

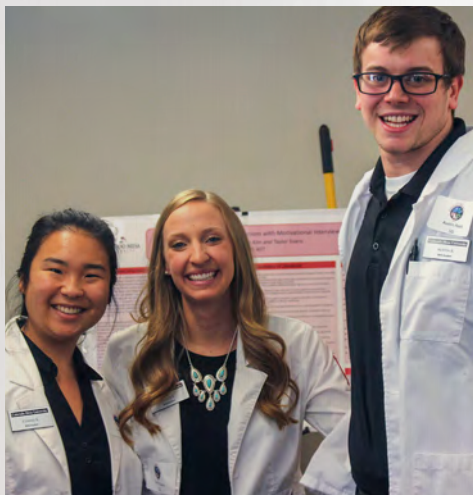
PROGRAM

The Student Showcase program is also posted at coloradomesa.edu/showcase.



ABOUT THE STUDENT SHOWCASE

The Student Showcase highlights student works involving creativity, discovery, research, innovation and/or entrepreneurship through sessions by undergraduates at Colorado Mesa University and Western Colorado Community College. 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.



BRONZE POUR DEMONSTRATION

3:15 pm
Fine Arts Building Foundry

The bronze pour is the culmination of the artists' work in creating an artwork using the lost wax process. In this process the artist creates an artwork; creates a mold from the artwork; slushes the mold with wax and then uses this to create a ceramic shell to be used during the pour. Today, during the bronze pour you will see the molten metal being poured into these ceramic shells. After the pour, these forms will cool and then the artist breaks off the ceramic shell; cuts off areas that are not artwork, cleans the sculpture, puts a patina on the artwork and exhibits the artwork.

AWARDS CEREMONY

Friday, April 20, 2018, 4:00 pm

Moss Performing Arts Center,
Robinson Theatre

Refreshments provided
by Chez Lena Restaurant.



Chez Lena Restaurant, located on the WCCC Bishop Campus, is a state-of-the-art learning lab for culinary arts students. Join us for lunch and explore our eclectic blend of regional and international food that focuses on local, sustainable and organic products in a fine dining establishment.

Open Monday, Wednesday and Friday,
11:30am–1:30pm during the
regular academic year.
Reservations recommended.

[coloradomesa.edu/wccc/
about/chez-lena](http://coloradomesa.edu/wccc/about/chez-lena)
970.255.2641

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PRESENTERS

PRESENTER	TRACK	ABSTRACT PG #	PRESENTER	TRACK	ABSTRACT PG #
Mathew			Rebecca Bryan	2	28
Abercrombie	14	95	Joseph Buches	5E	51
Bryanna Adams	7	53	Alain Bucio Barrios	5E	52
Bader Alkhamees	4A	33	Brogan Butler	5D	47
Catherine Alldredge	6	53	Samantha Cage	13C	94
Jeana Althea Altura	4A	34	Meaghan Caldwell	6	53
Levi Anstine	4B	36	Neifi Campas	4A	34
Erin Bair	10A	64	McKayla Campbell	11D	82
Erin Bair	10B	66	Nicholas Carozza	9	60
Jefferson Baker	11D	82	Erin Case	11A	76
Kylie Banks	13A	91	Erin Case	11C	81
Quinton Barnett	10D	75	Samantha Cathey	11D	83
Levi Basler	5A	39	Taylor Cecil	7	54
Meghan Beale	12B	87	Lance Chaffin	12A	84
Brant Bear	5E	49	Amanda Charles	12A	85
Sarah Benton	12B	88	Jake Chiddix	5E	50
Lucas Bingham	4A	33	Adam Childs	4A	33
Sean Blackmer	15	96	Nicholas Cholas	10C	71
Ashley			Brett Christensen	9	60, 61
Blankenbeckler	12B	89	Sadie Christensen	10A	64
Sabrina Blea	12B	87	Sadie Christensen	10D	74
Jared Boese	4B	35	Maxemiliano Cintora	5B	43
Mitchell Bohn	4A	34	Matthew Cirkovic	4A	34
Alexis Bonsante	13C	93	Lucas Clarke	14	95
Sarah Bos	13A	91	Johnathan Clemmer	5C	45
Timothy Bowers	10C	69	Meghan Cline	11C	81
Taylor Bowns	13C	94	Kasidy Codner	5B	41
Jacob Boyce	4B	36	Samuel Coleman	14	95
Jesse Boyce	5C	45	Elijah Columbia	2	28
Jason Brace	7	53	Dakota Connors	4B	35
Alexander			Corbin Cooper	5E	52
Breitkreuz	5A	39	Jordan Coquoz	5A	40
Samuel Brennan	5C	45	Abby Costello	7	54
Dominick Brevig	5E	50	Liz Cottingham	11B	78
Bret Brouse	4C	36	Chad Coulter	5A	38
Bret Brouse	10A	62	Jacob Creglow	5A	39
Tyler Brown	3	32	Austin Cromwell	3	32
Lindsey Brown	4A	34	Michaela Cross	1	26
Chase Brown	9	60	Cameron Crow	4B	35
Andrew Brown	10B	67	Sandra Currier	15	97
Alissa Brown	11C	80	Michael Dackonish	9	60

PRESENTER	TRACK	ABSTRACT PG #	PRESENTER	TRACK	ABSTRACT PG #
Saige Dacuycuy	10B	66	Brea Giancaterino	11B	79
Jalen Dalla	9	60	David Gionco	4C	37
Natalie Danielson	14	96	David Gionco	7	53
Deseray Davis	6	53	Sara Gladding	5D	47
Allison Davis	12B	88	Nathaniel Glennon	5E	52
Ethan Davis	14	95	Rosa Gomez	8A	57
Alma De Lara	11A	76	Luke Goodrich	5B	42
Anthony DeFeo	5E	51	Colin Gordon	4A	33
Renaya Demarest	3	30	Mary Katherine Gorsuch	10A	65
Joseph DeMers	13A	89	Blake Graf	3	32
Joseph DeMers	13C	94	Myles Grandbouche	5A	38
Valentine Desreumaux	5B	42	Mitchell Grant	3	31
Davis Devereux	14	95	Karlie Hadden	5B	43
Jacob Dickhausen	9	61	Jesse Hagen	5C	44
Mitchell Dilley	5D	47	Jamie Hall	11B	77
Mark Domingo	11B	78	Dalton Hamer	5E	51
Gabrielle Donalson	10B	66	Duel Hammonds	5C	46
Logan Donohue	5E	49	Greer Hanes	7	56
Jordan Drake	10C	69	Georgia Hansen	7	55
Stephen Drozda	5D	47	David Harbert	11C	81
Dane Dulaney	5E	52	Aric Harper	5D	47
Nicholas Duncan	5B	42	Nicole Harris	5C	44
Rebecca Dykes	10D	72	Patrice Harris	13A	91
Kathleen Dykstra	10C	67	Austin Harshman	9	61
Dylan Ecker	5A	40	Eric Hart	5C	46
Chance Eden	5B	42	Nicholas Harvey	4B	36
Justin Eller	5C	45	Sarah Harvey	4A	33
Zachary Elliott	5B	42	Sarah Harvey	4B	36
Nolan Ellis	3	30	Donovan Harwell	3	32
John Ellyson	5A	39	Jace Hattermann	5B	41
Anthony Feller	10B	67	Mallory Havens	12B	89
Lucas Ferguson	5A	40	Madison Heberden	12B	86
Rod Ferree	10D	72	Daniel Hegge	5E	50
Anthony Fiantaca	5E	49	Jennifer Hemenway	9	61
Brendan Figueroa	5C	46	Joel Henderson	10D	74
Marcus Fingerlin	1	27	Michael Hendricks	14	95
Ross Fischer	5E	48	Ashlee Henson	2	29
Dustin Foster	5A	40	Miguel Hermosillo-Velez	9	60
Dillon Foster	5C	44	William Herrington	12A	84
Scott Foster	5E	50	Brittany Heye	11D	83
Mykenzie Fox	15	97	Jessica Hicks	3	32
Caroline Gallegos	11B	80	Thomas Hook	5B	43
Sara Garcia	2	30			
Michael Getz	10C	69			

PRESENTER	TRACK	ABSTRACT PG #	PRESENTER	TRACK	ABSTRACT PG #
Heather Hough	12A	85	Nevin Lister	5E	49
Trenton Howlett	5	38	Rachael Lohse	10C	68, 70
David Hunt	5D	47	Caleb Lone	14	95
Wyatt Hurst	4A	34	Scott Lowe	4A	33
Noah Jackson	5D	47	Paige Luke	12B	88
Scott Jackson	10A	64	Cameron Macdonald	4B	36
Eric Jacobs	5E	48	Emma Malmquist	7	56
Marisa Jahnke	13A	90	Brieanna Mangette	9	61
Kia James	12A	84	George Manning	3	32
Haley Jensen	4C	37	Nicolas Maraschin	5D	48
Keenan Jewkes	5E	49	Destiny Mares	5	38
Jonathan Johannsen	5E	51	Hannah Martin	1	27
Marcus Johnson	4B	35	Jose Martinez		
Leo Johnson	5C	46	Loachamin	5C	45
Westlyn Johnston	5D	47	Joshua Mathews	10B	66
Jessica Jolley	11A	75	James Mathson	4A	33
Tyler Jones	4B	35	Lance Matosky	5E	50
Hannah Kadel	5A	39	Heather Mayerle	5E	51
Andrew Karnowka	3	31	Derek Mayo-Alvarez	8A	57
Bryce Keever	5A	39	Connor McCallum	5C	44
Tammy Kellerby	3	32	Devyn McCallum	12B	89
Autumn Kelly	9	61	Ivan McClellan	10D	72
Emma Kemper	8A	58	Tabitha McCombe	5B	43
Hilary Kennedy	3	32	Emily McCune	11D	83
Zachary Kennison	5E	52	Quiana McElroy	13C	93
Damick Kinson	5A	39	Joshua McGarity	5D	47
Grayson Koenemann	10D	75	Ian McGuire	9	60
Jaden Koos	5D	48	Samantha Medina	9	61
Austin Krebill	14	95	Kenzi Medina	12B	89
Molly Kubesh	10A	65	Dillon Merenich	5C	45
Bryce Kuehl	5B	43	Brent Metzler	5C	44
Quintin Kurtz	5B	42	Aldrin Micua	5E	50
Kwasi			Kaitlin Miller	1	26
Kyeremeh-Dapaah	5E	52	Lucas Mitchell	5C	45
Tom Lambert	3	32	Sione Moniati	5A	39
Zack LaVergne	4B	35	Nicole Monte	5C	45
Megan Lawson	3	32	Chase Morris	13A	91
Sarah Lease	8A	58	Braden Mullen	5A	38
Jordyn Levering	11B	77	Kayla Murphy	2	28
Jaclyn Levitt	11B	78, 79	Hayden Murphy	5E	49
Joshua Levy	5D	46	Nicholas Mynes	11A	76
Megan Lewin	3	31	Brittni Nack	9	60
Chance Lewis	5B	43	Isaac Nagel-Brice	5C	44
Calvin Lindberg	9	60, 61	Francisco Navarro	5C	46
Lauren Lipski	8A	57	Adam Nawacki	10A	63

PRESENTER	TRACK	ABSTRACT PG #	PRESENTER	TRACK	ABSTRACT PG #
Dalton Neely	4B	35	Caleb Robinson	5A	40
Allyson Nelson	12B	88	Michael Robinson	13C	93
Kyle Newborn	5C	45	Garrett Rodstrom	5E	52
Mathew Nielsen	5E	52	Bailey Rogers	12B	89
Shea Nieslanik	10D	73	Wyatt Rollins	9	60, 62
Jacob OBanion	5C	45	Jose Ruiz	5A	40
Mariaha O'Dell	10C	70	Bennett Russell	5B	41
Reilly O'Donnell	5C	44	Matthew Rutter	4B	35
Alexis O'Neil	13A	90	Bryson Sanchez	5C	44
Alexis O'Neil	13C	94	Sierra Sanchez	11A	75
Sarah Orosz	12B	86	Delaney Santoro	9	62
Kellisha Ostler	5B	43	Bradly Schiesser	5C	45
Patrick O'Sullivan	5B	41	Arond Schiltz	6	53
Cheyenne Pace	11B	79	John Schmalz	3	31
Luke Pagni	5D	47	Tristan Schmalz	10D	73
Gunnar Pagni	5E	50	Anna Schmidt	7	55
Michael Pankey	5B	42	Lauren Schott	5B	42
Joshua Park	14	95, 96	Erin Schuckers	10D	72
Cole Parker	9	60	Ayla Schuetz	13B	93
Jhelline Aprill Patricio	11B	77	Amy Schuster	11A	77
Greggory Payseno	5B	42	Courteney Schwander	11C	80
Alix Peltier	5E	49	Kailey Shabelski	3	32
Adam Perry	3	32	Riad Shash	4A	33
Jack Pezdirtz	5A	40	Grace Shively	13B	92
Alex Polito	12A	86	Garrett Shudinis	5A	40
Daylon Ponce	14	95	Zachary Siemsen	10D	73
Kyle Poole	5B	41	Luis Silverio Flores	5B	42
Vanessa Porras	1	26	Jennifer Sine	12A	86
Trevor Potter	10C	71	Logan Smith	5A	38
Daniel Powell	4A	34	Matthew Smith	5B	42
Alexis Prall	8B	59	Darby Spence	10D	72
Morgan Pratte	10A	63	Cassandra Spor	6	53
James Prescott	5D	48	Kaitlyn Stark	4B	36
Kaitlyn Pridy	12B	89	Cameron Steinholtz	5A	40
Bailey Pugh	12B	87	Connor Stephenson	7	53
Lucy Raaum	8B	58	Richard Sterling	4B	35
William Ramsey	5E	50	Blake Stevens	4A	34
Tyler Raymond	5E	48	Blake Stevens	4B	34
Gary Reece-Scott	11C	81	Jacob Stewart	5A	40
Bradley Riva	5C	46	Matthew Stewart	10D	74
Darric Roark	5A	39	Jeremy Stone	5A	39
Jordan Robblee	5A	38	Warren Story	4A	33
Sean Roberson	5A	38	Tyler Stump	5B	41
Estella Roberts	3	32	Kylyn Suarez	5B	42

PRESENTER	TRACK	ABSTRACT PG #
Conner Swatloski	5D	47
Rachel Switzler	1	27
Caleb Talkington	9	61
Spencer Taylor	5B	43
Kenton Teske	5A	40
Sayre Thomas	4B	35
Dalton Thornton	4B	35
Espen Thune-Larsen	13A	90
Marshall Thurmon	10C	68
Trey Thurmond	7	53
Kyle Tigar	5C	44
Emily Tighe	10D	75
Connor Timms	5E	50
Jason Tipton	10D	74
Beau Torres	5A	39
Anexys Torres Castro	5B	43
Nicole Troester	3	32
Nico Tscherner	5A	40
Tia Valles	5D	48
Jamie Van Dyke	9	60
Daniel Van Hoose	5A	40
Jordan Van Vleet	5B	43
Meri-Ashton Van Winkle	13B	92
Mitchell Vandel	7	54
Cody Vanden Brink	10D	74
Christopher Vandermeer	10B	67
Johnathan VanVleet	5	38

PRESENTER	TRACK	ABSTRACT PG #
Isabella Vaz	11C	81
Lucia Velasco	8A	57
Jesus Velasquez	4A	33
Madison Vincent	2	27
Joshua Vincent	10B	67
Megan Vorse	8B	59
Levi Walcher	5E	49
Gregory Waldorf	5D	48
Jacob Wallace	5E	49
Brooklyn Waterhouse	2	29
Ryan Watkins	5C	44
Alexander Weaver	5D	47
Jacob Wellborn	4C	37
Alan Wheeler	5D	47
Benjamin Whitney	5E	51
Heather Wilczek	12A	85
Gerrold Wilkerson	5A	40
Kaleb Wilkins	8B	59
Jebidiah Wolf	5B	43
Eileen Wong	3	32
Brandy Worth	2	28
John Wright	3	32
Kelsey Wright	10D	72
Hailey Wright	12A	86
Paul Yanowich	5E	52
Christian Yngsdal	5B	41
Austin Zanoni	4B	35
Grant Zeller	9	61



⊕ AWARDS CEREMONY

Moss Performing Arts Center, Robinson Theatre, 4:00 pm

⊕ OPENING SESSION

Facilitators: Hunter Jetkoski-Defries, Liz Cottingham

LOCATION	TIME	TYPE	STUDENT(S)
ALPHA CHI PRESENTS "DEFEATING HUNGER ONE BAG AT A TIME"			
MPAC, Robinson Theatre	1:00	oral	Guest speaker, Mr. Mike Berry

⊕ SESSIONS

- Sessions listed alphabetically by department
- See back cover for a Campus Map with locations

DH: Dominguez Hall
EH: Escalante Hall
FA: Fine Arts Building
H: Houston Hall
Plaza (tent)
MPAC: Moss Performing Arts Center
WS: Wubben Hall & Science Center

ART AND DESIGN

TRACK 1

Facilitator: Suzie Garner

LOCATION	TIME	TYPE	STUDENT(S)
PARTY ANIMALS			
FA 111	2:00-3:45	exhibit	Michaela Cross
WRITHING AND WILTING: A MIXED MEDIA EXPLORATION OF TRANSFORMATION			
FA 106	2:30-2:45	oral	Vanessa Porras
THE SCIENCE OF ART: BUILDING PATHWAYS OF LEARNING			
FA 106	2:45-3:00	oral	Kaitlin Miller
ART THROUGH CRAFT			
FA Hallway	2:00-3:45	other	Marcus Fingerlin, Hannah Martin, Rachel Switzler

BIOLOGICAL SCIENCES

TRACK 2

Facilitator: Paul Hampton

LOCATION	TIME	TYPE	STUDENT(S)
EXPANDING THE MOLECULAR PHYLOGENETIC TREE OF THE CONIATUS GENUS			
H Hallway	2:00-3:45	poster	Madison Vincent

SEQUENCES OF THE MIDGET-FADED RATTLESNAKE, CROTALUS OREGANUS CONCOLOR, NEUROTOXIN

H Hallway 2:00-3:45 poster Rebecca Bryan

AN EXPLORATION INTO THE MODE OF ACTION OF SUCROSE ESTERS AGAINST ZOOSPORES OF PHYTOPHTHORA INFESTANS

H Hallway 2:00-3:45 poster Elijah Columbia, Kayla Murphy

TEMPERATURE CORRECTION OF BIOELECTRIC IMPEDANCE ANALYSIS IN FORENSIC APPLICATIONS

H Hallway 2:00-3:45 poster Brandy Worth

ACTIVITY PATTERNS OF AMERICAN PIKAS (OCHOTONA PRINCEPS) IN LOW-ELEVATION LAVA FLOWS AND HIGH ELEVATION MOUNTAINS IN IDAHO

H Hallway 2:00-3:45 poster Brooklyn Waterhouse

VALIDATING BIOELECTRICAL IMPEDANCE ANALYSIS MODELS FOR MEASURING LIPIDS IN SUCKER SPECIES

H Hallway 2:00-3:45 poster Ashlee Henson

USING INFRARED LIGHT PHOTOGRAPHY TO VISUALIZE TATTOOS ON DESICCATED HUMAN REMAINS

H Hallway 2:00-3:45 poster Sara Garcia

BUSINESS

TRACK 3

Facilitator: Deb Parman

LOCATION	TIME	TYPE	STUDENT(S)
NUTELLA FOCUS GROUP, CONSUMER BEHAVIOR SURVEY			
DH 110	2:00-2:15	oral	Renaya Demarest, Nolan Ellis
NATIVE4RENT			
DH 110	2:15-2:30	oral	Andrew Karnowka, John Schmalz
FACTORS INFLUENCING INTENTION TO CHOOSE A BUSINESS ANALYTICS PROGRAM			
DH 110	2:30-2:45	oral	Megan Lewin
SHOULD BLOCKCHAINING BE THE NEW SOLUTION TO THE FCC'S NET NEUTRALITY?			
DH 110	2:45-3:00	oral	Mitchell Grant
ENHANCING UNIVERSITY ONBOARDING PROGRAMS THROUGH RESEARCH AND ANALYSIS			
DH 110	3:00-3:15	other	Donovan Harwell, Megan Lawson, Nicole Troester
ADVANCED INFORMATION SYSTEMS FIRS DATABASE			
DH 110	3:15-3:30	other	Tyler Brown, Austin Cromwell, Blake Graf, Jessica Hicks, Tammy Kellerby, Hilary Kennedy, Tom Lambert, George Manning, Adam Perry, Estella Roberts, Kailey Shabelski, Eileen Wong, John Wright

COMPUTER SCIENCE, MATHEMATICS AND STATISTICS

TRACK 4A

Facilitator: Lori Payne

LOCATION	TIME	TYPE	STUDENT(S)
SPECKLED VOID WS 118	2:00-2:15	oral	Lucas Bingham, Sarah Harvey, Warren Story
R.A.M. (REALISTIC ASSEMBLY OF MACHINES) WS 118	2:15-2:30	oral	Bader Alkhamees, Adam Childs, Colin Gordon
EAPOS - ENHANCED ACCESS POINT OF SALE WS 118	2:30-2:45	oral	Scott Lowe, James Mathson, Riad Shash, Jesus Velasquez
GROCEREASE — A QUICK AND EASY WAY TO SHOP WS 118	2:45-3:00	oral	Jeana Althea Altura, Mitchell Bohn, Neifi Campas, Wyatt Hurst
LINKD: STUDENT ACTIVITY CLASSIFIED ADS BOARD WS 118	3:00-3:15	oral	Lindsey Brown, Daniel Powell, Blake Stevens

COMPUTER SCIENCE, MATHEMATICS AND STATISTICS

TRACK 4B

Facilitator: Eric Miles

LOCATION	TIME	TYPE	STUDENT(S)
A NEW LOOK FOR WCCC WS 120	2:45-3:00	oral	Matthew Cirkovic, Blake Stevens
CMU CUSTODIAL DELIVERY APP EH 318	2:15-2:30	oral	Dakota Connors, Dalton Thornton
PROJECT ARMOIRE EH 318	2:30-2:45	oral	Tyler Jones, Zack LaVergne, Dalton Neely, Sayre Thomas
EXPEDITION MENU: AN OUTDOOR PROGRAM TRIP MENU PLANNER EH 318	2:45-3:00	oral	Cameron Crow, Matthew Rutter, Richard Sterling, Austin Zanoni
TREE TOUR: A TOUR OF THE TREES IN LINCOLN PARK EH 318	3:00-3:15	oral	Jared Boese, Marcus Johnson
TUTORIAL LEARNING CENTER AVAILABILITY APPLICATION EH 318	3:15-3:30	oral	Jacob Boyce, Nicholas Harvey, Cameron Macdonald
MELONIZER EH 318	3:30-3:45	oral	Levi Anstine, Sarah Harvey, Kaitlyn Stark



COMPUTER SCIENCE, MATHEMATICS AND STATISTICS

TRACK 4C

Facilitator: Cathy Bonan-Hamada

LOCATION	TIME	TYPE	STUDENT(S)
AN INVESTIGATION OF PHYSICS USING MODEL THEORY AND FIRST-ORDER LOGIC			
WS South Hallway	2:00-3:45	poster	Bret Brouse
PROBABILITY OF PLAYING IN THE NHL			
WS South Hallway	2:00-3:45	poster	David Gionco
JACKSONVILLE JAGUARS: HOW TO EXPECT SUCCESS			
WS South Hallway	2:00-3:45	poster	Haley Jensen
MATHEMATICS AND MUSIC			
WS South Hallway	2:00-3:45	poster	Jacob Wellborn

ENGINEERING – FIRST YEAR DESIGN EXPO

TRACK 5A

Facilitator: Sarah Lanci

LOCATION	TIME	TYPE	STUDENT(S)
MAVERICK ASABE			
Plaza (Tent)	not judged	exhibit	Trenton Howlett, Destiny Mares, Johnathan VanVleet
STEAM POWER PLANT DEMONSTRATION			
Plaza (Tent)	2:00-3:45	poster	Chad Coulter, Jordan Robblee, Logan Smith
PIPE SLIDE EXHIBITION FOR EUREKA! MCCONNELL SCIENCE MUSEUM			
Plaza (Tent)	2:00-3:45	poster	Myles Grandbouche, Braden Mullen, Sean Roberson
OPEN AIR HONEY BEE OBSERVATION HIVE			
Plaza (Tent)	2:00-3:45	poster	Levi Basler, Alexander Breitkreuz, John Ellyson, Hannah Kadel
PREDICTING THE TERMINAL VELOCITY OF A SPHERE: A DEMONSTRATION			
Plaza (Tent)	2:00-3:45	poster	Jacob Creglow, Bryce Keever, Sione Moniati, Darric Roark
SOLAR PANEL OPERATED SWAMP COOLER			
Plaza (Tent)	2:00-3:45	poster	Damick Kinson, Jeremy Stone, Beau Torres

DEVELOPMENT OF BALANCE/IMBALANCE DEMONSTRATION

Plaza (Tent)	2:00-3:45	poster	Dustin Foster, Jack Pezdirtz, Jose Ruiz, Nico Tscherner, Daniel Van Hoose
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DEVELOPMENT OF LIQUID DIELECTRIC PLATE CAPACITOR DEMO

Plaza (Tent)	2:00-3:45	poster	Jordan Coquoz, Lucas Ferguson, Garrett Shudinis, Jacob Stewart, Gerrold Wilkerson
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METAL QUENCHING SYSTEM FOR TESTING METAL HARDENABILITY

Plaza (Tent)	2:00-3:45	poster	Dylan Ecker, Caleb Robinson, Cameron Steinholtz, Kenton Teske
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ENGINEERING – FIRST YEAR DESIGN EXPO**TRACK 5B****Facilitator: Sarah Lanci**

LOCATION	TIME	TYPE	STUDENT(S)
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TWO DIRECTIONAL CAMERA GIMBAL MOUNT FOR DRONE FLIGHT

Plaza (Tent)	2:00-3:45	poster	Jace Hattermann, Patrick O'Sullivan, Kyle Poole
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STRUCTURAL BEAM DEMONSTRATION

Plaza (Tent)	2:00-3:45	poster	Kasidy Codner, Bennett Russell, Tyler Stump, Christian Yngsdal
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INTERACTIVE CLIMATE CHANGE EXHIBIT OF GLACIAL CAVITATION

Plaza (Tent)	2:00-3:45	poster	Valentine Desreumaux, Nicholas Duncan, Chance Eden, Michael Pankey
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TESTING THE BOUNDARY EFFECT/FIRST LAW OF THERMODYNAMICS

Plaza (Tent)	2:00-3:45	poster	Quintin Kurtz, Greggory Payseno, Luis Silverio Flores, Klyn Suarez
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DEMONSTRATION OF CONSTANT ACCELERATION

Plaza (Tent)	2:00-3:45	poster	Zachary Elliott, Luke Goodrich, Lauren Schott, Matthew Smith
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GAS IT UP

Plaza (Tent)	2:00-3:45	poster	Maxemiliano Cintora, Kellisha Ostler, Spencer Taylor, Jebidiah Wolf
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FIRE SYRINGE

Plaza (Tent)	2:00-3:45	poster	Karlle Hadden, Bryce Kuehl, Chance Lewis, Jordan Van Vleet
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LIGHT ON COLOR EXHIBIT

Plaza (Tent)	2:00-3:45	poster	Thomas Hook, Tabitha McCombe, Anexys Torres Castro
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ENGINEERING – FIRST YEAR DESIGN EXPO**TRACK 5C****Facilitator: Sarah Lanci**

