpheres (glass) andSIR-Spheres (resin) in Y^{90} radioembolization for the treatment of hepatocellular carcinoma (HCC). Isotope yttrium-90 microsphere brachytherapy treatments have significantly increased in number in the last

few years due to their ability to treat unresectable metastatic liver tumors. These catheter-administered microspheres are injected directly into the tumor through the femoral artery in the groin to the hepatic artery of the liver. Once injected, the microspheres irradiate the surrounding area while simultaneously restricting blood flow to the tumor. However, the current practice, where doctors typically perform rough contours and estimates leaves some uncertainty. To address this, we propose utilizing more refined contouring techniques to better identify both normal organs at risk and treatment targets prior to each session. This approach aims to minimize the uncertainty of the tumor's exact shape and size, as well as the percentage of surrounding organs susceptible to radiation damage. This study seeks to investigate whether adopting precise contouring methodologies leads to significant improvements in treatment preparation accuracy, potentially altering the dosage administered to patients.

Title: **ACCURATE MAGNETIC FIELD ESTIMATION USING QUANTUM SPIN PARTICLES**
Presenter(s): Andrew Griffenberg
Faculty Mentor: David Collins
Track: 10A
Abstract: Quantum parameter estimation includes estimating parameters that describe evolutions of quantum systems and considers the accuracy of estimation. We consider estimating the strength of an unknown magnetic field using spin particles. We quantify the accuracy of estimation using quantum Fisher information. We consider various protocols and compare the Fisher information when the particles undergo various methods of preparation. We find some protocols that use multiple particles yield gains in accuracy when compared to protocols using a single particle.

Title: **MEASURING THE POLARIZATION OF FERROELECTRIC MATERIALS**
Presenter(s): Joshua Boeke
Faculty Mentor: Brian Hosterman
Track: 10A
Abstract: Electric fields cause materials to be polarized due to the alignment of electric dipole moments. In most materials, after the field is removed, the polarization disappears immediately. Ferroelectric materials, however, will remain in the polarized state even after the electric field is removed. To remove the polarization of a ferroelectric, an opposing electric field must be applied. This leads to an effect known as hysteresis, which can be shown by hysteresis curves. Ferroelectrics are important to a wide range of applications and technologies, such as binary storage and the electrocaloric effect. Herein is described the construction a circuit to measure polarization and hysteresis of a barium titanate capacitor.

Title: **UTILIZING DENDROCHRONOLOGY OF PONDEROSA PINE STAND TO DETERMINE POTENTIAL CLIMATE CHANGE REFUGIA IN BANGS CANYON RECREATION AREA**
Presenter(s): Lauren Brandt, Mary Hromadka
Faculty Mentor: Deborah Kennard
Track: 10B
Abstract: Climate change refugia are areas that remain buffered from climate change and enable the persistence of species and ecological features. We studied a population of ponderosa pine (Pinus ponderosa) in the Bangs Canyon Recreation Area to determine if the site is a climate change refugium. The dominant tree species at this elevation are Utah juniper (Juniperus osteosperma) and pinyon pine (Pinus edulis). Ponderosa pines are typically found at higher and cooler elevations. The low elevation of this stand

raised the question of the potential influence of past climate conditions on ponderosa pine colonization. Using dendrochronology, we identified that this stand likely established during the Little Ice Age (a period of cooling from the 16th-19th centuries) and may have persisted here because of environmental differences between site conditions. Temperature data from HOBO 64k Pendant Temperature/Alarm Waterproof Data Loggers revealed no significant differences between the ponderosa site and adjacent pinyon-juniper site. This result prompted investigation of the site's hydrology through surface flow characterization to determine if water availability provided more suitable conditions for ponderosa persistence. The results of this study can aid BLM managers in the identification and protection of local climate change refugia, a strategy to encourage climate change adaptation.

Title: **EVALUATING SOIL AND VEGETATION DYNAMICS OF A POST-TAMARISK REMOVAL SITE IN WESTERN COLORADO**
Presenter(s): Mary Hromadka, Noah Enoch, Alicia Giger, Lauren Brandtt
Faculty Mentor: Christopher Cohu
Track: 10B
Abstract: Tamarisk (Tamarisk spp.) is a highly invasive salt-tolerant shrub introduced from Asia. Riparian corridors along the Colorado River in the southwestern United States have been particularly vulnerable to invasion and have sustained a variety of negative impacts on overall ecosystem function. Impacts on soil health have been a consistent concern due to tamarisk's morphology which imposes many physical and chemical alterations to natural soils and vegetation. This includes increased salinity, electrical conductivity (EC), and pH along with degradation of soil organic matter and reduced persistence of native species. Common restoration methods include chemical and mechanical removal followed by revegetation to encourage the return of native riparian vegetation. Through the identification of species composition and soil analysis, this study aims to identify site-specific restoration recommendations for a tamarisk removal and revegetation site located at Walter Walker Site Wildlife Area. Soil health analyses include EC and pH measurements while vegetation data was gathered with line-point intercept assessments and square meter plot establishment. This study can provide post-revegetation data for Rivers Edge West and will aid in the development of more effective revegetation techniques for tamarisk-impacted regions of western Colorado.

Title: **INDIVIDUAL SIZE DISTRIBUTIONS AS A BIOMONITORING TOOL IN THE ARKANSAS RIVER, COLORADO**
Presenter(s): Nia Taubr
Faculty Mentor: Justin Pomeranz
Track: 10B
Abstract: Individual size distributions (ISD) describe the decline in relative abundance with increasing body size in biological communities. ISD relationships have been proposed as "universal" indicators of ecosystem health given their remarkable consistency across habitats and capability to detect anthropogenic disturbances such as legacy effects of acid mine drainage in streams. However, it is unknown if ISD relationships improve in response to restoration activities. In this project, we tested the hypothesis that ISD relationships will be able to detect legacy mining impacts to streams, and that they will improve after restoration. We leveraged a long-term dataset of benthic macroinvertebrates collected from sites along the Arkansas River near Leadville, CO. We processed and analyzed macroinvertebrate samples collected in 1990 and 2012 to see if ISDs responded to restoration actions. We will present results of a Before-After-Control-Impact (BACI)

study design comparing the ISD relationship at control and treatment sites, both before and after restoration. Statistical analysis will be performed in the R language. Although this study covers a small area, the consistent and long-term data collection offers a powerful test for assessing whether ISD relationships change through time, and if ISD patterns can be used to assess the effectiveness of restoration activities.

Title: **WATER CONSERVATION AND MANAGEMENT PLAN FOR A TRANSITION TO A MORE NATURAL LANDSCAPE IN A RESIDENTIAL AREA**

Presenter(s): Ashley Emery, Katherine Seiler, Hannah Przystup, Audrey Caso
Faculty Mentor: Christopher Cohu
Track: 10B
Abstract: In response to the escalating concern over water scarcity exacerbated by climate change-induced droughts, the importance of efficient water resource management has become increasingly critical. The prolonged drought experienced in the Upper Colorado River Basin from 2000 to 2022 has underscored the urgency of this matter. Drought conditions not only directly impact water availability but also have far-reaching consequences on various facets of human life and the environment. This study focuses on the Summer Hill Homeowners Association (HOA), a representative local neighborhood, to examine various parameters related to water conservation and analyze pollutant runoff. The Mesa Conservation District is conducting a detailed case study on the water usage of the Summer Hill HOA. In collaboration with their goals, this project will study current water practices to highlight inefficiencies and sustainability issues. Like many neighborhoods in the region, Summer Hill HOA predominantly employs turfgrasses for landscaping, often characterized by excessive watering and fertilizing applications. This unsustainable water usage not only strains local water resources but also contributes to environmental degradation. A comprehensive analysis will provide means to identify areas for improvement and recommend sustainable alternatives. This will consist of researching native plant species and water conservative lawn options, utilizing water quality data, and surveying the HOA for land uses, turf needs, and pollutant drainage pathways. These findings will not only benefit the Summer Hill HOA community but will also serve as a model for other neighborhoods grappling with similar challenges.

Title: **EVAPOTRANSPIRATION COVER CONVERSION STUDY RECOMMENDATIONS AT THE DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO DISPOSAL SITE**

Presenter(s): Wyatt Coffman, Sophia Dow, Liam Murphy
Faculty Mentor: Christopher Cohu
Track: 10B
Abstract: Grand Junction, Colorado has a legacy of uranium mining that has resulted in large amounts of radioactive waste, posing a threat to human health and the environment. This waste is contained in the Grand Junction Disposal Site, which is located approximately 18 miles south-east of Grand Junction. The Disposal Site consists of a 6-layer system topped by an armored rip rap layer. Herbicides are sprayed onto the rip rap layer to prohibit plant germination, as it was previously believed that plants could lead to the transport of radioactive materials through aerial tissues, which could then be transported off-site, contaminating other areas. It was also believed plants would penetrate the layers within the system causing structural damage. To enhance containment efficiency, this study proposes the implementation of an evapotranspiration (ET) cover system on the rip rap surface of the cell. An ET cover system utilizes plants and natural processes

to promote transpiration from plants and evaporation from the soil surface, reducing percolation and erosion. By analyzing plant species currently on the test site and species within the surrounding area, this study aims to develop recommendations when designing an ET barrier that is unique to the climate of the Grand Junction Disposal Site. To conserve water, native plants with low irrigation requirements are prioritized. In addition to analyzing specific plant species, this study examines irrigation requirements and monitoring procedures that comply with regulatory requirements. By properly implementing an ET cover specific to Grand Junction's climate, percolation and radon flux at the site can be limited through natural processes, eliminating the need to devote time and resources to herbicide treatments and application.

Title: **GOLD (III) COMPLEXES CONTAINING N-(8-QUINOLINYL)AMIDE LIGANDS: SYNTHESES AND COLOR DIFFERENCES**
Presenter(s): Julian Manila, Alexander Eckberg, Chloe Angello, Siya Salunke, Benjamin Stites
Faculty Mentor: David Weinberg
Track: 10C
Abstract: Novel gold(III) complexes have been synthesized with N-(8-quinolinyl)amide and 1,10-phenanthroline ligands. In the complexes of N-(8-quinolinyl) amides, significant differences in the ground state energy levels arise from the steric bulk of the parent acyl group. These manifest as a difference in color; while the gold(III) complex of 2-ethyl-N-(8-quinolinyl)butanamide was yellow, the complex of 2,2-dimethyl-N-(8-quinolinyl)propanamide was a verdant green. Current work involves the synthesis and complexation of a wider variety of N-(8-quinolinyl) amide ligands.

Title: **INBORN ERRORS OF METABOLISM: 3-METHYLGLUTACONIC ANHYDRIDE REACTIVITY TO HYDROLYSIS AND MITOCHONDRIAL PROTEINS**
Presenter(s): Chloe Schrader
Faculty Mentor: Dylan Jones
Track: 10C
Abstract: Elevated levels of cis- and trans-3MGC acid in urine are biomarkers for a family of inborn errors of metabolism known as 3-methylglutaconic (3MGC) acidurias. In primary 3MGC acidurias, deficiency of the leucine catabolism pathway enzyme, 3-methylglutaconyl-CoA hydratase, results in the buildup of 3MGC CoA and subsequent urinary excretion of its more stable acid form. In secondary 3MGC acidurias, the leucine degradation pathway is functional, but the same intermediate is excreted in the urine. In these cases, the acetyl CoA diversion pathway is activated due to inhibition of the TCA Cycle in brain, cardiac, and muscle tissues. In the mitochondrial matrix, the presence of a thioester bond in 3MGC CoA makes it susceptible to two major reactions: hydrolysis to 3MGC acid, or isomerization to cis-3MGC CoA with subsequent cyclization to 3MGC anhydride (which can also undergo hydrolysis to form 3MGC acid). However, the anhydride can additionally undergo N-acylation to be added onto lysine residues in mitochondrial proteins. The primary goal of this research is to gain insight into an important marker of metabolic dysfunction by comparing the reactivity of 3MGC CoA to hydrolysis and to protein acylation.

Title: **SYNTHESIS OF (2E,4Z)-2,4-HEPTADIEN-1-OL AND (2E,4Z)-2,4-HEPTADIENAL**
Presenter(s): Fiona Richards
Faculty Mentor: Joseph Richards

Track: 10C
Abstract: The title compounds (2E,4Z)-2,4-heptadien-1-ol and (2E,4Z)-2,4-heptadienal, originally isolated from the Saltcedar leaf beetle (Diorhabda elongata), have been shown to be biologically active signaling compounds. This beetle has been utilized for biological control of saltcedar, an invasive bushy tree found along rivers in the western United States, and the title compounds appear to play a significant role in pheromonal communication. This project centers around the total synthesis of these compounds from (2Z)-2-penten-1-ol as a means to provide large quantities for future studies on their role as pheromones and potential use as biological control agents.

Title: **INVESTIGATION OF THE THERMAL DEGRADATION OF BEER BITTERNESS**
Presenter(s): Eli St Onge, Ellen Rickerd, Valentine Jeptoo, Jasmine Lovell
Faculty Mentor: Timothy D'Andrea
Track: 10C
Abstract: The flowers of Humulus lupulus, commonly referred to as hops, are an integral component in beer; in fact, much of the bitterness, flavor, and aroma of beer comes directly from hops. Specifically, hops contain alpha acids which, when brewed, isomerize into iso-alpha acids, and it is the iso-alpha acids that are responsible for the hoppy bitterness of beer. After brewing, however, iso-alpha acids can degrade due to oxidation, thermal decomposition, and light exposure, resulting in a loss of bitterness. This research is focused on determining the thermal decomposition rate constants of iso-alpha acids over a broad range of temperatures and pH's. Under the conditions studied, first-order thermal decomposition rate constants were found to increase with an increase in temperature and a decrease in pH, which supports a previously proposed acid-catalyzed degradation mechanism of iso-alpha acids.