LOCATION	TIME	TYPE	STUDENT(S)
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STREAM TABLES RE-DESIGN

Plaza (Tent)	2:00-3:45	poster	Dillon Foster, Brent Metzler, Bryson Sanchez, Ryan Watkins
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HERO'S ENGINE POWERED BY PROPANE GAS			
Plaza (Tent)	2:00-3:45	poster	Jesse Hagen, Nicole Harris, Isaac Nagel-Brice
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MASS-SPRING DAMPER DISPLAY			
Plaza (Tent)	2:00-3:45	poster	Connor McCallum, Reilly O'Donnell, Kyle Tigar
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DEMONSTRATION OF FLOW VELOCITY PREDICTION IN SYSTEM WITH SIGNIFICANT VISCOUS LOSSES			
Plaza (Tent)	2:00-3:45	poster	Jesse Boyce, Jose Martinez Loachamin, Kyle Newborn, Jacob O'Banion
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DEVELOPMENT OF A BUBBLE RAFT DEMONSTRATION FOR ATOMIC STRUCTURE IN MATERIALS			
Plaza (Tent)	2:00-3:45	poster	Samuel Brennan, Justin Eller, Lucas Mitchell, Nicole Monte
<hr/>			
DESKTOP LINKAGE BENCH			
Plaza (Tent)	2:00-3:45	poster	Johnathan Clemmer, Dillon Merenich, Bradly Schiesser
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BOILING WATER AT LOWER PRESSURE AND TEMPERATURE			
Plaza (Tent)	2:00-3:45	poster	Brendan Figueroa, Leo Johnson, Bradley Riva
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GEARBOX BENCH TEST			
Plaza (Tent)	2:00-3:45	poster	Duel Hammonds, Eric Hart, Francisco Navarro
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ENGINEERING – OPEN DESIGN

TRACK 5D

Facilitator: Scott Bevell

LOCATION	TIME	TYPE	STUDENT(S)
<hr/>			
SHIN SPLINTS			
Plaza (Tent)	2:00-3:45	exhibit	Joshua Levy
<hr/>			
AUTONOMOUS ROVER			
Plaza (Tent)	2:00-3:45	poster	Brogan Butler, Mitchell Dilley, Stephen Drozda, Westlyn Johnston
<hr/>			
THE AUTOBOX			
Plaza (Tent)	2:00-3:45	poster	Sara Gladding, Aric Harper, Alan Wheeler
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THE R.O.V.E.R. UNIT			
Plaza (Tent)	2:00-3:45	poster	David Hunt, Noah Jackson, Joshua McGarity, Alexander Weaver
<hr/>			
KINEMATIC AND DYNAMIC ANALYSIS OF EXTERNAL KNEE ADDUCTION MOMENT WITH VARYING FOOTWEAR			
Plaza (Tent)	2:00-3:45	poster	Luke Pagni, Conner Swatloski
<hr/>			
PLOT YO SELF			
Plaza (Tent)	2:00-3:45	poster	Jaden Koos, Nicolas Maraschin, James Prescott, Gregory Waldorf
<hr/>			

Facilitator: Chris Penick

LOCATION	TIME	TYPE	STUDENT(S)
RATCHETING MECHANISM FOR PARTIAL HAND PROSTHESIS			
Plaza (Tent)	2:00-3:45	poster	Tia Valles
FEASIBILITY STUDY OF PENDULUM VIBRATION ABSORBER ADAPTED TO 90-DEGREE V-TWIN AERO ENGINE			
Plaza (Tent)	2:00-3:45	poster	Ross Fischer, Eric Jacobs, Tyler Raymond
SOLDER PASTE FOIL JETTING PUMP			
Plaza (Tent)	2:00-3:45	poster	Nevin Lister, Hayden Murphy, Jacob Wallace
MODIFICATION OF ATECH SAW FOR CUTTING GREEN CERAMIC			
Plaza (Tent)	2:00-3:45	poster	Keenan Jewkes, Alix Peltier, Levi Walcher
INTERNAL COMBUSTION ENGINE TEST STAND FOR ANALYZING THERMODYNAMIC PROCESSES			
Plaza (Tent)	2:00-3:45	poster	Brant Bear, Logan Donohue, Anthony Fiantaca
OPTIMIZATION OF CHANGEOVER PROCESS ON A RECREATIONAL FISHING LINE COATING MACHINE AT WESTERN FILAMENT, INC.			
Plaza (Tent)	2:00-3:45	poster	Daniel Hegge, Aldrin Micua, Gunnar Pagni
DESIGN OF AN ENVIRONMENTAL SIMULATION CHAMBER FOR HUMAN PERFORMANCE RESEARCH			
Plaza (Tent)	2:00-3:45	poster	Dominick Brevig, Lance Matosky, Connor Timms
DESIGN OF AN AUTOMATED TRANSPORTATION SYSTEM FOR INNOVATIVE TEXTILES			
Plaza (Tent)	2:00-3:45	poster	Jake Chiddix, Scott Foster, William Ramsey
DEVELOPMENT OF BICYCLE WHEEL TRUING AND DISHING COMBINATION STAND			
Plaza (Tent)	2:00-3:45	poster	Joseph Buches, Jonathan Johannsen, Benjamin Whitney
INSTRUMENTATION FOR THERMODYNAMIC ANALYSIS OF A MAZDA MIATA COOLING SYSTEM			
Plaza (Tent)	2:00-3:45	poster	Anthony DeFeo, Dalton Hamer, Heather Mayerle
DESIGN AND CONSTRUCTION OF A THERMODENUDER FOR CONDITIONING AEROSOLS			
Plaza (Tent)	2:00-3:45	poster	Kwasi Kyeremeh-Dapaah, Mathew Nielsen, Paul Yanowich
WEIGHT REDUCTION OF QUICK RELEASE MECHANISM FOR LOWER LIMB PROSTHESES			
Plaza (Tent)	2:00-3:45	poster	Alain Bucio Barrios, Dane Dulaney, Zachary Kennison
DATA ACQUISITION SYSTEM DESIGN AND IMPLEMENTATION ON A FORMULA SAE CAR			
Plaza (Tent)	2:00-3:45	poster	Corbin Cooper, Nathaniel Glennon, Garrett Rodstrom

HEALTH SCIENCES

TRACK 6

Facilitator: Olga Grisak

LOCATION	TIME	TYPE	STUDENT(S)
IMPORTANCE OF THE MEDICAL LABORATORY			
H West Hallway	not judged	poster	Deseray Davis, Arond Schiltz, Cassandra Spor
A REVIEW OF BREAST AND PROSTATE CANCER TUMOR MARKERS			
H West Hallway	not judged	poster	Catherine Alldredge, Meaghan Caldwell

KINESIOLOGY

TRACK 7

Facilitator: Brent Alumbaugh

LOCATION	TIME	TYPE	STUDENT(S)
ACUTE EFFECTS OF PERFORMING HEAVY CONVENTIONAL DEADLIFTS ON VERTICAL JUMP AND PEAK GROUND REACTION FORCE			
H East Hallway	2:00-3:45	poster	Bryanna Adams, Jason Brace, David Gionco, Connor Stephenson, Trey Thurmond
THE EFFECTS OF THERATOGS ON POSTURAL MUSCLE AMPLITUDE IN SUBJECTS WITHOUT SENSORIMOTOR IMPAIRMENTS			
H East Hallway	2:00-3:45	poster	Taylor Cecil, Abby Costello
A PILOT STUDY OF INJURY PREDICTION IN FEMALE D2 SOCCER PLAYERS USING FUNCTIONAL MOVEMENT SCREEN (FMS) AND LANDING ERROR SCORING SYSTEM (LESS)			
H East Hallway	2:00-3:45	poster	Mitchell Vandel
SUBSTRATE UTILIZATION BETWEEN GENDERS AT HIGH AND LOW INTENSITIES			
H East Hallway	2:00-3:45	poster	Anna Schmidt
GRIP STRENGTH AND THE VELOCITY OF A FOREHAND TENNIS STROKE			
H East Hallway	2:00-3:45	poster	Georgia Hansen
THE PUBLIC HEALTH OF MESA COUNTY: FINDING AN AMERICAN FITNESS INDEX FOR SMALLER COMMUNITIES			
H East Hallway	2:00-3:45	poster	Greer Hanes
SKIING ECONOMY DURING CLASSIC AND SKATE TECHNIQUES IN BEGINNING AND ADVANCED CROSS-COUNTRY SKIERS			
H East Hallway	2:00-3:45	poster	Emma Malmquist

LANGUAGES, LITERATURE AND MASS COMMUNICATION TRACK 8A

Facilitator: Bill Wright

LOCATION	TIME	TYPE	STUDENT(S)
ESPERANZA: BREAKING BARRIERS			
FA 214	2:00-2:15	oral	Rosa Gomez
DREAMS DYING IN A PATRIARCHAL SOCIETY			
FA 214	2:45-3:00	oral	Lucia Velasco

THE AWAKENING OF ESPERANZA

FA 214	3:15-3:30	oral	Derek Mayo-Alvarez
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GALLEGOS' DOÑA BÁRBARA AS AN EXAMPLE OF ATWOOD'S 'CREATIVE NON-VICTIM'

FA 214	2:15-2:30	oral	Lauren Lipski
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ROMPIENDO ESTEREOTIPOS: CÓMO LA MUJER SE ENCONTRÓ A SÍ MISMA FUERA DE LAS NORMAS CULTURALES (BREAKING STEREOTYPES: HOW THE WOMAN FOUND HERSELF OUTSIDE OF CULTURAL NORMS)

FA 214	3:00-3:15	oral	Emma Kemper
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PEPITA JIMÉNEZ: EL RECONOCIMIENTO DEL INTELLECTO DE LA MUJER TANTO EN LA AMISTAD COMO EL ROMANCE

FA 214	2:30-2:45	oral	Sarah Lease
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LANGUAGES, LITERATURE AND MASS COMMUNICATION **TRACK 8B****Facilitator: Bill Wright**

LOCATION	TIME	TYPE	STUDENT(S)
WHY 13 REASONS ARE NOT ENOUGH			
WS 115	2:00-2:15	oral	Lucy Raaum
ROSSETTI'S SECRET			
WS 115	2:15-2:30	oral	Kaleb Wilkins
THE ROLE OF VIGILANTES IN MONSTER THEORY			
WS 115	2:30-2:45	oral	Alexis Prall
FINDING VALUE IN 'UNCREATIVE' WRITING			
WS 115	2:45-3:00	oral	Megan Vorse

MUSIC**TRACK 9****Facilitator: Kristen Yeon-Ji Yun**

LOCATION	TIME	TYPE	STUDENT(S)
DEVELOPING ENSEMBLE AND IMPROVISATION SKILLS THROUGH PLAYING AN ARRANGEMENT OF PATIENCE BY GUNS AND ROSES			
MPAC 005	2:00-2:15	performance	Brett Christensen, Miguel Hermosillo-Velez, Brittnei Nack, Wyatt Rollins, Jamie Van Dyke
CODE YELLOW'S "THE DOUCHE FLUTE"			
MPAC 005	2:15-2:30	performance	Chase Brown, Nicholas Carozza, Michael Dackonish, Jalen Dalla, Calvin Lindberg, Cole Parker
EMCEE - A CLASSICALLY TRAINED MUSICIAN EXPLORES A NON-TRADITIONAL OPPORTUNITY			
MPAC 005	2:30-2:45	oral	Ian McGuire
DIE ANYWHERE ELSE MUSIC VIDEO			
MPAC 005	2:45-3:00	oral	Jennifer Hemenway, Calvin Lindberg, Brieanna Mangette, Grant Zeller
LUTE MUSIC OF JOHN DOWLAND			
MPAC 005	3:00-3:15	performance	Brett Christensen

ROCK/POP VIDEO PROJECT, CHUNKY BY BRUNO MARS			
MPAC 005	3:15-3:30	performance	Jacob Dickhausen, Austin Harshman, Autumn Kelly, Samantha Medina, Caleb Talkington
.....			
REACHING SENIORS CITIZENS THROUGH MUSIC			
MPAC 005	3:30-3:45	oral	Wyatt Rollins, Delaney Santoro
.....			

PHYSICAL AND ENVIRONMENTAL SCIENCES
 TRACK 10A

Facilitator: Dave Weinberg

LOCATION	TIME	TYPE	STUDENT(S)
EXPLORING THE FLUID REGIME IN D-DIMENSIONAL FRW COSMOLOGY			
WS 161	2:00-2:15	oral	Bret Brouse
.....			
PREDICTING DEBRIS FLOWS FOLLOWING WILDFIRES IN CENTRAL WESTERN COLORADO			
WS 161	2:15-2:30	oral	Sadie Christensen
.....			
IS CLIMATE CHANGE AFFECTING PEAK FLOWS IN THE UPPER COLORADO RIVER BASIN, AND DOES SNOWPACK CONTROL PEAK DISCHARGE? A COMPARISON OF SNOWPACK AND RIVER DISCHARGE RECORDS			
WS 161	2:30-2:45	oral	Morgan Pratte
.....			
MAGNETIC SURVEYS AS A MEANS OF PROSPECTING FOR URANIUM-BEARING MINERALS IN SANDSTONE DEPOSITS OF THE COLORADO PLATEAU			
WS 161	2:45-3:00	oral	Adam Nawacki
.....			
ISO-ALPHA ACID DEGRADATION IN BEER			
WS 161	3:00-3:15	oral	Erin Bair
.....			
EXAMINING THE VACUUM REGIME IN THE D-DIMENSIONAL FRIEDMANN-ROBERTSON-WALKER MODEL OF COSMOLOGY			
WS 161	3:15-3:30	oral	Scott Jackson
.....			
JAHN-TELLER DISTORTION IN LITHIUM MANGANESE SPINEL OXIDE			
WS 161	3:30-3:45	oral	Mary Katherine Gorsuch
.....			
CHARACTERIZATION OF THE EFFECTS OF CARNOSIC ACID ON DICTYOSTELIUM DISCOIDEUM TO INVESTIGATE POTENTIAL CHEMOPROTECTIVE PROPERTIES			
WS 161	3:45-4:00	oral	Molly Kubesh
.....			

PHYSICAL AND ENVIRONMENTAL SCIENCES
 TRACK 10B

Facilitator: Sam Lohse

LOCATION	TIME	TYPE	STUDENT(S)
NOVEL GOLD(III) COMPLEXES FOR THE UTILIZATION OF STRONG C-H BONDS			
WS East Hallway	2:00-3:45	poster	Erin Bair, Gabrielle Donalson
.....			
INVESTIGATION OF JOHNSON NOISE AND SHOT NOISE			
WS East Hallway	2:00-3:45	poster	Saige Dacuycuy
.....			
CONSTRUCTING AN EARTH'S FIELD NUCLEAR MAGNETIC RESONANCE SPECTROMETER			
WS East Hallway	2:00-3:45	poster	Joshua Mathews
.....			



GOLD NANOPARTICLE AGGREGATION EFFECTS ON NANOPARTICLE TOXICITY IN DAPHNIA MAGNA

WS East Hallway 2:00-3:45 poster Christopher Vandermeer

AFFORDABLE AIR ANALYSIS

WS East Hallway 2:00-3:45 poster Andrew Brown, Anthony Feller, Joshua Vincent

PHYSICAL AND ENVIRONMENTAL SCIENCES

TRACK 10C

Facilitator: Larry Jones

LOCATION	TIME	TYPE	STUDENT(S)
EXPLORING SEDIMENTARY PROVENANCE USING DETRITAL SANIDINE ⁴⁰AR/³⁹AR GEOCHRONOLOGY			
WS North Hallway	2:00-3:45	poster	Kathleen Dykstra
APATITE (U-TH)/HE THERMOCHRONOLOGY OF BATTLEMENT MESA, WESTERN CO: NEW CONSTRAINTS ON LATE CENOZOIC EVOLUTION OF THE UPPER COLORADO RIVER BASIN			
WS North Hallway	2:00-3:45	poster	Rachael Lohse
PICEANCE CREEK-SAN JUAN BASIN CORRELATION USING DAKOTA SANDSTONE WELL-LOGS			
WS North Hallway	2:00-3:45	poster	Marshall Thurmon
POSSIBLE PALEOCLIMATE RECORD OF CALCIC VERSUS NON-CALCIC SOIL FORMATION ON THE GRAND MESA, COLORADO			
WS North Hallway	2:00-3:45	poster	Michael Getz
THE SEQUENCE OF HYDROTHERMAL MINERALIZATION IN UNAWEEP CANYON, COLORADO, AND ITS APPLICATION TO THE RELATIVE AGE DATING OF FAULTING EVENTS			
WS North Hallway	2:00-3:45	poster	Timothy Bowers
GEOCHEMISTRY AND MINERALOGY OF WELL 11-2 IN MANCOS SHALE: APPLICATIONS FOR HYDRAULIC FRACTURING			
WS North Hallway	2:00-3:45	poster	Jordan Drake
AN INVESTIGATION OF THE SELENIUM CONCENTRATION IN THENARDITE EFFLORESCENCES ON MANCOS SHALE, WESTERN COLORADO			
WS North Hallway	2:00-3:45	poster	Rachael Lohse
STUDY OF TRANSGRESSIVE-REGRESSIVE CYCLES OF THE LOWER MANCOS IN THE GRAND VALLEY			
WS North Hallway	2:00-3:45	poster	Mariaha O'Dell

DETERMINING PROVENANCE OF THE TIDWELL MEMBER OF THE
JURASSIC MORRISON FORMATION

WS North Hallway 2:00-3:45 poster Trevor Potter

ARE THERE LARAMIDE-AGE PSEUDOTACHYLITE IN UNAWEEP CANYON?

WS North Hallway 2:00-3:45 poster Nicholas Cholas

PHYSICAL AND ENVIRONMENTAL SCIENCES

TRACK 10D

Facilitator: Tamara Minnick

LOCATION	TIME	TYPE	STUDENT(S)
A COMPARISON OF POSSIBLE CRAYFISH BURROWS IN THE CHINLE FORMATION OF THE COLORADO NATIONAL MONUMENT WITH CRAYFISH BURROWS FOUND IN CANYONLANDS NATIONAL PARK, UTAH			
WS South Hallway	2:00-3:45	poster	Darby Spence
STREAM MORPHOLOGY RESPONSE IN NO THOROUGHFARE WASH TO TAMARISK REMOVAL USING THE CUT-STUMP METHOD			
WS South Hallway	2:00-3:45	poster	Ivan McClellan
DESIGNING A NATIVE SEED GARDEN PLAN FOR LADDER CANYON RANCH AND COLORADO WEST LAND TRUST FOR FUTURE RESTORATION			
WS South Hallway	2:00-3:45	poster	Rebecca Dykes, Rod Ferree, Erin Schuckers, Kelsey Wright
CHANGES IN AGRICULTURAL SOIL PROPERTIES THROUGH VERMICOMPOST AMENDMENTS			
WS South Hallway	2:00-3:45	poster	Zachary Siemsen
RESTORATION PLAN TO IMPROVE HABITAT AND REDUCE NOXIOUS WEEDS IN THE COLORADO RIVER WILDLIFE AREA (CRWA)			
WS South Hallway	2:00-3:45	poster	Shea Nieslanik, Tristan Schmalz, Zachary Siemsen
CHARACTERIZATION OF UPPER UINTA FORMATION			
WS South Hallway	2:00-3:45	poster	Sadie Christensen
SITE ASSESSMENT FOR THE SUITABILITY OF AN ENDANGERED FISH AND WATERFOWL WETLAND PROJECT IN THE GRAND VALLEY AUDUBON SOCIETY NATURE PRESERVE			
WS South Hallway	2:00-3:45	poster	Joel Henderson, Matthew Stewart, Jason Tipton, Cody Vanden Brink
EVALUATING THE USE OF DRONE-COLLECTED MULTISPECTRAL DATA FOR ASSESSING RESTORATION EFFORTS			
WS South Hallway	2:00-3:45	poster	Quinton Barnett, Grayson Koenemann, Emily Tighe

SOCIAL AND BEHAVIORAL SCIENCES

TRACK 11A

Facilitator: Tim Casey

LOCATION	TIME	TYPE	STUDENT(S)
THE EFFECTS OF STRESS AND TRAUMA ON POLICE OFFICERS' RELATIONSHIPS			
H 105	2:00-2:15	oral	Sierra Sanchez

FAMILY VERSUS PEER INFLUENCE ON UNDERAGE CONSUMPTION OF ALCOHOL AND MARIJUANA

H 105 2:15-2:30 oral Jessica Jolley

MEN'S VERSUS WOMEN'S SUCCESS WITH COLLEGE MATH

H 105 2:30-2:45 oral Alma De Lara

FAMILY PRESSURE IN COLLEGIATE FOOTBALL

H 105 2:45-3:00 oral Nicholas Mynes

THE AFFECT OF PORNOGRAPHY ON MEN'S INTIMATE RELATIONSHIPS

H 105 3:00-3:15 oral Erin Case

PORTRAYALS OF WOMEN IN MAGAZINE ADVERTISEMENTS

H 105 3:15-3:30 oral Amy Schuster

SOCIAL AND BEHAVIORAL SCIENCES

TRACK 11B

Facilitator: Chelsie Hess

LOCATION	TIME	TYPE	STUDENT(S)
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GENERATIONAL DIFFERENCES ON MOTIVATION FOR HIGHER EDUCATION

H 106 2:00-2:15 oral Jamie Hall, Jordyn Levering,
Jhelline Aprill Patricio

AN EXAMINATION OF MOTIVATIONS BEHIND THE USE OF MARIJUANA IN HIGH ACHIEVING COLLEGE STUDENTS

H 106 2:15-2:30 oral Jaclyn Levitt

IMMEDIATE EFFECTS OF BRIEF SUICIDE INTERVENTION GATEKEEPER TRAINING

H 106 2:30-2:45 oral Liz Cottingham

THE EFFECTIVENESS OF INDIRECT CONTACT WITH OUTGROUP MEMBERS ON PREJUDICE

H 106 2:45-3:00 oral Mark Domingo

LONG TERM EFFECTIVENESS OF A BRIEF SUICIDE INTERVENTION GATEKEEPER TRAINING

H 106 3:00-3:15 oral Brea Giancaterino, Cheyenne Pace

A META ANALYSIS OF THE DULUTH MODEL'S "POWER AND CONTROL WHEEL" FOR SAME-SEX VICTIMS OF DOMESTIC VIOLENCE

H 106 3:15-3:30 oral Jaclyn Levitt

MY GRANDMOTHER'S NAME

H 106 3:30-3:45 oral Caroline Gallegos

A POLITICIZED ENVIRONMENT

H Hallway 2:00-3:45 poster Courteney Schwander

SOCIAL AND BEHAVIORAL SCIENCES

TRACK 11C

Facilitator: Tim Winegard

LOCATION	TIME	TYPE	STUDENT(S)
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BLACK AND WHITE PERSPECTIVES ON RACIAL STEREOTYPES IN COMMERCIAL ADVERTISEMENTS

H 107 2:15-2:30 oral Alissa Brown

RAP MUSIC'S INFLUENCE ON YOUNG AFRICAN AMERICANS			
H 107	2:30-2:45	oral	Gary Reece-Scott
NORTH KOREA'S NUCLEAR PURSUIT: AN ANALYSIS ON KIM JON UN'S RHETORIC			
H 107	2:45-3:00	oral	David Harbert
BEE CAMPUS USA			
H 107	3:00-3:15	oral	Erin Case, Meghan Cline, Isabella Vaz

SOCIAL AND BEHAVIORAL SCIENCES

TRACK 11D

Facilitator: Michael Delaney

LOCATION	TIME	TYPE	STUDENT(S)
THE HEAT OF THE CIVIL WAR: THE FIRST AMERICAN DRAFT 1863			
H 139	2:15-2:30	oral	McKayla Campbell
THE CONFEDERATE SECESSION FROM THE SOUTHERN POINT OF VIEW			
H 139	2:30-2:45	oral	Jefferson Baker
JOHN WAYNE AND THE AMERICAN MYTH IN CINEMA			
H 139	2:45-3:00	oral	Brittany Heye
THE SPEECH BEFORE THE STORM			
H 139	3:00-3:15	oral	Samantha Cathey
SEVERE WANT DURING THE AMERICAN CIVIL WAR			
H 139	3:15-3:30	oral	Emily McCune

TEACHER EDUCATION

TRACK 12A

Facilitator: Ann Gillies

LOCATION	TIME	TYPE	STUDENT(S)
DYSLEXIA IN THE CLASSROOM			
DH 104	2:00-2:15	oral	Kia James
MATHEMATICS AND ENGLISH LANGUAGE LEARNERS			
DH 104	2:15-2:30	oral	William Herrington
THROUGH THE EYES OF AUTISM			
DH 104	2:30-2:45	oral	Lance Chaffin
LEARNING WITH A GREATER PURPOSE			
DH 104	2:45-3:00	oral	Heather Hough
HOW PHYSICAL ACTIVITY IMPACTS ACADEMICS			
DH 104	3:00-3:15	oral	Amanda Charles, Heather Wilczek
PEER VS. TEACHER: HOW DO YOU LEARN?			
DH 104	3:15-3:30	oral	Alex Polito, Jennifer Sine, Hailey Wright

TEACHER EDUCATION

TRACK 12B

Facilitator: Ann Gillies

LOCATION	TIME	TYPE	STUDENT(S)
AUTISM IN THE CLASSROOM			
DH Hallway	2:00-3:45	poster	Madison Heberden
INCLUSIVE EDUCATION			
DH Hallway	2:00-3:45	poster	Sarah Orosz
TEACHING TO STUDENTS DISABILITIES: FOCUS ATTENTION DEFICIT HYPERACTIVITY DISORDER			
DH Hallway	2:00-3:45	poster	Meghan Beale
LEARNING OUTDOORS POSITIVELY AFFECTS TEACHERS AND STUDENTS			
DH Hallway	2:00-3:45	poster	Bailey Pugh
AUTISM AND ASPERGER SYNDROME			
DH Hallway	2:00-3:45	poster	Sabrina Blea
TEACHING PRACTICES FOR AUTISM			
DH Hallway	2:00-3:45	poster	Paige Luke
TEACHING SOCIAL SKILLS			
DH Hallway	2:00-3:45	poster	Allyson Nelson
MUSCULAR DYSTROPHY			
DH Hallway	2:00-3:45	poster	Sarah Benton, Allison Davis
ADAPTED BOOKS, SONGS WITH MANIPULATIVES AND STRUCTURED TASKS			
DH Hallway	2:00-3:45	poster	Ashley Blankenbeckler, Mallory Havens, Kenzi Medina, Kaitlyn Pridy
LEARNING STYLES IN EARLY CHILDHOOD EDUCATION: STRUCTURED OR UNSTRUCTURED ART			
DH Hallway	2:00-3:45	poster	Devyn McCallum, Bailey Rogers

THEATRE

TRACK 13A

Facilitator: Benjamin Reigel

LOCATION	TIME	TYPE	STUDENT(S)
BASEBALL: THE MUSICAL			
WS 111	2:00-2:15	oral	Joseph DeMers
"THE VERSATILE PERFORMER: THE STRENGTHS AND CHALLENGES OF DANCE TRAINING FOR MUSIC THEATRE PERFORMERS IN EDUCATION"			
WS 111	2:15-2:30	oral	Alexis O'Neil
OIL: THE INESCAPABLE US ADDICTION			
WS 111	2:30-2:45	oral	Espen Thune-Larsen
CREATIVE, OR CRAZY?			
WS 111	2:45-3:00	oral	Marisa Jahnke
LOOKING PAST THE RAINBOW: STORIES FROM THE QUEER COMMUNITY			
WS 111	3:00-3:15	oral	Kylie Banks
HOW TO RISE ABOVE IT ALL: EDUCATION AND BARRIERS IN AMERICAN CULTURE			
WS 111	3:15-3:30	oral	Patrice Harris

THOROUGHLY MODERN MILLINERY

WS 111	3:30-3:45	oral	Sarah Bos
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FLOW STATES

WS 111	3:45-4:00	oral	Chase Morris
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THEATRE**TRACK 13B****Facilitator: Benjamin Reigel**

LOCATION	TIME	TYPE	STUDENT(S)
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ÉVOUEUNT: A SOLO EXPLORATION

MPAC 144	2:00-2:15	performance	Meri-Ashton Van Winkle
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PERFORMING ATHLETES: DANCE MEETS STRENGTH AND CONDITIONING

MPAC 144	2:15-2:30	performance	Grace Shively
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TRAUMATIZATION TO ALLEVIATION DEDICATED TO DYLAN SCHUETZ

MPAC 144	2:30-2:45	performance	Ayla Schuetz
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THEATRE**TRACK 13C****Facilitator: Benjamin Reigel**

LOCATION	TIME	TYPE	STUDENT(S)
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EXCERPT FROM "BLACK SHEEP"

MPAC 142	2:00-2:15	performance	Quiana McElroy
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EXCERPT FROM "SINCE I LOOK LIKE A HIGH-SCHOOLER ANYWAY"

MPAC 142	2:15-2:30	performance	Michael Robinson
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EXCERPT FROM "AN ODE TO THE PAST, PRESENT, AND FUTURE SELF"

MPAC 142	2:30-2:45	performance	Alexis Bonsante
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EXCERPT FROM "A BITCH... BUT A NICE ONE"

MPAC 142	2:45-3:00	performance	Samantha Cage
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EXCERPT FROM "I CAN SING THE MELODY TOO"

MPAC 142	3:00-3:15	performance	Taylor Bowns
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EXCERPT FROM "THE HERO'S JOURNEY" BY JOEY DEMERS

MPAC 142	3:15-3:30	performance	Joseph DeMers
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EXCERPT FROM "THE POWER OF VOICES"

MPAC 142	3:30-3:45	performance	Alexis O'Neil
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CAREER AND TECHNICAL EDUCATION**TRACK 14****Facilitator: Chris Murphy**

LOCATION	TIME	TYPE	STUDENT(S)
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ARLO COLLISION AVOIDENCE

H 135	3:00-3:15	oral	Austin Krebill
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AN INTERACTION OF FILM AND ANIMATION

H 135	2:45-3:00	oral	Davis Devereux
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EMOTIONS THROUGH ANIMATION

H 135	3:15-3:30	oral	Joshua Park
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DRIFT TRIKE

Plaza (Tent)	2:00-3:45	exhibit	Mathew Abercrombie, Lucas Clarke, Samuel Coleman, Ethan Davis, Michael Hendricks, Caleb Lone, Daylon Ponce
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IMPLEMENTING CRITICAL THINKING IN AGRICULTURE

Plaza (Tent)	2:00-3:45	exhibit	Natalie Danielson
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GRADUATE STUDIES**TRACK 15****Facilitator: Kurt Haas**

LOCATION	TIME	TYPE	STUDENT(S)
THE LOST ART OF MOVEMENT			
DH 110	3:00-3:15	oral	Sean Blackmer
TRAUMA IN OUR NATION'S SCHOOLS			
DH 110	3:15-3:30	oral	Mykenzie Fox
NEW AVENUES OF EXPRESSION			
DH 110	3:30-3:45	oral	Sandra Currier



ART & DESIGN

Title: **PARTY ANIMALS**
Presenter(s): Michaela Cross
Faculty Mentor: Eric Elliott
Track: 1
Abstract: Happiness is such an important aspect of life, and everyone deserves to smile. This project was motivated because of the struggles that people face in everyday life. This project will display artwork that focuses on creating humorous images to spark the viewer's interest and emotions with personified animals. This presentation will include both paintings and sketchbooks that demonstrate how every painting begins before it is put on the canvas, along with an artist talk about the thought process behind this artwork and why it is created. This presentation is about reminding people how important it is to smile and feel the warmth of happiness, along with spreading joy onto others, because no one ever knows what another person might be going through. Anyone who enjoys the art of painting, or is interested in learning how the process of a painting begins, or even just needs a good laugh may enjoy this exhibit.