Title: **SYNTHESIS OF BIS-IMIDAZOLE COMPOUNDS AS FRAMEWORKS FOR MULTIDENTATE LIGAND SYSTEMS**
Presenter(s): Grace Forbes
Faculty Mentor: Joseph Richards
Track: 10C
Abstract: Imidazole is a biologically relevant heterocycle often used to coordinate metals in both naturally occurring metalloproteins and useful synthetic metal complexes. Many of these complexes involve more than one imidazole interacting with a metal as part of a multidentate ligand system. This research is aimed at preparing a novel bis-imidazole framework that can be used to prepare a variety of multidentate ligand systems by providing easily modified and connectable functionality. The bis-imidazole target was synthesized from commercially available 4(5)-iodoimidazole via N-protection, subsequent metalation and functionalization at C4, and dimerization via lithiation at C2.

Title: **INDIVIDUAL AND COLLECTIVE MOTION IN COLLOIDAL ACTIVE MATTER UNDER APPLIED ELECTRIC FIELDS: EXPERIMENTAL AND COMPUTATIONAL PERSPECTIVES**
Presenter(s): Jordan Dehmel
Faculty Mentor: Jarrod Schiffbauer
Track: 10D
Abstract: The study of colloidal active matter observes and models behavior in self-propelled particle suspensions. These particles rely on extracting energy from their environment (e.g. fuel or external fields) and use particle-level asymmetry to determine their direction (distinguishing them from passive "phoretic" motion). This presentation focuses on microscale, half-metal,

half-dielectric Janus particles which move via fluid flow induced by an alternating electric field. One key problem in active matter is making accurate measurements of particle velocity without environmental interference. Earth's gravity causes suspended Janus particles to sediment and interact with the walls, making measuring their velocities difficult. This can be addressed in several ways, including suspension-medium density matching and particle data filtering algorithms. Both are discussed herein. In addition to experiments, computer simulations are used to study active matter. These simulations use either discrete or continuum models based on the mathematics of colloidal motion to simulate phase transitions and collective movement. The role of simulations and some important results will also be discussed. Ongoing work for this project is being conducted as a collaboration between CMU and FIU, including experiments on Earth, a planned flight experiment on the ISS (target: August 2024), and the mathematical modeling of colloidal collective motion.

Title: **MAGNETIC SURVEY OF POSSIBLE IGNEOUS INTRUSIONS IN THE RYAN PARK-PINON MESA AREA, NORTHWESTERN UNCOMPAHGRE PLATEAU, COLORADO AND UTAH**
Presenter(s): Emilio Topete
Faculty Mentor: Verner Johnson
Track: 10E
Abstract: The Ryan Park-Pinon Mesa area of the northwestern Uncompahgre Plateau is represented by two magnetic anomalies. These anomalies have not been the primary focus of previous geophysical surveys despite intense silicification in the Wingate Formation and metalliferous minerals, which are suggestive of hydrothermal activity. This study aims to identify the potential location and depth of an igneous intrusion(s) using portable magnetometer data acquisition. The investigation seeks to explain the magnetic anomalies and to evaluate their potential relationship to the observed hydrothermal activity. Drawing from previous studies on the Uncompahgre Plateau and nearby La Sal Mountains, hypotheses regarding the origin of the magnetic anomalies are explored. One scenario is that the La Sal Mountains were the source of a magmatic intrusion in the Ryan Park-Pinon Mesa area. Through detailed fieldwork using a proton magnetometer and ArcGIS data analysis, the study will infer the location and potentially the properties of the subsurface igneous intrusion(s). The project's outcomes are expected to provide valuable insights into the geological and geophysical features of the Ryan Park-Pinon Mesa area and will contribute to a deeper understanding of regional tectonic processes and hydrothermal influences. The findings may also facilitate future research in similar geological settings.

Title: **STRUCTURAL AND HYDROTHERMAL FEATURES OF RYAN PARK, NORTHWESTERN UNCOMPAHGRE PLATEAU, COLORADO AND UTAH**
Presenter(s): Addison Early
Faculty Mentor: Verner Johnson
Track: 10E
Abstract: This study aims to shed light on the geologic structures of Ryan Park and the structural evolution of the northwestern edge of the Uncompahgre Plateau. The northwestern edge of the Uncompahgre Plateau has a very complicated geologic history, leading to many different interpretations of its sedimentary stratigraphy, tectonics, structural development, and topographic evolution. The study area is located in western Colorado and eastern Utah on the Uncompahgre Plateau, specifically the Ryan Park area, which includes the Ryan Park fault zone. The methods used to interpret the structural geology of Ryan Park include gathering orientation data of the exposed outcropped formations, measuring joint and fracture orientations,

and analyzing the data using stereonet plots to identify trends within the deformation. Sedimentary units present in the study area include the Triassic Chinle Formation and the Jurassic Wingate Formation, Kayenta and Entrada Formations. This study indicates that there has been a right lateral movement of the Ryan Park fault zone. The northwestern section of Ryan Park was subject to hydrothermal alteration, identified by the presence of silicification of segments of the Wingate Sandstone.

Title: **RYAN PARK-PINON MESA HYDROTHERMAL FLUORITE DEPOSITS**
Presenter(s): Mackina Chamberlain
Faculty Mentor: Verner Johnson
Track: 10E
Abstract: The Ryan Park-Pinion Mesa research area on the Colorado-Utah border houses mineral deposits that are indicators of hydrothermal activity. The minerals of interest in the study area are ore minerals, however fluorite is the most useful in analyzing hydrothermal fluids. The mineralization is structurally controlled as it is found along joints and veins or as a breccia matrix along the faults. Fluorite mineralization commonly occurs within hydrothermal veins and can hold information regarding the origin and intensity of hydrothermal fluids by analyzing rare earth elements (REE) data. Analyzing REE found in fluorite mineralization can help determine the source of the deposits and hydrothermal fluids. Using REE fluorite data normalized to chondrite or post-Archean Australian shale (PAAS) values will identify patters of REE enrichment or depletion. Enrichment of certain REE such as Europium (Eu) or Cerium (Ce), can provide information regarding the mineralization processes and give insight about the causative intrusion. REE signature patterns can also help categorize mineralization into different types. Analyzing REE data in fluorite can assist in identifying the origin of the hydrothermal fluids, and potentially provide a timeline of the geological evolution of the Ryan Park-Pinon Mesa area.

Title: **REVIEW OF SELECTED CRITICAL MINERALS: COPPER, TIN, AND TITANIUM**
Presenter(s): Hunter Stewart
Faculty Mentor: Andres Aslan
Track: 10E
Abstract: Global demand for mineral resources has dramatically increased in the last 50 years. This demand grew from 26.7 billion tons in 1970, to about 100 billion tons in 2017, and is expected to reach about 185 billion tons by 2050. As a step towards meeting U.S needs for mineral resources, the U.S. Geological Survey published in 2018 a critical minerals list. The list includes copper, tin, and titanium. The U.S. is a leader in copper production whereas tin and titanium are mostly imported from other countries. This review focuses on the occurrences, origins, uses, and potential significance of copper, tin, and titanium in the U.S. and globally.

Title: **MAPPING AND CHARACTERIZATION OF MASS WASTING SITES ALONG THE COLORADO RIVER BLUFFS, GRAND VALLEY, WESTERN COLORADO**
Presenter(s): Ethan Freeburger
Faculty Mentor: Andres Aslan
Track: 10E
Abstract: Mass wasting events are a common type of natural disaster that cause serious losses to people and communities. It is important to understand the factors that lead to these events so that humans can avoid risks and dangers from landslides and other types of mass wasting events. This is especially important in areas such as the Grand Valley in Grand Junction,

Colorado, where the combination of the Colorado River and weak bedrock units such as Mancos Shale are present, which makes this area susceptible to mass wasting events. The purpose of this research project is to create an inventory of active and recently active mass wasting sites along the bluffs located south of the Colorado River using a combination of drone mapping and field descriptions. The resulting work will produce a map of the major mass wasting sites and will improve our understanding of the types of mass wasting that occur in the Grand Valley. This information can be used for tasks such as hazard assessments of the area, and land use planning for the development of buildings and homes.

Title: **ORIGIN OF A PALEOSOL AT THE CRETACEOUS-PALEOCENE BOUNDARY IN THE OHIO CREEK MEMBER OF THE WILLIAMS FORK FORMATION, SHALE RIDGE AREA, PICEANCE BASIN**
Presenter(s): Ben Chamberlain
Faculty Mentor: Andres Aslan
Track: 10E
Abstract: A paleosol is a fossil soil that can preserve information about paleoclimates, paleoenvironments and the evolution of landscapes in the past. Paleosols often form during periods of landscape stability that can coincide with the formations of unconformities. The Cretaceous-Paleocene boundary is an important geologic unconformity, and it may be represented by a paleosol. To test this hypothesis, five samples of a possible paleosol were collected in the Shale Ridge area located West of DeBeque, Colorado from the top of the late Cretaceous Ohio Creek Member of the Williams Fork formation for study. The paleosol is overlain by the Paleocene Wasatch Formation. X-ray diffraction and X-ray fluorescence will be used to characterize the clay mineralogy and geochemistry of the paleosol samples to determine if vertical trends in the composition of the samples are consistent with late Cretaceous weathering. This analysis could reveal the paleoclimatic conditions during the time of paleosol formation and could help resolve controversies surrounding the stratigraphy of the Ohio Creek unit.

Title: **DETRITAL SANIDINE 40AR/39AR DATING OF THE WEST ELK RIVER GRAVELS OF THE BLACK CANYON OF THE GUNNISON, CO: INSIGHTS ON POST-LARAMIDE PALEOGEOGRAPHY AND TECTONISM**
Presenter(s): Coral Copenhaver
Faculty Mentor: Andres Aslan
Track: 10E
Abstract: This proposed research aims to investigate post-Laramide paleogeography and possible epeirogenic uplift in western Colorado, focusing on the Blue Mesa area of the Black Canyon of the Gunnison National Park. The research will employ gravel clast counts, paleocurrent data, and high precision detrital sanidine 40Ar/39Ar dating of the West Elk River Gravels to determine the age and orientation of paleochannel drainage patterns that existed during the time represented by the post-Laramide Rocky Mt. Erosion Surface (RMES). While previous perspectives suggest that epeirogenic uplift during the Eocene may have contributed to formation of the RMES, either due to a mantle drip or isostatic rebound, the specific mechanisms remain debated. Analysis of the West Elk River Gravels will include developing a geologic map of the deposits, identifying their provenance and age, and reconstructing paleochannel networks. Ultimately, this research could provide valuable insights into the timing and processes driving probable post-Laramide epeirogenic uplift in western Colorado, shedding light on the region's dynamic geological evolution.

Title: **EVALUATION OF PETROPHYSICAL HETEROGENEITY WITHIN FLUVIAL ARCHITECTURAL ELEMENTS OF THE CRETACEOUS BURRO CANYON FORMATION, PICEANCE BASIN, COLORADO**

Presenter(s): Liam Posovich

Faculty Mentor: Javier Tellez Rodriguez

Track: 10E

Abstract: This research explores the Cretaceous Burro Canyon Formation's heterogeneity in Deer Creek Canyon, Colorado. The study uses detailed stratigraphic analysis, drone photogrammetry, and petrophysical modeling to refine fluid flow models within a well-exposed point-bar outcrop. This study aims to enhance the predictive accuracy of reservoir behavior by focusing on the fine-scale heterogeneity often overlooked in conventional reservoir modeling by integrating small-scale bed sets into larger geological framework models. This research underlines the challenges in predicting reservoir behavior due to internal heterogeneities and highlights the necessity of integrating larger- and smaller-scale architectural elements for a comprehensive understanding of fluid behaviors. The use of drone technology to generate a 3D point cloud, combined with traditional field methods and petrophysical data from nearby wells, allows for an enhanced understanding of fluid pathways. The population of petrophysical properties and other variables combined with multiple simulations offers a comprehensive geological model using an advanced methodological approach for reservoir modeling. By leveraging insights obtained from the Burro Canyon Formation, this study underscores the role of integrating high-resolution geological data in improving reservoir management practices. Advancements in reservoir characterization enhance our understanding of fluid dynamics within complex sedimentary environments, enabling better understanding and management of its resources.

Title: **HYDROGEOLOGICAL AND HYDROGEOCHEMICAL ANALYSIS OF A GRAND MESA ALLUVIAL FAN NEAR WHITEWATER, MESA COUNTY, COLORADO**

Presenter(s): KennaLee Worster

Faculty Mentor: Gregory Baker

Track: 10E

Abstract: Hydrogeologic and hydrogeochemical analyses are conducted to determine whether water associated with shallowly buried paleochannels features are acting as groundwater conduits. Hypothesized locations for the paleochannels in a terraced alluvial-fan remnant on the western flank of Grand Mesa are tested using a hydrogeologic mass-balance approach involving measurements of surface runoff versus groundwater seepage rates. Geochemical analyses include basic water parameters (pH, electric conductivity, and oxidation-reduction potential) and a comparison of surface runoff versus groundwater seepage parameters. Previous RGB and multispectral drone (sUAS) imagery yielded hypothesized locations of buried paleochannels, including several locations associated with apparent groundwater-sapping erosional features. Additional high-resolution RGB imagery is collected at one of the features, and the resulting 3D digital model allows for further examination of surface runoff versus groundwater seep pathways. By assimilating the entirety of the available data, including drone imagery, hydrogeology, and hydrogeochemistry, the hypothesis for the location of shallowly buried paleochannels acting as groundwater conduits is tested.

Title: **THREE-YEAR SEASONAL MONITORING OF LADDER CREEK TO ESTIMATE SEDIMENT FLUX AND STREAM COMPETENCE USING DRONE ORTHOMOSAIC IMAGERY, MESA COUNTY, COLORADO, USA**

Presenter(s): Graceanne Hanson
Faculty Mentor: Gregory Baker
Track: 10E
Abstract: Ephemeral streams dominate the steep topography of the Western Slope of Colorado. Water discharge and resulting sediment flux has implications for flash-flooding and infrastructure damage in Grand Junction, Colorado; thus, any information on water and sediment movement throughout these canyons is useful. The study area is a 300-meter section of Ladder Creek within the 8.5-km-long Ladder Canyon associated with steep topography of the Uncompahgre Uplift. Cyclical sediment-transport behavior was monitored from 2022 through 2024, using sUAS (drone) structure-from-motion (SfM) orthomosaic imagery. For each time step, ca. 1000 images were acquired and subsequently processed with the difference-of-Gaussians SfM method to generate 3-D orthorectified digital models and digital elevation models (DEMs). Two methods of analyses are performed: First, DEMs from each time step are analyzed and compared using model-to-model point-cloud comparison to provide volumetric estimates of overall sediment transport through time. Second, individual cobbles and boulders are analyzed for movement to make estimates of maximum stream discharge using a standard stream-competency equation. Results of overall sediment transport plus maximum discharge values from 2022-2024 allow for preliminary projections of longer-term sediment flux rates and stream power within Ladder Creek.

Title: **DRONE (SUAS) MULTISPECTRAL IMAGING OF HUMAN FOOTPRINTS FOR ENHANCED FORENSIC SITE INVESTIGATION**

Presenter(s): Janelle Pethick
Faculty Mentor: Gregory Baker
Track: 10E
Abstract: Small unmanned aircraft systems (sUAS), often referred to as "drones", are useful in helping forensic investigators with preliminary crime-scene site investigations. Use of sUAS in forensics is increasingly applied to (i) improve site safety exploration (if in rough or dangerous terrain) and/or (ii) eliminate contamination of the scene with other post-crime foot traffic. Although standard RGB photography and videography is already in use, we propose here enhancing results through multispectral imaging. Specifically, we are collecting sUAS data at a test site using a multispectral camera with five distinct bands (blue, green, red, red edge, and near infrared) for detection of shoe tracks/prints in various substrates. Multispectral imaging allows for enhanced visualization of subtle features often less visible in standard RGB imagery. The experiment—with multiple trials of footprints—is conducted at a test site over four different substrates: dry dirt, mud (wet dirt), grass, and gravel. Multispectral orthomosaic imagery using sUAS is analyzed to develop the optimal wavelength combination through a normalized residual differencing method. Multispectral results are compared with standard RGB imagery. Results should highlight an improved site characterization technique, enabling forensic investigators to gather potentially crucial evidence in a safer and more effective way using this new method.

Title: **EFFECTS OF GENDER AND INFORMATION DISSEMINATION EFFECTS ON PRECONCEPTION HEALTH KNOWLEDGE, SELF-PERCEPTION, AND BEHAVIOR CHANGE AMONG COLLEGE STUDENTS**
Presenter(s): Sarah Hirschman, James Walker II, Corynn Simon
Faculty Mentor: Valeria Balogh
Track: 11A
Abstract: Preconception health, which encompasses the health behaviors and conditions of individuals before they become pregnant, is an essential component of reproductive health. This aspect gains particular significance considering that roughly 35-40% of all pregnancies are unplanned (CDC, 2023). Improving preconception health aims to enhance both pregnancy outcomes and overall well-being. The importance of preconception health has been recognized by several organizations such as the CDC, the American College of Obstetricians and Gynecologists, and the American Academy of Pediatrics. Despite the recognition of the importance of preconception health and heightened health consciousness in certain areas of the population, awareness and knowledge regarding preconception health remains relatively limited. This research aims to shed light on the influence of gender and information dissemination on knowledge, self-perception, and willingness to take action related to preconception health among college students. In this study, we will administer a survey questionnaire to male and female students to assess their knowledge of preconception health, self-perception of their own preconception health, and their willingness to make behavioral changes for improved preconception health. Two groups of students will participate: one group will receive preconception health information before completing the questionnaire, while the other group will not receive this information.

Title: **GENERATIONAL TRANSMISSION OF ADVERSE CHILDHOOD EXPERIENCES**
Presenter(s): Aurora O'Connor, Chelsey Stock
Faculty Mentor: Aisha Chapra
Track: 11A
Abstract: Adverse Childhood Experiences (ACEs) have been identified to have a generational impact on families. However, limited research has explored the connection between mothers with ACEs and their income levels and how they contribute to the cycle of integrational trauma. In this paper, we investigate the significant relationship between pregnant mothers with ACEs and low-income status. Research shows that babies born to mothers who have experienced ACEs are at a greater risk of physical and psychological issues postpartum. Additionally, the number of ACEs experienced is directly correlated with income level. Despite gaps in literature, social workers have the ethical responsibility to provide effective interventions for these vulnerable populations. Early interventions during a child's development have been proven to not only support them through their ACEs but also break the cycle of generational trauma. This synthesis of current research provides social workers with effective ways to support clients dealing with ACEs at all levels - micro, mezzo, and macro. Keywords: interventions, adverse childhood experiences, at-risk populations.

Title: **DECISION MAKING STYLE AND EMOTIONAL INTELLIGENCE**
Presenter(s): Haley MacDonald
Faculty Mentor: Jeremy Tost
Track: 11A

Abstract: The purpose of the current research is to explore the relationship between decision-making style and display of emotional intelligence. Participants are assigned to the deliberation or intuition decision style categories with two possible subtypes for deliberation and two for intuition. This assignment is made based on survey responses to the SSREIT Scale and the USID Scale. Findings address this relationship as well as the distribution of demographic data relating to emotional intelligence. It was found that there is not a significant difference between emotional intelligence scores among decision making styles ($p = .29$). Using provided demographic data, it was found that women had higher emotional intelligence scores than men and this difference was statistically significant ($p = .04$). The lack of significant results for decision making style on emotional intelligence could be attributed to individual differences in the effectiveness of decision-making style, regardless of capacity for emotional intelligence. It could also be attributed to context related to making decisions or bias associated with survey research.

Title: **SOCIAL WORK WITHIN THE IMMIGRATION POPULATION AND WOMEN EXPERIENCING DOMESTIC VIOLENCE**
Presenter(s): Alexis Krepps, Abigail Solis, Alexis Krepps
Faculty Mentor: Aisha Chapra
Track: 11A
Abstract: This research study investigates a population with intersecting factors of immigration status, gender identity, and the experience of domestic violence. There are some challenges that could arise when providing the adequate resources to this specialized population. This research demonstrates what social workers must consider are the challenges and obstacles that immigrant women face when looking for resources. Identifying challenges and designing research studies can lead to creating systems and methods that adequately address the intersectional issue of domestic violence or intimate partner violence in the immigrant population. This research recommends changes at the individual treatment level that address cultural sensitivity and overall shift in current system approaches that have not traditionally considered cultural differences with intervention with women experiencing domestic violence.

Title: **FOUNDATIONAL FIGURES IN THE FORMATION OF THE PSYCHOLOGY DEPARTMENT AT COLORADO MESA UNIVERSITY: AN INCLUSIVE HISTORICAL INVESTIGATION**
Presenter(s): Sam Parrill, Melissa Vargas
Faculty Mentor: Michael Rhoads
Track: 11A
Abstract: This project explores the historical events leading to the development of Colorado Mesa University (CMU) and the influential figures who contributed to the growth of the psychology department at the institution. The research questions guiding this exploration are: What historical events led to the development of CMU? Who were the historical figures in the emergence of CMU as a university? Finally, how did the psychology department at CMU develop? This study focuses on founding figures, including Walter Walker, Mary Rait, and Dr. Thomas Graves. In addition, this study explores early psychology faculty like Clifford Houston, Horrace Wubben, Kenneth Ury, and Harry J. Tiemann. A timeline of historical events will be presented, along with a summary of early years and noteworthy events. Special attention is paid to the emergence of the psychology program as well as the social and behavioral science department.

Title: **QUANTIFYING WORK MOTIVATIONAL GAINS BETWEEN GENERATIONAL COHORTS: A REGULATORY FOCUS FRAMEWORK**
Presenter(s): Jake Braun
Faculty Mentor: Kevin Kelley
Track: 11A
Abstract: By matching gain or loss framed negative feedback to promotion or prevention focused individuals, this study explores differences between motivation gains in generational cohorts. Regulatory focus theory, posited in Higgins' (1998) research, establishes that humans set goals to either approach pleasure or avoid pain. Recipients of feedback fall into either subcategory based on their focus: promotion-focused individuals set goals to gain positive outcomes, while prevention-focused individuals set goals to avoid negative outcomes. Matching framed messages to focus of regulatory fit has been employed to produce higher motivation from respondents has been documented (Cesario, Corker & Jelinek, 2013; Kung et al., 2016). Age has been found to have an effect on the focus of regulatory fit (Zacher & Lange, 2011; Hamstra & Schreurs, 2018), so this study uncovered the dynamic relationship between regulatory focus, message framing, and generational cohorts. By utilizing the Regulatory Focus Questionnaire (Higgins et al., 2001) as a scale to determine chronic regulatory focus, this study established partial support for hypothesis 1: Generation Z has a promotional focus on average (n=164, mu=0.4354, p-value = 8.925e-09). No conclusive evidence was found to support hypothesis 2, potentially attributed to methodological factors such as an insensitive motivation scale or response fatigue.

Title: **SEEKING TRANSGENDER AND GENDER EXPANSIVE COMPETENCY IN SOCIAL WORK EDUCATION**
Presenter(s): Ashling Hallford
Faculty Mentor: Aisha Chapra
Track: 11A
Abstract: This study will address the lack of advocacy and adequate curriculum around transgender and gender expansive (TGE) issues in Social Work higher education, aiming to identify effective strategies to infuse specific curricular changes to lessen gaps in competency. TGE people face threats to their rights through oppressive, state-level legislation, with the ACLU watching 437 bills currently (2024). Prock, et al, (2022) report 40% of social work programs in religiously affiliated institutions use TGE discriminatory language in their internal literature. Curriculum in CSWE accredited programs is lacking and often perpetuates cisnormative mindsets. The consequences of this are dire. 1.4% of youth and 0.5% of adults identify as transgender in the U.S., with 53.7% sharing an intersectionally marginalized racial identity (Herman, et al., 2022). The 2023 survey by The Trevor Project examining the mental health of LGBTQ youth, 41% had strongly considered suicide in the past year, with 14% having attempted. Kinney, et. al (2023) discuss the need for faculty competence in TGE issues as well as direct involvement from TGE voices in formulating and implementing inclusive policies. Other recommendations include expanding policies and written materials within programs, trauma-informed classrooms for TGE students, and seeking TGE-affirming practicum partners (Greenwood & Paceley, 2023).

Title: **PSYCHOLOGICAL BENEFITS OF PUBLIC LAND USE**
Presenter(s): Haley MacDonald
Faculty Mentor: Kevin Kelley
Track: 11A
Abstract: The current research examines the benefits that individuals experience from outdoor recreation within land managed by the Bureau of Land

Management (BLM) given related factors. The existing literature regarding the benefits of outdoor recreation split benefits into seven different factors: community, economic, nature, physical, interpersonal, and mental. These benefits are expressed differently among demographics, cultural contexts, and locations. Furthermore, the current research investigates the context in which individuals can have the best experience utilizing outdoor recreation via BLM land. Survey responses of those who have engaged with outdoor recreation in BLM land have been collected over time, providing information about their personal experiences including length of stay, activities participated in, location, skill level, number of members in a group, and modalities used to participate in outdoor recreational activities. Demographic data such as age, sex, and race were also collected. The current research utilizes statistical procedures including correlation and multiple regression models to analyze patterns in usage and benefits of outdoor recreation in BLM land. Implications regarding potential policies and practices will be discussed. Future research to investigate factors that contribute to the public's enjoyment of outdoor recreation is needed.

Title: **GROUNDWATER PUMPING AND THE THREAT OF INTERNATIONAL WATER SECURITY**
Presenter(s): Olivia Wick
Faculty Mentor: Terence Casey
Track: 11B
Abstract: Groundwater, one of the sources of water that most people drink from internationally, is becoming a source for water security stress. With growing water scarcity, more countries are writing, have written, or will need to write legislation to prevent one of our crucial sources of life from being used unsustainably. The creation of legislation pertaining to groundwater varies from country to country. In order to take a more introspective look on ground water policy making, three countries- India, the United States and Australia- were selected to analyze how they have been managing this resource through public policy in recent years. The goal of this project is to look at a variety of policies and determine their effectiveness and implementation across these countries to inform future policy regarding groundwater use and sustainability.

Title: **HOOKUP CULTURE AT CMU**
Presenter(s): Josselin Sorto Leiva, Elias Cressler
Faculty Mentor: Stephen Merino
Track: 11B
Abstract: For many university students in the United States, hook up culture has become the norm. However, some students opt out of participating. By choosing not to hook up with peers (or choosing to hook up with the wrong peers) students may risk feeling alienated. There are many factors that impact one's decision to hook up and with who they choose to hook up. These factors can include stigma, social norms, being under the influence, the usage of dating apps, and peers. Using mixed methods of surveying and interviewing current college students at Colorado Mesa University, we aim to understand the prevalence of and reasoning behind hooking up. In addition, the purpose of this research is to destigmatize hooking up and better inform students at CMU about safety and the resources available to them.