Title: **WRITHING AND WILTING: A MIXED MEDIA EXPLORATION OF TRANSFORMATION**
Presenter(s): Vanessa Porras
Faculty Mentor: Alison Harris
Track: 1
Abstract: From an early age, my obsession with butterflies has evolved from a mere fascination with a delicate creature to the psychological implications of its transformation. In the past year, I have created over 100 abstract drawings trying to understand what the caterpillar endures inside the chrysalis in order to emerge as a butterfly and the way humans go through a similar process. The in-between state that is so crucial for renewal is often overlooked and seen as insignificant. We live in a tunnel-vision society that is hyper focused on getting from point A to point B without acknowledging the chaos and grace of the journey. As with people who experience Seasonal Affective Disorder (SAD), the equivalent of winter is the in-between state of being enveloped in the chrysalis that is so essential for change. This presentation focuses on finding beauty in a mental disorder that requires connecting to all that surrounds us, understanding that our connection to nature and all its organisms is beyond molecular. We are deeply rooted in the soil and, as everything wilts around us, we too writhe and wither only to be reborn in spring among the butterflies.

Title: **THE SCIENCE OF ART: BUILDING PATHWAYS OF LEARNING**
Presenter(s): Kaitlin Miller
Faculty Mentor: Alison Harris
Track: 1
Abstract: Throughout my time studying art in depth, I have learned that the "arts" in a broad sense has opened connective pathways between all the subjects I have studied; from physics and geology to psychology and language. Like philosophy, art is the act of questioning of the unknown. These questions

are easy to ignore because of their expansive nature. In a way this can be seen as what science refers to as “pseudo.” Knowledge, though, is the act of discovering and at some point is a mystery to all of us. In my time trying to understand what my art is, I have become aware that through art I have developed a heightened understanding of learning. This presentation is about opening a perception to the idea that art and creation are an essential element of the brain’s function and a lost element of learning. Creation then becomes the tool that bridges all modes of thinking together.

Title: **ART THROUGH CRAFT**
Presenter(s): Marcus Fingerlin, Hannah Martin, Rachel Switzler
Faculty Mentor: KyoungHwa Oh
Track: 1
Abstract: We will be exhibiting ceramic processes involving wheel throwing, hand building, and surface design. This exhibit is designed to showcase the versatility of ceramics and the huge variety of possibilities that come from working with clay. Through these demonstrations, the artists will show the expressive capabilities which are unique to each artist. Ceramics is unique in that it allows for collaboration, cohesion, and pragmatism. Historically in Western culture, ceramics is considered a craft and not an art form. Functional pottery is aligned with craft because of its relationship with the user. Because these items are meant to be used and not viewed, their artistic integrity is put into question. This functionality allows for a unique transfer of the artists’ intentions through both a visual and a physical lens. This debate continues today with the discussion of whether a functional object can be art.

BIOLOGICAL SCIENCES

Title: **EXPANDING THE MOLECULAR PHYLOGENETIC TREE OF THE CONIATUS GENUS**
Presenter(s): Madison Vincent
Faculty Mentor: Zeynep Ozsoy
Track: 2
Abstract: In 2006 a nonnative weevil was discovered in Arizona on Tamarisk trees. In 2011, Eckberg and Foster described this weevil as *Coniatus splendidulus*, the splendid tamarisk weevil, based on morphology. The native range of *C. splendidulus* and four other morphologically similar species of the genus *Coniatus* spans Eurasia from Spain to Central Asia. Since the introduction of this nonnative weevil was not intentional, its origin within Eurasia is unknown. This research was performed to genetically confirm that the *Coniatus* species in North America is *C. splendidulus* and to determine its origins. Specimens collected in the U.S. and overseas, as well as those obtained from museums, were used to compare the Cytochrome Oxidase 1 (CO1) gene sequence. I isolated their DNA, amplified CO1 gene, and sent the DNA to be sequenced. The results support earlier findings that: (i) there was a single introduction of these weevils into North America, (ii) provide evidence that the *Coniatus* species found in North America may have been misidentified as *C. splendidulus*, and (iii) they may have originated from Iran. Based on these results, further research is required to identify the correct species and possibly restructure the phylogenetic tree of the *Coniatus* genus.

Title: SEQUENCES OF THE MIDGET-FADED RATTLESNAKE, *CROTALUS OREGANUS CONCOLOR*, NEUROTOXIN

Presenter(s): Rebecca Bryan

Faculty Mentor: Steven Werman

Track: 2

Abstract: Local Midget-faded rattlesnakes, *Crotalus oreganus concolor*, have a venom that contains a presynaptic neurotoxin called "concolor" toxin. This toxin is composed of two subunits, an acidic protein subunit A and a basic protein subunit B (Mtx-a, Mtx-b respectively). These subunits form dimers that act pre-synaptically, blocking the release of acetylcholine (neurotransmitter) at skeletal muscle neuromuscular junctions. Genomic DNA that includes genes for both subunits was isolated from a number of specimens from blood and tissue samples. The Mtx-a and Mtx-b genes were characterized by amplification through PCR (polymerase chain reaction) and purified for subsequent DNA sequencing. The DNA sequence information obtained was further analyzed and compared between each specimen. The goal of this study was to compare *C. o. concolor* neurotoxin sequences to Mojave rattlesnake (*C. c. scutulatus*) neurotoxin sequences to determine if genetic differences exist within *C. o. concolor* and between this snake and the Mojave Rattlesnake. Preliminary data shows that the neurotoxin genes of the midget faded rattlesnake are highly similar to the Mojave toxin sequences.

Title: AN EXPLORATION INTO THE MODE OF ACTION OF SUCROSE ESTERS AGAINST ZOOSPORES OF *PHYTOPHTHORA INFESTANS*

Presenter(s): Elijah Columbia, Kayla Murphy

Faculty Mentor: Margot Beckett

Track: 2

Abstract: *Phytophthora infestans*, most famously known for its role in the Irish Potato Famine, causes a disease known as late blight on potatoes, tomatoes, and petunias. Of these three hosts, petunias are significantly less susceptible to late blight. Previous work in our lab has demonstrated that amphipathic sucrose esters extracted from the leaves of petunias cause the zoospores (motile, infective spores) of *P. infestans* to lyse. The aim of the current study is to explore the mechanism that causes zoospore lysing. Zoospores of *P. infestans* contain a water expulsion vacuole (WEV) that aids in osmoregulation. Preliminary observations using differential interference contrast (DIC) microscopy and sucrose monolaurate (a model sucrose ester) suggest a decrease in the function of the WEV. When exposed to sucrose monolaurate, the zoospores and their WEVs swell, eventually leading to lysing. With the use of DIC microscopy and a sucrose ester staining protocol, we hope to gain further insights into the mode of action of sucrose esters against the zoospores of *P. infestans* and thus a better understanding of how petunias defend themselves against this pathogen. Understanding the petunia-*P. infestans* interaction may lead to a method for reducing the susceptibility of potatoes and tomatoes to blight.

Title: TEMPERATURE CORRECTION OF BIOELECTRIC IMPEDANCE ANALYSIS IN FORENSIC APPLICATIONS

Presenter(s): Brandy Worth

Faculty Mentor: Erick Hansen

Track: 2

Abstract: Many agencies using forensic sciences rely on the estimation of the postmortem interval (PMI; time since death). Current methods rely on qualitative data to estimate time of death, which is not always reliable for late PMI. Bioelectrical impedance analysis (BIA) is a new quantitative

technique to estimate PMI by measuring the resistance and reactance of bodies. Temperature is a major factor contributing to the progression of decomposition and affects the resistance and reactance measurements. Accumulated degree-days are an indice of PMI and is the dependent variable in predictive models. Since temperature is included in the dependent variable, there are problems with including temperature as an independent variable in the model to correct resistance and reactance measurements. A method for correcting resistance and reactance for temperature prior to inclusion in the model is needed. The objective of this research was to evaluate different methods for correcting resistance and reactance values to a standardized temperature. The correction methods evaluated include multiple regression, random intercept models, percent correction per degree temperature change (reported in the literature), and an alternative percent correction method based on data collection for this project. Development of temperature correction methods will improve PMI estimates for the BIA models.

Title: **ACTIVITY PATTERNS OF AMERICAN PIKAS (OCHOTONA PRINCEPS) IN LOW-ELEVATION LAVA FLOWS AND HIGH ELEVATION MOUNTAINS IN IDAHO**

Presenter(s): Brooklyn Waterhouse

Faculty Mentor: Johanna Varner

Track: 2

Abstract: The American pika (*Ochotona princeps*) is a mammal that typically resides in high-elevation boulder fields and relies on cool climates. However, at Craters of the Moon National Monument in Idaho, these animals thrive in low-elevation lava fields that reach temperatures of over 32°C in the summer. By using camera traps placed at Craters of the Moon and at Grays Peak in the Pioneer mountain range, we captured natural pika behaviors in each habitat. Cameras were placed near pika haypiles from May 2017 to October 2017. In total, we captured 1,133 photos/videos of pikas. We then constructed activity graphs to compare daily patterns. The data show that pikas at Craters tend to be active in the morning before 9:00, then become active again in the evening around 20:00. In contrast, pikas at Grays Peak are most active between the 6:00 and 10:00 in the morning, and do not tend to be as active in the evenings. These data will advance our understanding of how pikas at Craters use behavior modifications to inhabit an atypical habitat. Since pikas are known to be affected by climate change, these data will also serve as a baseline to which we can compare activity patterns of these animals in the future.

Title: **VALIDATING BIOELECTRICAL IMPEDANCE ANALYSIS MODELS FOR MEASURING LIPIDS IN SUCKER SPECIES**

Presenter(s): Ashlee Henson

Faculty Mentor: Erik Hansen

Track: 2

Abstract: Lipid mass can be used as an indicator of fish health or condition because lipids are more sensitive to change than other condition measurements. Bioelectrical impedance analysis is being developed as a non-lethal method to quantify fish proximate body composition (water, lipid, and lean masses) to replace standard lethal methods. The goal of this research was to develop bioelectrical impedance analysis as a tool for managing native sucker species (Catostomidae). Multiple regression models for predicting proximate body composition were developed using invasive White Sucker (*Catostomus commersonii*) as a proxy for the native suckers. The objective of this project was to evaluate the developed models using native Bluehead

Sucker (*C. discobolus*) and Flannelmouth Sucker (*C. latipinnis*) hybridized with White Suckers. To evaluate the accuracy of the models with hybrid species, the observed proximate body compositions were compared to predicted proximate body compositions from statistical models. The models accurately predicted water mass and lipid-free dry mass. The models predicting lipid mass were not as accurate as the other proximate body composition components. Additional work is needed to expand the lipid mass range used to develop the predictive models. Additionally, more hybrid species are needed among all size classes to validate the models.

Title: **USING INFRARED LIGHT PHOTOGRAPHY TO VISUALIZE TATTOOS ON DESICCATED HUMAN REMAINS**

Presenter(s): Sara Garcia

Faculty Mentor: Melissa Connor

Track: 2

Abstract: The use of an Alternative Light Source (ALS) has the potential to reveal tattoos that were not previously visible, or only partially visible, on bodies in various stages of decomposition. An ALS is a device that allows an item or area to be viewed under light of a specific wavelength, allowing items to be visualized or enhanced. An infrared light is an ALS with a wavelength of greater than 700nm. In an attempt to locate and enhance possible tattoos, human remains were examined using infrared light photography. Infrared photography captures images with only infrared wavelengths when using the correct filter. For this study, an infrared camera was used to examine known tattoos on five human remains from CMU's Forensic Investigation Research Station (FIRS). The camera is owned by the Colorado Bureau of Investigation and was brought to FIRS and operated by Kayleigh Matook, a Forensic Scientist in Biological Sciences. Tattoos examined included both decorative tattoos and permanent makeup. An excised tattoo on desiccated tissue was also examined, with infrared light photography and then under the visible spectrum with wavelengths between 420-525nm. When compared to tattoos viewed under the visible spectrum, tattoos viewed using infrared light photography were more visible and better defined.

BUSINESS

Title: **NUTELLA FOCUS GROUP, CONSUMER BEHAVIOR SURVEY**

Presenter(s): Renaya Demarest, Nolan Ellis

Faculty Mentor: Deborah Parman

Track: 3

Abstract: A group of marketing students conducted a study to examine consumer perspectives regarding Ferrero Nutella. After researching Ferrero Nutella and its brand presence, the students administrated a focus group composed of Grand Valley residents to evaluate local perceptions of the company. Respondents participated in a blind taste test before being shown Nutella advertisements and being asked a series of questions regarding the company. From the focus group, the students identified product strengths and weaknesses in regard to Nutella's overall marketing mix (product, price, place, and promotion); thus, demonstrating Nutella's perceived positioning against competitors and recognizing areas of improvement. The outcomes of this study served as marketing research for brand development.

Title: **NATIVE4RENT**
Presenter(s): Andrew Karnowka, John Schmalz
Faculty Mentor: Georgann Jouflas
Track: 3
Abstract: The idea came at midnight just a few hundred feet from the trailhead of a 14er as an elderly couple from out-of-state tried to hire a student to walk with them to the top. Because the student refused payment, they tricked him into lunch by asking to be taken to the best restaurant around, stating that "natives know best!" Immediately, the inspiration took root to employ similar social advancements made in the sharing industry by Uber and Airbnb to fill the need from recreationalists looking for guidance from locals capable of providing help. However, the potential of providing such a service for everyone didn't become a possibility until Native4Rent sprouted. Students are working to create a Native4Rent website and application where anyone may find an adventure or a guide using a directory of established, licensed, adventure providers and helpful locals eager to share their passions. Service providers on Native4Rent can earn a little extra income or create a career for themselves by doing what they love, local charities can gain more exposure, and more people can get outside and be more active! This isn't just a dream, it is a solution.

Title: **FACTORS INFLUENCING INTENTION TO CHOOSE A BUSINESS ANALYTICS PROGRAM**
Presenter(s): Megan Lewin
Faculty Mentor: Johnny Snyder
Track: 3
Abstract: As the world of business adapts to more technologically advanced and data driven conditions, a need for professionals who can analyze, describe, and predict data has grown. McKinsey & Company estimates that there will be a severe shortage of individuals with strong foundational knowledge and skills in the use of business analytics in the next several years (Manyika, Chui, Brown, Bughin, Dobbs, Roxburgh, & Byers, 2011). In response, numerous universities have introduced both bachelors and masters programs with emphases in business analytics. While it is argued that this introduction of programs will help fill the increasing demand for these professionals, it does not mean there are enough prospective students interested in fulfilling the demand. This study looks to identify factors that impact a student's intention to choose a business analytics program, which can in turn be used to identify prospective business analytics students. The information gathered will be useful to Colorado Mesa University as it launches a business analytics concentration and to other schools who are considering offering business analytics programs.

Title: **SHOULD BLOCKCHAINING BE THE NEW SOLUTION TO THE FCC'S NET NEUTRALITY?**
Presenter(s): Mitchell Grant
Faculty Mentor: Jeff Meese
Track: 3
Abstract: This presentation introduces the question "Should blockchaining be the new solution to the FCC's Net Neutrality?" Based on research on the topic, this project outlines arguments for and against blockchaining. The arguments for blockchaining include "economic growth and development of green technologies" (Cocco), "the development and use of decentralized databases" (Fabiano), and "giving control back to the public when it comes to third-party transactions (i.e., using PayPal to pay for a meal for delivery)" (Morabito). The opposing arguments are that "net neutrality will affect

online learning" (Yamagata-Lynch), "net neutrality could take a long time to implement due to lawsuits having to be straightened out first" (Koziol), and "due to more than one form of cryptocurrency, bitcoin is decreasing in value" (Dumitrescu). This presentation concludes that blockchaining can offer both advantages and disadvantages. It could be the future to online banking but may cost ease-of-access to online learning.

Title: **ENHANCING UNIVERSITY ONBOARDING PROGRAMS THROUGH RESEARCH AND ANALYSIS**
Presenter(s): Donovan Harwell, Megan Lawson, Nicole Troester
Faculty Mentor: Nathan Perry
Track: 3
Abstract: Onboarding is a critical task that companies must implement correctly to effectively integrate new employees into their organization. Because of this, our group decided to review and analyze onboarding processes around the country and present our findings and suggestions for a mid-sized, western regional public university. This included writing a literature review on onboarding and interviewing three faculty members and five staff members at the university who were hired in the same year within the past five years. The interviews allowed us to better able to understand the university's practices and provide relevant feedback and suggestions. Ultimately, we made four suggestions to the university. First, that they continue shifting toward an employee-centric culture. Second, that they advocate for further capital investment. Third, that they critically review their onboarding processes and logistics. And fourth, that they incorporate more opportunities for socialization during the onboarding process. Overall, we found that the university already had a strong onboarding process in place, but we were able to provide information that can further improve the program.

Title: **ADVANCED INFORMATION SYSTEMS FIRS DATABASE**
Presenter(s): Tyler Brown, Austin Cromwell, Blake Graf, Jessica Hicks, Tammy Kellerby, Hilary Kennedy, Tom Lambert, George Manning, Adam Perry, Estella Roberts, Kailey Shabelski, Eileen Wong, John Wright
Faculty Mentor: Johnny Snyder
Track: 3
Abstract: The Forensic Investigation Research Station (FIRS) is an outdoor research facility focused on research, teaching, and service in the subject of the decomposition of human remains. This research is collected periodically by student interns and volunteers. The data collected is entered into a database for storage and analysis. Students in the Advanced Information Systems course have undertaken the project of analyzing, designing, and building a new database for the facility. The project allows this group of students to plan, create, document, and test the process of a database. The end result of this process is the delivery of a functioning, normalized database that is ready for use by the FIRS facility and future related sites. As a part of this capstone class, the students will integrate management information needs, decision-making criteria, and design of interactive user interfaces in the design and development of this computerized data management system. Students are using the SCRUM methodology for project management. They are working independently and as a group to complete all deliverables associated with the project.

Title: **SPECKLED VOID**

Presenter(s): Lucas Bingham, Sarah Harvey, Warren Story

Faculty Mentor: Lori Payne

Track: 4A

Abstract: This fast-paced mobile action game relies on player reflexes and spatial awareness to achieve high scores. The player uses a variety of tools and weapons to dispatch the various foes of the Void as they navigate randomly generated levels. The game's control scheme is built with a touchscreen in mind, allowing for quick taps and swipes to send the player character into a flurry of strikes and energy blasts as they dart across the screen. This game provides a fun, kinetic experience for all types of gamers, from casual players who play only for a few minutes while waiting for the bus, to invested players who seek to challenge themselves and raise their high scores over the course of an hour or more.

Title: **R.A.M. (REALISTIC ASSEMBLY OF MACHINES)**

Presenter(s): Bader Alkhamees, Adam Childs, Colin Gordon

Faculty Mentor: Lori Payne

Track: 4A

Abstract: Building desktop computers can be a hassle with all the different components and variability in sizes and shapes. Realistic Assembly of Machines (R.A.M.) will make the process of building a desktop computer more efficient and streamlined. R.A.M. was designed to help the everyday user find the correct computer components or to recommended computer builds for them. Through this program, the user can seek recommendations that will suit their needs. In specific user cases, there is an easy search option based off of user requirements or price range. Our Parts Picker will show the parts that are compatible with previously selected parts. Throughout the process, graphics are displayed to show the user what the components look like during the build process.

Title: **EAPOS - ENHANCED ACCESS POINT OF SALE**

Presenter(s): Scott Lowe, James Mathson, Riad Shash, Jesus Velasquez

Faculty Mentor: Lori Payne

Track: 4A

Abstract: Common Point of Sale systems are built for businesses to take and manage orders, track labor hours, and manage menu options, but often little attention is given to learnability, accessibility, and ease of use. The Enhanced Access Point of Sale (EAPOS) allows for small businesses to accommodate common impairments, such as color blindness, and offers options for hand preference. This system includes a training mode which allows new users to learn the system before they are required to do anything in the store. This helps reduce the labor costs for training. The FAQ section covers common functions that are easily forgotten due to infrequent use. This Point of Sales System helps an employer to better accommodate their new employees and to set them up for success when taking orders with EAPOS. Whether you are experienced with Point of Sales systems or are a first-time user, learning this system will be a breeze.

Title: **GROCEREASE — A QUICK AND EASY WAY TO SHOP**
Presenter(s): Jeana Althea Altura, Mitchell Bohn, Neifi Campas, Wyatt Hurst
Faculty Mentor: Lori Payne
Track: 4A
Abstract: Grocery shopping can be mundane and inconvenient, but with our app GrocerEase, we can make your trip quicker and easier. Store owners will be able to customize the app layout to their specific store, including developing a diagram and an inventory for the convenience of their customers. Users will then be able to create a list of grocery items and the app will organize and guide them through the aisles. Worried about saving money? The app will make price comparisons to other brands of similar items, allowing the user to make a more informed decision. Furthermore, users can create and set reminders for frequently purchased items. This will prevent the users from forgetting common items, saving them from having to make a second trip. Overall, GrocerEase will create an efficient and convenient experience for users and store owners alike.

Title: **LINKD: STUDENT ACTIVITY CLASSIFIED ADS BOARD**
Presenter(s): Lindsey Brown, Daniel Powell, Blake Stevens
Faculty Mentor: Lori Payne
Track: 4A
Abstract: Part of the college experience is interacting with peers, be it in sports, academic pursuits, or recreational activities. In gatherings, groups, clubs, councils, or just one-on-one, students meet up to share their interests. As a student, it can be difficult to find a tennis partner, climbing buddy, or fellow coffee connoisseur among the crowd. We will provide a student classified ads board specifically for students to find an activity partner, scale club activities, or learn about campus events. Built to streamline the process of activity planning between students that have likely never met, our service will provide an intuitive, easy to learn interface that breaks down the barrier for students to share their passions.

Title: **A NEW LOOK FOR WCCC**
Presenter(s): Matthew Cirkovic, Blake Stevens
Faculty Mentor: Warren MacEvoy
Track: 4B
Abstract: The Western Colorado Climbers' Coalition (WCCC) is dedicated to preserving access to Western Colorado's climbing areas. With the important work they do, they believed that their old website didn't effectively reflect their mission or impact the climbing community to its potential. Our new website will preserve the information of the old site, while bringing their web presence to modern standards. By utilizing graphic design and high resolution images, our site characterizes what they aim to accomplish as a coalition and gives a more user-friendly experience. With these changes, we expect to see an increase in donations by helping potential donors understand the work that the WCCC has done (and will continue to do) to maintain climbing areas on the western slope. Visitors gain insight, and have a much better platform to get involved with the local climbing community.

Title: CMU CUSTODIAL DELIVERY APP
Presenter(s): Dakota Connors, Dalton Thornton
Faculty Mentor: Warren MacEvoy
Track: 4B
Abstract: The CMU Custodial Department has multiple teams of workers involved in the distribution of laundry and cleaning products. To keep track of all the moving parts in the system, the department currently uses Google Forms to help submit and save information from each worker. As helpful as Google Forms has been in organizing this delivery system, the department needs a more customized approach so all workers can use the system to help speed up their job. The goal of this project is to create an app that the CMU Custodial Department can use to place orders and track deliveries as they are made. After tracking this information, the app will also be able to tell the department how many supplies are being used in each building, how much those supplies cost, and even when to expect to deliver more.

Title: PROJECT ARMOIRE
Presenter(s): Tyler Jones, Zack LaVergne, Dalton Neely, Sayre Thomas
Faculty Mentor: Warren MacEvoy
Track: 4B
Abstract: Many computer science professors do not have access to computer-aided grading systems for student homework and test submissions. Online grading systems reduce the amount of time required for professors to grade assignments and provide more immediate feedback for students about their code. However, traditional grading tools are typically capable of either being secure against common attacks or effectively scale to many simultaneous users. By redesigning the typical grading system from the ground up with modern techniques, we demonstrate that both problems can be fully addressed. Project Armoire provides automated grading to professors and students in an easy to use interface to improve computer science education at Colorado Mesa University.