Title: **THE EFFECTS OF DIABETES ON THE SKELETONS IN THE FIRS COLLECTION**
Presenter(s): Jack Bills
Faculty Mentor: Melissa Connor
Track: 11B

Abstract: The United States has an ongoing problem with diabetes, with an estimated 11.6% of the population impacted. A study done at Radford University examined 50 human skeletons to determine if there were any visible changes caused by diabetes. Changes they saw included extraosseous tissue, increased ankle and pelvic bone fracture rates, and Diffuse Idiopathic Skeletal Hyperostosis in the spine. This study done at the Forensic Investigation Research Station uses the methods developed by Radford University to attempt a validation study. The study began with an anonymous sample of 4 skeletons with their ankle bones and pelvises examined for significant changes, including extraosseous bone growths and evidence of fractures. They were then rated on a scale of 0-4, with 0 being minor and 4 being major changes. The skeletons were also examined for DISH in the spine. The initial study of these 4 skeletons had a 75% success rate, but the methods are still being tested. Being able to determine if someone had diabetes based on their skeletal remains would aid identification efforts in missing persons cases, as well as aid medical understanding of the effects of diabetes.

Title: **FIRS FIRST MEDICAL MYSTERY**
Presenter(s): Lexi Alexander
Faculty Mentor: Melissa Connor
Track: 11B
Abstract: Case number 15-05 is a 57-year-old white female whose skeleton has multiple osteological pathologies as a result of her hip surgeries. Beyond having basic medical devices, the surgeries and alterations on her right side have resulted in multiple changes to her skeleton. As a donor to the Forensic Investigation Research Station (FIRS), she underwent both decomposition and maceration before joining the skeletal collection. Based on medical records received with her donation, her right hip was fully replaced and then later removed due to infection. After she was skeletonized, it became clear the medical hardware in her right hip wasn't replaced, leaving her with a shortened femur and the wound packed with a string of antibiotic beads. These antibiotic beads in her right hip were not initially identifiable, and her shortened femur and impacted pelvis became a unique case in the collection. When these medical circumstances were finally identified, they could be linked to several of the changes in her skeleton. Now that her case is a part of the FIRS records, her skeleton can be a point of reference for identifying remains for forensic casework or identifying medical devices and pathologies.

Title: **THE ECONOMIC IMPACT OF THE CAMINO DE SANTIAGO ON RURAL SPAIN: A GEOSPATIAL ANALYSIS**
Presenter(s): Gabrielle Arterburn
Faculty Mentor: Audrey Lumley-Sapanski
Track: 11B
Abstract: The Camino de Santiago in Spain has a dynamic history reaching back over 1,000 years. Originally conceived as a pilgrimage to pay homage at the tomb of St. James, this route has expanded to include religious and popular tourists alike. Approximately 400,000 individuals complete the pilgrimage each year. The flourishing tourism sector provides a stark contrast to the struggling rural economy. In academic fields studying deruralization, researchers propose sustainable tourism as a remedy to the negative impacts of urbanization. The literature argues that cultural routes are a net positive for the economic, demographic, cultural and environmental challenges experienced by rural communities. Many of the Camino de Santiago routes traverse these rural landscapes, the most popular of which being the Camino Frances. Where rural villages may otherwise have been

abandoned, the Camino Frances attracts a minimum 100,000 visitors per year to these communities. Open-source statistical and spatial data on demography, society, economy and standard of living in Spain are readily accessible for analysis. Utilizing these datasets and the visual/analytic capacity of GIS, this research explores the relationship between the Camino Frances and the socioeconomic security of rural northern Spain.

Title: **HISTORY OF THE PALISADE PEACH**
Presenter(s): Tasalyn Anderson
Faculty Mentor: Pamela Krch
Track: 11B
Abstract: Colorado is home to the world-famous Palisade peach. Beginning in the late nineteenth century, peaches have positively impacted the Western Slope both economically and culturally. The history of the Palisade peach industry displays the transformation of the labor force, from German prisoners of war to Mexican migrant workers, displaying the great impact peaches had on the local economy. The explosion of agriculture in Palisade created a tangible and trackable flow of economy that sustained the small town through hardships and set the foundation for Palisade to thrive. A plethora of contemporary businesses, vineyards and parks are named after the Palisade peach. If that alone does not display cultural impact, the vast amount of material culture that centralizes the aesthetically pleasing Palisade peach does. Numerous locally produced products, from stickers to spirits, both include as well as highlight the Palisade peach. Locals carry immense pride in the world-famous fruit. The annual Palisade Peach Festival attracts locals and tourists alike, emphasizing the widespread influence of the world-famous fruit. The globalization of the Palisade peach not only places Palisade, Colorado, on the map, but also displays a unique perspective on the economic and cultural evolution of the Western Slope.

Title: **COPING METHODS, SUBSTANCE ABUSE, AND SUICIDAL IDEATION IN A RURAL COMMUNITY AND UNIVERSITY**
Presenter(s): Austin Leach, Preston Fluekiger, Brooke Erickson
Faculty Mentor: Jacob Jones
Track: 11C
Abstract: Individuals faced with stressful situations such as suicidal ideation, depression, and anxiety use coping methods to deal with these stressful feelings. In addition, the approach an individual takes to utilize coping methods can be contributed to several factors at the individual, familial, and community level (Guo et al., 2018). Thus, the purpose of this study is to understand specific ways college students and members of a rural community, with one of the highest rates of suicide in the United States, use coping strategies to deal with suicidal ideation (Gray, 2023). An online survey research design was utilized to investigate the effect of problem-, emotion-, and avoidance-focused coping and drug use on suicidal ideation risk. The sample consisted of 141 participants. A one-way MANOVA was conducted to determine whether there is a significant difference between coping styles based on an individual's suicidal ideation. There was an overall significant effect of suicidal ideation on an individual's utilized coping styles. Further analysis revealed how substance abuse, sexuality, and class standing relate to suicidal ideation. Results and analysis are reported with further commentary on implications and future directions to take this research.

Title: **THE IMPACT OF PHYSICAL ACTIVITY ON SYMPTOMS OF DEPRESSION & ANXIETY**
Presenter(s): Alex Olson, Ella Dillon, Violet Detwiler
Faculty Mentor: Kevin Kelley

Track: 11C

Abstract: There has been extensive research on physical activity's positive impact on depression, and while the majority of these studies focus on aerobic exercise, there is evidence that other types of physical activity may also be effective. There is also evidence that exposure to a natural environment can decrease the severity and prevalence of depressive symptoms, but it is less conclusive. The current study examines 174 adult volunteers, assessing various types of exercise participation and symptoms of depression and anxiety, as assessed by the Beck Depression Inventory-II (BDI-II) and the Beck Anxiety Inventory (BAI). It was found that participants who reported running or jogging had a significantly lower mean BDI-II score than those who did not. Furthermore, those who reported running or jogging outdoors rather than indoors had a significantly lower mean BAI score. Participants who reported weightlifting had significantly lower mean BDI-II and BAI scores than those who did not. Those who reported participating in weightlifting by themselves had a significantly lower mean BAI score than those who reported weightlifting with a partner or in a group. Taken as a whole, these results show the positive effect that different types of exercise have on depression and anxiety.

Title: **RELATIONSHIP OBSESSIVE-COMPULSIVE DISORDER (ROCD) SYMPTOMS IN AMERICAN UNIVERSITY STUDENTS: EXPLORING TIKTOK'S IMPACT ON EXTREME LOVE BELIEFS AND PREDICTING ROCD SYMPTOMS VIA ATTACHMENT STYLES AND MEDIA-USAGE VARIABLES**

Presenter(s): Grace Thompson, Indica Machost

Faculty Mentor: Jeremy Tost

Track: 11C

Abstract: Relationship obsessive-compulsive disorder (ROCD) affects individuals' intimate relationships, and symptoms correlate with relationship/sexual dissatisfaction (Doron et al., 2014). There are two types of romantic ROCD: relationship-centered (RC-ROCD) and partner-focused (PF-ROCD). RC-ROCD focuses on the nature of the relationship — with intrusive thoughts and obsessions over the relationship's quality (Cerea et al., 2020). PF-ROCD centers on perceived flaws with the romantic partner — their appearance, sociability, morality, emotional stability, and intelligence (Cerea et al., 2020). Romantic ROCD is maintained by unrealistic romantic expectations, termed extreme love beliefs (ELBs) (Doron & Derby, 2017). The current research examines the immediate impacts of TikTok relationship representations on ELBs via an experimental manipulation. Additionally, we utilized regression models to predict romantic ROCD symptoms using attachment styles, demographics, and media-usage variables. Media-usage variables included time spent on social media, pornography consumption, and TikTok use frequency. Lastly, we investigated participants' social-media research tendencies. Preliminary results indicated that ELBs do not differ based on the TikTok content an individual was shown. Additionally, attachment avoidance and anxiety were found to explain only 8% of the variability in PF-ROCD symptoms — demonstrating that the etiology of ROCD is likely complex. It remains unclear whether TikTok might be effective in facilitating mental health engagement.

Title: **VIRTUAL MAKEOVER USE: MOTIVATIONS BEHIND THE SCREEN**

Presenter(s): Natalie Brown, Sarah Krieghoff

Faculty Mentor: Amy Niu

Track: 11C

Abstract: The proliferation of virtual makeover tools, such as Snapchat and Instagram beauty filters and Facetune, among college students has sparked interest

in understanding the underlying motivations for their use. Our research, anchored in self-concept and self-presentation theories, aims to develop a robust measurement tool to capture the motives behind selfie-editing behaviors. Utilizing preliminary data from college females in China and the United States, we refined a 26-item measurement scale to assess the motives of self-enhancement, self-protection, and entertainment-exploration, as aligned with our exploratory factor analysis. Our sample comprised 236 students from a Rocky Mountain region college, who participated in an online survey between April 27th and June 4th, 2023. We further explored the relationship between the three motivational factors, individual characteristics (such as narcissism and self-concept clarity), and selfie behaviors. Results shed light on the complex interplay between individual traits and digital self-presentation behaviors, offering insight into their intersection with emerging technology and self-construction. Future research could expand on these findings, exploring the implications of these digital behaviors for broader societal norms and individual psychological well-being.

Title: **PERCEPTIONS OF FIRST-GENERATION COLLEGE STUDENTS' TRANSITION: A QUALITATIVE STUDY**
Presenter(s): Isabela Sanchez, Maya Mendoza
Faculty Mentor: Amy Niu
Track: 11C
Abstract: Transitioning to college is often stressful and particularly challenging for first generation students due to unique pressures and barriers. This proposed qualitative study explores how the perceived differences of being a first-generation student can affect one's college transition experiences. The development of interview protocols and data analysis was informed by Bandura's Social Cognitive Theory, Deci and Ryan's Self-Determination Theory, and Tinto's Student Integration Theory. The study recruited nineteen first-generation students during the spring and the fall of the 2023. Data were collected through in-depth individual interviews and are currently being analyzed using thematic analysis. Following data collection, the research team is now transcribing interviews and creating memos to prepare for thematic analysis. Themes from the data analysis will illuminate the challenges first-generation students encounter during their college transition. Additionally, the study examines how first-generation status intersects with identities like non-traditional or commuter students. The findings will guide development of interventions and support services that leverage digital services to lessen the challenges experienced by first-generation students during the transition. Furthermore, the findings will provide actionable insights into enhancing Colorado Mesa University's recruitment strategies for first-generation students and providing ongoing support throughout their college years.

Title: **DISPARITIES FACED BY IMMIGRANTS FROM NON-ENGLISH-SPEAKING COUNTRIES**
Presenter(s): Raeann Mosqueda
Faculty Mentor: Aisha Chapra
Track: 11D
Abstract: There are many disparities faced among the population of immigrants from Non-English speaking countries, these include multiple systems like education, healthcare, and career outcomes. There are multiple methods used such as qualitative and quantitative studies that address each of these issues in depth. While there are gaps within research and aid this paper offers practice implications and changes that can be made in order to address the barriers that are faced by this population. There will be a

review of Two-Way-Language Immersion programs, multilingual screeners, colorblind perspective, multicultural approach, and non-profit organizations that aid and harm this population. These non-profits include Refuge Point which aids this population on a micro level as well as a macro policy level and the other organization, the International Refugee Assistance Project which offers legal aid to this population. This presentation will examine each of these resources and the gaps that are still needing to be filled by social workers in order to promote social justice and the dignity and worth of a person.

Title: **YOUTH, PARENTS, AND REPRODUCTIVE HEALTH IN MESA COUNTY**
Presenter(s): Gina Dezwaan-Martinez, Natasha Fox, Josselin Leiva, Jesse Pass
Faculty Mentor: Megan Henley
Track: 11D
Abstract: This study's purpose is to understand how youth (13-26 years old) and parents of youth in Mesa County receive information about reproductive health services (contraceptives, STI testing, pregnancy tests, counseling, etc.). Previous research has found that parents can have a significant influence on youths' knowledge of and utilization of reproductive healthcare. Moreover, there is a correlation between parental political affiliation and how parents and youth receive information. Overall, there remains a societal stigma against discussing and seeking out information about reproductive healthcare. We seek to understand why many youths in Mesa County do not utilize reproductive health services. To do this, we are using a mixed-method approach with surveys and interviews. We will interview 6 young adults between the ages of 18 and 26 to represent our youth group and 6 parents with children between 13 and 19 years old. Additionally, we have about 50 respondents for our survey. We will use our research findings to solicit solutions that will directly benefit the local community. By uncovering how youth receive information about reproductive healthcare, we can help Mesa County Public Health better address the needs of youth and improve outreach to them.

Title: **SHADES OF IDENTITY: EXAMINING THE INFLUENCE OF FAMILY AND SOCIAL CONTEXT ON MIXED RACE INDIVIDUALS**
Presenter(s): Morgan Geiger
Faculty Mentor: Stephen Merino
Track: 11D
Abstract: Interracial marriage has become increasingly common in the United States, and as a consequence, the multiracial population has increased dramatically to nearly 40 million people. Existing research suggests the racial identities of individuals in this population are in part shaped by the race of their parents. The children of Hispanic/White and Asian/White couples tend to identify as biracial or White, suggesting an assimilative effect of these intermarriages. The children of Black/White couples tend to identify as Black because of the historical legacy of the one-drop rule and the racial landscape of the US today. Using in-depth semi-structured interviews, my study will examine multiracial individuals' identities. The sample will include young adults with Latino/White, Asian/White, and Black/White parents. Interview questions will examine these individuals' own perceptions of their identities, the influence of parents and extended family, and the social context in which they were raised.

Title: **EXPLORING BARRIERS TO ECONOMIC ASSISTANCE UPTAKE IN MESA COUNTY**
Presenter(s): Hailey Samyn, Elias Cressler, Keely Kelley, Sean Satchell, Kayla Miller
Faculty Mentor: Megan Henley

Track: 11D

Abstract: Individuals or families are often eligible for programs that can help them reach economic stability. However, there are people in Mesa County who are eligible for economic support programs but never apply. This is called the eligible-but-not-enrolled rate. There are a multitude of social factors that impact individual and family decisions around applying for and using assistance programs. Many stigmas or stereotypes surrounding economic assistance programs in society influence individuals applying for help, as well as sustainability issues surrounding requirements of programs such as income, permanent housing, employment, etc. This research utilizes surveys and interviews to uncover why individuals in Mesa County may not enroll in economic support programs. The purpose of our research is to reveal the social issues surrounding applying and sustaining the usage of economic assistance programs. With the data obtained from our research we will better inform the Mesa County Public Health department on how to shape outreach to better assist the community of Mesa County. Ultimately, our research will be used to better inform the public of different programs within our county, help individuals understand the enrollment process, and help destigmatize applying for economic support in order to increase economic stability in the county.

Title: **AN EXPLORATION OF "LOW-HANGING FRUIT" AROUND IMPROVING GRADUATION AND RETENTION RATES, AND A STUDENT'S SENSE OF BELONGING**

Presenter(s): Michael Gibson

Faculty Mentor: Michael Rhoads

Track: 11D

Abstract: The population of "stopouts" or Some College, No Credential (SCNC) adults is now over 40.4 million in the United States. To put that into perspective, there are more SCNC individuals in this country than residents of California, a state whose economy, if it were a country, would be the 5th largest in the world. We also have a population of over 100 million college graduates. In terms of income, wealth, lifespan and health-span disparities compared to college graduates, the burden to SCNC individuals, to their families, and to this country is crushing. The "crush" is largely due to college loan debt which SCNCs have less ability to repay relative to college graduate peers, and which cannot ever be discharged in bankruptcy. However, research studies have shown several areas of "low-hanging fruit" (crucial elements) where colleges and universities have significantly improved their graduation and retention rates. This project explores those crucial elements, success stories, and the importance of a student's sense of belonging, connection, and engagement, especially via advisor and counselor relationships.

Title: **THE ARCHAEOLOGY OF KOREA AND JAPAN**

Presenter(s): Christina Horn

Faculty Mentor: John Seebach

Track: 11E

Abstract: From the 6th century BCE to the 2nd century CE, various interactions between Mumun-era southern Korea and Jomon-era Japan are evident. The sea was not a barrier, but a valuable tool in migration and trade relations between the continent and westernmost Japanese archipelago via Tsushima and Iki islands. The main interaction routes are seen through the movement of various forms of material culture. Prehistoric Japanese foragers integrated into their societies Korean technologies, such as wet-rice agriculture, bronze wares, ritual practice, new forms of burial structures, and social hierarchical systems. During this cultural and societal

transition, the Mumun and Jomon hybridized into the Yayoi people, who eventually became the dominant population and culture in western Japan. Ultimately, these events ushered in the transition from complex hunter-gatherer societies to complex agriculture hierarchical status societies that brought forth the first kingdom of Japan.

Title: **FROM TELLER TO STELLAR**
Presenter(s): Julia Wildman
Faculty Mentor: Audrey Lumley-Sapanski
Track: 11E
Abstract: "Kill the Indian, save the man," was a popular saying used by US policy makers to justify the dehumanization and cultural annihilation of indigenous people using "Indian boarding schools." One such school, the Teller Institute operated for 30 years in Grand Junction, Colorado. It was named for Colorado's first senator Henry Teller, a vehement advocate for the aforementioned slogan. Through social discourse and political policy, Teller perpetuated the idea that Native people needed reformation to function in US society. His name is enshrined everywhere in our state. An entire county is named for him, as is the street on which I live, Teller Avenue. Words communicate ideology and de-glamorizing this word acknowledges a desire to take accountability for the displacement, murder, and lost graves of Natives in this area. Renaming campaigns are occurring everywhere. For example, Mount McKinley back to Denali, and the land-back campaign in the Black Hills. The proposed project involves three actions. First, to collect insight from Native populations about Teller. Second, develop a proposal including those collected insights and present it to Grand Junction City Council. Third and last, to formally and legally remove his name from the street, and rename it Stellar Avenue.

Title: **THE EVOLUTION OF "JUST WAR" IN THE WEST FROM THE POST-CLASSICAL TO THE MODERN ERA**
Presenter(s): Brianna Bolcato
Faculty Mentor: Vincent Patarino
Track: 11E
Abstract: The concept of "Just War," first intellectualized by the Romans, refers to the philosophical and practical arguments for waging war. Among Western societies, from the post-classical to the modern era, justifications for war expanded and, in some cases, became more nuanced as Western powers evolved. During the Middle Ages, both Christian and Islamic scholars appropriated the "Just War" construct to explain religious justifications to wage war against one another. In the West, they also relied on the Church itself to fulfill and act upon the demands from those in the upper social orders who wanted clear guidelines about conducting war, especially against the forces of Islam. During the early modern religious wars, Western kingdoms continued to embrace religious justifications, but also began to broaden their arguments more generally. These included economic claims by nascent European empires, as well as proto-nationalistic justifications that surfaced during the Thirty Years War. Lastly, as modern societies transitioned away from religious justifications for war, ideological arguments such as nationalism replaced it as the central rationalization for Western states to consolidate power and embrace national prestige.

Title: **SKELETAL PRESENTATION OF A MODIFIED SURGICAL TECHNIQUE**
Presenter(s): Isabelle Marler
Faculty Mentor: Melissa Connor
Track: 11E

Abstract: This case study was done to identify the surgical procedure done on the left distal radioulnar joint (DRUJ), or wrist, of a 62 year old white male. While the medical history for this individual is minimal, the technique was identified as a Darrach Procedure. The method of this surgery involved removing the end of the ulna, then drilling a hole through the bone which served as an anchor point for a tendon which is a modified technique of the Darrach Procedure. The relationship between the DRUJ and the triangular fibrocartilage complex (TFCC) is a complicated one that allows the wrist to twist and turn the way it does. A Darrach Procedure is done to stabilize the TFCC, but further instability of the wrist is a common complication. Because a traditional Darrach Procedure can often fail, there are modified techniques as well as techniques done to fix failed Darrach Procedures. The ability to identify a surgical procedure on skeletal remains when there is little to no medical history is of great use to forensic specialists who are working to identify unknown remains.

Title: **FIRS VISUAL DICTIONARY OF MEDICAL DEVICES**
Presenter(s): Charles Curry
Faculty Mentor: Melissa Connor
Track: 11E
Abstract: The project is the creation of an inventory, or visual dictionary, of medical devices from the Forensic Investigation Research Station (FIRS). Medical devices from the skeletal collection of the donors at FIRS and unused devices donated to the FIRS by Dr. Matt Swelstad are included. The basic make, model, and color of each device are described. More specific information, such as the manufacturers, and where and how these devices are used is detailed as well. Documentation of what these devices look like within, and outside, the human body can also be found within the dictionary. Some examples of unique medical devices that are documented include a medical plate within a mandible, an intrapelvic plate, and an intraosseous device. More common devices include surgical screws, a range of medication ports, and hip replacements. This dictionary is useful in forensic settings to help in identifying medical devices attached to or found in association with remains. This information may help determine cause of death and to collect information on the medical history of the people. It will also add context and unveil missing information surrounding forensic cases.

Title: **OVERFISHING — THE ENVIRONMENTAL CRISIS**
Presenter(s): Torin Lackmann
Faculty Mentor: Terence Casey
Track: 11E
Abstract: The climate crisis is interconnected with human rights. This project delves into this concept through the topic of overfishing. Overfishing is one of the largest if not the largest threats to our oceans. Decades of harvesting the seas have disrupted the delicate balance of our ocean ecosystems despite the global efforts to mitigate this damage. This has created one of the most pressing issues in today's climate crisis, not only affecting fish and the oceans, but all people living on the planet. To explore this, the presentation contains four parts, each delving into different areas to explore this complex issue. The overarching summary of the issue and history surrounding the crisis will be examined. In addition, the key stakeholders involved along with how different sectors are affected have been investigated. Lastly, policy recommendations, strategies, and solutions are discussed to theorize how best this crisis should be tacked.

Title: **POST-COLONIAL MARXIST APPROACH TO INTERNATIONAL ADOPTION**
Presenter(s): Sauvelyne Randel
Faculty Mentor: Holly Oberle
Track: 11F
Abstract: This paper analyzes the ways that the international adoption system has been directly influenced by colonization; its implications on the legality of international adoption, possible trauma on adoptees, and economic effects. Since international adoption frequently overlaps at the state and international level there are laws in place to establish uniformity. Since there has been an influx of need for international adoption, the system has had to make accommodations. As a result, the shift in attention away from the adoptee's personal experiences within the system has led to most international adoption cases overlooking the ramifications that international adoptions have on adoptees. The emotional and physical transition in an adoptees' life from their biological home to their adoptive home plays a vital role in their internal monologue. The obligation to help adoptees and provide a supportive environment falls squarely on the shoulders of the organizations involved and the adoptive parental guardians. The research that will be presented will outline if there is a correlation between the construction of the legal aspects of international adoption organizations, trauma to adoptee throughout this process, and economic effects as a result of colonization and or other factors.

Title: **CASE STUDY: AN ANALYSIS OF RAPID DEMOCRATIZATION IN TAIWAN**
Presenter(s): Kyle Patten
Faculty Mentor: Holly Oberle
Track: 11F
Abstract: This case study delves into Taiwan's complex political landscape, where the quest for democracy coexists with geopolitical challenges and sovereignty disputes. The People's Republic of China (PRC) for example does not consider Taiwan sovereign. But regardless of lacking widespread international recognition, Taiwan is a vibrant democracy. This case study employs four theoretical perspectives to analyze Taiwan's democratic development: the international perspective, a multi-factor approach emphasizing modernization theory, a functionalist approach focused on analyzing elections as evidence of democratization, and a postcolonial perspective highlighting Taiwan's unique historical trajectory. Using these theoretical perspectives, this case study looks to analyze Taiwan's rapid democratization because of its ability to sustain democratic governance with continuing authoritarian pressure. Variables that may have assisted Taiwan in this include influences from democratic nations, notably the United States, for having some democratic influence on Taiwanese political environment. But more importantly factors such as geography, climate, natural resources, and a distinctive postcolonial culture further supported Taiwan's transition to democracy. The study underscores Taiwan's significance as a case study, offering insights into the interplay of modernization, culture, and postcolonial legacies in shaping democratic transitions. However, the conclusion notes that Taiwan's democracy continues to face ongoing threats from the PRC.

Title: **GENIUS PLAYBOY BILLIONAIRE PHILANTHROPISTS - HOW HUMAN SECURITY BECAME A TOOL FOR AMERICAN HEGEMONY**
Presenter(s): Shayla Trowbridge
Faculty Mentor: Holly Oberle
Track: 11F

Abstract: When discussing human security and global health regimes, there is no doubt that philanthropic organizations and foundations are the world's largest actors on the global stage. There is a distinct lack of literature surrounding why this is the norm for global health regimes. This essay is an attempt at beginning to address this enormous question, tracing the origin of philanthropic foundations back to American entrepreneurs wishing to exercise influence in the world. The answer is made clear as we see how philanthropic foundations and organizations not only participate in our global system of health and human security, but played a hand in creating the system as we know it today. Not only does this essay address how the system came to be, it discusses how philanthropy functions as a tool for the United States to exercise cultural and economic hegemony and modern colonialism world-wide.

Title: **ON POLITICAL UPHEAVAL AND ETHNIC CLEANSING IN EGYPT AND SUDAN**
Presenter(s): Rachel Baron
Faculty Mentor: Holly Oberle
Track: 11F
Abstract: This paper is designed to understand how in two different revolutions, one in Egypt and one in Sudan, could both end in similar ways with a new authoritarian regime taking power, yet only in Sudan was ethnic cleansing a major aspect of the conflicts surrounding the revolution. If two revolutions can be so similar in nearly every respect, yet only one of them has the grisly consequence of genocide, then it is critical to understand how genocides can happen during political upheavals.