Title: EXPEDITION MENU: AN OUTDOOR PROGRAM TRIP MENU PLANNER
Presenter(s): Cameron Crow, Matthew Rutter, Richard Sterling, Austin Zandoni
Faculty Mentor: Warren MacEvoy
Track: 4B
Abstract: At CMU, the Outdoor Program(OP) is the headquarters for outdoor adventure and education. When preparing for a trip, the OP creates a trip menu and shopping list for each breakfast, lunch, and dinner. Doing this for a multiple day trip with a varying numbers of people and potential dietary restrictions can take a significant amount of time and manpower. We describe the development of a tool, Expedition Menu, that provides an easy to use interface for assisting in the creation of a trip menu from its database of recipes. It provides a scalable serving size adjuster for recipes to account for the varying group sizes. After describing the meal plans, Expedition Menu provides a printable version of the completed trip menu and shopping list.

Title: TREE TOUR: A TOUR OF THE TREES IN LINCOLN PARK
Presenter(s): Jared Boese, Marcus Johnson
Faculty Mentor: Warren MacEvoy
Track: 4B
Abstract: The Grand Valley is a beautiful area for outdoor activities, including hiking, rafting, and even learning about trees. Within Lincoln Park, every tree has a story, and in the past these stories could only be accessed through

scanning a QR code or making a phone call. With QR codes, each code must be scanned one at a time, and phone numbers have a similar issue when multiple numbers must be called. However, now there is an easier way. Tree Tour seeks to create an interactive way to learn about the trees in Lincoln Park. As users walk around Lincoln Park, they will be able to select a tree and access information about that tree (such as type, size, color, etc.) from the database. Aside from being a cool way to learn about trees for people of all ages, this is a good way for people to figure out what tree to plant based on how much space they have or what colors they want. This app will be a useful tool for everyone interested in trees.

Title: **TUTORIAL LEARNING CENTER AVAILABILITY APPLICATION**

Presenter(s): Jacob Boyce, Nicholas Harvey, Cameron Macdonald

Faculty Mentor: Warren MacEvoy

Track: 4B

Abstract: At CMU, the Tutorial Learning Center provides useful tutoring services to students that may be struggling in certain academic subjects. An important problem is that students seeking help need a quick and simple way to check tutor availability. Similarly, the tutors need a way to announce their availability at certain times. Our solution is a cross-platform mobile application. With this, tutors will be able to login and create a profile describing their subject areas. After creating the profile, they can announce their availability with a few taps. Correspondingly, students seeking tutors can immediately know which tutors are available and in which subject areas. We will discuss technicalities, including database, privacy, and security concerns.

Title: **MELONIZER**

Presenter(s): Levi Anstine, Sarah Harvey, Kaitlyn Stark

Faculty Mentor: Warren MacEvoy

Track: 4B

Abstract: Every year, thousands of watermelons are wasted when being tested for ripeness. To ensure quality, farmers typically test one of every ten watermelons they pick by breaking it open, making it unusable. To help prevent this waste, we are creating a product that will test watermelon ripeness using soundwaves, causing no damage to the watermelon. The product can reduce waste, saving farmers time, money and effort with a less intrusive testing method.

Title: **AN INVESTIGATION OF PHYSICS USING MODEL THEORY AND FIRST-ORDER LOGIC**

Presenter(s): Bret Brouse

Faculty Mentor: Ed Bonan-Hamada

Track: 4C

Abstract: Physical systems are represented or modeled using mathematics, but understanding what is mathematically true is a discipline in itself. This branch of mathematics is known as model theory, a part of mathematical logic that has developed techniques that transform certain theories or models to give new models that extend or modify the properties of the originals. If quantum theory and general relativity can be captured in First-Order Logic, and if the intersection of the two theories has certain properties, then there is a theorem that ensures that both models can be reconciled. This may be a first step toward a theory of quantum gravity.

Following the work of H. Andréka on the logical analysis of relativity, we extend the concept of applying mathematical logic to physics by introducing important tools available within model theory which may aid in the pursuit of a unifying theory of quantum gravity. The concept of amalgamation is explored by describing Craig interpolants and the Robinson Joint Consistency Lemma, tools we may use to decide if relativity and quantum mechanics are represented by accurate models and if a theory of quantum gravity is currently attainable.

Title: PROBABILITY OF PLAYING IN THE NHL

Presenter(s): David Gionco

Faculty Mentor: Clay King

Track: 4C

Abstract: Each June, the National Hockey League (NHL) organization draft players they believe will maximize the potential of their teams. They look at open roster positions, character traits, and player statistics to choose players that best fit their needs. But what are the odds that their picks will actually play in the NHL? Many draft picks are young, inexperienced, and underdeveloped. This leads to some players being stuck in farm leagues such as the American Hockey League (AHL) and Southern Professional Hockey League (SPHL). We look at various player demographics and use logistic regression to determine which variables correlate with a draft pick making it to the NHL. After fitting the model with these variables, we calculate the probability that a chosen draft pick will make it through the farm leagues to the NHL and then compare the probabilities of players with different attributes.

Title: JACKSONVILLE JAGUARS: HOW TO EXPECT SUCCESS

Presenter(s): Haley Jensen

Faculty Mentor: Richard Ott

Track: 4C

Abstract: In the National Football League (NFL), a vital component of a team's success is how well the offense performs. In collaboration with the analytics team for the Jacksonville Jaguars, we focus on using the concept of expected points to both fairly and effectively analyze the execution of an offense. For a given combination of down and field position, the expected value of points for that position is equal to the average of every previous next score from that position. We are then able to find the value of different plays using expected points, called expected points added. This information can be used for in-game decision making by being able to compare expected points from different possible outcomes. Subsequently, we use expected points and expected points added to determine the efficiency of the offense in their time of possession.

Title: MATHEMATICS AND MUSIC

Presenter(s): Jacob Wellborn

Faculty Mentor: Eric Miles

Track: 4C

Abstract: The connection between mathematics and music is a topic that has interested both mathematicians as well as music theorists. One such connection is the study of rhythm patterns. Rhythm patterns can be represented both numerically and geometrically, and we study the various properties of both discrete and continuous rhythm patterns.

ENGINEERING - FIRST YEAR DESIGN EXPO

- Title:** **MAVERICK ASABE**
Presenter(s): Trenton Howlett, Destiny Mares, Johnathan VanVleet
Faculty Mentor: Christopher Penick
Track: 5
Abstract: Quarter Scale Tractor: The American Society of Agricultural and Biological Engineers (ASABE) host an annual Quarter Scale Tractor competition in Peoria, IL. The competition is open to all engineering programs around the world. The Maverick ASABE Engineering Club was formed to design and build a quarter scale tractor to perform in the 2018 competition. The goal was to gain additional experience in design and manufacturing along with project management. The Maverick ASABE Engineering Club will be competing for the first year and the plan is to make this a part of Colorado Mesa for years to come.
- Title:** **STEAM POWER PLANT DEMONSTRATION**
Presenter(s): Chad Coulter, Jordan Robblee, Logan Smith
Faculty Mentor: Scott Kessler
Track: 5A
Abstract: Steam power was a major catalyst for the Industrial Revolution. It is most commonly associated with the steam powered locomotives of the 1800s. The steam engine is no longer something we see day to day; however, steam engines provide an excellent demonstration of the laws of thermodynamics and power conversion. The client desired a demonstration of an old-fashioned steam power plant and needed a boiler to power a steam engine, a generator to be driven by the engine, and a load connected to the generator. Additionally, the client wanted instrumentation to monitor steam pressure and temperature entering and leaving the engine. The boiler was built using a heating element from a water heater. The designers then added pressure and temperature gauges to the engine. Finally, a generator was connected to the engine via drive belt. A circuit of lights and switches was connected to the generator to provide a way to demonstrate the fact that work is required to produce electrical energy. When more lights are switched on, the engine RPM slows and proves that electrical energy does not come free, it requires work. The power plant will be an entertaining way for the client to demonstrate this principle to students.
- Title:** **PIPE SLIDE EXHIBITION FOR EUREKA! MCCONNELL SCIENCE MUSEUM**
Presenter(s): Myles Grandbouche, Braden Mullen, Sean Roberson
Faculty Mentor: Sarah Lanci
Track: 5A
Abstract: Eureka! McConnell Science Museum is a non-profit organization that teaches scientific principles to kids through hands-on demonstrations in Mesa County. One station in the exhibit is the pipe slide. This station has PVC tracks that are cut to various lengths with magnets on the back which then attach to a magnetic wall. These slides can be rearranged by children who send a mini tennis ball through the slides to demonstrate concepts of physics in a fun interactive way. The purpose of this project was to enhance the existing exhibit by adding/developing specific combinations of parts that can be put together to better demonstrate singular concepts such as friction, mass, and motion. It also has several nets that can be magnetically attached to the wall in different places. Improvements to the design now

feature sleek magnetic attachments embellished with felt so that they do not scratch the magnetic wall. The goal with this exhibit was to generate a simple yet fun way of showing many important scientific concepts for all ages.

Title: OPEN AIR HONEY BEE OBSERVATION HIVE
Presenter(s): Levi Basler, Alexander Breitzkreuz, John Ellyson, Hannah Kadel
Faculty Mentor: Scott Kessler
Track: 5A
Abstract: Honey Bees are extraordinary, hardworking insects with an extremely organized habitat and a fascinating eusociality. Bees' role in pollination is essential to preserve the ecosystem and humans greatly benefit from several products produced by bees such as honey, beeswax, royal jelly, and propolis, which are even used in medical treatments. The purpose of this project was to build an Observation Hive to serve as an educational exhibit for children in the Eureka! McConnell Science Museum. The observation Hive consists of an acrylic hexagonal prism of approximate 12 sq. ft. of volume. The Observation Hive is equipped with wheels for its relocation and a flexible tube that allows bees to go in and out of the museum. In this prism, bees will strategically create a habitat that will sustain them. This observatory will serve to educate people about bees and their importance in our environment at the Eureka! Museum.

Title: PREDICTING THE TERMINAL VELOCITY OF A SPHERE: A DEMONSTRATION
Presenter(s): Jacob Creglow, Bryce Kever, Sione Moniati, Darric Roark
Faculty Mentor: Scott Kessler
Track: 5A
Abstract: Every object in freefall has a terminal velocity; this scientific fact holds true whenever the external surroundings are not a vacuum. To determine this terminal velocity, an accurate way to measure the distance travelled and associated time intervals must exist. The relevance of this demonstration is to visually realize the predicted terminal velocity of an sphere in freefall. Lasers collect data on the point of passage to calculate terminal velocity. A viscous fluid slows freefall to more easily observe the passing of the sphere between points. The students observing this demonstration will utilize the physics of solid and fluid dynamics along with calculus to describe the terminal velocity of an object.

Title: SOLAR PANEL OPERATED SWAMP COOLER
Presenter(s): Damick Kinson, Jeremy Stone, Beau Torres
Faculty Mentor: Scott Kessler
Track: 5A
Abstract: Thermodynamics measures the relationship between heat and the various forms of energy. This project is designed to demonstrate the student's ability to successfully build an evaporative cooler from scratch, which will later be used as an activity in a thermodynamics course. The swamp cooler will be compact, capable of running on solar, and will be easy to transport. Thermodynamic student will compare the data from the swamp cooler and data from an outside source using temperature, humidity, and volumetric flow rate of the air leaving the cooler, in order to prove theoretical calculations.

Title: DEVELOPMENT OF BALANCE IMBALANCE DEMONSTRATION

Presenter(s): Dustin Foster, Jack Pezdirtz, Jose Ruiz, Nico Tscherner, Daniel Van Hoose

Faculty Mentor: Sarah Lanci

Track: 5A

Abstract: Physics can be a difficult subject to master given that most of its topics are conceptually complex. Hands on demonstrations can aid in the understanding of this field by providing an interactive opportunity to explore concepts such as balance. This particular concept plays an important role in many of the world's machines that incorporate rotating components. The purpose of this project is to develop a spinning flywheel with variable weight attachments to demonstrate the importance of having a symmetrically balanced system. When the moment of inertia is altered on a rotating object, the torque required to keep it steady increases. It is the goal with this demonstration that a person holding the spinning device could feel the imbalance when weight is randomly distributed across the flywheel's x-y plane. When in an imbalanced state, a person will struggle to keep the flywheel steady. Conversely, symmetrically dispersing the weights will require little to no effort from the person holding the device to keep the wheel steady. This project is intended to reveal the importance of balance in objects such as wheels, fans, and gyroscopes through a hands-on demonstration.

Title: DEVELOPMENT OF LIQUID DIELECTRIC PLATE CAPACITOR DEMO

Presenter(s): Jordan Coquoz, Lucas Ferguson, Garrett Shudinis, Jacob Stewart, Gerrold Wilkerson

Faculty Mentor: Sarah Lanci

Track: 5A

Abstract: Polarization is a concept involving the alignment of positive and negative charges that has applications to physics, chemistry, and biology. This concept is difficult to demonstrate due to the microscopic scale in which it occurs. One way to demonstrate this naturally-occurring phenomenon is to place a transparent capacitor within a dielectric liquid to show the effect that an electric field has on the liquid. The primary goal of this project is to create this demonstration to show how the liquid is raised due to the attraction of the positive and negative charges within the liquid. These charges align the particles and give them the energy to overcome the gravitational force. The demo consists of two glass plates that are angled towards each other in order to vary the capacitance thus varying the electric field between the plates. The liquid height is directly proportional to the distance of the plates, and the liquid demonstrates an exponential curve showing that the relationship between distance of plates and height of the liquid is not linear.

Title: METAL QUENCHING SYSTEM FOR TESTING METAL HARDENABILITY

Presenter(s): Dylan Ecker, Caleb Robinson, Cameron Steinholtz, Kenton Teske

Faculty Mentor: Sarah Lanci

Track: 5A

Abstract: Hardenability is a material's ability to be hardened through atomic transformation. This transformation can be forced in a controlled manner by spraying room temperature water on the bottom of a 1" diameter sample of steel that has been heated to between 800 and 900 degrees celsius. Once the metal is cooled, the hardness can be measured at intervals down the length of the sample. Higher hardness is indicative of the atomic transformation whereas a lower hardness indicates a slower cooling rate

and a lack of transformation. The purpose of this project is to develop a portable water-quench test to be used in the engineering program's material science class. The design consists of a traditional Jominy end-quench setup that adheres to an industry standard with one water inlet (controlled with a variable pressure valve and a ball valve) and one water outlet (to drain excess water back to a drain. The quench tank consists of a cylindrical tank with a horizontal flat strap across the top for the specimen to rest in. Students in the materials science class can then place the heated sample in the device and, after conducting the appropriate hardness tests, observe the effect of cooling rate on mechanical properties.

Title: TWO DIRECTIONAL CAMERA GIMBAL MOUNT FOR DRONE FLIGHT
Presenter(s): Jace Hattermann, Patrick O'Sullivan, Kyle Poole
Faculty Mentor: Sarah Lanci
Track: 5B
Abstract: The future of surveillance and environmental data acquisition lies with automated drone flight, providing greater mobility. This project was to design, develop and potentially produce a gyroscopic gimbal for the Yuneec H540 hex drone. Due to the recent release of the drone itself there have been no 3rd party camera mounts developed, making this project one of the first. The mount is a two directional gimbal (x,y) that uses the camera's weight, a MicaSense RedEdge 3 Multispectral camera, to keep it continuously pointing toward the ground during flight. This makes it possible for the camera to capture 3-D models of the landscape producing a topographical image. Without having to account for all 3 directions of motion (z excluded), fixing the mount to the drone will be simple and consist purely of 4 case screws. The mount itself has a vibration dampener connected in between the drone and camera. It's lightweight and had to fit between the legs of the drone when it lands. Due to weight restrictions while also needing strength, the gimbal was made with a combination of carbon fiber, aluminum and plastic polymer.

Title: STRUCTURAL BEAM DEMONSTRATION
Presenter(s): Kasidy Codner, Bennett Russell, Tyler Stump, Christian Yngsdal
Faculty Mentor: Scott Kessler
Track: 5B
Abstract: Beams and pillars are basic structural components of most buildings and infrastructures worldwide. Consequently, an early understanding of their behavior and principal characteristics is essential for designers, architects, and engineers. The objective of this project was to create flexible beams and pillars, of the most common shapes, to easily demonstrate their behavior, when loaded, in a classroom. The most common profiles include: I-Beam, C-Channel, Equal Angle, Non-Equal Angle and a Solid Round Member. This is a hands on demonstration. The beams must be flexible enough for students to manipulate but also strong enough to withstand use. A Cast/Mold technique was used to manufacture each element. Molding was identified as the most productive and cost effective technique for the construction of these specimens. The obtained beams and columns serve students at Colorado Mesa University to quickly understand the behavior of these structural elements subject to different loads of configuration.

Title: INTERACTIVE CLIMATE CHANGE EXHIBIT OF GLACIAL CAVITATION
Presenter(s): Valentine Desreumaux, Nicholas Duncan, Chance Eden, Michael Pankey
Faculty Mentor: Scott Kessler
Track: 5B
Abstract: There is abundant scientific evidence of the impact that climate change has on the environment. One of such impacts is the sea level rising due to calving of ice caps at the poles. The aim of the interactive climate change exhibit is to make kids realize the issue that climate change is, in particular cavitation, on our planet. The exhibit will show what happens when glaciers calve off into the sea in a basic and straightforward manner, so children can understand easily. In fact, the "glacier" is divided in different pieces, which submerge under water by activating a mechanical device. When the piece submerges, the water level goes up, thus affecting coastal cities. A representation of New York City stands on a shore line and in turn with the raising water, the city will begin to flood. The exhibit presents a topographical scale to show how much the sea has risen. The exhibit presents a physical demonstration for the education of children at the Math and Science Center.

Title: TESTING THE BOUNDARY EFFECT/FIRST LAW OF THERMODYNAMICS
Presenter(s): Quintin Kurtz, Gregory Payseno, Luis Silverio Flores, Kylyn Suarez
Faculty Mentor: Christopher Penick
Track: 5B
Abstract: Boundary Work Experiment: Evaluating boundary work and the first law of thermodynamics can be easily demonstrated by manipulating the atmosphere inside of a closed system. The experiment consists of a small tube running into an otherwise closed container that will be heated. When the exposed end of the tube is inserted in a water bath, the water will travel into the container. By changing the temperature and pressure inside of the closed system. Then measuring the volume of water that is displaced, one can calculate the amount of boundary work that is done by the system. The project is designed to be efficient and portable so it will be useful for classroom demonstrations.

Title: DEMONSTRATION OF CONSTANT ACCELERATION
Presenter(s): Zachary Elliott, Luke Goodrich, Lauren Schott, Matthew Smith
Faculty Mentor: Scott Kessler
Track: 5B
Abstract: The connection between net force and acceleration is a vital component of Newtonian physics. The aim of this project is to build a device able to show that a constant acceleration requires a constant net force, and coherently, a constant speed requires the net force to be zero. The engineered device consists of a motor to vertically pull a one-kilogram mass at a controllable acceleration and speed while giving a tangible, numerical value of the applied force. The one-kilogram mass is pulled a total distance of two meters with either a constant non-zero or zero acceleration, by means of a rope and a motor. The force is measured by a spring-actuated force sensor, providing a reading of constant force on the trip upward. At a constant speed, it is shown that the net force at dynamic equilibrium is zero. Overall, the demonstration provides evidence of Newton's second law of motion in a visual, large-scale manner, useful for student's instruction.

Title: GAS IT UP
Presenter(s): Maxemiliano Cintora, Kellisha Ostler, Spencer Taylor, Jebidiah Wolf
Faculty Mentor: Ulises Techera

- Track:** 5B
Abstract: The Ideal Gas Law states $PV=mRT$ (where P =pressure, V =volume, m =mass, R = gas constant, and T =temperature). The relationship between these variables exist in the functioning of countless devices that affect our life style, the industry, and the economy. The purpose of constructing this device is to be used primarily to demonstrate this law in a laboratory setting for students. The piston-cylinder device creates an air tight controlled system in which volume, temperature, and pressure can be manipulated and measured. With this new device, students can see the fulfilment of the Ideal Gas Law, for example, by increasing the temperature while keeping mass and volume constant there results an increase in pressure.
- Title:** FIRE SYRINGE
Presenter(s): Karlie Hadden, Bryce Kuehl, Chance Lewis, Jordan Van Vleet
Faculty Mentor: Christopher Penick
Track: 5B
Abstract: The first law of thermodynamics describes energy and how it can be transformed from one type of energy to another. An equation given in the first law is $\Delta U=Q\pm W$, which states that the change in internal energy (U) is equal to the amount of heat added (Q) plus/minus the work done on or by the system (W). In this project, this theory is tested by using a plunger to compress air in a sealed tube increasing the internal energy of the system. The ideal gas equations of state indicate that, as you increase the pressure and decrease the volume on the system, the temperature also has to increase. The goal of the project was to design a cylinder and plunger system that can ignite a piece of cotton in the tube by increasing the pressure, lowering the volume, and therefore increasing the temperature enough to ignite the cotton. A pressure gauge was added to the system to allow for measurement of the pressure in the tube to identify what pressure it takes to increase the temperature enough to ignite the cotton.
- Title:** LIGHT ON COLOR EXHIBIT
Presenter(s): Thomas Hook, Tabitha McCombe, Anexys Torres Castro
Faculty Mentor: Scott Kessler
Track: 5B
Abstract: Have you ever noticed that in parking garages the lighting makes the colors of the cars appear slightly different? This interesting phenomenon is due to the absorption and reflection of wavelengths of colored light on colored objects. The Light on Color Exhibit was created for the Eureka! McConnell Science Museum as an explanation and demonstration of the effect various light colors have on the appearance of colored objects. The team of three, Tabitha McCombe, Anexys Torres, and Thomas Hook, took approximately two months to design, construct and test the exhibit. The structure of the exhibit consisted of a wooden triangular base that supported a steel shade. Inside the shade wooden dividers separated the light colors, and the three different lights were mounted near the top of the triangular base. On the inside lip of the shade an acrylic barrier was added to serve as a protective barrier and holes were drilled in the wooden base to keep the wiring hidden. Children viewed a variety of colored objects under the lights and observed the interesting effects that the different colored lights had on the objects. The exhibit was both interactive and informative, all while maintaining visual intrigue.

Title: STREAM TABLES RE-DESIGN

Presenter(s): Dillon Foster, Brent Metzler, Bryson Sanchez, Ryan Watkins

Faculty Mentor: Gigi Richard

Track: 5C

Abstract: Stream tables are useful tools to demonstrate river channel systems by showing the erosion processes that form rivers and by allowing students to see how rivers affect the land around them. Understanding the transport and deposition of sediment in streams and rivers allows hydrologists, engineers, water resource managers, river scientists, land use planners, stream ecologists and other professionals to help address pressing environmental issues including fate of pollutants, effects on aquatic life and habitats, and changes related to land use. The geology program at CMU has stream tables which needed mechanical adjustments and re-design to alleviate issues with pumps, filtration, and substrate material. The team used a dual outlet pump that allows for the adjustment of the rate of moving water, analyzed various substrate materials, and utilized and designed a filter system to keep sediment particles out of the water reservoir. The stream tables allow students to measure characteristics of the river channel by manipulating the model of the river in the stream table. By simulating rainfall or adding structures to the interactive river models, students can see how the river will react in different landscapes.

Title: HERO'S ENGINE POWERED BY PROPANE GAS

Presenter(s): Jesse Hagen, Nicole Harris, Isaac Nagel-Brice

Faculty Mentor: Christopher Penick

Track: 5C

Abstract: The Hero's engine is a simple device useful in demonstrating basic concepts of thermodynamics and chemistry. In its simplest form, the Hero's engine uses a concentrated heat source to boil water in a container with two small openings that are tangential to the surface of the container and diametrically opposed. The two openings allow the steam from the boiling water to escape and cause the container to spin. Overall, the Hero's engine will exhibit the laws of thermodynamics and the transfer of energy and be used as a demonstrator for future thermodynamics classes.

Title: MASS-SPRING DAMPER DISPLAY

Presenter(s): Connor McCallum, Reilly O'Donnell, Kyle Tigar

Faculty Mentor: Scott Kessler

Track: 5C

Abstract: All around the world, there are devices or systems utilizing dampers to control the decay of oscillations to return those devices or systems back to a static equilibrium. In this project, a mass-spring-damper device will be modified and then tested showing the effects of various levels of damping on a weight suspended on a spring. In addition to the visual display, the device will utilize an accelerometer to allow data to be collected and evaluated determining the ideal level of damping per a given scenario. The device will be used to verify the theoretical concepts discussed in the System Dynamics and Vibration classes taught at CMU. Students in those classes will be able to vary the amount of mass, the spring rate, and the amount of damping to test various scenarios.

Title: DEMONSTRATION OF FLOW VELOCITY PREDICTION IN SYSTEM WITH SIGNIFICANT VISCOUS LOSSES

Presenter(s): Jesse Boyce, Jose Martinez Loachamin, Kyle Newborn, Jacob O'Banion

Faculty Mentor: Sarah Lanci

Track: 5C

Abstract: Pressure-driven flow velocity predictions have numerous real-world applications, such as calculating speeds, volumes and associated pump requirements for the transportation of oil in a pipeline, or calculating available fluid power for free-flow hydropower turbines. The purpose of this project was to develop a demonstration to allow students to predict velocities in flow systems with significant viscous losses. Specifically, students will compare the measured velocity to their predictions using a version of Bernoulli's equation. The device developed for this demonstration has the ability to adjust and maintain water height, such that different types of flow (i.e., laminar or turbulent) can be achieved. Fluid dynamics students in the CMU engineering program will then predict the flow velocity from the end of the discharge pipe.

Title: DEVELOPMENT OF A BUBBLE RAFT DEMONSTRATION FOR ATOMIC STRUCTURE IN MATERIALS

Presenter(s): Samuel Brennan, Justin Eller, Lucas Mitchell, Nicole Monte

Faculty Mentor: Sarah Lanci

Track: 5C

Abstract: Atomic structure in crystalline materials is the driving factor for material behavior. Solid materials are classified by their atomic arrangement and deformation under external forces depends on that arrangement. Observing these atomic arrangements with the naked eye is impossible, therefore computer models or static physical models are often used to demonstrate these arrangements to students in the classroom setting. What is even harder to observe is the movement of the atoms in relation to one another when external forces are applied. However, being able to identify atomic features and observe the effect of external forces on the structure is vital to understanding how crystalline materials deform. The purpose of this project is to create a lab demonstration of atomic movement in crystalline materials when acted on by external forces. By subjecting a solution of bubbles to a variety of mechanisms that simulate external forces, the behavior of the atomic structures of metals is mimicked by the bubbles. The simulation of the bubble "atoms" will give students insight on some behaviors of materials such as plastic deformation, shear, and slip.

Title: DESKTOP LINKAGE BENCH

Presenter(s): Johnathan Clemmer, Dillon Merenich, Bradly Schiesser

Faculty Mentor: Scott Kessler

Track: 5C

Abstract: The ability to visualize the linkage movement for angular displacement aids analysis of mechanical designs. A Desktop Linkage Bench is an apparatus designed to demonstrate degrees of freedom (number of independent movements) and loads on linkage models. The operator will be able to change the configuration of the structure. Each configuration shows different real-world designs in simple ways for visualizing movement of linkages in adjustable positions to realize the loads that those components are under in different positions. Dr. Castro required a Desktop Linkage Bench to demonstrate degrees of freedom and linkage models in Machine Design classes. Under guidelines from Dr. Castro, the apparatus was designed as a frame closed in with Plexiglas sides and front door with latch for protection. The horizontal top frame bars had holes made every inch to have removable rods. The rods were used to support the Technic Lego™ pieces that join to make the various linkage models possible. The final product will demonstrate the operation of linkages found in daily life.