Title: **POSTSTRUCTURALIST THEORY AND ITS APPLICATION TO ISRAEL AND PALESTINE**
Presenter(s): Sam Miller
Faculty Mentor: Holly Oberle
Track: 11F
Abstract: When discussing world affairs and international relations, it is imperative we understand how the manipulation of discourse affects our perception of world events, particularly when applied to conflicts. Applying poststructuralist theory to the ongoing conflict between Israel and Palestine will allow us a new lens to view the conflict that may not have been considered before. In the past, explanations have been given mostly in the two dominant theoretical lenses, realism and liberalism, this paper attempts to offer a third lens based on qualitative research. To understand the conflict through a poststructuralist mindset, it is beneficial to have at least a brief understanding of the historical events that led to the current conflict. To help further the understanding of how essential language is to conflicts, this paper breaks the manipulation of discourse down into the three main levels of analysis which are the individual, the state, and international. Furthermore, we'll look at how language can be used to "other" a particular group of people and the impacts of that action politically. Overall, this research aims to provide another lens to view conflicts through as well as attempt a better understanding of how our world works politically at all levels.

Title: **EQUATORIAL GUINEA AND AUTHORITARIAN PERSISTENCE**
Presenter(s): Joe Williams
Faculty Mentor: Holly Oberle
Track: 11F
Abstract: This paper examines the persistence of authoritarianism in Equatorial Guinea through the perspectives of the following five theories: (1) historical

institutionalism, (2) barriers to collective action through appeal to rational choice, (3) institutional weakness, (4) political culture, and (5) economic development/modernization. Drawing on historical analysis and this theoretical framework, I explore how these theories have been manifested in Equatorial Guinea's political landscape. My research then focuses on modernization theory in particular, asking why authoritarianism persists in Equatorial Guinea despite sustained economic growth since 1995. I analyze factors including economic indicators, political institutions, and social dynamics to provide insight into the country's authoritarian resilience, and explore possible reasons for its persistence despite economic development. This is done using a mixed method analysis relating economic data to social, cultural, institutional, and political factors. My findings suggest that authoritarianism persists in Equatorial Guinea despite economic growth due to unequal wealth distribution, the enduring rule of a single dictator, and the government's utilization of the various tools characteristic of authoritarian regimes. I conclude that Equatorial Guinea serves as a representative case study for most major theories of authoritarian persistence, and illustrates the ability of well-established authoritarian regimes to endure in the face of common causal factors associated with democratization, such as economic development.

Teacher Education

Title: **BUILDING RELATIONSHIPS TO SUPPORT STUDENTS WITH TRAUMA**
Presenter(s): Laura Trusty
Faculty Mentor: Ann Gillies
Track: 12A
Abstract: This presentation is an examination of the literature on the impact relationships have on improving outcomes for students who have experienced trauma or are dealing with mental health issues. The presentation infuses a personal narrative from a teacher who works with high-school students who have severe emotional disabilities or are diagnosed with anxiety, depression, and post-traumatic stress disorder (PTSD).

Title: **EDUCATION, MOTIVATION, AND THE POWER OF CHOICE**
Presenter(s): Micah Amborn
Faculty Mentor: Ann Gillies
Track: 12A
Abstract: The presenter will share research on best practices of teaching; specifically looking at the role motivation plays in education, and how to best foster motivation. Further, the presenter will explore the connection between student motivation and a student's ability to make choices about their learning. What are best practices for teaching in a way that provides for student choice while keeping the best practices of direct instruction? The presenter will share insight into the balance between the need for direct instruction and providing student choice. If a teacher can allow students to choose their projects or products, the teacher also needs to use explicit instruction to provide feedback and modeling of the skills necessary for student success. Topics like this are important because if too much emphasis is placed on covering state and national standards then student motivation might fall to the wayside. Additionally, if schools can create a

Title: **TEACHING STEAM IN AN INCLUSIVE CLASSROOM**
Presenter(s): Avery Burks
Faculty Mentor: Amelia Baldwin

Track: 12B

Abstract: STEAM is an especially important concept for all teachers to incorporate into their inclusive classroom. An inclusive classroom includes many different students of diverse cultures and backgrounds. Each student needs help to find something they are good at, and using STEAM can help with that. According to research, STEAM can help all children grasp a love for learning, build confidence in their abilities and skills, develop important thinking skills, and help establish creativity in their young minds. All these concepts are especially important in an inclusive classroom. Since students may struggle with a traditional teaching style, it is important to use a universal concept such as STEAM to help them grasp new concepts and find something they are passionate about. STEAM also benefits teachers, since incorporating STEAM into the classroom helps teachers produce innovative ideas and concepts to instruct their students and make activities and hands-on experiences for students. Because of STEAM's integrated concepts and hands-on learning activities, students will feel like the classroom has been adapted for them. Students can establish a love for any concept they can imagine through the power of STEAM learning.

Title: **BENEFITS OF BRAIN BREAKS**

Presenter(s): Paige Franklin

Faculty Mentor: Amelia Baldwin

Track: 12B

Abstract: Brain breaks bring many benefits to the classroom. Brain science has shown that cognitive overload can be decreased in the classroom by using brain breaks. Knowledge of children's cognitive overload is important for teachers to remember so they can give their students a break when needed. A brain break is a break that is designed to refresh students' minds so when they are done they are recharged and ready to learn more. Other benefits of brain breaks include decreasing negative behavior and maintaining students' focus. If teachers use brain breaks in the classroom, they may see many positive benefits through students' work. Adding brain breaks into the classroom doesn't have to take up much precious learning time, because brain breaks can vary in time. Some breaks may last as long as thirty minutes or they could last two minutes. Brain breaks will benefit children in the classroom and allow students to learn how to self-regulate when becoming overwhelmed and, in the future, when their brains are overloaded as adults.

Title: **FIELD TRIPS IN EDUCATION**

Presenter(s): Tayah Carle

Faculty Mentor: Amelia Baldwin

Track: 12B

Abstract: Putting students in real-life situations helps build knowledge and understanding of topics outside of what they learn in the classroom. They can learn firsthand from the places that they go. Research shows that students build their social/emotional learning by being exposed to environments where they can interact with peers and grow a better understanding about one another. This interaction through field trips allows students to become better communicators, critical thinkers, and problem-solvers. Field trips can also be a way to engage parents. Research shows that field trips facilitate relationships for students and their parents by creating memories that they will have forever. Not only does research show that they take those memories with them, but it also leads to higher grades in school, a higher high school graduation rate, and a higher college graduation rate. Although there have been many short- and long-term benefits, there has been a downward trend in field trips happening in

school. This is something that needs to be changed and prioritized in schools.

Title: **CLASSROOM PETS**
Presenter(s): Taylor Stockemer
Faculty Mentor: Amelia Baldwin
Track: 12B
Abstract: Engagement, motivation, and academic advancement are critical aspects of student success. As a teacher, it is important to increase these three aspects in the classroom. Unfortunately, support for these is lacking, which turns the "lesson of the day" into forty-five minutes of addressing challenging behaviors and going over expectations. The implementation of class pets can be utilized as an encouragement for students to be more attentive and engaged with the lesson plan. Research has found that class pets instill a sense of responsibility and motivation to achieve the goals set for each student while maintaining an inclusive environment for all students to participate in. Furthermore, with a classroom pet present, students can see real-life examples of the science and concepts being presented to them, which supports every learning type. Pets ranging from a fish to a bunny can be the significant experience needed to increase the enjoyment of a classroom setting and the desire to learn.

Title: **THE "A" IN STEAM**
Presenter(s): Chris Gibson
Faculty Mentor: Amelia Baldwin
Track: 12B
Abstract: It is important for teachers throughout the year to add the "A" for arts into STEM, which adds dance, music, theater, visual, and media arts—allowing students with learning disabilities to benefit differently. Having this approach, students with a learning disability can explore and learn through different mediums, which can help them achieve their full potential and enhance their learning experience. Research shows that incorporating arts in the instruction of math and english, motivates a student through STEAM. Unfortunately, teachers in several school districts face the tough decision of cutting art programs such as drama, music, visual arts, and photography. These cuts are usually a result of budget constraints and are based on state or national academic priorities that place more emphasis on math and english student achievement. The solutions to ensure that STEAM keeps benefiting students with learning disabilities are: raise awareness and professional development, advocate for policy changes and partnerships, collaborate with schools, evaluate the impact of art, and engage parents in the community.

Title: **NUTRITION: THE KEY COMPONENT OF SCIENCE THAT SCHOOLS ARE MISSING**
Presenter(s): Katy Ghilarducci
Faculty Mentor: Amelia Baldwin
Track: 12B
Abstract: Science is one of the most extensive topics to explore. The possibilities for learning within the scientific field are endless. Even the most advanced scientists still have things to learn. In school, one learns about what they think are all the basics: biology, chemistry, geophysics, etc. Yet somehow, one of the most important sciences may be completely neglected—the study of nutrition. What does it mean to be healthy? How does one create a healthy relationship with food? Why does the general population tend to choose junk food over fruits and vegetables? Most importantly, why aren't children taught this topic from a young age? This Student Showcase

presentation will answer all of these questions. It will also touch on issues such as the "advertised diet" vs. the "recommended diet"" and the push towards sedentary lifestyles in the United States. Research says that the only food advertisements on children's television channels consist of four categories: breakfast cereals, confectionery (candy), savory snacks, and soft drinks. Regarding the science aspect of STEAM, education is missing a key component that is necessary for maintaining a healthy lifestyle, and that component is nutrition.

itle: **MATH IS IMPORTANT TOO**
Presenter(s): Palmer Lyons
Faculty Mentor: Amelia Baldwin
Track: 12B
Abstract: For most students and even teachers, their most feared and hated class is math. Math is a domain that everyone uses every day. It is crucial for teachers to develop this skill set in their students. Without math skills, students can struggle not only academically but also in everyday life. Everyone's brains process math differently, and it is important for teachers to approach math with an open mind. Teaching math should be fun for both the teacher and the students. Math is not an esoteric subject but one that applies to all facets of a person's life. Encouraging students to develop a number sense and love for math is not only good for the students but also for society. Students' attitudes towards math can affect their ability to problem solve which affects their academic achievement and lifetime success. According to News Nation (2023), United States students are ranked 28th in math, and math scores have continued to fall. This is not just a U.S. problem, but an international one. On the other hand, reading in the United States ranks 6th in the world. This means math is a crucial topic and should be a priority in our schools.

Title: **HOW TECHNOLOGY AFFECTS THE CLASSROOM**
Presenter(s): Payten Hodgin
Faculty Mentor: Amelia Baldwin
Track: 12B
Abstract: Research has shown that collaborative learning improves higher-level thinking, communication, management and leadership skills, and has proven to help students' overall future education. STEAM is one of the most important aspects within education. Technology is the future of STEAM and even the school system. With the help of technology, educators can provide opportunities for students to better their lives. The evolution of technology will aid students throughout school and better prepare them for their future careers. The future is still unknown; as future educators, it is hard to conclude how to assist with technology advancement. With the help of STEAM, teachers can use their known tools to educate and prepare students for their future lives with the technology that will be surrounding them.

Title: **FAMILY MATTERS**
Presenter(s): Avery Fitzgerald
Faculty Mentor: Ann Gillies
Track: 12C
Abstract: This Student Showcase presentation highlights the essential role of family involvement in young students' success. When parents engage in their children's education, it significantly boosts academic performance. But it is more than just helping with homework; it's about creating a supportive atmosphere where children feel motivated to learn. Through collaboration between families and schools, students gain confidence, develop positive attitudes towards learning, and sharpen critical skills like problem-solving

and communication. Moreover, family involvement extends beyond academics, shaping children's values and aspirations. By participating in school events, maintaining open communication with teachers, and supporting learning at home, families create an environment where children thrive both academically and emotionally. In essence, this presentation emphasizes the power of families as educational partners. Together with schools, families play a crucial role in ensuring that every child receives the support they need to excel academically and grow into well-rounded individuals. By fostering strong family-school connections, teachers pave the way for students to reach their full potential and become lifelong learners.

Title: **DOWN SYNDROME**
Presenter(s): Maddie Fay
Faculty Mentor: Ann Gillies
Track: 12C
Abstract: This presentation will introduce Down Syndrome, covering what it is, the different types, and symptoms. Additionally, the presenter will share insights from observing two students with Down Syndrome in a classroom setting from her field observations in a Significant Support Needs classroom. Before diving deeply into their case studies, the presenter will discuss her experience with the two students. These case studies will introduce the students, their specific type of Down Syndrome, their abilities, and their challenges in and out of the classroom. Lastly, the presenter will highlight high-leverage teaching strategies that benefit students with Down Syndrome in a school environment. These strategies or practices offer guidance on how teachers can assist students feeling overwhelmed, frustrated, or who need help.

Title: **EFFECTIVE TEACHING IMPROVEMENT PROJECT**
Presenter(s): Stacy Trickel
Faculty Mentor: Ann Gillies
Track: 12C
Abstract: This Student Showcase presentation will share an Effective Teaching Improvement Project the presenter implemented in her classroom during the Spring semester of 2024. The presenter is a Preschool Teacher of a diverse and inclusive group of 3 to 5 year-olds and the project aimed to support students and the staff in specially designed ways to create a safe and effective learning environment. The focus is to improve communication between the many staff coming in and out of the classroom, to re-establish a consistent, organized, and respectful learning environment, maintain routine, and focus on self-care.

Title: **TOOLS OR TOYS**
Presenter(s): Abby Guddat
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: Tools or Toys? An age-old question for our young students as well as a large portion of the adult population. There are uses for everything from pop-its in spelling and slime in math. Teachers need to find new ways to teach students in the classroom. This may mean taking a different, unconventional route to get there. Fidgets can be used for so much more than a way to keep our neurodivergent students on task. They can help with kinesthetic learning, visual learning, and making learning fun. If teachers can make learning fun then why not, some of the information that we are supposed to retain at the elementary level is dry and boring so using pop-its to help a child learn syllables or having a child learn about fractions while making slime will only make them more willing to learn.

Title: **LET'S TAKE THIS OUTSIDE...**
Presenter(s): Audrey Jones
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: This presentation will share the benefits of outdoor learning in early childhood education and beyond. The presenter will give examples of activities in many learning domains across different age levels, and provide research about the importance of being outside. Challenges for outdoor learning will be discussed, including more modern societal challenges, and some creative ideas for how teachers can overcome and adapt to them. The presenter hopes to convey the many benefits outdoor learning can have with mental and physical health as well as with student engagement and real life experience-based learning. Benefits of utilizing outdoor time for brain breaks, and the positivities of any kinesthetic activities for overall learning and focus will be shared. Incorporating more outdoor time into the schedule can be not only extremely beneficial, but also fun and enjoyable for both students and teachers.

Title: **AUTISM SPECTRUM DISORDER AND UNIVERSALLY- DESIGNED LEARNING**
Presenter(s): Cristal Ferguson
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: According to the CDC's research in 2023, one in thirty-six children will be diagnosed with autism. This statistic increased from one in forty-four children just two years prior. With the diagnosis of autism spectrum disorder (ASD) becoming ever-expanding, teachers must base curriculum around the concept of universal design. Just like universally-designed architecture that integrates ramps and automatic doors for every person regardless of disability, a universally designed curriculum contributes to effective teaching for all students. For students on the autism spectrum, universal design can provide the most successful ways to learn in the classroom. As teachers, it is also understood that ASD is a complicated and individualized difference plagued with false myths. To be effective, teachers must understand the facts underlying ASD, aid in dispelling false beliefs, relate to students and families, and incorporate universal design into their classroom.

Title: **CONNECTING MOVING WITH LEARNING**
Presenter(s): Elise Aho
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: This Student Showcase presentation will share the presenter's journey throughout a semester using personal experiments to engage in learning using movement to maximize the learning experience. This presentation will also highlight the understanding of how both learning and movement are related, and the benefits associated with exercise including the effect exercise has on both the mind and body. The presenter used personal exercises weekly to test theories of learning based on movement and the results of these experiments are reflected in this presentation.

Title: **TEACHING KIDS ON THE SPECTRUM**
Presenter(s): Kalli Chapman
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: Autism Spectrum Disorder (ASD) is a disorder in which children act differently in terms of socialization and how they learn. Just as is included

in the title, students with ASD can range on this spectrum from completely nonverbal, to hardly differentiating from students without the disorder. Because of these differences in behavior, socialization and learning styles, children with ASD must be met with some accommodations. These accommodations might simply be a slight extension in time to complete homework, or a completely separate instructor or group for the child to work with. Some of the behaviors that children with ASD can have are being blunt or offensive without realizing it, needing their own, fixed routine, and being prone to outbursts if this routine is not kept, as well as silence or very little communication. Children with ASD may also make little or poor eye contact, or have unique obsessions, interests or behaviors. They also could be geniuses or have extreme learning disabilities. Truly, these children are unique, and should have accommodations to help them thrive.

Title: **UNIVERSAL DESIGN FOR LEARNING AND TEACHER BURNOUT**
Presenter(s): Naomi Cook
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: This Student Showcase presentation will share research about what Universal Design for Learning (UDL) can do for teachers who may be frustrated in their efforts to effectively teach a diverse class of students. The reason behind this investigation is because of the high turnover rate for teachers. Research shows the average of the longest-lasting teacher is 3-5 years and with the need for teachers being high, the presenter wishes to figure out how the field of education can better support teachers and in turn better provide education to the next generation.

Title: **EFFECTIVE TEACHING IMPROVEMENT PROJECT**
Presenter(s): Sarah Pope
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: In this Student Showcase presentation, the presenter will share what she learned about how to effectively teach in a PreKindergarten classroom with challenging behaviors and improve on her teaching skills. She will be talking about her plan of action to create a connected classroom community, and to use high-leverage teaching practices to strengthen instruction. The presenter will also be sharing the lessons that she learned from the process and the project that she worked on all semester. Lastly, the presenter will talk about the ways that she can continue to improve on her plan of action and how it can help with her students.

Title: **JOURNAL EXPERIMENTS**
Presenter(s): Sophie Miyagishima
Faculty Mentor: Ann Gillies
Track: 12D
Abstract: This Student Showcase presentation will share the presenter's perspective in the course of a semester on expanding their learning and moving through a variety of personal experiments. The presenter kept concise personal journals throughout their self-growth journey, tracking the outcome of each experiment journal. The presenter will share how they identified an increase in attention and mindfulness in their day to day life. In addition, by working on their self-awareness they gained a better understanding on how they learn and work most efficiently. The presenter will also report empirical research that has shown how physical exercise can change the physiology of the brain providing different benefits for

an individual's holistic health. Some benefits include improved memory, increase in attention, improved executive function, and a decrease in stress and anxiety.

Theatre

Title: **"IN MY OWN LITTLE CORNER"**
Presenter(s): Emily Skinner
Faculty Mentor: Jeremy Franklin
Track: 13A
Abstract: Inspired by her imagination and process of finding the light in this world through her faith and storytelling, the artist's cabaret will feature songs and stories that depict significant moments growing up. The artist will emphasize the importance of her imagination that she embraced in her childhood in "In My Own Little Corner" from Rodger and Hammerstein's Cinderella. This song showcases the joy and somewhat fantastical view of life in this excerpt from her larger cabaret.

Title: **IT'S ALL IN MY HEAD**
Presenter(s): Isabela Sanchez
Faculty Mentor: Jeremy Franklin
Track: 13A
Abstract: It's All in My Head aims to explore the concept of having an excessively active imagination and living within the realm of one's own created world. Throughout her life, the artist has relied on her imagination to escape the monotony of everyday existence and immerse herself in a vast array of extraordinary scenarios and circumstances. With her innate ability to conjure up intricate and vibrant thoughts, she has had the opportunity to engage in numerous romantic relationships, assume various personalities, and envision potential future outcomes, all without facing any real-life consequences. In this brief showing extracted from a larger performance, the artist will speak directly to the audience as she stumbles upon her old diary from her youth that contains entries commentating upon various moments in her life which delve into the comedic yet truthful intricacies of her fantastical mind. These entries shown in the excerpt will focus on her childhood tendency to create multitudes of imaginary boyfriends and relationships that afforded her many torrid and passionate love affairs (as torrid and passionate as an imaginary relationship can be). These entries will be followed and/or interrupted by the songs "I Cain't Say No" from Oklahoma and "If I Ain't Got You" by Alicia Keys as the artist endeavors to allow the audience a glimpse into the realm of her overactive imagination.

Title: **THE EIGHT OF PENTACLES**
Presenter(s): Catie Spann
Faculty Mentor: Jeremy Franklin
Track: 13A
Abstract: The pivotal role of recognizing moments for personal growth, healing, and creative evolution is examined through the lens of tarot in a unique cabaret performance. This work introduces a novel approach to engaging with tarot, employing it not only as a tool for introspection but as a creative medium, with the performer utilizing their skills as a character actress to animate the tarot's imagery. The excerpt the performer will be showing centers on "The Devil" card, symbolizing the complex interplay between constraint and liberation. Through the performance of "Good Little Girls" from The Littlest Revue, the duality of human nature—embodied by the "angel and devil on one's shoulder" concept—is explored. This

performative piece aims to offer insights into the use of tarot for navigating life's transitions, presenting it as a live, interactive experience that reflects on personal and collective narratives of growth and transformation, part of a larger project that merges narrative, music, and symbolism in a compelling synthesis, inviting audience reflection on the paths towards self-discovery and renewal.

Title: **TRYING SOMETHING NEW**
Presenter(s): Maureen Martin
Faculty Mentor: Jeremy Franklin
Track: 13A
Abstract: In this excerpt of her capstone project, the artist will be portraying the character Lenora while singing "Screw Loose" from the musical Cry Baby by Adam Schlesinger and David Javerbaum. The goal of the larger project of which this is a part is to examine extreme characterization in contemporary musical theatre, in contrast to character typing. Maureen will offer insight into the nuances of modern performance styles, highlighting the significance of character development rather than appearance in storytelling. Accompanied by Max Riley, her solo performance will serve as an illustration of the evolution of theatrical character expression, Maureen hopes to bring dynamic energy to the stage creating memorable and vibrant characters. Attendees are invited to immerse themselves in a journey of emotion and intensity as Maureen Martin pushes the boundaries of traditional theatre in this performance.

Title: **LULLABY OF BROADWAY**
Presenter(s): Emily Weedon
Faculty Mentor: Jeremy Franklin
Track: 13A
Abstract: Dreaming is a universal experience. As a performer, most people believe that Emily's biggest dream is to be on Broadway, but things are not always what they seem. In her cabaret, She takes a dive into the most common dreams experienced by college students, as well as what they may mean to the dreamer. The audience will be taken into a dream-like state and can analyze for themselves whether or not dreams have relations to life when you're awake. For this showcase, she will perform a small piece of her capstone. It is a song entitled "Lullaby of Broadway," and it represents her real-life dreams manifesting in sleep.

Title: **ALL YOU WANNA DO**
Presenter(s): Jake Lende
Faculty Mentor: Jeremy Franklin
Track: 13A
Abstract: As artists and creators, we face the inevitable reality of getting stuck or "blocked" creatively. When this happens, mentors often say to fill our creative well - to reconnect with the reason why we make art in the first place. This cabaret explores what happens when an artist forgets their why. The performer delves into the concept of trying to please others with their art, and trying to be an artist that others approve of as opposed to being an artist that is truthful to them. The show ends with the decision to create for themself going forward. Specifically, the artist will perform one of the six songs from the Cabaret titled "All You Wanna Do". This song shows the journey of a character who unravels upon realizing that, despite being assured in her sexuality, love interests have only pursued her with physical desires. This song, in context of the cabaret, is broken up into four sections, and it serves as a parallel to the creator's experience as an artist. Initially, the external validation is new, exciting and fulfilling. Over time, however,

the reality begins to set in and other peoples' opinions begin to harm more than they help.

Title: **MARS**
Presenter(s): Hao Tran
Faculty Mentor: Jeremy Franklin
Track: 13A
Abstract: Part of their forthcoming cabaret performance, aspiring singer-songwriter Hao Tran endeavors to unveil the most authentic facets of their being through their musical expression. With a keen desire to offer solace and escapism to their audience, they aim to become a sanctuary for those grappling with overwhelming emotions, drawing from their own experiences of seeking refuge in music during times of vulnerability. In collaboration with Max Reilly, all the songs featured in the performance are original compositions. At the heart of their lyrical narrative lies the theme of love, particularly unrequited love, and the challenging journey of healing from heartbreak. Beyond mere entertainment, the artist's performance seeks to forge genuine connections with their audience, inviting them to find solace and kinship in shared experiences of longing, heartache, and resilience. Through their music, they aspire to spread love and understanding, fostering a sense of unity and empathy among listeners.

Title: **NOVEMBER AIR: A ONE ACT PLAY ABOUT LIFE AND DEATH**
Presenter(s): Phoenix Gallegos
Faculty Mentor: Benjamin Reigel
Track: 13B
Abstract: My project, November Air is a short one act play. I had originally written this play as a revenge play, but after many drafts it has become a story of its own. This play is about River, a mid 20s Latinx person who is taking care of their grandmother following the passing of their grandfather, Luz. Luz has been gone for the last five years and was a major part in River's life, so River and their sister agreed to help in taking care of their grandmother, after some time it came out that their uncle not only despised them, but actively tried to emotionally poison their grandmother against them throughout the years. On day of the dead (Nov 1st), Luz is allowed to come back, and hopes to surprise River; however, he is the one who gets surprised when River confronts him for the actions of his son. The theme of this play takes the idea of: 'the sins of the father' and flips it in reverse. With the use the thematic device of having one last conversation with someone who has passed on. Now I am happy to see this play getting up on its feet, and I have hopes that this can help families start conversations and hopefully aid in preventing familial fighting around end of life care for loved ones. Times like that are hard on everyone involved, and fighting only makes it even harder.

Title: **A SELECTION FROM ROSENCRANTZ AND GUILDENSTERN ARE DEAD**
Presenter(s): C.W. Hellen, Ian Rowzee, Austin Jensen, Noah Reedy
Faculty Mentor: Benjamin Reigel
Track: 13B
Abstract: Artists will perform a scene from their senior theatre capstone project. This particular presentation is a 5-minute cut performance of the play Rosencrantz and Guildenstern are Dead by Tom Stoppard.

Title: **THE CHILDREN'S HOUR**
Presenter(s): Emma Gregory, Ella Joseph
Faculty Mentor: Margaret Knapp
Track: 13B

Abstract: This project is a demonstrative scene from the extensive scene work study done in an Acting II class, culminating the in-depth lessons and strategies that have been instilled in students as we develop our understanding of the Stanislavski style. This scene, from the play Children's Hour, studies internal motivation versus external manifestation, the use of actions and objectives, how a play informs a scene, and how to intuitively block once one understands the inner workings of a character. This play holds importance in the history of the LGBTQIA+ community, demonstrating how the understanding and community around homosexuality has developed since the 1960s. Showing how ideologies have shifted will demonstrate not only the cultural development of the LGBTQIA+ movement and how binary ideas were compared to modern-day, but also demonstrate how in-depth character work and understanding of history can greatly inform and enhance a scene. This project is intended to bring awareness to the treatment and conditions of the LGBTQIA+ community in the past, but also a foster an appreciation among modern LQBTQIA+ folks about how far we have come. We also hope to demonstrate the value of historical and motivational understanding in the performance of a scene/play.