Title: **BOILING WATER AT LOWER PRESSURE AND TEMPERATURE**
Presenter(s): Brendan Figueroa, Leo Johnson, Bradley Riva
Faculty Mentor: Christopher Penick
Track: 5C
Abstract: Water boils at 212° F, and this is no secret or scientific breakthrough. Although, what if I could convince you that with a little bit of will power, we could make even warm tap water boil? The Ideal Gas Law, illustrates that water can be boiled by manipulating pressure within the system. The pressure of the system can be changed by drawing water into a syringe, closing the nozzle and quickly pulling back the plunger, this increases the volume and lowers the pressure within the syringe.

Title: **GEARBOX BENCH TEST**
Presenter(s): Duel Hammonds, Eric Hart, Francisco Navarro
Faculty Mentor: Scott Kessler
Track: 5C
Abstract: A gearbox alters torque and speed between a power source, e.g. an engine, and a load. A gearbox bench test is an apparatus for observing how gears respond to different operation conditions. Gearbox bench tests are very useful in understanding exactly how much energy the gears in the gearbox are putting out relative to how much energy is utilized to turn the gears. The purpose of this project is to be able to study the effect of different parameters on performance variables such as angular speed and power. These parameters include: the mass of the gears, the resistance torque added to the smallest gear, and water or oil to simulate lubricants.

ENGINEERING - OPEN DESIGN

Title: **SHIN SPLINTS**
Presenter(s): Joshua Levy
Faculty Mentor: Georgann Joufflas
Track: 5D
Abstract: A shin splint, or medial tibial stress syndrome (MTSS), tool is used for soft tissue massage and breaking up and healing scar tissue caused by MTSS, a condition that can result from athletic training. The different heads of the tool are used for completely different areas of affected tissue and employ different amounts of pressure and technique. It is a self-treatment tool for use at the customers' or athletic training programs' expense that is a cheaper, more viable option to help relieve stress in the soft-tissues involving MTSS. This product was designed to save people money while providing much better treatment than traditional methods. The customer can now, as they could not before, treat their own shin splints or MTSS without a doctor or athletic trainer. The tool can be distributed throughout athletic training programs to save time, money, and reduce the athletes' discomfort while performing. This product also has potential to become an at-home, user-friendly device for anyone experiencing shin pain regardless of whether or not they are suffering from MTSS. All heads used in combination with oils, either combined with the product or at the user's discretion, create pressure on soft tissue and scar tissue. Combined, the complete device is used to relieve symptoms of MTSS, and this was purpose behind creating this product.

Title: **AUTONOMOUS ROVER**
Presenter(s): Brogan Butler, Mitchell Dilley, Stephen Drozda, Westlyn Johnston

- Faculty Mentor: Scott Bevill
Track: 5D
Abstract: The purpose of this project is to create an autonomous rover capable of navigating to specified GPS coordinates and delivering a payload while detecting and avoiding obstacles in its path.. The design incorporates an Arduino microcontroller, motor driver, radio frequency receiver, ultrasonic range finders, and four DC motors run by two sets of NiMH battery packs. Through testing of multiple prototypes, the final design was developed. Completion of this project required application of course material from multiple engineering classes. The finished prototype demonstrates the integration of a microcontroller and multiple sensors to create a "smart" vehicle.
- Title: THE AUTOBOX**
Presenter(s): Sara Gladding, Aric Harper, Alan Wheeler
Faculty Mentor: Scott Bevill
Track: 5D
Abstract: Growing out of the frustration of constantly searching for tools, as well as the desire to help mechanics with disabilities manage their tools, the AutoBox is a proof-of-concept prototype that tracks inventory and automatically stores/dispenses tool containers on command. The AutoBox team worked through several concept generation exercises before hitting upon the idea for the AutoBox. The design and construction of the AutoBox demonstrates that the concept we envisioned is valid. In its fully developed state, the AutoBox would be able to manage an entire toolbox worth of tools.
- Title: THE R.O.V.E.R. UNIT**
Presenter(s): David Hunt, Noah Jackson, Joshua McGarity, Alexander Weaver
Faculty Mentor: Scott Bevill
Track: 5D
Abstract: The R.O.V.E.R. is a small but mighty robot, that will be programmed to complete 4 missions. The main goal of these missions is dropping a payload after navigating through a specific course. The R.O.V.E.R. will need to be able to send and receive wireless messages, use an obstacle detection and avoidance system, and accurately travel to specified GPS coordinates.
- Our team is working on this project for the class Engineering Integration 2, with significant time spent in and out of class to make it run. Through the design process, we learned three things: First, to generate as many ideas as possible to solve the problem (if you have 100 different ideas at least one might be good). Second, to evaluate those ideas and choose the best for your project. Third, always give yourself more time than you think it will take to test and troubleshoot.
- Title: KINEMATIC AND DYNAMIC ANALYSIS OF EXTERNAL KNEE ADDUCTION MOMENT WITH VARYING FOOTWEAR**
Presenter(s): Luke Pagni, Conner Swatloski
Faculty Mentor: Scott Bevill
Track: 5D
Abstract: The purpose of this project was to investigate the effect of footwear on the external knee adduction moment (EKAM) in five healthy subjects. Gait analysis was performed using a Vicon motion capture and force plate system followed by inverse dynamics calculations using OpenSim software. Subjects were analyzed wearing a uniform stiffness control shoe, variable

stiffness shoe, flip-flops in “new” condition, flip-flops following 10 weeks of wear, and the subject’s personal shoe. Additionally, changes in hardness and thickness after 10 weeks of wear were measured for the flip-flop footwear and correlated with changes in EKAM.

Title: **PLOT YO SELF**

Presenter(s): Jaden Koos, Nicolas Maraschin, James Prescott, Gregory Waldorf

Faculty Mentor: Scott Bevill

Track: 5D

Abstract: The purpose of this project was to construct a 2.5D CNC plotter. The CNC plotter was capable of drawing on a 10-inch by 10-inch surface with a .005-inch tolerance. This tolerance was held while running at 100-inches per minute feed speed. One additional requirement of the project was to make the plotter portable. The finished product weighed less than 25 pounds and was under 20 inches wide, making it easy to transport for on-site applications. The plotter was capable of drawing images from G-code using Chilipeppr, F-Engrave, and Arduino. Design and fabrication of the plotter required various manufacturing methods including 3D printing and welding.

ENGINEERING – SENIOR DESIGN

Title: **RATCHETING MECHANISM FOR PARTIAL HAND PROSTHESIS**

Presenter(s): Tia Valles

Faculty Mentor: Tom Benton

Track: 5E

Abstract: The partial-hand design features single-hand operation, human-powered per wrist flexion, and ratcheting mechanism for grasping formation. The release mechanism is located near the residual thumb for returning the prosthesis to a relaxed position. Integrating human powered mechanical assemblies for complex tasks with the intimate fit of silicon is the goal of the project. While silicon prosthesis has aesthetic benefits, manual jobs that require holding a position for long periods of time are strenuous for the user. The ratcheting mechanism would remove unnecessary stress to the residual limb as the most common prosthesis involve constant wrist flexion for the fingers to contract. My design contracts at intervals specific to the number of wrist flexions instead of continuous pressure.

Title: **FEASIBILITY STUDY OF PENDULUM VIBRATION ABSORBER ADAPTED TO 90-DEGREE V-TWIN AERO ENGINE**

Presenter(s): Ross Fischer, Eric Jacobs, Tyler Raymond

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: Spirit Engineering, a small engineering firm located in Grand Junction, Colorado, is developing an inexpensive Light Sport Aircraft (LSA). A 45-HP, two-cylinder, V-twin engine powers the light aircraft and is particularly well-suited because of its short length, high thrust line, and overall package shape. However, the torque pulses of the two-cylinder engine are relatively harsh compared to engines with higher cylinder counts. These harsh torque pulses result in high internal loads, stresses, and vibrations within the crankshaft. Spirit reached out to a group of senior mechanical engineering students to evaluate the potential of using pendulum absorbers to mitigate torsional vibrations in the crankshaft. Pendulum absorbers store vibrational energy and return it to the crankshaft by incorporating masses on the crankshaft counterweights, which have some degree of angular and radial

movement relative to the rotational axis of the crankshaft. The group quantified the level of vibration reduction and visually demonstrated the function of pendulum absorbers in this application.

Title: SOLDER PASTE FOIL JETTING PUMP

Presenter(s): Nevin Lister, Hayden Murphy, Jacob Wallace

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: As electronics become smaller and smaller and are in greater demand, production processes that make them possible must operate with greater precision and speed. The objective of this senior design project was to research and develop a new method for dispensing solder paste using a novel foil jetting concept for GPD Global, a manufacturer of fluid dispensing systems located in Grand Junction, Colorado. Solder paste is an adhesion component for circuit boards comprised of individual microscopic beads. Solder paste is difficult to work with because the solder beads can be crushed during the dispensing process. Foil jetting is a method of dispensing solder paste, which involves jetting air through a thin metal foil with small apertures containing solder paste onto a circuit board below. The research done by the team provides data necessary for designing a foil jetting head to mount to a GPD Global precision dispensing system. This method will produce smaller volumes and higher speeds than the current industry standards, providing GPD Global with a competitive edge in the market.

Title: MODIFICATION OF A TECH SAW FOR CUTTING GREEN CERAMIC

Presenter(s): Keenan Jewkes, Alix Peltier, Levi Walcher

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: CoorsTek Bioceramics is a manufacturing company located in Grand Junction, Colorado that fabricates ceramic parts used in prosthetics, implants, and other medical devices. These parts are manufactured from a powder mixture that is compressed into solid cylindrical billets that resemble chalk in both appearance and durability. This chalk-like product is referred to as green ceramic and must be heated in a furnace to be hardened for strength and durability. Prior to the hardening process, billets of green ceramic are cut into cylindrical sections that are picked up by a suction device for further processing. Currently, these slices are cut from green ceramic billets using a band saw posing a safety risk to saw operators and creating a rough surface that cannot be picked up by the suction device. CoorsTek purchased an upward-feed saw with a safety hood to help address the safety risk. The design team has equipped the saw with a blade that creates a surface suitable for the suction device in the next operation of the manufacturing process. The team also modified the machine to include a clamping system that allows the machine to cut green ceramic billets without requiring the saw operator's hands to guide the process.

Title: INTERNAL COMBUSTION ENGINE TEST STAND FOR ANALYZING THERMODYNAMIC PROCESSES

Presenter(s): Brant Bear, Logan Donohue, Anthony Fiantaca

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: To help students better understand thermodynamic systems such as internal combustion engines, hands-on lab activities can be used. The project client, Dr. Nathan McNeill, is a professor for the CMU/CU-Boulder Partnership

Program. He teaches Thermodynamics I & II, which are junior level classes in the engineering program. Currently, the class is taught with only an analytical approach with no current method to compare calculated values to actual values for a given thermodynamic process. Dr. McNeill challenged the team of 2017/18 seniors to design an engine test stand to allow future students to conduct lab activities to better understand the thermodynamic processes involved in internal combustion engine performance. The team also developed lab activities where students can analyze an engine's torque, input temperature, output temperature, emissions, output power, input power, and mass air flow rate.

Title: OPTIMIZATION OF CHANGEOVER PROCESS ON A RECREATIONAL FISHING LINE COATING MACHINE AT WESTERN FILAMENT, INC.

Presenter(s): Daniel Hegge, Aldrin Micua, Gunnar Pagnin

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: The purpose of this project was to reduce the time required to perform a color changeover process on a color coating machine at Western Filament, Inc. Western Filament manufactures an assortment of industrial braided fibers for automotive, aerospace, and medical applications as well as recreational fishing line. To coat a filament, it travels through a coating pot filled with resin and then through a drying oven. When a new color is required, all components that came into contact with the previous line are cleaned in-place to prevent contamination between coating colors. Prior to the redesign, a color changeover took three hours and only one color is used at a time. Our team designed a modular system where the dirty components are removed from the coating machine and replaced with clean components in a few minutes. The dirty components are cleaned in a separate area after resuming production. The coating pot was also redesigned with individual sections to allow multiple colors to run at the same time. These changes will result in a decrease in time required to perform a color changeover on the coating machines and will allow Western Filament to produce four colors of line at a time.

Title: DESIGN OF AN ENVIRONMENTAL SIMULATION CHAMBER FOR HUMAN PERFORMANCE RESEARCH

Presenter(s): Dominick Brevig, Lance Matosky, Connor Timms

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: The purpose of this project was to provide a climate controlled environment in which the performance of exercising athletes could be evaluated for research purposes for the Monfort Family Human Performance Lab of Colorado Mesa University. The chamber that was designed has the ability to maintain a constant temperature between 32°F and 115°F and to also maintain a relative humidity of up to 95%. Infrared heating panels are used to heat the chamber and simulate direct radiation from the sun. To cool the chamber, a refrigeration system is used. The chamber is able to reach the maximum and minimum temperatures within an hour.

Title: DESIGN OF AN AUTOMATED TRANSPORATION SYSTEM FOR INNOVATIVE TEXTILES

Presenter(s): Jake Chiddix, Scott Foster, William Ramsey

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: Innovative Textiles, also known as POWER PRO, is a subsidiary of Shimano

with a manufacturing facility located in Grand Junction, Colorado. Innovative Textiles creates braided fishing line which is wound onto plastic spools of various sizes. Innovative Textiles experiences problems moving large containers of new spools around their factory. The current method of moving containers of spools is inefficient, unsafe, and time consuming. Innovative Textiles tasked this senior mechanical engineering design team with developing a system to convey individual spools from a container in one location to a container in another location in less than half an hour. A pneumatic conveying system was designed to pull spools out of one container and transport them through a plastic pipe to another container.

Title: DEVELOPMENT OF BICYCLE WHEEL TRUING AND DISHING COMBINATION STAND

Presenter(s): Joseph Buches, Jonathan Johannsen, Benjamin Whitney

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: DT Swiss is a Switzerland-based manufacturer of high-end bicycle components who specialize in the production of bicycle wheels. Each wheel is hand-made to ensure tight tolerances resulting in high quality. Two processes of wheel manufacturing are truing and dishing, which are essential for ensuring the wheels are round and the rims are centered on the hub. Currently, these two processes are separate operations that the wheel builder switches between during wheel manufacturing. The DT Swiss subsidiary in Grand Junction, Colorado, tasked the senior design team to combine truing and dishing into a single operation to reduce the overall wheel manufacturing time. The senior design team combined these two processes by using a laser measurement device that measures the true and the dish of the wheel simultaneously. The system analyzes the measurements and gives recommendations for the necessary corrections to the operator. The system fits on DT Swiss' current truing stand and can store various wheel information to give recommendations for the wheel that is currently being manufactured.

Title: INSTRUMENTATION FOR THERMODYNAMIC ANALYSIS OF A MAZDA MIATA COOLING SYSTEM

Presenter(s): Anthony DeFeo, Dalton Hamer, Heather Mayerle

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: The purpose of this project is to complete a thermodynamic analysis of the cooling system for a high-performance Mazda Miata four-cylinder engine. The original engine cooling system has been modified by the Flyin' Miata performance shop located in Grand Junction, Colorado. The modifications include a turbo kit to increase the air flow into the engine, a larger aluminum radiator for improved cooling and dual electric radiator fans for increased airflow through the radiator. With the modifications, the coolant temperature is overheating during high ambient temperature track use. The thermodynamic analysis of the cooling system defines the amount of heat each component of the system generates, and how much heat the system can dissipate. The thermodynamic analysis provides insight into which components of the system require modification and how they should be arranged in the engine compartment to allow for lower coolant temperatures during track races.

Title: **DESIGN AND CONSTRUCTION OF A THERMODENUDER FOR CONDITIONING AEROSOLS**

Presenter(s): Kwasi Kyeremeh-Dapaah, Mathew Nielsen, Paul Yanowich

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: The Vance Lab at the University of Colorado, Boulder is headed by Marina Vance, PhD, who is a research scientist and assistant professor of Mechanical Engineering. The research group applies environmental engineering tools to better understand human exposures to emerging environmental contaminants, especially ultrafine aerosols and incidental or engineered nanomaterials. Aerosols are minute particles in the air and are generated from sources like volcanic eruptions, dust particles from the desert, burning of fossil fuels, and emissions from internal combustion engines. These particles can have significant effects on human health when inhaled, atmospheric visibility, and climate change. Aerosols serve as the nuclei for the formation of cloud droplets affecting earth's climate based on the chemical composition of the aerosol. A thermodenuder is a device used in air quality research to separate and measure the volatile components of an aerosol. The purpose of this project was to design and build a thermodenuder for the Vance Lab. Investigating the volatile properties of aerosols helps scientists and engineers better understand their organic makeup and their effects on the environment.

Title: **WEIGHT REDUCTION OF QUICK RELEASE MECHANISM FOR LOWER LIMB PROSTHESES**

Presenter(s): Alain Bucio Barrios, Dane Dulaney, Zachary Kennison

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: People with lower limb prostheses face the difficulty of putting on and taking off pants because the foot is rigidly set at a right angle to the leg. The client for this project, Mark Lewis, founder of Rocky Mountain Manufacturing, designed a quick release mechanism for lower limb prostheses to make this task easier. The component allows people with lower limb prosthesis to quickly detach their foot from their prosthetic leg. The client believes his design is too heavy and has requested the senior engineering design team to model loading conditions on the component to determine regions of high and low stress to suggest methods for weight reduction. The proposed solution is to reduce the weight of the quick release mechanism by utilizing finite element analysis (FEA) to pinpoint areas of high and low stress. Areas of high stress will be reinforced, if necessary, to improve structural integrity, while the thickness of low-stress areas will be reduced to decrease the weight.

Title: **DATA ACQUISITION SYSTEM DESIGN AND IMPLEMENTATION ON A FORMULA SAE CAR**

Presenter(s): Corbin Cooper, Nathaniel Glennon, Garrett Rodstrom

Faculty Mentor: Christopher Penick

Track: 5E

Abstract: The Colorado Mesa University Engineering Club, Mesa Motorsports, wants to strengthen their design process by implementing data acquisition on the racecar they are developing for the 2018 Formula SAE competition. They would like to obtain performance data so they can understand ways to reduce vehicle weight, improve performance, and better understand design decisions. The senior design team sponsored by Mesa Motorsports was tasked with developing a basic data acquisition system for the racecar by selecting and implementing all the equipment required to acquire data

from the chassis, tires, brakes, and suspension systems. The car has been instrumented with a student-built data logger that reads and records data from pressure transducers, infrared temperature sensors, force sensors, and an accelerometer. In addition, the senior design team has generated test plans for measuring tire temperatures, and setting up the car's chassis for torsional stiffness testing. This system will continue to be used to help the team improve 2018 design scores by 20%. The team will also use the data acquisition system and test plans in future years to improve scores and decrease the car's weight by five pounds for the 2019 season.

HEALTH SCIENCES

Title: **IMPORTANCE OF THE MEDICAL LABORATORY**

Presenter(s): Deseray Davis, Arond Schiltz, Cassandra Spor

Faculty Mentor: Tracy Matthews

Track: 6

Abstract: The medical laboratory plays a key role in providing appropriate care for patients. This poster has an historical and current perspective of the medical laboratory profession. The importance of education and certification is covered as well as the scope of laboratory testing. For education, the focus is on the specific training and skills that are provided by Medical Laboratory Technician programs. This poster also covers why obtaining certification, as well as continuing education, is an important component of working in a laboratory. Although automation has made testing easier, there is still depth and complexity to providing quality tests. After viewing this poster, the audience will have a greater understanding of the role the medical laboratory plays in diagnostics and patient care.

Health Sciences

Title: **A REVIEW OF BREAST AND PROSTATE CANCER TUMOR MARKERS**

Presenter(s): Catherine Alldredge, Meaghan Caldwell

Faculty Mentor: Tracy Matthews

Track: 6

Abstract: This presentation explores the use of tumor markers in both the screening and monitoring of treatment for breast and prostate cancer. In 1847, Henry Bence-Jones made a breakthrough in the discovery that cancer cells produce a protein that is known as a tumor marker. These markers allow for easier recognition of benign and malignant tumors within a patient. Over a century later, two of the most commonly screened cancers in the United States, breast and prostate cancer, were discovered to have their own differentiating tumor markers. Through these findings, we discuss how these tumor markers are now being utilized in laboratory testing to observe for tumor growth, recurrence, and effectiveness of treatment.

KINESIOLOGY

Title: **ACUTE EFFECTS OF PERFORMING HEAVY CONVENTIONAL DEADLIFTS ON VERTICAL JUMP AND PEAK GROUND REACTION FORCE**

Presenter(s): Bryanna Adams, Jason Brace, David Gionco, Connor Stephenson, Trey Thurmond

Faculty Mentor: Michael Reeder

Track: 7

Abstract: Acute prior muscle activation has been shown to improve the rate of force development (RFD), peak ground reaction force (GRF), and vertical

jump height. One of the proposed mechanisms to these increases is post-activation potentiation (PAP). Purpose: To determine if performing a submaximal deadlift immediately prior to a vertical jump can enhance peak GRF and vertical jump performance in Division II football players. Methods: Twelve collegiate football players randomly completed two trials in a crossover design over a two-week period. The control trial consisted of three vertical jumps with no prior muscle activation while the experimental trial had subjects perform three submaximal deadlifts at 80% of one repetition maximum (1RM) immediately prior to performing three vertical jumps. All jumps were performed on a force platform while measuring vertical jump. The jump eliciting the highest vertical jump was used to measure peak GRF in newtons (N) and then normalized to bodyweight in kilograms (kg). Results showed no significant ($p>.05$) differences between the control and experimental trials in vertical jump performance and normalized peak ground reaction force. Results indicated that a heavy deadlift used to stimulate PAP had no significant effect on vertical jump height or normalized GRF.

Title: THE EFFECTS OF THERATOGS ON POSTURAL MUSCLE AMPLITUDE IN SUBJECTS WITHOUT SENSORIMOTOR IMPAIRMENTS

Presenter(s): Taylor Cecil, Abby Costello

Faculty Mentor: Michael Reeder

Track: 7

Abstract: There has been little research done on the effects of postural muscle amplitude while donned in TheraTogs. TheraTogs is a full body undergarment and strapping system made of elasticized, latex-free, Velcro sensitive fabric that encourages all day passive, postural support. Previous research focused on patients with sensorimotor impairments whereas the current study's subjects had no known impairments. This non-randomized, experimental study aimed to investigate TheraTogs on postural muscle amplitude. To assess the muscles amplitude of four postural muscles, an electromyography (EMG) was used. Data collection was taken for five different cumulative conditions. Average EMG activity of middle trapezius, thoracic erector spinae, rectus abdominis, and external oblique muscles was collected. Group postural muscle amplitude was the highest for the middle trapezius when the erector spinae strap was applied (+54.9%) compared to no garment. There was little change in the thoracic erector spinae amplitude for each condition, but the rectus abdominis strap caused the highest percent change in that muscle (+22.3%). In the abdominal muscles, all conditions produced less amplitude compared to no garment. Following an ANOVA, there were no significant differences between each condition, although there were qualitative differences. TheraTogs induced changes that can be effective for daily postural control.

Title: A PILOT STUDY OF INJURY PREDICTION IN FEMALE D2 SOCCER PLAYERS USING FUNCTIONAL MOVEMENT SCREEN (FMS) AND LANDING ERROR SCORING SYSTEM (LESS)

Presenter(s): Mitchell Vandel

Faculty Mentor: Carmine Grieco

Track: 7

Abstract: In collegiate sports, injuries are common and can hinder athletic performance. Before an athlete is cleared for participation, they are screened for life-threatening conditions; however, there is no screening for musculoskeletal injury risk. If medical professionals were able to identify athletes at an increased risk for injury, they may be able to develop individualized prevention programs to help mitigate injuries.

The purpose of this investigation was to determine the relationship between performance on pre-exercise screening instruments and the likelihood of injury in Division 2 varsity women's soccer athletes. Two screening instruments, which assess fundamental movement patterns, included the Functional Movement Screen (FMS)[™] and the Landing Error Scoring System (LESS). To test their ability to predict injury, 15 subjects completed both screens and then injury rates were documented across one competitive season. The data are currently in the last portion of collection and evaluation. Once evaluated, the data will help add to the existing information on pre-exercise screening instruments and their ability to predict injury.

Title: SUBSTRATE UTILIZATION BETWEEN GENDERS AT HIGH AND LOW INTENSITIES

Presenter(s): Anna Schmidt

Faculty Mentor: Brent Alumbaugh

Track: 7

Abstract: Substrate utilization can be affected by intensity and duration of physical activity. There is also evidence suggesting that gender plays a role in substrate utilization. The purpose of this study was to measure Respiratory Exchange Ratio (RER) differences between genders at different exercise intensities. Two males and two females performed two predetermined, randomly selected exercise bouts of either high or low intensity. Speeds were calculated by using the American College of Sports Medicine equation for running based off their estimated VO₂ max from the Rockport walk test. The low intensity exercise trial consisted of a 10-minute trial at 50% of VO₂ max. High intensity consisted of two, four minute intervals at 85% of VO₂ max. RER comparisons at the last minute of each trial were made using a non-parametric two-sample Welch's t-tests. There was not a significant ($p > .05$) difference during high intensity exercise. At low intensities, the males had a significantly ($p < .001$) higher RER than females. The results indicated that gender has an effect on substrate utilization at low intensities, but these differences are not significant when exercise intensities are greater than 85% of VO₂ max. Understanding these difference can help improve fueling strategies between genders at different intensities.

Title: GRIP STRENGTH AND THE VELOCITY OF A FOREHAND TENNIS STROKE

Presenter(s): Georgia Hansen

Faculty Mentor: Brent Alumbaugh

Track: 7

Abstract: Ball velocity is an important characteristic for success in competitive tennis. Methods for improving ball speed vary greatly, and controversy exists on which physiological characteristics have the greatest impact on ball speed. The purpose of this study was to determine if there is a correlation between grip strength and arm length with the velocity produced in a forehand tennis stroke. Fifteen collegiate tennis players, ages 19-23, were measured for grip strength, body mass, and arm length. Grip strength was normalized to body mass and was considered relative strength. After warming up, each subject hit five forehand shots while being recorded with a high-speed camera and distance markers to determine ball velocity. The highest velocity was compared to peak grip strength, arm length, and relative strength; these relationships were then put into a regression plot. Results indicated a strong positive correlation between velocity and arm length in females ($R = .70$) and a strong negative correlation between velocity

and relative strength in males ($R=-0.77$). There was no clear, trainable, physiological determinant of ball speed. The relationship between ball speed and arm length in females suggests that genetics play an important role in one's capability to produce high velocity in a forehand tennis stroke.

Title: THE PUBLIC HEALTH OF MESA COUNTY: FINDING AN AMERICAN FITNESS INDEX FOR SMALLER COMMUNITIES

Presenter(s): Greer Hanes

Faculty Mentor: Michael Reeder

Track: 7

Abstract: The American College of Sports Medicine (ACSM) developed a tool, the American Fitness Index (AFI), which assists communities in tracking and measuring health behaviors and community access to healthcare. The AFI lists only the top 50 metropolitan areas in the country. This study evaluated the AFI score for Mesa County and assessed the applicability of the MyAFI Toolkit, which was designed for smaller communities. Using the MyAFI Toolkit, information and data were obtained on preventative health behaviors, levels of chronic disease conditions, and healthy community resources and policies. The information was obtained at the Mesa County Health Department, Colorado Department of Public Health and Environment, and the Colorado Health Institute. Chronic health disease rates were higher in Mesa County than in Colorado statewide while healthy behaviors were significantly lower. Obtaining an AFI score for Mesa County using the MyAFI Toolkit is challenging secondary to the fact that data is not measured by many local health entities. The information gathered indicates the need to focus attention on promoting healthy behaviors and policies to decrease chronic disease.

Title: SKIING ECONOMY DURING CLASSIC AND SKATE TECHNIQUES IN BEGINNING AND ADVANCED CROSS-COUNTRY SKIERS

Presenter(s): Emma Malmquist

Faculty Mentor: Carmine Grieco

Track: 7

Abstract: Limited research suggests a difference in economy between the two primary cross-country ski techniques. Experience level of the skier may also have an impact on skiing economy. The purpose of this study was to investigate the influence of experience level on oxygen consumption in beginning and advanced cross-country skiers. One skate technique (V2) and one classic technique (double pole) was used for technique comparison. Eighteen subjects completed two submaximal tests on a rollerski treadmill. Metabolic data were collected to determine heart rate (HR), oxygen consumption, and respiratory exchange ratio (RER). Skate technique was found to be less economical than classic technique ($p<0.05$) in all skiers, while there was no significant difference in economy between beginning and advanced skiers for each technique. The respiratory exchange ratio (RER) was significantly lower in advanced skiers for both techniques. Strong negative correlations were discovered between hours of training per year and each of the following variables: skiing economy, HR and RER. It was concluded that although there was a trend towards significance in advanced skiers being more economical, hours of training per year may have a greater impact on economy.

LANGUAGES, LITERATURE AND MASS COMMUNICATIONS

Title: **ESPERANZA: BREAKING BARRIERS**

Presenter(s): Rosa Gomez

Faculty Mentor: Mayela Vallejos Ramirez

Track: 8A

Abstract: The House on Mango Street by Sandra Cisneros demonstrates the typical life of a Latin neighborhood in Chicago, USA. Esperanza, the protagonist, notices that the women on her street are trapped. She tries to find a way to break the traditional patterns that the conservative and patriarchal society have imposed on her. In this research, I focus on showing how Esperanza serves as a role model for all the Mexican American girls that are trying to balance the traditions of their culture while also trying to make a name for themselves in the world.

Title: **DREAMS DYING IN A PATRIARCHAL SOCIETY**

Presenter(s): Lucia Velasco

Faculty Mentor: Mayela Vallejos Ramirez

Track: 8A

Abstract: Círculos, by Aline Pettersson is a novel that portrays the reality of some women in contemporary society. Although Petterson is a Mexican writer, her ideas and perspectives embody the feelings of women around the world. This novel shows the frustration of a woman who lost her dreams and inspiration in the patriarchal society we live in. In my research, I will focus primarily on the roles that have been imposed on women that restrict their ability to act freely in a patriarchal society and to become their own selves in the twenty-first century.

Title: **THE AWAKENING OF ESPERANZA**

Presenter(s): Derek Mayo-Alvarez

Faculty Mentor: Mayela Vallejos Ramirez

Track: 8A

Abstract: The story "The Awakening of Esperanza" explores the odyssey of a woman named Esperanza and what she goes through to find her beloved daughter. In the process of searching for her daughter, she ends up finding her true self. Esperanza, a secluded woman living in a humble community, takes on the challenge of exploring beyond the boundaries of world in which she lives. Through her struggles, she ends up having an internal awakening. The idea explored is that of a bildungsroman literature style story - a story that explores the character's formative experiences - and how the concept of bildungsroman writing reflects on the Hispanic novel. A careful study of the symbolism is also conducted, including examining how it helps reinforce the bildungsroman artistic style of writing of the author, Maria Amparo Escandon.

Title: **GALLEGOS' DOÑA BÁRBARA AS AN EXAMPLE OF ATWOOD'S 'CREATIVE NON-VICTIM'**

Presenter(s): Lauren Lipski

Faculty Mentor: Mayela Vallejos Ramirez

Track: 8A

Abstract: When the titular character of Rómulo Gallegos novel Doña Bárbara is analyzed, it is traditionally regarding how she manifests both her masculine and feminine traits. However, previous analyses of Bárbara fail to acknowledge how she uses what once provoked her victimization—her feminine body, her beauty, and her budding sexuality—to rise above her

circumstances and attain agency in an otherwise masculine world. Through her re-created identity as a femme fatale, Bárbara becomes what Margaret Atwood calls a creative non-victim. However, at the end of the novel when she moves toward a more socially acceptable femininity and away from her reputation as a devadora de hombres, does she maintain or lose the agency and power she fought for years to attain? This presentation explores this question.

Title: ROMPIENDO ESTEREOTIPOS: CÓMO LA MUJER SE ENCONTRÓ A SÍ MISMA FUERA DE LAS NORMAS CULTURALES (BREAKING STEREOTYPES: HOW THE WOMAN FOUND HERSELF OUTSIDE OF CULTURAL NORMS)

Presenter(s): Emma Kemper

Faculty Mentor: Mayela Vallejos Ramirez

Track: 8A

Abstract: In a patriarchal society, women are forced to meet expectations created and designed by men. This includes the roles they fill and the actions they take. Throughout history, the definition of a woman has been imposed on women in order to please men. Women have been told that in order to function in society, they must fulfill the role of mother and wife and act in a way that is pleasing to men. This paper explores these imposed norms and how the protagonist of the novel *El Expediente* by Linda Berrón escaped the label of the perfect woman as she found her true self outside of society's definition of the traditional woman.

Title: PEPITA JIMÉNEZ: EL RECONOCIMIENTO DEL INTELECTO DE LA MUJER TANTO EN LA AMISTAD COMO EL ROMANCE

Presenter(s): Sarah Lease

Faculty Mentor: Mayela Vallejos Ramirez

Track: 8A

Abstract: Pepita Jiménez offers the reader a masculine view of the dichotomy of the woman: angel or demon. However, Juan Valera redefines this concept with the introduction of platonic love, thus adding another component to buen amor. Juan Valera comments that carnal love can coincide with platonic love, something that does not appear in Juan Ruiz's definition. Valera's definition defends women and recognizes their intellectual abilities. This presentation examines the dichotomy of the woman from three perspectives; acknowledges intelligence within the dichotomy; and defends Valera's definition of buen amor as it relates to the position of the woman.

Title: WHY 13 REASONS ARE NOT ENOUGH

Presenter(s): Lucy Raam

Faculty Mentor: Barry Laga

Track: 8B

Abstract: The purpose of this paper is to identify the negative impacts that "13 Reasons Why," a program on Netflix, has on its viewers. The contents of the show depict scenes of suicide and rape that are inappropriate and destructive for all members of its audience. I will verify this through research of the correlation between scenes of suicide and thoughts of depression, the effectiveness of the preventative measures that the show included in some episodes, and imitative behaviors of people after exposure to violent events both locally and worldwide. The presentation argues that viewing of the program should be strictly controlled in order to prevent at-risk audience members from emulating similar acts.

Title: ROSSETTI'S SECRET

Presenter(s): Kaleb Wilkins
Faculty Mentor: William Wright
Track: 8B

Abstract: Christina Rossetti's "Winter My Secret," to many readers, champions women's volition through withholding the "secret." It seems to tease readers with pretentious games. Many have concluded that there are neither secrets nor clues about a secret present in the poem and that Rossetti is utilizing her platform to assert feminist ideals and exercising her right, as a woman, to privacy. However, after much time spent with the poem, many clues have been revealed, and it can be argued that there is abundant textual evidence to support the claim that there is, in fact, a secret given. How does this affect a feminist reading of the text? It may be bold to say that nothing changes, but it must be considered that there is, in fact, a secret given, and for the remainder of Rossetti's life, she remained silent about its presence. Furthermore, for the last 150-or-so years, the secret has remained hidden. It could be argued that this would be more powerful than a simple game. It would mean that she truly guarded a secret to her death. Rossetti's secret will finally be revealed; it will be up to the audience to interpret its significance for Victorian England.

Title: THE ROLE OF VIGILANTES IN MONSTER THEORY

Presenter(s): Alexis Prall
Faculty Mentor: Tiffany Kinney
Track: 8B

Abstract: Many researchers use monster theory to examine the connection between cultures and their collective fears as embodied by figurative "monsters" (Cohen, 1997; Poole, 2014). However, within this academic conversation little has been studied regarding vigilantes as monstrous. By vigilantes, I refer to "someone who seeks personal revenge against a suspected criminal" (Bergman, 2015). My research attempts to fill this gap by examining how vigilantes are depicted favorably in popular films such as *The Avengers* while real life vigilantes are castigated. This line of research is important because it signals a contradiction in the treatment of vigilantism in the media versus in real life. In other words, people who take on vigilante roles in society are seen as monstrous because they are killing real individuals, while popular culture depicts vigilantes as "heroes," therein glorifying their image. It needs to be emphasized that these movies make an upwards of 1.5 billion dollars per film in the box office, yet many moviegoers do not critically analyze the destruction that these "heroes" are achieving through their vigilantism. My research will analyze the difference between the real-life and popular culture vigilantes and why one is seen as more monstrous than the other.

Title: FINDING VALUE IN 'UNCREATIVE' WRITING

Presenter(s): Megan Vorse
Faculty Mentor: Barry Laga
Track: 8B

Abstract: The common understanding of creativity limits the concept to originality in both syntax and content as well as in regard to ethical responsibility. Creativity in writing exists outside these perimeters and includes imitation or the reworking of another's work. The result of my 'uncreative' writing project, a die-cut alteration of Nathaniel Hawthorne's "The Minister's Black Veil," is an exercise in finding creative potential in preexisting material, putting subjectivity and unfamiliarity at the forefront of the creative endeavor rather than original thought or language. This project

differentiates between what is 'creative' and what is unfamiliar, placing greater value on what is self-aware. It gives the reader a new experience, rather than that which is original to the writer, but recycles the literary canon subconsciously.

MUSIC

Title: **DEVELOPING ENSEMBLE AND IMPROVISATION SKILLS THROUGH PLAYING AN ARRANGEMENT OF PATIENCE BY GUNS AND ROSES**
Presenter(s): Brett Christensen, Miguel Hermosillo-Velez, Brittnei Nack, Wyatt Rollins, Jamie Van Dyke
Faculty Mentor: Kristen Yeon-Ji Yun
Track: 9
Abstract: Composing pieces has always been my goal in studying music. While studying Vocal Performance, I have been working on composing and arranging new pieces. Upon joining the chamber group, I was very excited by the diverse ideas brought by the members and started to arrange pieces for the group. We present the arrangement of the piece "Patience" by Guns and Roses. As the main vocalist of the group – Axl Rose's voice range is similar to mine – I think the piece can showcase our greatest potential. The piece is originally written for an acoustic guitar and a solo voice. I arranged the piece for a voice and various instruments including piano, violin, cello, and bass guitar. The ensemble group hopes to exhibit good sound development, stage presence, and improvisation skills through this presentation.

Title: **CODE YELLOW'S "THE DOUCHE FLUTE"**
Presenter(s): Chase Brown, Nicholas Carozza, Michael Dackonish, Jalen Dalla, Calvin Lindberg, Cole Parker
Faculty Mentor: Darin Kamstra
Track: 9
Abstract: In a world of political, economic, and environmental drama, sometimes you need to step back and enjoy the little things in life. A year ago, I wrote a hip-hop song called "The Douche Flute," joking and celebrating the uprising trend of e-cigarettes. A year later, with the help of some uber-talented musicians, I was able to turn a laptop project into a full-band music piece. Originally, I used sound samples and MIDI notes inside of Logic Pro X (a digital audio interface) to create the song. Then, with the help of Dr. Kamstra, I could turn this electronic, hip-hop track into sheet music for my fellow band members to read. With an actual score of music, the band properly rehearsed and even added their own musical ideas to the piece. This song is meant to remind the world to not take things so seriously sometimes and enjoy the silly things in life.

Title: **EMCEE - A CLASSICALLY TRAINED MUSICIAN EXPLORES A NON-TRADITIONAL OPPORTUNITY**
Presenter(s): Ian McGuire
Faculty Mentor: Jonathan Hinkle
Track: 9
Abstract: As the music industry grows and competition continues to build, the ability to make a living as a performer can be quite difficult. After spending more than a decade acquiring and refining many traditional music performance skills, I decided to begin exploring other opportunities that might utilize these learned skills in a different part of the industry. Interactions with

individuals who have been successful in the contemporary music industry led me to become increasingly interested in pursuing careers in wedding services, which eventuality led to researching opportunities available in western Colorado. The result was the start of my own DJ business in 2017. This presentation gives an overview of my first year in this business and projections for the future.

Title: **DIE ANYWHERE ELSE MUSIC VIDEO**
Presenter(s): Jennifer Hemenway, Calvin Lindberg, Brianna Manette, Grant Zeller
Faculty Mentor: Darin Kamstra
Track: 9
Abstract: The project displays a collaborated music video created entirely by CMU students majoring in music. The cover song recorded is "Die Anywhere Else" from "Night in the Wood," an indie game by the developers Infinite Fall. This video shows an intimate scene of a band in the process of recording. For the video's audio, the tracks for each instrument were edited, mixed, and mastered through ProTools into a stereo audio format. The video features drumset, electric guitar, bass guitar, keyboard and vocals. The project shows how audio can be recorded to meet professional standards in a limited time frame with standard recording equipment. This project was used as a learning opportunity for making high-quality music videos that can be applied in future careers.

Title: **LUTE MUSIC OF JOHN DOWLAND**
Presenter(s): Brett Christensen
Faculty Mentor: Kristen Yeon-Ji Yun
Track: 9
Abstract: The influence of John Dowland (1563 -1626) on early Classical music is hard to understate. He is considered to be one of the greatest lute virtuosos and composers of the 17th century, and he composed over 80 pieces of lute music in his life. Dowland had the fortune of living at the height of the English Renaissance when instrumental, folk, and dance music began to overtake choral and church music in popularity. His skill in writing pieces for solo lute as well as for lute and voice were unparalleled. His work ranged in tone from the serious to the lighthearted, and his skilled playing was called "heavenly" by poets. During his time, he served as a court musician to King Christian the IV of Denmark and to King James I of England. Dowland published five books of solo lute work in his life, and his work appeared in five other publications. His first book, *The First Book of Songs or Ayres* (1597), became a bestseller, and Dowland went on to publish a second and third *Book of Songs*. I hope to do his legacy justice with a solo performance of *Come Again* from *The First Book of Songs*.

Title: **ROCK/POP VIDEO PROJECT, CHUNKY BY BRUNO MARS**
Presenter(s): Jacob Dickhausen, Austin Harshman, Autumn Kelly, Samantha Medina, Caleb Talkington
Faculty Mentor: Darin Kamstra
Track: 9
Abstract: Each presenter is a major in the Bachelor of Music with Elective Studies in Business program at CMU. This project is for the course *Advanced Music Technology*. In this course, we learn fundamental concepts of music production, and this rock/pop video project was a hands-on learning experience that allowed us to apply these concepts. In completing the project, we learned how to record in a studio to multi-track, set up and connect audio components, choose and use microphones effectively, and

edit and mix digital audio. This project gave us all great opportunities to apply what we have learned from our textbook to real life. The most beneficial way to learn about recording and mixing music is to do it hands on. We have had a great time putting this video together and we hope you enjoy it!

Title: REACHING SENIORS CITIZENS THROUGH MUSIC

Presenter(s): Wyatt Rollins, Delaney Santoro

Faculty Mentor: Arthur Houle

Track: 9

Abstract: My grandmother had a stroke 25 years ago, and although she lost the ability to form coherent sentences, she can still sing Happy Birthday. Music is a powerful tool, and various researchers are increasingly proving the astounding effects it can have on those with degenerative brain diseases. Not only can music improve mood, it can also replace medication in some situations and has even been shown to reverse the trend of Alzheimer's and dementia. As musicians, we have a responsibility to use our music to make a positive impact on the world. How better to do that than to bring music to the elderly?

We assembled a team of musicians who intend to serve our community by bringing music to senior centers throughout the Grand Valley. We will play at several centers, including Aspen Ridge, an Alzheimer's special care center, and Senior Daybreak, a senior day care for patients with memory loss. We will also research how music can be used most effectively to benefit these patients, using our research to shape our outreach efforts. As musicians, we have the power to make a great difference and want to use this power to bring joy to seniors in our community.

PHYSICAL AND ENVIRONMENTAL SCIENCES

Title: EXPLORING THE FLUID REGIME IN D-DIMENSIONAL FRW COSMOLOGY

Presenter(s): Bret Brouse

Faculty Mentor: Chad Middleton

Track: 10A

Abstract: A model of Friedmann-Robertson-Walker cosmology involving $d+4$ dimensions, where d is the number of extra dimensions, is examined. In this model, the higher-dimensional space is allowed to evolve at a different rate, in general, than that of standard three-dimensional (3D) space. By adopting two equations of state, we decouple a system of differential equations and obtain an exact expression relating the higher-dimensional scale factor to the 3D scale factor. This decoupling allows us to obtain the 4D effective field equations from which we obtain a solution to the three-dimensional scale factor by examining one specific regime. Here, the density of the universe dominates over vacuum terms that contribute to the evolution of the universe as a whole. The approximate solution is obtained for the scale factor in this "fluid regime". By requiring the energy density to be non-negative, we then explore the allowed parameter space and find a region where accelerated expansion is predicted, as this is consistent with our current observations regarding the evolution of the universe. Further, we find the region of this parameter space that yields dynamical compactification of the higher-dimensional scale factor, where the higher-dimensional space contracts as our 3D space expands.

Title: IS CLIMATE CHANGE AFFECTING PEAK FLOWS IN THE UPPER COLORADO RIVER BASIN, AND DOES SNOWPACK CONTROL PEAK DISCHARGE? A COMPARISON OF SNOWPACK AND RIVER DISCHARGE RECORDS

Presenter(s): Morgan Pratte

Faculty Mentor: Andres Aslan

Track: 10A

Abstract: An important topic of study is how climate change might be affecting river discharge in the Colorado River Basin. Several studies conducted across the United States and North America that provide correlating data of decreasing snowmelt with decreasing streamflow rates from 2009-2017 served as a basis for this research project. A prior and local study in 2017 attempted to correlate increasing temperatures in Colorado to decreasing peak discharges. The resulting data did not prove causation; however, it did leave the opportunity to explore snowpack and its possible correlation with decreasing peak discharges. Further examination of the snowpack data, measured as snow-water equivalent (SWE), is required to understand how snowpack has changed in the Upper Colorado River and Yampa River Basins and how these changes correlate with peak discharge trends. Discharge records, snowpack levels, and instances of possible human-induced water diversions were gathered from U.S. Geological Survey and Natural Resources Conservation Service over the years of 2003-2016. The relationship between snowpack and peak discharge will be documented within the watersheds of the Yampa and the Upper Colorado Rivers to evaluate and analyze possible effects of climate change and to heighten the public's awareness of the importance of river conservation.

Title: MAGNETIC SURVEYS AS A MEANS OF PROSPECTING FOR URANIUM-BEARING MINERALS IN SANDSTONE DEPOSITS OF THE COLORADO PLATEAU

Presenter(s): Adam Nawacki

Faculty Mentor: Verner Johnson

Track: 10A

Abstract: Areas of the Colorado Plateau have long been mined due to an abundance of rare earth metals such as uranium, vanadium, and radium. Minerals with these elements were originally detected by radiometric anomalies using a Geiger counter. Present-day prospecting continues to involve radiometric anomaly identification, but it has expanded to also include geophysical surveys. Uranium-bearing mineral deposits are often associated with metals such as iron and zinc, which may have magnetic signatures. The premise of this study is to locate ferrous minerals using a magnetometer and compare the locations of these magnetic anomalies with the location of uranium-bearing minerals. Electrical resistivity tomography will be used to study geochemical changes in the subsurface to help better correlate mineral locations. Previous studies conducted on this topic in Wyoming and Arizona demonstrate that there are numerous factors which influence the effectiveness of a magnetic survey, including ore grade, mineral association, and ore-body depth. Studying the effectiveness of magnetic surveys on well-known ore deposits near Slick Rock, Colorado will lead to a better understanding of regional ore associations and the reliability of the magnetometer as an instrument for prospecting uranium ores.

Title: ISO-ALPHA ACID DEGRADATION IN BEER

Presenter(s): Erin Bair

Faculty Mentor: Timothy D'Andrea

Track: 10A

Abstract:

The Rocky Mountain region is the fifth highest exporter of beer in the United States. As a result, the chemistry involved in the beer brewing process, as well as the chemistry governing the shelf life of beer, is of great local importance. This chemistry, however, is complicated. The only non-essential ingredient used in most beers is hops. Hops act as a preservative and add bitterness and affect the flavor and aroma of beers. This bitterness comes from the formation of iso-alpha acids, which are both light and temperature dependent; thus, exposure to light and elevated temperatures have a significant effect on the flavor profile of a beer. While reactions of iso-alpha acids with light have been extensively studied, the thermal degradation of these compounds has not. In this research, the rate of thermal degradation of iso-alpha acids was analyzed at several different temperatures using high performance liquid chromatography (HPLC). The degradation was found to be a first order reaction. From the various rate constants measured, the activation energy of the reaction was calculated using the Arrhenius equation. This current research, and the future of the project, will lend valuable insight into the quality and underlying chemistry of an aging beer.

Title:**PREDICTING DEBRIS FLOWS FOLLOWING WILDFIRES IN CENTRAL WESTERN COLORADO****Presenter(s):**

Sadie Christensen

Faculty Mentor:

Andres Aslan

Track:

10A

Abstract:

Colorado's Western Slope is susceptible to many natural hazards such as debris flows and wildfires. It may be possible to determine when a post-wildfire debris flow is likely to occur. In Western Colorado, factors such as lithology, vegetation, and season lead to debris flows. Debris flows are dangerous because they carry large amounts of materials long distances at incredibly fast speeds. While debris flows commonly occur five to ten years after a wildfire has occurred, the exact timing of debris flows is specific to each location. Storm King Mountain was burned during the South Canyon Fire in July of 1994. By September 1, 1994, 84 debris flows had occurred in this area, suggesting the usual recurrence interval for debris flows does not apply locally. By correlating the locations and timing of debris flows in relation to wildfires, data can be analyzed to determine the mean, median, and mode length of time between wildfire and debris flow events. Data will be compared to geological features at these locations to determine trends. Results will explain when and why an area is prone to a debris flow. With these results, it is possible to be better prepared for post-wildfire debris flows in the future.

Title:**EXAMINING THE VACUUM REGIME IN THE D-DIMENSIONAL FRIEDMANN-ROBERTSON-WALKER MODEL OF COSMOLOGY****Presenter(s):**

Scott Jackson

Faculty Mentor:

Chad Middleton

Track:

10A

Abstract:

Cosmology utilizes Einstein's Theory of General Relativity to study the nature and temporal evolution of the universe on the largest of scales. It is traditional to study cosmology in four dimensions (4D), but various troubling features arise from this model. In particular, disagreement between the vacuum energy required by the 4D model and what is predicted by quantum field theory reach a staggering 120 orders of magnitude. Here, we consider the Friedmann-Robertson-Walker model of cosmology in D spacetime dimensions, where $D=d+4$ and d is the number of extra dimensions. This higher-dimensional model potentially offers

resolutions to troubling features associated with the 4D model. Here, we investigate the vacuum regime in which the pressure and density of our universe are negligibly small. The zeroth-order solution is obtained for the 3D scale factor, which tells us how our universe evolves with time. From this, we examine the specific case of $d=1$ and obtain a first-order correction term to our zeroth-order solution. Finding this correction term modifies the 3D scale factor from describing a static, unchanging universe to that of a dynamical universe. With this result, we find the possibility of accelerated expansion of our universe, which agrees with current observational evidence.

Title: JAHN-TELLER DISTORTION IN LITHIUM MANGANESE SPINEL OXIDE

Presenter(s): Mary Katherine Gorsuch

Faculty Mentor: Brian Hosterman

Track: 10A

Abstract: Due to the abundance and low toxicity of manganese, an interest has developed in using lithium manganese oxide as a cathode in lithium-ion batteries. Lithium ion batteries are a rechargeable energy source and power many devices, including smartphones, laptops, and other portable electronics and household devices. However, the lithium manganese spinel structure experiences Jahn-Teller distortion over time as the battery charges and discharges. This makes the battery less efficient, thus decreasing its life cycle. This project aims to find a method that will suppress the Jahn-Teller distortion while still maintaining the efficiency of lithium manganese oxide as a battery cathode. Copper is explored as a potential substitute for some of the manganese in this structure, with three different ratios of manganese to copper. The cation-substituted lithium manganese spinel oxides, with copper fractions of 0.05, 0.1, and 0.15 respectively, were synthesized via combustion in a furnace, and the products were analyzed with x-ray diffraction.

Title: CHARACTERIZATION OF THE EFFECTS OF CARNOSIC ACID ON DICTYOSTELIUM DISCOIDEUM TO INVESTIGATE POTENTIAL CHEMOPROTECTIVE PROPERTIES

Presenter(s): Molly Kubesh

Faculty Mentor: Kyle McQuade

Track: 10A

Abstract: Carnosic acid, a natural product derived from rosemary and sage, is known for its antioxidant, anti-inflammatory, and neuroprotective properties. Additionally, carnosic acid has displayed anticancer effects in a variety of in vitro and in vivo models. In this study, the model organism Dictyostelium discoideum was used to further characterize the effects of carnosic acid in vitro. Dictyostelium are single-celled eukaryotes that undergo a unique multistep developmental lifecycle; this feature creates an ideal system for studying human cellular processes. Carnosic acid disrupts the Dictyostelium lifecycle at a variety of stages. At higher concentrations of drug treatment, the cells failed to stream appropriately and at lower concentrations aggregation and fruiting body formation was delayed. Cells treated with carnosic acid displayed a reduction in cellular growth. Furthermore, a decline in cellular motility is evident by a reduction in average cell speed and cell displacement following carnosic acid treatment. These results indicate that carnosic acid is effective in reducing the cellular activities of Dictyostelium. Because the Dictyostelium lifecycle relies on mechanisms commonly altered in human disease, these results suggest chemopreventive or chemotherapeutic properties.

Title: NOVEL GOLD(III) COMPLEXES FOR THE UTILIZATION OF STRONG C-H BONDS

Presenter(s): Erin Bair, Gabrielle Donalson

Faculty Mentor: David Weinberg

Track: 10B

Abstract: Alkanes are the primary components of natural gas and petroleum, and they are an abundant resource that can be used for the generation of fuels and chemicals. Alkanes are composed of strong C-H bonds and efforts are being made to efficiently convert these types of C-H bonds into C-O or C-N bonds. Gold(III) has shown potential on this front due to its high electrophilicity and its strong bonds to carbon. In searching for reactions of gold(III) with strong C-H bonds, two novel gold(III) complexes have been synthesized. Interestingly, small structural differences resulted in the two gold(III) complexes being different colors. These gold(III) complexes are now being tested for C-H bond breaking reactions.

Title: INVESTIGATION OF JOHNSON NOISE AND SHOT NOISE

Presenter(s): Saige Dacucyucy

Faculty Mentor: Brian Hosterman

Track: 10B

Abstract: Electrical noise, random fluctuations in an electrical signal, is typically an unwanted feature when measuring electrical quantities. Although recent designs of circuits have the ability to reduce electrical noise, studies have shown that we can use noise in experiments to investigate fundamental physical quantities related to thermodynamics and electromagnetism. In this work, we constructed multiple circuits that amplify these signals by a factor of 5,000 to 50,000. These circuits demonstrate the effects of two types of noise, "Shot noise" and "Johnson noise". Here, Johnson noise was used to determine a fundamental constant of nature, while Shot noise was used to determine the charge of an electron.