Title: **DON'T LET THE PIGEON DRIVE THE BUS LIGHTING DEMO**
Presenter(s): Andrea Chavero
Faculty Mentor: Michael Legate
Track: 13C
Abstract: This presentation is a demonstration of the special effects lighting design for Don't Let the Pigeon Drive the Bus! The Musical! — a stage adaptation of the beloved children's book by Mo Willems. The lighting design features the Circa Scoop LED fixture from MEGA-Lite, utilizing its innovative capabilities to bring the titular bus to life on stage. The presentation offers insight into the use of lighting design for entertainment and an explanation of the effects' composition.

Title: **PYROTECHNICS IN THE ENTERTAINMENT INDUSTRY**
Presenter(s): Teresa Guenther
Faculty Mentor: Michael Legate
Track: 13C
Abstract: Fire can be quite beautiful, yet also quite deadly if handled improperly. However, in recent times it has been used for many special effects for theater, live performance, and even film. One must know how to properly use safe fire protocol in the entertainment industry. This presentation will offer a brief history on pyrotechnics and how it has become used in special effects today, and it will feature a demonstration of safely operating special effect flares and candles, and other types of onstage fire effects.

Title: **THEATRE: WHAT'S THE BIG DEAL?**
Presenter(s): Courtney Lyon
Faculty Mentor: Michael Legate
Track: 13C
Abstract: Is it possible for a single extracurricular activity to provide a fun, safe environment for students of the Grand Valley while also building fundamental life-skills at the same time? In my experience, YES! Where else can one stretch their collaborative, problem-solving muscles while applying practical knowledge such as math, English, social studies, and athletics; and that's just to name a few? Join us for a step-by-step walk through of a fully realized production of Matilda the Musical, recently performed at Grand Junction High School, and the resulting impact of having a full Technical Advisor on board with students and faculty alike. Let's start a discussion about making the art form that is Theatre more accessible to students of

School District 51, and let's build confidence and important, life-long skills while we're at it!

Title: **THE ART OF ORAL TRADITION IN SOCIAL DANCES**
Presenter(s): Roxana Espinosa-Muniz
Faculty Mentor: Kathleen Diehl
Track: 13D
Abstract: Social dances are imperative in our communities to build a sense of connection. As homo sapiens, we thrive in this dynamic art form. From the Choncheros Dance (Chichimecas, Aztecas, and Mexicas ceremonial dance) to the Country Swing Nights at the local saloon, we experience a sense of unity and belonging through dance. But, how do these dances get passed on from generation to generation? In this presentation, I will discuss my pedagogical research regarding oral traditions in dance and share several teaching methodologies and practices I have been exploring. These practices cultivate inclusivity and connection and emphasize the importance of exploration, play, and blissful joy in dance. This research offers new possibilities that honor cultural heritage and individuality, moving beyond traditional approaches to dance training that tend to focus on conformity and the attainment of specific aesthetic ideals.

Title: **COLLABORATION AND COMMUNITY ENGAGEMENT IN DANCE MAKING**
Presenter(s): Mallory Christopher , Kara Farmer, Doran Kelsey, Caitlin Lawson, Izzy Lawson, Lauren Gram, Roxana Espinoza-Muniz, Molly Mitchell, Michelle Deuster
Faculty Mentor: Kathleen Diehl
Track: 13D
Abstract: This presentation will address the research that went into creating a site-specific dance work for the National Water Dances (NWD) project as part of our Dance Company course. NWD engages artistic, educational, and scientific communities on a national level and promotes dance as a vehicle for change by increasing awareness around a variety of environmental and social issues. This presentation will highlight the interdisciplinary collaboration and community engagement practices involved in this creative project, drawing particular attention to the collaboration with Dr. Kennard from the CMU Environmental Sciences Department. We will summarize discoveries made from the movement research and collaborative elements and share an excerpt of the performance.

Title: **WEST AFRICAN DANCE ELEMENTS - YANKED MAKRU**
Presenter(s): Emily Weedon, Mallory Christopher, Roxana Espinoza-Muniz, Lauren Gram, Anna Johnston, Mina Langness, Jacob Lende, Hannah Smith, Catie Spann, Hao Tran
Faculty Mentor: Caitlin Mahon
Track: 13D
Abstract: This showcase highlights the culmination of the West African Dance Elements class, where students have immersed themselves in the dance styles and cultures of various West African countries. The focus of the presentation will be on the students' exploration of their favorite Adinkra symbols, a significant cultural element of the Akan Tribe in Ghana. Through discussion and demonstration, the students will share their insights into the symbolism and meanings behind these unique symbols. Additionally, the audience will be treated to a captivating performance of Yankadi Makru, a traditional courting dance originating from Guinea. By showcasing their knowledge and talent, the students aim the celebrate and honor the

rich cultural heritage of West Africa while inviting others to join them in experiencing the vibrancy and diversity of its dance traditions.

Title: **IGNITE CHANGE THROUGH THE PAGES OF BANNED BOOKS**
Presenter(s): Kaila Harward
Faculty Mentor: Nicole Grider
Track: 13E
Abstract: The suppression of knowledge and inhibition of independent, imaginative thought is a human problem with a simple solution: stop the practice of banning books. This persuasive presentation explores the contemporary book-banning movement and suggests multiple courses of action including reading banned books and supporting legislation that allows knowledge to remain unbound and open to all.

Title: **KIDS LIVING WITH BROKEN BODIES**
Presenter(s): Lily Lightner
Faculty Mentor: Scott Andrews
Track: 13E
Abstract: Type 1 diabetes. What comes to mind when you hear that? Is it fat old men, keto diets, or people who don't eat sugar? Whatever comes to mind is almost definitely wrong. Type 1 is an autoimmune disorder where your pancreas shuts down and stops working. It's genetic, and nothing you do in your life will change if it presents. If you have the gene there's no stopping it regardless of age, weight, or gender. I want to give you a little look into this kind of life from personal experience and offer a solution to this misunderstood diagnosis.

Title: **ESCAPING TOXIC FAMILIES**
Presenter(s): Morgan Kice
Faculty Mentor: Scott Andrews
Track: 13E
Abstract: Ohana means family, and family means nobody gets left behind or forgotten. But what if there is no ohana? That's what the speaker will ponder, talking about what toxic families are, how those parents affect their children, what laws are in place to fix this, and perhaps a better solution.

Title: **THE GARLIC FESTIVAL SHOOTING FROM A MACRO LENS**
Presenter(s): Joseph Deras
Faculty Mentor: Scott Andrews
Track: 13E
Abstract: As a native of Gilroy, California, the speaker will offer a recap of the 2019 Gilroy Garlic Festival shooting before discussing mass shootings in the United States in general, while also delivering a hypothetical resolution to the gun violence that we face everyday in this nation.

Title: **PROFITS AND PEOPLE**
Presenter(s): Donovan Walton
Faculty Mentor: Scott Andrews
Track: 13F
Abstract: In this presentation, the speaker unfolds the effects of guileless spending and greed and the effects on the common people. Specifically, the speech will explore the common problems of profit seeking companies and greedy business dealings, before offering a common sense solution.

Title: **YOU ARE USING THE F-WORD WRONG**
Presenter(s): Kayla Bauer
Faculty Mentor: Nicole Grider
Track: 13F
Abstract: 85% of Americans believe in equality for women yet only 18% would consider themselves feminists. This presentation, the speaker examines negative connotations surrounding feminism and urges a shift in mental ideology to help change this paradigm.

Title: **UNDERSTANDING GOD'S METHODS THROUGH SCIENCE**
Presenter(s): Malachi Yeager
Faculty Mentor: Scott Andrews
Track: 13F
Abstract: People will constantly disagree with your perspective on how to live, from clothes you wear, to car you buy, to how you believe the universe was created. The differences of belief have caused a divide among one another, limiting ourselves from understanding each other, furthering a divide--one such divide being Science and Religion--that the path to truth must either be science OR religion. Is it a possibility that they can coexist and complement one another? That is what the speaker seeks to prove starting with the chemicals released in your brain, showing that these paradigms are in fact not so different.

Title: **PERCEPTION AND ITS EFFECTS ON ATHLETES**
Presenter(s): Isaiah Cheeks
Faculty Mentor: Scott Andrews
Track: 13F
Abstract: Perception and anxiety intertwine in sports, influencing athletes' ability to interpret cues and make effective decisions under pressure. High levels of anxiety can distort perception, leading to negative interpretations of events and heightened stress responses. This presentation sheds light on those subjects, before describing techniques such as mindfulness, cognitive restructuring, and systematic desensitization which offer promising avenues for managing anxiety and cultivating more adaptive perceptions in sports contexts.

THANK YOU, SHOWCASE CREW!

Session Facilitators

Nate Bachman
Ram Basnet
Cecilia Battauz
Michael Carlton
Shiang-Lih Chen McCain
Julia Crocetto
Linda Cummins
Jessa Dearth
Edward Dry
Ed Bonan-Hamada
Lucy Graham
Paul Hampton
Sundial Hoffman
Dirk Johnson
Barry Laga
Sarah Lanci
Warren MacEvoy
Britt Mathwich
Katie McClain
Michelle Mellenthin
Joshua Meuwly
Allison Morris
Chris Penick
Randy Phillis
Jennifer Radomski
John Snyder
Karrie Stanfill
Tammie Shoultz-McCole
Sarah Schrader
Wayne Smith
Steven Soychak

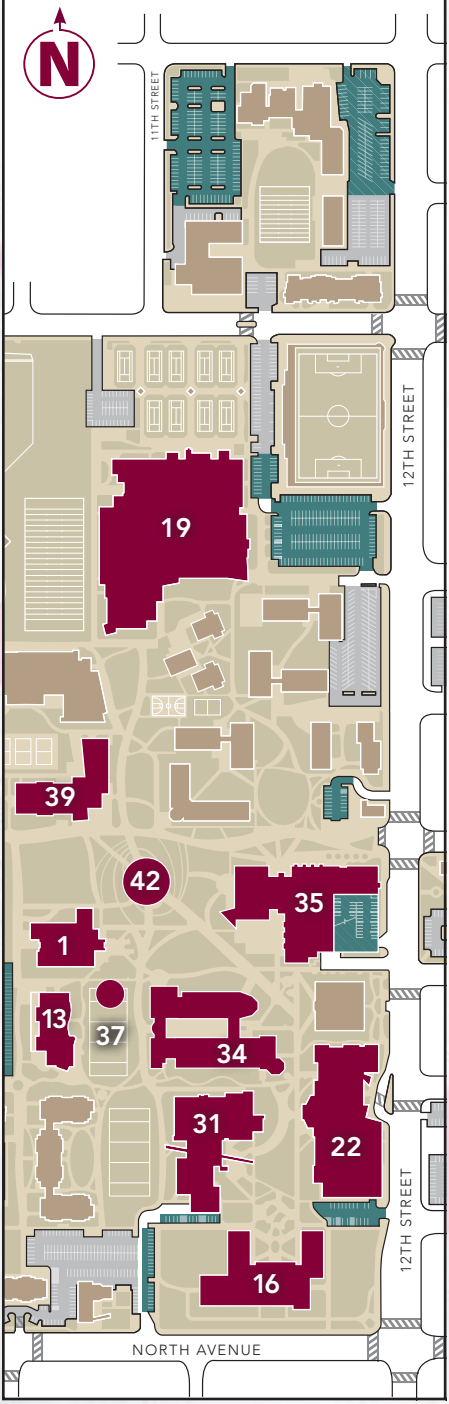
Judges

Gina Bishop
Megan Barnard
Tara Carleo
Kamen Chiles
Courtney Collard
Juliet Evans
Alisa Farabee
Amy Flukey
Amanda Gauthier
Diandra Green
Kevin Hoskin
Grace Lee
Mike Moran
Brandi Penner
Brian Perna
Chelsie Roth
Dariana Salazar
Austin Solko
Austin Smith

Planning Committee

Brent Alumbaugh, Kinesiology
Scott Andrews, Theatre Arts
Brooke Arrieta, Academic Affairs
Cathy Bonan-Hamada, Mathematics and Statistics
Evan Curtis, Art and Design
Casey Dry, CMU Tech
Ann Gillies, Center for Teacher Education
Paul Hampton, Biological Sciences
Marcus Johnson, Information Technology
Brian Krinke, Music
Sarah Lanci, Computer Science and Engineering
Chad Middleton, Academic Affairs
Michelle Mellenthin, Computer Science and Engineering
Laura Muñoz, Languages, Literature, and Mass Communication
Jacob Ongaki, Business
Jenny Radomski, Health Sciences
Michael Rhodes, Social and Behavioral Sciences
Erin Rooks, Academic Affairs
Lisa Smith, Marketing and Communications
Kara Walter, Business
Kevin Wernke, Physical and Environmental Sciences

COLORADO MESA UNIVERSITY



Campus Map

Student Showcase presentations, exhibits and demonstrations will take place at the following locations across the CMU Main Campus:

Delta Field Sidewalk 37
- Mathematics and Statistics

Dominguez Hall (DH) 1
- Davis School of Business
- Kinesiology
- Teacher Education
- Teacher Education - CMU Tech

Escalante Hall (EH) 39
- Computer Science and Engineering
- Languages, Literature and Mass Communication

Houston Hall (HH) 16
- Social and Behavioral Sciences
- Theatre Arts

Jac Kephart Fine Arts Building (FA) 13
- Art and Design

Maverick Center 19
- Kinesiology

Moss Performing Arts Center (MPAC) 22
- Music
- Theatre Arts

The Plaza (tent) 42
- Computer Science and Engineering
- CMU Tech

Tomlinson Library (TL) 31
- CMU Tech – Culinary Arts
- Center for Teaching and Learning
- Computer Science and Engineering

University Center (UC) 35
- Celebration Event
- Check-In
- Information Table

Wubben Hall & Science Center (WS) 34
- Biological Sciences
- Physical and Environmental Sciences