Title: CONSTRUCTING AN EARTH'S FIELD NUCLEAR MAGNETIC RESONANCE SPECTROMETER

Presenter(s): Joshua Mathews

Faculty Mentor: Brian Hosterman

Track: 10B

Abstract: Nuclear Magnetic Resonance (NMR) is the process in which molecules absorb and emit electromagnetic radiation. This physical phenomenon has applications such as Magnetic Resonance Imagery (MRI) and spectroscopy, a tool that gives structural details of various molecules. An NMR spectrometer detects emitted radiation from a sample. Although the majority of NMR Spectrometers use high magnetic fields to align molecules within the sample, the spectrometer built in this project instead uses the Earth's magnetic field, which is substantially lower. This project presents the theoretical details on NMR spectrometry as well as the construction of a low field NMR spectrometer.

Title: GOLD NANOPARTICLE AGGREGATION EFFECTS ON NANOPARTICLE TOXICITY IN DAPHNIA MAGNA

Presenter(s): Christopher Vandermeer

Faculty Mentor: Sam Lohse

Track: 10B

Abstract: The purpose of this research is to study how engineered nanoparticle (NP) aggregation affects interactions with biological systems. NP

aggregation is a natural process by which colloids cluster together to form larger structures, which may limit their ability to participate in certain chemical reactions. An important goal of this study is to control particle aggregation to isolate the effects of aggregate size on bio-interactions. Gold nanoparticles (AuNP) were specifically chosen for this study because the reduction potential of gold is much higher than other transition metals, making them relatively stable in biological systems. To study the effect of aggregation on AuNP uptake in organisms, we synthesized AuNPs stabilized with a mixed monolayer of γ -functionalized thiols, mercaptoethoxyethoxyethanol (MEEE), and mercaptopentyltrimethyl ammonium (MPTMA), with core diameters of 6.0 nm, and studied their aggregation behavior in moderately hard water. The AuNPs were characterized using ultraviolet-visible absorbance spectroscopy, FTIR and ¹H-NMR spectroscopy. Nanoparticle aggregation is also monitored through absorbance spectroscopy. We have also begun some research into how AuNP aggregation affects their interactions with *Daphnia magna*, a freshwater planktonic crustacean. Preliminary collaborative studies are focusing on the acute and chronic toxicological effects of MEEE-, MPTMA-, and mixed monolayer AuNPs on *D. magna*.

Title: AFFORDABLE AIR ANALYSIS

Presenter(s): Andrew Brown, Anthony Feller, Joshua Vincent

Faculty Mentor: James Ayers

Track: 10B

Abstract: Air quality is an important aspect of health and general quality of life. Air quality analyzers are often expensive, and intense maintenance is required; however, there are affordable, user-friendly air quality analyzers on the market. The accuracy of affordable analyzers was compared to the accuracy of research-grade ozone analyzers. The affordable analyzer, Air Quality Eggs (AQE), were compared to a Thermo 49c ozone analyzer and Thermo 42i NOx Analyzer. Outside air samples were analyzed in the early part of 2018 at Colorado Mesa University.

Title: EXPLORING SEDIMENTARY PROVENANCE USING DETRITAL SANIDINE ⁴⁰Ar/³⁹Ar GEODATATION

Presenter(s): Kathleen Dykstra

Faculty Mentor: Andres Aslan

Track: 10C

Abstract: The purpose of this project is to explore provenance of sanidine grains of ancient river sediments in relation to their volcanic source areas using ⁴⁰Ar/³⁹Ar geochronology. ⁴⁰Ar/³⁹Ar geochronology is a technique of age dating that boasts extreme precision. Several recent studies have used detrital sanidine to reconstruct the history of river systems in the western United States. Sanidine is derived from explosive volcanic eruptions, mainly within ash-fall tuffs. These ashes travel long distances before settling and being reworked into river deposits. Sanidine grains that end up in ancient river sediments can then be age dated to isolate the timing of river activity. Another important aspect of ⁴⁰Ar/³⁹Ar geochronology is the possibility of linking the ages of individual or groups of sanidine grains to their source calderas. When the grains are age dated, a potassium/calcium (K/Ca) value is also obtained. This value and the age of the grain can link the origin of a sanidine grain to specific volcanic fields. Detrital sanidine data from several late Cenozoic fluvial units will be used to explore the provenance of sanidine grains in relation to five volcanic fields in the western United States: Yellowstone-Snake River Plain, San Juan Volcanic Field, Basin and Range, Mogollon-Datil, and Trans-Pecos.

Title: APATITE (U-TH)/HE THERMOCHRONOLOGY OF BATTLEMENT MESA, WESTERN CO: NEW CONSTRAINTS ON LATE CENOZOIC EVOLUTION OF THE UPPER COLORADO RIVER BASIN

Presenter(s): Rachael Lohse

Faculty Mentor: Andres Aslan

Track: 10C

Abstract: The timing of the erosional history of Colorado River in the upper Colorado basin is poorly defined. Apatite helium (U-Th)/He thermochronology is being used to investigate the cooling history this region. With a low closure temperature of $70^{\circ}\text{C} \pm 15^{\circ}\text{C}$, this age dating method can detect multiple cooling events within the upper few kilometers of sedimentary basins. The technique can provide meaningful insight on the recent geomorphic history and potential driving mechanisms of Colorado River integration. Proposed hypotheses suggest the onset of incision entails of one or more of the following factors: late Cenozoic mantle-driven uplift, knickpoint propagation from regions downstream, and changes to wetter climates. A geothermal gradient of $43^{\circ}\text{C}/\text{km}$ from the MWX well provides useful insight in regards to the thermal history of the study area. Twenty-eight apatite grains, taken from four sandstone samples from the Shire Member of the Wasatch Formation on the flanks of Battlement Mesa were analyzed to determine their cooling history. The resulting corrected cooling ages from these samples range from $14.14 \pm 0.92\text{Ma}$ to $2.64 \pm 0.19\text{Ma}$. HeFTy thermal modeling with the observed data generates best-fit time-temperature (t-T) cooling paths. These paths provide a Colorado River incision rate (m/Ma) and detailed evolutionary background.

Title: PICEANCE CREEK-SAN JUAN BASIN CORRELATION USING DAKOTA SANDSTONE WELL-LOGS

Presenter(s): Marshall Thurmon

Faculty Mentor: Andres Aslan

Track: 10C

Abstract: The objective of this research project is to correlate well-log data from two basins (Piceance, San Juan basins) and to evaluate whether or not it is possible to correlate Cretaceous rock sequences in the subsurface between both basins. The lithological facies of the Cretaceous-aged Dakota Sandstone Formation are the focus of this study, and numerous oil and gas wells in Colorado have targeted this unit. Previous studies have shown that marine transgressive sequences sometimes contain bentonitic clay facies. These bentonite beds can be identified in the subsurface using gamma-ray, resistivity, and spontaneous potential log data from regional wells. Once the position of the bentonite beds is established, log data from wells in between the basins will be evaluated to determine whether or not lateral continuity of the Dakota Sandstone subunits between the two basins exists. If subsurface continuity can be established between Piceance and San Juan basins, this geologic framework could improve future oil and gas exploration efforts.

Title: POSSIBLE PALEOCLIMATE RECORD OF CALCIC VERSUS NON-CALCIC SOIL FORMATION ON THE GRAND MESA, COLORADO

Presenter(s): Michael Getz

Faculty Mentor: Andres Aslan

Track: 10C

Abstract: The purpose of this project is to research the effects of climate change and uplift in Western Colorado based on the possible presence of a calcic paleosol on the Grand Mesa. Sediments interbedded with Miocene basalt flows have white matrix colors and effervesce with dilute HCl. These

features could suggest that they represent a Miocene calcic paleosol. Formation of a calcic paleosol on the Grand Mesa would suggest climate change or structural uplift since the Miocene. The area of study is located on the Grand Mesa near Skyway. The hypothesis of this project is that the formation of a calcic paleosol on the Grand Mesa between individual basalt flows represents a drier Miocene climate and/or post-Miocene uplift. Literature is reviewed to link climate change with calcic paleosol formation on the Grand Mesa. X-ray diffraction and a calcimeter will be used to evaluate samples of the possible calcic paleosol. Climate and Grand Valley soil data will also be used to help determine the potential significance of calcic soil formation on Grand Mesa.

Title: THE SEQUENCE OF HYDROTHERMAL MINERALIZATION IN UNAWEEP CANYON, COLORADO, AND ITS APPLICATION TO THE RELATIVE AGE DATING OF FAULTING EVENTS

Presenter(s): Timothy Bowers

Faculty Mentor: Richard Livaccari

Track: 10C

Abstract: Unaweep Canyon has experienced multiple episodes of hydrothermal mineralization, generated by a series of faulting events. The most abundant minerals crystallized during these events include fluorite, calcite, and amethyst. Lower amounts of chalcopyrite, malachite, azurite, hematite, and barite can be found within some veins. This mineralization has been subject to little commercial or scientific inquiry due to a perceived lack of economic importance. Hand-sample observations indicate fluorite was the first mineral crystallized, followed by multiple layers of calcite, and lastly amethyst. Hand-sample analysis does not allow for relative timing of the opaque minerals, such as hematite and chalcopyrite, as they are encased in calcite cement. Studying the mineralization sequences and determining the genesis of mineral deposits in the area could help decipher the relative sequence of faulting. Evaluation of the mineralization sequences will be performed by examination of the veins located on the surface and in the subsurface, thin section analysis, and XRF (x-ray fluorescence) analysis. This data may provide a more detailed history of the tectonism experienced within the area, and could be of use in determining the locations of more valuable ore deposits located in the canyon.

Title: GEOCHEMISTRY AND MINERALOGY OF WELL 11-2 IN MANCOS SHALE: APPLICATIONS FOR HYDRAULIC FRACTURING

Presenter(s): Jordan Drake

Faculty Mentor: Andres Aslan

Track: 10C

Abstract: The lower Cretaceous Mancos Shale in Western Colorado is a potential unconventional energy resource. Knowledge of the geochemistry and mineralogy of the Mancos Shale is useful for any future drilling that involves hydraulic fracturing. Additionally, the Mancos Shale is a known source of severe pollution in the area. Knowledge of the selenium distribution in the shale will assist remediation efforts including selenium monitoring data. This project will determine the geochemistry and mineralogy of Mancos Shale cuttings from the Matrix Oil Corporation, Sheridan Number 11-2 well in Rio Blanco County, Colorado. 80 samples ranging from depths of 400 to 4000 feet will be cleaned, pulverized, pressed into pellets, and analyzed using x-ray fluorescence. The analysis will determine the major and trace element geochemistry of the Mancos Shale cuttings. Carbonate content will be determined using a calcimeter. The mineralogy of the samples will be approximated by using the analytical results and MinLith, a computer software that estimates mineral abundance from chemical data.

Title: AN INVESTIGATION OF THE SELENIUM CONCENTRATION IN THENARDITE EFFLORESCENCES ON MANCOS SHALE, WESTERN COLORADO

Presenter(s): Rachael Lohse

Faculty Mentor: Andres Aslan

Track: 10C

Abstract: Selenium is a pollutant of ground and surface waters in areas underlain by the Mancos Shale in western Colorado. A white efflorescence occurs sporadically on the surface of the lower third of the shale (Niobrara Member equivalent). It often appears in disturbed soils and areas receiving seepage from irrigation canals. Limited amounts of previous work indicate the efflorescence largely consists of sodium sulfate. This study hypothesizes that the efflorescence may contain selenium because of the similarity between the selenate ion and the sulfate ion. 106 samples of the efflorescence collected in Montrose, Delta, and Mesa Counties were analyzed using x-ray diffraction to determine the mineralogy and x-ray fluorescence to determine the selenium content. Results indicate the efflorescence is predominantly thenardite with minor occurrences of other sulfate minerals. The samples varied considerably in selenium concentration: 22% contained less than 0.5 ppm Se, 39% contained between 0.5 and 5 ppm, 25% contained between 5 and 50 ppm Se, and 14% contained over 50 ppm Se with the highest value being 416 ppm Se. The data suggests selenium can concentrate in areas where the efflorescence occurs and that these sites could be targets for remediation efforts.

Title: STUDY OF TRANSGRESSIVE-REGRESSIVE CYCLES OF THE LOWER MANCOS IN THE GRAND VALLEY

Presenter(s): Mariaha O'Dell

Faculty Mentor: Rex Cole

Track: 10C

Abstract: The purpose of this project is to determine if specific parasequence sets can be correlated throughout the southwest Piceance Basin. Parasequences are genetically related beds or bedsets bound by marine flooding surfaces and their correlative surfaces. They are usually asymmetrical shallowing-upward sedimentary cycles. The lower Mancos is Cretaceous in age and formed during a time when the interior of the U.S. was occupied by a shallow seaway. The first unit of the lower Mancos marks the distinct change from underlying Dakota Group fluvial and shoreface sandstones to marine mudrocks representing the first major transgression of the Western Interior Seaway. The sediments that constitute the Mancos Shale were shed from the Sevier uplift as part of large clastic wedges bounding the western edge of the seaway. Determining if specific parasequences can be correlated throughout the study area and the surrounding areas will help oil and gas companies identify subsurface reservoirs that hold hydrocarbons. There are companies that have started drilling in the lower Mancos, but if correlation of parasequences can be demonstrated then more hydrocarbon resources could be discovered.

Title: DETERMINING PROVENANCE OF THE TIDWELL MEMBER OF THE JURASSIC MORRISON FORMATION

Presenter(s): Trevor Potter

Faculty Mentor: Andres Aslan

Track: 10C

Abstract: The provenance of the lacustrine Tidwell Member of the Jurassic Morrison Formation has been somewhat controversial amongst geologists. Initially the Tidwell and underlying Wanakah Formation were considered to be

unconformable and are separated by the J-5 unconformity. However, recent U/Pb age dating of detrital zircons indicates that they are conformable in locations such as Escalante Canyon and that the J-5 unconformity does not exist in much of western Colorado. The U/Pb ages of detrital zircon grains from the Tidwell Member and underlying Wanakah Formation show a significant 512-539 Ma age distribution that begins in the Wanakah and tapers off in the Tidwell. This abundance of similar-aged grains, as well as a large amount of feldspar in Tidwell sediments, has led researchers to correlate the Tidwell Member with the McClure Mountain syenite from central Colorado. In order to test this claim, the Tidwell Member will be mapped and paleocurrents in fluvial sandstones will be measured at various locations throughout western Colorado. Information collected in the field will be compiled and compared with results of previous Tidwell provenance studies to see if the correlation with the McClure Mountain syenite is valid.

Title: ARE THERE LARAMIDE-AGE PSEUDOTACHYLITE IN UNAWEEP CANYON?

Presenter(s): Nicholas Cholas

Faculty Mentor: Richard Livaccari

Track: 10C

Abstract: The purpose of this project is to determine if pseudotachylite is present in Unaweep Canyon, Colorado. In Unaweep Canyon, there are veins of what appear to be pseudotachylite. Pseudotachylite is a dark, aphanitic frictional melt rock that forms during brittle faulting that contains randomly suspended visible breccia clasts. Other types of pseudotachylites form from shock by massive meteor impacts. This study focuses on a type of pseudotachylite found along the surface of a fault. These form from a combination of high lithostatic pressure from a high magnitude earthquake. At the fault slip surface, friction is extremely high and melts host rock on the fault surface creating a magma-like fluid. The magma-like fluid pulls breccia particles of host rock as the fault is in motion and within second's freezes, leaving behind a record of how much energy was involved, similar to an implosion breccia. Pseudotachylite is rare, but reported pseudotachylite of Laramide-age is found in the Homestake Shear Zone north of Leadville, Colorado. If conclusive evidence of pseudotachylite is found in Unaweep Canyon, then comparisons can be made with other local pseudotachylites.

Title: A COMPARISON OF POSSIBLE CRAYFISH BURROWS IN THE CHINLE FORMATION OF THE COLORADO NATIONAL MONUMENT WITH CRAYFISH BURROWS FOUND IN CANYONLANDS NATIONAL PARK, UTAH

Presenter(s): Darby Spence

Faculty Mentor: Andres Aslan

Track: 10D

Abstract: The earliest known crayfish fossils and their burrows are found in the Upper Triassic Chinle Formation of Canyonlands National Park. The only other known traces of freshwater crayfish fossils in Triassic rocks are located in North Carolina and the Petrified Forest Member of the Chinle in Arizona, but these fossils are not associated with burrows. The Chinle Formation in the Canyonlands area contains thousands of burrows and numerous crayfish fossils, which have been studied and classified into three morphotypes. The studies of these burrows in Triassic strata of the Colorado Plateau has important implications for the paleohydrologic structure and dynamics of depositional systems of Triassic paleoecosystems. Analyzing crayfish burrows and their architectural and surficial morphologies in the Chinle Formation of the Colorado National Monument, and comparing these to

features of known crayfish burrows in the Canyonlands area, will aid in the reconstruction of the ancient water table levels of the Colorado Plateau as well as demonstrate the preservation potential of modern traces in the fossil record.

Title: STREAM MORPHOLOGY RESPONSE IN NO THOROUGHFARE WASH TO TAMARISK REMOVAL USING THE CUT-STUMP METHOD

Presenter(s): Ivan McClellan

Faculty Mentor: Gigi Richard

Track: 10D

Abstract: Stream channel morphology across the Colorado Plateau is often affected by invasive riparian species such as tamarisk. Intermittent streams draining Colorado National Monument, such as No Thoroughfare Wash, are no exception. Geological factors and urbanization surrounding the lower area have created an environment suitable for noxious weeds. In 2014, Mesa County and the Tamarisk Coalition removed a dense stand of tamarisk roughly one acre in area using the cut-stump method. The proliferation of tamarisk had increased channel roughness, which led to widespread sediment deposition followed by the development of a stable single channel and floodplain. Following tamarisk removal in 2015, 18 cross-sections were surveyed using US Forest Service standards. Eight of the surveyed sections were located upstream of the removal area, five were located within the removal area, and five were located downstream. For the next two years, transects were resurveyed using the endpoints set in 2015. Using three years of post-removal data and HEC-RAS stream modeling software, the effects of the tamarisk removal on stream channel morphology were evaluated.

Title: DESIGNING A NATIVE SEED GARDEN PLAN FOR LADDER CANYON RANCH AND COLORADO WEST LAND TRUST FOR FUTURE RESTORATION

Presenter(s): Rebecca Dykes, Rod Ferree, Erin Schuckers, Kelsey Wright

Faculty Mentor: Deborah Kennard

Track: 10D

Abstract: Ladder Canyon Ranch is a private property under conservation easement located in Glade Park, Colorado. Previous land use degraded areas of the ranch, and the current owners desire to restore native vegetation and improve habitat quality for native wildlife. Native plants are useful in restoration efforts because they are already accustomed to local climate and soil conditions. Native plants require less maintenance to become established, and wildlife are naturally accustomed to this forage. Local native seed gardens are an excellent resource to improve the availability of genetically adapted native seed for restoration. Having genetically appropriate seeds will improve future restoration with higher establishment success and vigor of the native plants. The goal of this project is to design a cost-effective, self-sustaining, and local source of seed for Ladder Canyon Ranch and Colorado West Land Trust. To obtain this goal, research will be conducted to determine site constraints, species selection, planting methods, seed collection and storage, and future monitoring needs. The result of the research will be a comprehensive plan for installing and maintaining a native seed garden for Ladder Canyon Ranch and Colorado West Land Trust.

Title: CHANGES IN AGRICULTURAL SOIL PROPERTIES THROUGH VERMICOMPOST AMENDMENTS

Presenter(s): Zachary Siemsen
Faculty Mentor: Deborah Kennard
Track: 10D
Abstract: Compost application is a very common agricultural practice to improve crop yield and soil quality. Vermicompost is a type of compost that uses worms to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast. Vermicompost improves soil structure which allows for more aeration, infiltration, and water holding capacity. Vermicompost is also very high in macronutrients that improve the soil chemical and biological properties. The goal of this study is to evaluate the improvement of agricultural soil properties after the application of different amounts of vermicompost. Vermicompost from the CMU Compost Facility will be plowed into plots at the CSU Agriculture Research Center using these application amounts: one inch depth (standard treatment), half inch depth (low treatment), and no compost (control). The following parameters will be compared using soil samples collected from each treatment one month after vermicompost application: soil water holding capacity, organic matter, CEC, and bulk-density and pH. The results of this study will be used as a basis for recommendations for CMU vermicompost application rates for horticultural and agricultural practices.

Title: **RESTORATION PLAN TO IMPROVE HABITAT AND REDUCE NOXIOUS WEEDS IN THE COLORADO RIVER WILDLIFE AREA (CRWA)**

Presenter(s): Shea Nieslanik, Tristan Schmalz, Zachary Siemsen
Faculty Mentor: Deborah Kennard
Track: 10D
Abstract: The Colorado River Wildlife Area (CRWA) in Grand Junction, Colorado is a habitat replacement site for riparian ecosystems lost in the Grand Valley Salinity Control Program. Managed by the Bureau of Reclamation (BoR), the CRWA needs to improve ecosystem structure, function, and composition while providing a suitable habitat for mammals, raptors, and migratory birds. Invasive species and habitat fragmentation are inhibiting this area from meeting habitat replacement requirements as mandated by the salinity control program. The goal of our project is to develop a restoration plan that will provide an invasive species removal and native plant revegetation model to improve wildlife habitat and ensure proper riparian ecosystem function. We conducted a site assessment to evaluate habitatability based off of the Habitat Replacement Criteria Checklist as well as evaluated soil conditions to ensure planting success. We selected native species that provide varying levels of canopy cover to ensure suitable habitat for the threatened yellow-billed cuckoo. These recommendations will support improvements of vegetation cover across fragmented areas to improve connectivity while restoring ecosystem function to meet required habitat criteria. This restoration plan will provide riparian land managers with a basis for future goals and procedures to continue to improve habitat requirement credits.

Title: **CHARACTERIZATION OF UPPER UINTA FORMATION**

Presenter(s): Sadie Christensen
Faculty Mentor: Rex Cole
Track: 10D
Abstract: The Uinta Formation is located in the Piceance Basin, Green River Basin, and the Uinta Basin. Very little is known about the Uinta Formation in the Piceance Basin. Even less is known about the upper sequences of the Uinta Formation in this area. A field component and a lab component will be used to characterize the upper sequences of the Uinta Formation. Field data

will be gathered from Piceance Creek, Colorado. Field work will include a measured section, sample collection, and paleocurrent measurements. The measured section will demonstrate the transgressive regressive cycles seen in the upper sequences. The sample collection will be used to characterize the lithologies in the Uinta Formation. Paleocurrent measurements will provide a direction of paleoflow within the units. Lab work will include chemical analysis, sample analysis, thin section analysis, and data comparison. The chemical analysis will help create better understanding of the mineralogy of the lithofacies. Thin sections will provide insight to the porosity, permeability, and grain origin within the samples. Data will be compared with previous work to find trends. Results will be used to characterize the upper sequences found in the Uinta Formation to provide better insight into the stratigraphic units of the Piceance Basin.

Title: **SITE ASSESSMENT FOR THE SUITABILITY OF AN ENDANGERED FISH AND WATERFOWL WETLAND PROJECT IN THE GRAND VALLEY AUDUBON SOCIETY NATURE PRESERVE**

Presenter(s): Joel Henderson, Matthew Stewart, Jason Tipton, Cody Vanden Brink

Faculty Mentor: Deborah Kennard

Track: 10D

Abstract: The Grand Valley Audubon Society Nature Preserve near Connected Lakes State Park was once mined for gravel by a private company. When ownership changed, the pits were converted into ponds for a native fish and migratory bird habitat. However, the suitability of this site to for this use is in question. The Audubon Society, in partnership with Ducks Unlimited, is planning to remediate and reconstruct the ponds into suitable wetland habitat. The goal of our study is to deliver thorough water and soil quality, hydrology, and wetland vegetation information so the client may make informed land management decisions. We will also investigate the water quality of the Colorado River and the Redlands Canal as the property owners may use water from these sources to supplement the ground water that currently fills these ponds. Investigative parameters will include testing the soil and water for pH, conductivity, salinity, selenium, turbidity, and nitrogen (other agricultural pollutants) as well as conducting a wetland delineation. Our study will provide a reference for monitoring activities and provide recommendations for reconstruction and remediation projects.

Title: **EVALUATING THE USE OF DRONE-COLLECTED MULTISPECTRAL DATA FOR VEGETATION MAPPING**

Presenter(s): Quinton Barnett, Grayson Koenemann, Emily Tighe

Faculty Mentor: Deborah Kennard

Track: 10D

Abstract: While restoration and subsequent monitoring of ecosystems is not a new science, the use of unmanned aerial vehicles (UAVs) in this field has risen to prominence in the last decade. Unmanned aerial vehicles can access areas that are challenging to reach on foot, all while avoiding possible damage and disruption to ecosystems. Our client, Richard Alward of Aridlands LLC, flew his drone equipped with a multispectral camera over 50 acres within the Walter Walker State Wildlife Area. The goal of our project is to evaluate the reliability and accuracy of his drone-collected multispectral imagery for identifying key species and functional groups. For our project, we aim to assess the accuracy of the current image classification compared to GPS ground truthing methods. After analyzing the accuracy, we will create our own classification images using two different image analysis methods: pixel-based and object-based classification. Based on our compiled data, we will determine the accuracy of image classification for landscape analysis.

- Title:** **THE EFFECTS OF STRESS AND TRAUMA ON POLICE OFFICERS' RELATIONSHIPS**
Presenter(s): Sierra Sanchez
Faculty Mentor: Megan Henley
Track: 11A
Abstract: This research looks at how current police officers cope with emotional trauma as well as its effects on their relationships with family and co-workers. Emotional trauma results from an experience of a stressful or disturbing event that leads to heightened emotional states or helpless feelings. Previous research has examined the trauma or stress a police officer goes through and how it affects them personally. However, little research has focused on how trauma can affect the relationships in an officer's life. Through in-depth interviews with current police officers, an investigation into how experiences at work affect officers' relationships and how such relationships can help officers cope with work-related stress and trauma was conducted. Police officers may face high levels of stress on a daily basis, but speaking to their co-workers and families about their emotional trauma may help them manage. This research is important because it can help officers see or create another way to cope.
- Title:** **FAMILY VERSUS PEER INFLUENCE ON UNDERAGE CONSUMPTION OF ALCOHOL AND MARIJUANA**
Presenter(s): Jessica Jolley
Faculty Mentor: Megan Henley
Track: 11A
Abstract: The college years are known as the time of experimentation. It is very common for students to feel pressure from peers to join in on something "cool" like alcohol or drug use, as risky behavior often can help one gain status or may be perceived as an outlet for stress. Existing research has shown that peers have a greater influence than family on college students' behavior. While limited research has focused on family influences on substance abuse, scholars find that college students tend to mimic their role models' behaviors. In this study, in-depth interviews with college students between the ages of 18 and 21 were conducted in order to assess the influence of family structure and support on underage drinking and marijuana use. An evaluation of how familial influence compares to friends' influence was also carried out. While family has less effect than peer influence, family members and family structures do play an important role in underage consumption of alcohol and marijuana. This research can help us better understand why underage students may be abusing or over using alcohol and marijuana.
- Title:** **MEN'S VERSUS WOMEN'S SUCCESS WITH COLLEGE MATH**
Presenter(s): Alma De Lara
Faculty Mentor: Megan Henley
Track: 11A
Abstract: Math can be the hardest subject for students of all ages. While many students struggle with math, research shows that women tend to perform lower than men in this subject. Educational institutions have not implemented mandatory resources to help students succeed; success is largely left to individuals. Accordingly, in this study, an examination of how personal experiences affect students' success in college math took place. A comparison of these experiences between men and women was also

conducted. This research utilizes in-depth interviews with five men and five women. Variables included experiences in school, resources available, and other personal factors that affect math success. Findings suggest that many students, men and women alike, suffer from test anxiety. Surprisingly, not many women attributed gender as one of the factors affecting their overall performance in math, although they do report struggles that they attribute to personal difficulties with learning math in particular. This research is important because it illuminates the struggles that many students face that keep them from succeeding in college math courses. Importantly, women, in particular, do not recognize the social context of their struggles and instead attribute difficulties largely to personal failings.

Title: FAMILY PRESSURE IN COLLEGIATE FOOTBALL

Presenter(s): Nicholas Mynes

Faculty Mentor: Megan Henley

Track: 11A

Abstract: Collegiate football players carry immense weight on their shoulders to be the best athlete they can be while still doing their best to earn a degree. Family members can either be highly supportive in this effort or be a driving factor in athletes quitting the game they once loved. The purpose of this study is to understand how family members affect collegiate football players' experiences. Previous research suggests that family, mainly parents, can pressure their children immensely to play a certain sport, and this pressure can result in athletes losing their passion. Other research suggests that a gradual push and a supportive background will benefit the athlete in his or her pursuance of sports. This study uses in-depth interviews with collegiate football players to find out their current and past pressure from family members. Varying amounts of support or pressure from the family can have a significant effect on how athletes feel about football in particular. This research suggests that family plays an important role in football players' passion for the game and their likelihood of pursuing a long-term athletic career.

Title: THE AFFECT OF PORNOGRAPHY ON MEN'S INTIMATE RELATIONSHIPS

Presenter(s): Erin Case

Faculty Mentor: Megan Henley

Track: 11A

Abstract: The issue of men viewing pornography is a rising concern. Previous studies have found that there are trust issues in marriages where the male partner has viewed pornography, and that pornography consumption can have a negative impact on marital relationships. Other research has linked pornography to negative sexual behaviors including sexual aggression toward women. This study explores how pornography plays a role in men's intimate relationships and how it affects them. In-depth interviews with college men who have viewed pornography were used to examine how pornography consumption affects their intimate relationships, sexual behaviors, and attitudes. Higher amounts of pornography consumption may result in severe relationship problems. It may also contribute to higher rates of young men being single. This research suggests that society needs to lend more consideration to the effects of consuming pornography and the affects it has on young men and their relationships today.

Title: PORTRAYALS OF WOMEN IN MAGAZINE ADVERTISEMENTS

Presenter(s): Amy Schuster

Faculty Mentor: Megan Henley

- Track: 11A
- Abstract: The current study looks at how print advertisements in magazines portray and potentially sexually objectify women. How magazine advertisements affect women's body image is also investigated. Research has shown that media images can have a negative impact on women's self-esteem. Research has further shown that popular culture can lead to greater amounts of self-sexualization. In this study, content analysis of magazine advertisements from Glamour and popular magazines that are targeted at women is used. In-depth interviews with college women were also conducted to look at the effects of advertisements on body image. Many young women view advertisements as objectifying and over-sexualizing of women, and the images often negatively impact their self-esteem. This research shows how influential magazine advertisements can be on young women, and is important for society because it further demonstrates the unrealistic expectations placed on women.
- Title:** **GENERATIONAL DIFFERENCES ON MOTIVATION FOR HIGHER EDUCATION**
- Presenter(s): Jamie Hall, Jordyn Levering, Jhelline Aprill Patricio
- Faculty Mentor: Megan Henley
- Track: 11B
- Abstract: This study investigated generational differences for attending college. Generations have been defined by arbitrary cut-off dates which are as follows: Millennials, born between 1982-2000; Generation X, born between 1965-1981; and Baby Boomers, born between 1946-1964. It was hypothesized that Millennials attended college for social capital as well as intrinsic and extrinsic motivators. Participants (N=168) in this study were recruited through social media and asked to share the survey with their acquaintances. Participants responded to a series of survey items measuring Aspirations and Life Goal Self-Determination Theory, Intrinsic Motivation, Self-Regulation and Self-Determination Theory Learning in Adulthood, level of agreement for each Generation's Attributes, and level of importance for various statements in the decision to attend college. Preliminary descriptives suggest that 70% of participants agreed that Millennials were entitled and educationally successful, 50% agreed that Generation X will spend extra time to get a job done, and 60% agreed Baby Boomers live to work. The researchers hope that information gained from this study will encourage individuals to identify and reflect on personal values and motivation for attending college to increase intrinsic motivation that could lead to increased commitment and stronger quality of education.
- Title:** **AN EXAMINATION OF MOTIVATIONS BEHIND THE USE OF MARIJUANA IN HIGH ACHIEVING COLLEGE STUDENTS**
- Presenter(s): Jacyln Levitt
- Faculty Mentor: Chelsie Hess
- Track: 11B
- Abstract: This study is part of a longitudinal study on the trends of Coloradoans' marijuana usage before and after the passing of Amendment 64. The purpose is to examine the relationship between marijuana use and mental illness in high achieving college students. This study has three hypotheses. H1: High achieving, regular marijuana users are more likely to suffer from clinically significant levels of anxiety and/or depression. H2: Those users are more likely to use marijuana as self-treatment for those mental illnesses. H3: Those users perceive marijuana use as important to their academic achievements. The first data collection in 2015 consisted of 350 students college students aged 18-35. Our second data collection will consist of 350

adult university students from ages 18-35. If interested in participating, students were emailed a link to a 15-minute Qualtrics survey to fill out (after reading fully and agreeing to the informed consent). In addition to questions about general demographics, the survey includes questions focusing on type and frequency of drug use, history of crime or familial drug use, and self-ratings on their academic achievement and ambitions.

Title: IMMEDIATE EFFECTS OF BRIEF SUICIDE INTERVENTION GATEKEEPER TRAINING

Presenter(s): Liz Cottingham

Faculty Mentor: Jacob Jones

Track: 11B

Abstract: This research investigates the effectiveness of Brief Suicide Intervention Training (BSIT) by examining participants' confidence in peer suicide intervention immediately after the training. Based on 2017 data, Mesa County has more than double the number of suicides than the national rate. The training provides information on awareness about suicide, a discussion of barriers to intervention, role-playing for practice, and information about what resources are available to help the person once suicide risk is ascertained. Trainers visited various locations, including CMU, to provide training and surveys for this research were administered immediately following the training sessions. Of the 642 participants, 64% identified as female. The average age of all participants was 44.2 years. The difference between average confidence of intervention before ($M = 6.19$) and after ($M = 8.54$) training was statistically significant with a moderate effect size. Thus, there was a significant increase in participants' confidence with suicide intervention after the BSIT. Additional results examine the effectiveness of the different training components. The results have implications for the effectiveness of BSIT training to increase the likelihood of suicide intervention for non-professional gatekeepers such as family, friends, and acquaintances.

Title: THE EFFECTIVENESS OF INDIRECT CONTACT WITH OUTGROUP MEMBERS ON PREJUDICE

Presenter(s): Mark Domingo

Faculty Mentor: Susan Becker

Track: 11B

Abstract: Gordon Allport's (1954) contact hypothesis states that contact between an ingroup member and an outgroup member can reduce prejudice and discrimination. Researchers (e.g., Hewstone & Swart, 2011; McKeown & Dixon, 2017) have demonstrated that direct contact, such as being friends with an outgroup member, is not the only type of contact that leads to a decrease in prejudice and discrimination. Hewstone and Swart (2011) found that indirect contact (e.g., knowing someone who is friends with an outgroup member or reading articles about them) can also be effective. Moreover, McKeown and Dixon (2017) emphasize the effect of contact either being positive or negative, in which they believe that positive contact is better received than negative contact. From this research, two hypotheses were formulated: 1) reading a positive vignette about an outgroup member in comparison to a negative vignette will produce more positive attitudes and 2) post-contact attitudes will be more positive compared to pre-contact. In this study, the vignette technique was implemented and findings from this study will be added on to the large body of research concerning prejudice and discrimination.

Title: LONG TERM EFFECTIVENESS OF A BRIEF SUICIDE INTERVENTION GATEKEEPER TRAINING

Presenter(s): Brea Giancaterino, Cheyenne Pace

Faculty Mentor: Crystal Baker

Track: 11B

Abstract: Brief Suicide Intervention Training (BSIT) increases one's knowledge, confidence, and behavioral intention to intervene successfully when someone is at risk of suicide. People at risk of suicide tend to be more likely to reach out to personal contacts and those with whom they have close relationships (i.e., family members) before seeking help from a professional (Seward & Harris, 2016), suggesting that suicide intervention training needs to be in the hands of those most likely to be the first to hear about possible suicide risk. We hypothesize that campus community members who have had the BSIT training will be more knowledgeable, comfortable, and prepared to intervene when someone is at risk of suicide compared to campus community members who have not had the training, assessed during long term follow-up. The follow-up outcome measure includes questions assessing implementation of the intervention model, behavioral intention to use aspects of the model, and knowledge about resources and steps to take. In addition, we asked respondents questions about their attitudes and beliefs about suicide and a brief stress measure to look at the impact life stressors has on willingness to intervene. Results indicate the applicability of BSIT for campus settings.

Title: A META ANALYSIS OF THE DULUTH MODEL'S "POWER AND CONTROL WHEEL" FOR SAME-SEX VICTIMS OF DOMESTIC VIOLENCE

Presenter(s): Jaclyn Levitt

Faculty Mentor: Susan Becker

Track: 11B

Abstract: Domestic violence is one of the most pervasive and dangerous forms of violence. While there has been extensive research conducted on this topic, there are still many gaps in our knowledge. In particular, studies have a tendency to focus only on heterosexual relationships. The most widely used model for domestic violence is the Duluth Model and it's "Power and Control Wheel", a visualization of the broadest types of abusive techniques and how they fall on two different spectrums of violence (sexual and physical). The main criticism of this model is how ineffective it is at addressing any relationship not falling into a strict male-abuser, female-victim category. This study aims to expand knowledge of domestic violence to include same-sex couples. It is a meta-analysis of the Duluth Model, same-sex couple domestic violence, and research examining implementation of same-sex friendly domestic violence resources in the United States. Through extensive examination of papers, studies, and theories of domestic violence and homosexual relationships, this study examines the Duluth Power and Control wheel and suggest modifications to make it more inclusive of same-sex couples. This study aims to culminate in the groundwork for drafting a revised gender and sexuality neutral model.

Title: MY GRANDMOTHER'S NAME

Presenter(s): Caroline Gallegos

Faculty Mentor: Jennifer Peil

Track: 11B

Abstract: This piece story is inspired by true events and combines the stylistic features of creative nonfiction and novel writing. The full-length novel is about a young girl, PJ, who finds out she is adopted. The piece weaves

between the story of PJ as she finds out who she is and journeys through life, and the story of her biological mother as she deals with her mistake. In her presentation, the author will briefly explain the backstory of the novel as well as the approach and craft behind the fiction and nonfiction sections of the piece. She will then read an excerpt which will introduce the biological mother as well as PJ and the different lives that they live but the struggle they both share.

Title: A POLITICIZED ENVIRONMENT

Presenter(s): Courteney Schwander

Faculty Mentor: T.J. Gerlach

Track: 11C

Abstract: This research aims to examine how political orientation shapes environmental perceptions and how this results in exhibited environmental behaviors. The hope of this research is that the findings will provide greater insight into which populations frame environmental issues as problematic and in need of greater governmental, social, and individual consideration and enacted behaviors. In America, corporations, media, and sectors of the government -- which are highly intertwined with political arenas -- encourage over-consumption of high-waste and environmentally damaging goods and services; creating an ecological rift between individuals and their environment. This rift leads to a general lack of consideration of what constitutes the environment and how individual behaviors interact and impact individual health and the environments in which Americans live, learn, work, and play. In addition, a more conservative political orientation tends to favor more business, corporate, and economic growth, often with a desire for little governmental monitoring over individuals or industries, which often has positive effects for consumption and production while having detrimental effects on the environment. In contrast, a more liberal political orientation tends to favor more governmental mediation and responsible and sustainable economic development that considers environmental issues.

Title: BLACK AND WHITE PERSPECTIVES ON RACIAL STEREOTYPES IN COMMERCIAL ADVERTISEMENTS

Presenter(s): Alissa Brown

Faculty Mentor: Stephen Merino

Track: 11C

Abstract: This research looks at how African Americans and Whites react to racial stereotypes in commercial advertisements. Existing research shows that commercials are often insensitive towards African American issues, portraying them as dirty, beast-like, and less valued. In addition, some commercial advertisements have gone as far as making serious African Americans' issues into a joke. For this study, data from mixed focus groups comprised of African American and White men and women who view different commercials is used. Findings from this research suggest that African Americans feel that commercial advertisements portray them negatively while Whites may be less aware of racial stereotypes. This research is important because it shows how in modern society, there is still racism in commercial advertisements. African Americans are more likely to face disadvantages in society compared to Whites, and this may be in part due to exposure to negative commercial advertisement portrayals of African Americans.

Title: **RAP MUSIC'S INFLUENCE ON YOUNG AFRICAN AMERICANS**
Presenter(s): Gary Reece-Scott
Faculty Mentor: Megan Henley
Track: 11C
Abstract: The purpose of this study is to determine how rap music affects young African Americans' choices in life. Research suggests that a lot of younger African American men seek to follow their rap idols' pathways in life in terms of the lyrics and the glamorous lifestyles they promote. Research has also linked rap music to violent behavior toward women. For this study, interviews with African American men ages 18-25 were conducted in order to assess their perspectives on how rap music affects their views and their interactions with others. Young African American men today may develop a type of masculine attitude adopted from rap music that influences how they act toward others. They also tend to have somewhat negative views of women as a group. This research provides insight into how rap music affects young African American men and leads them toward deviant behavior.

Title: **NORTH KOREA'S NUCLEAR PURSUIT: AN ANALYSIS ON KIM JON UN'S RHETORIC**
Presenter(s): David Harbert
Faculty Mentor: Megan Henley
Track: 11C
Abstract: The ever-increasing tensions between North Korea and the United States strike fear into all nations within the Pacific region. Kim Jong Un continues his father's legacy of pursuing nuclear weapons, which can be seen through his missile testing. He has more than doubled the amount of missile testing compared to his predecessors. This paper analyzes what elements of official speeches by Kim Jong Un indicate North Korea's nuclear pursuit. Through discourse analysis of speeches made by Un after each missile test, this paper carefully considers the frequency of phrases that were deemed 'oppositional' and 'nationalist'. If both variables represented at least 10% of the entire speech, it indicates the type of leader that would pursue nuclear aims. The data found the average percentage of each variable, oppositional and nationalist, to be 13.45% and 9.71%, respectively. While focused on North Korea, this approach may be applied to other similar nation-states as a way of understanding the reasons why these nation-states pursue nuclear weapons.

Title: **BEE CAMPUS USA**
Presenter(s): Erin Case, Meghan Cline, Isabella Vaz
Faculty Mentor: Timothy Casey
Track: 11C
Abstract: The Sustainability Council executive council, as a research team, offers an interdisciplinary approach to understanding why pollinators are vital to our ecosystem and feeding the planet's occupants. The oral presentation is about the benefits of proposed change regarding bee habitats on the CMU Campus. The group has researched Bee Campus USA, a program that endorses a set of commitments for creating sustainable habitats for pollinators on university campuses. The main purpose of the project is to visualize and discuss how it would look to develop the Colorado Mesa University campus into a Bee Campus USA. To become a Bee Campus USA, the Bee Campus subcommittee of Sustainability Council would be charged with the development of a Campus Pollinator Habitat Plan, planning annual events such as pollinator workshops and presentations, sponsorship of service-learning projects, offering pollinator-focused

curriculum, and educating the campus and broader community. The group is comprised of an International Business student, a Sociology student, and an Environmental Science student. Using approaches from their respective disciplines, the students discuss how CMU becoming a Bee Campus would be beneficial from sociological, ecological, and business standpoints.

Title: THE HEAT OF THE CIVIL WAR: THE FIRST AMERICAN DRAFT 1863
Presenter(s): McKayla Campbell
Faculty Mentor: Sarah Swedberg
Track: 11D
Abstract: Racial divisions have been a constant in our country, so it is no surprise that they were evident in the American Civil War. In July of 1863, angry Irish mobs took to the streets of New York City, burning buildings, including a black orphanage, to the ground. During three days of destruction, over 1,100 people were killed. Because of the widespread violence, the federal government had to send in militia and volunteer troops to break up the angry mobs. Two documents were triggers for the draft riots: Lincoln's Emancipation Proclamation and the new Conscription Act. The riots show us that not all of the Union was anti-slavery. Enraged mobs armed with torches, bricks, and torn-up railroad tracks took to the streets to both protest the federally mandated draft and in response to fear that newly-freed slaves would become competition in the labor market. This presentation uses the draft riots as a lens to examine the complexity of the politics of the draft and of antislavery within New York City.

Title: THE CONFEDERATE SECESSION FROM THE SOUTHERN POINT OF VIEW
Presenter(s): Jefferson Baker
Faculty Mentor: Sarah Swedberg
Track: 11D
Abstract: In February 1861, the newly declared Confederate States of America wrote and published their new Constitution. While the Confederate Constitution paralleled the United States Constitution, there were some significant differences. These variations give us a window into southern sentiments about secession and the place of slavery within their new nation as well as their states' rights and ideals. However, to truly comprehend the new Constitution, there needs to be a comparison to other relevant documents of the era. To that end, this paper examines the Confederate Constitution alongside CSA President Jefferson Davis's presidential inaugural address, declarations of the Confederate Congress, the American Civil War diary of William Tinnin (a Texas slave owner), and other documents that express a Confederate viewpoint. The objective is to clarify the ideologies behind the Confederate state and identify what made the South feel they could proceed with secession.

Title: JOHN WAYNE AND THE AMERICAN MYTH IN CINEMA
Presenter(s): Brittany Heye
Faculty Mentor: Steven Schulte
Track: 11D
Abstract: The American West is considered in both movies and our broader culture as the birthplace of our national identity. This creation myth of our country began with Frederick Jackson Turner and his Frontier Thesis, in which he wrote about the character of the frontiersmen. His characteristics have been adapted by Hollywood as the character of the cowboy and the character of

the true American. John Wayne, the Western genre King, is one person that embodies this character in his movie roles. Wayne is a symbol of American masculinity and has become the face of the mythic cowboy, the hero who must save the town and then leave it. It is John Wayne we think of when we think of the mythic West, and it is Wayne who most accurately portrays the violence, racism, and masculine ideals which bore America's national identity.

Title: THE SPEECH BEFORE THE STORM

Presenter(s): Samantha Cathey

Faculty Mentor: Sarah Swedberg

Track: 11D

Abstract: Abraham Lincoln became president on the cusp of the darkest years in American history, 1861-1865, the Civil War. In this presentation, the "First Inaugural Address of Abraham Lincoln," delivered by President Abraham Lincoln on March 4th, 1861, will be placed in its historical context. In the years preceding the American Civil War, thunderclouds had been brewing between the northern states and the southern, slave-holding states, and the election of the Republican president was the last straw for many southerners. In the months after Lincoln's election and before his inauguration, seven southern states declared that they had seceded from the United States. In his speech, Lincoln responded to their secession, iterating his desire for a united country and declaring his inability to abolish slavery in the south in an effort to pacify the fears of the already seceded states and prevent the secession of more states. His stated desire for unity went unrealized. Within the next two months, four more states joined the Confederacy and the tempest of the Civil War was unleashed.

Title: SEVERE WANT DURING THE AMERICAN CIVIL WAR

Presenter(s): Emily McCune

Faculty Mentor: Sarah Swedberg

Track: 11D

Abstract: During the years of 1861-1865, a civil war ripped through the United States leaving the country divided. While issues such as slavery, states' rights, and preservation of the union drove the division, records of personal experiences show that the conflict was more than politics. A close reading of "A Diary. Four Months' Prison Life of the First Maryland Regiment At Lychburg and Richmond" by an unknown sergeant of the First Maryland, published in 1862, helps readers view the extent of provisions shortages during the war. As a Union prisoner of war, the sergeant explained rough conditions as he was marched from camp to camp behind Confederate lines. Disease and starvation ran through these camps, while many prisoners simply hoped to live long enough to be freed by Union forces. Viewed from the perspective of a soldier and prisoner, the description of wartime conditions was especially telling of need and suffering that many experienced because of the choices of politicians. It also showed how ill prepared both the Union and Confederacy were. This paper explores these topics with the purpose of defining how much suffering the war caused those who were most exposed to its day-to-day realities.

Title: DYSLEXIA IN THE CLASSROOM

Presenter(s): Kia James

Faculty Mentor: Ann Gillies

Track: 12A

Abstract: This presentation will provide information on the learning disability dyslexia and present some different techniques for effectively teaching students with this disability. Dyslexia is a language-based learning disability that includes a cluster of symptoms that lead to difficulties with specific language skills, particularly those related to reading, spelling, writing, and pronouncing words. Many people with dyslexia who are undiagnosed are mistakenly viewed as lazy or as having a lack of intelligence or desire to learn, which is not true. It is also a myth that individuals with dyslexia “read backwards”. There are many more myths and misconceptions about this learning disability that can affect how an individual is treated. This presentation will cover misconceptions about dyslexia, ways to work with students with dyslexia in the classroom, and firsthand accounts from a student who was diagnosed in late middle school with dyslexia.

Title: MATHEMATICS AND ENGLISH LANGUAGE LEARNERS

Presenter(s): William Herrington

Faculty Mentor: Ann Gillies

Track: 12A

Abstract: This presentation shares research and investigates the topic of students who are English Language Learners (ELLs) having difficulty with mathematics. The main purpose of this presentation is to dive deeper into some of the unseen aspects of education that an ELL student may not understand, starting as broad as what they may experience during a classroom lesson and narrowing down to what could be going on in his/her head as the lesson progresses. On the surface, it would seem like math would be the one topic an ELL student would understand a little easier, but it is actually the exact opposite. There could have been different practices in their home country that contradict with the ones they are being taught now. This presentation will share some ways to alleviate this problem including making sure the ELL students understand key terms that will be used in the coming lessons, using real life examples to help them relate to a problem, breaking down the problem, and many more ideas.

Title: THROUGH THE EYES OF AUTISM

Presenter(s): Lance Chaffin

Faculty Mentor: Ann Gillies

Track: 12A

Abstract: Autism is one of today's a leading diagnoses and is growing rapidly, with one in 68 people being diagnosed. Expressions of Autism lie on a broad spectrum, and many mistakenly consider Autism to only be a disadvantage. Many people with Autism have a gift for artistic or abstract thinking and are high functioning, sometimes knowing a phenomenal amount of information about a particular subject. By looking through the eyes of one with Autism, one can help to identify, support, and build efforts to put their experience into perspective and see the advantages. This invisible condition can have many different expressions, and one might think that everyone has the capacity to exhibit characteristics of Autism. Autism can have disadvantages, but it's just another way of thinking and developing.

Society needs to have an open mind to listen and to have an obligation to support people with Autism. They might be the leading population of the world some day and, because of that, might grow into what we consider the “normal” community. This presentation discusses how the Autistic mind operates to give a better insight of experiences through the eyes of Autism as a growing, advantageous community.

Title: LEARNING WITH A GREATER PURPOSE

Presenter(s): Heather Hough

Faculty Mentor: Ann Gillies

Track: 12A

Abstract: What are the different ways that you learn academically? You might learn from a textbook, online course, in a classroom, outside, or another through another method. How often does the learning apply to you personally? This presentation will introduce project-based learning as an effective strategy to connect students’ academic learning to all other areas of life. How often do we feel like we learned useless information in school? Many times students will lose motivation or the desire to learn and grow because their learning is not attached to anything meaningful. This presentation will also discuss the importance of student motivation in teaching. Letting the learning stem from problems in their lives or problems that they are interested in gives life to the learning students are asked to engage in. As teachers, we should be able to foster a desire to learn in our students that is deep and long-lasting. Project-based learning allows the student to do just this.

Title: HOW PHYSICAL ACTIVITY IMPACTS ACADEMICS

Presenter(s): Amanda Charles, Heather Wilczek

Faculty Mentor: Vail Shoultz-McCole

Track: 12A

Abstract: With the ever-present strive for higher test scores and academic achievement, the question becomes how can we, as educators, help our students achieve their educational goals? Our presentation team’s interest is to see if physical activity can benefit academic achievement. Specifically, we want to see if engaging in a set amount of physical activity can benefit academic achievement for young children and if the amount needed is attainable or not during a regular school day. We will be observing children between the ages of 4-6 years because these children already have physical education and activity built into their preschool and kindergarten schedules. We will see if added physical activity dispersed throughout the day can increase positive classroom behavior, increase focus, decrease disruptive behavior, and result in higher performance of tasks.

Title: PEER VS. TEACHER: HOW DO YOU LEARN?

Presenter(s): Alex Polito, Jennifer Sine, Hailey Wright

Faculty Mentor: Vail Shoultz-McCole

Track: 12A

Abstract: As students in early childhood education learn from play and exploring, knowing which play is best for learning is important. The purpose of our work is to understand if children learn better from peer-guided play or teacher-directed play. Early childhood centers and programs in our community all provide a different approach to learning and guiding that learning. Each of the presenters are currently placed in a different educational center, so we all observe different styles of teaching. We are discovering the importance of knowing what elements of play help a child

to grow. Observing certain activities being directed by a teacher and certain activities being led by peers demonstrates how these affect the development of the children. This presentation will share observations and reflections that helped us better understand which type of learning, peer-guided or teacher directed, is more effective for children within the early childhood age group.

Title: AUTISM IN THE CLASSROOM

Presenter(s): Madison Heberden

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: As a teacher, it is crucial to meet each student's needs in the classroom. Every student is different on the inside and outside; they all learn in different ways and they all act differently. It is important that teachers are aware of this and know how to effectively teach students of all ability levels, learning styles, etc. Research has shown that there are different levels of autism; children can sit anywhere on the spectrum and still be placed in a general education classroom. However, research has also been done to provide teachers with strategies for teaching those students in a way that will be most useful to them as well as strategies for managing their behavior and participation in the classroom. It is important to include each and every student in the classroom in order to prevent any students from feeling left out, but teachers need to know how to do this in the right way. It's the teacher's job to acknowledge the differences among each and every one of his/her students as well as know how to keep them on the right track for their grade level.

Title: INCLUSIVE EDUCATION

Presenter(s): Sarah Orosz

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: As a teacher, it is my duty to ensure that everyone in the class is able to learn and thrive. Every student has his/her differences and it is up to me to incorporate those differences into my lessons and give each and every student a chance to shine. Involving students with special needs takes a lot of work and attention to detail. In my poster for this showcase, I provide research-based options and activities for those students who require a little extra help in the general education setting. Inclusive education should not be something for which teachers fear making lesson plans; it should be fun and should work to help a class full of diverse learners.

Title: TEACHING TO STUDENTS DISABILITIES: FOCUS ATTENTION DEFICIT HYPERACTIVITY DISORDER

Presenter(s): Meghan Beale

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: An educator's job goes beyond building lesson plans and delivering them; it's reaching each student on his/her level and appealing to who he/she is to make an impact. All children have unique qualities which set their minds apart. As a teacher, it is my goal to shed a light on those distinct characteristics and enable individualized growth. For students with learning disabilities, this job is a little harder since teachers must engage with the differences that set them apart, such as ADHD, and use them to help student work toward their dreams. Students with ADHD often become successful in their careers due to their drive and ability to think out of the

box. Therefore, when teaching to a child with ADHD, teachers must not limit curiosities due to challenges in the classroom but instead embrace their bright personalities. Teachers need patience and great creativity to enable learning with divergent thinkers and appropriately challenge these students. Often, educators erroneously think that disabilities set children below the benchmark, and this dangerous assumption narrows a child's opportunity to show his/her set of abilities. This presentation discusses how, with an open mind and heart, teachers can enrich a child's academic, social, and individual experience.

Title: LEARNING OUTDOORS POSITIVELY AFFECTS TEACHERS AND STUDENTS

Presenter(s): Bailey Pugh

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: States are becoming more competitive in regard to test scores and are trying to follow the Common Core Standards. This pressure on students results in more time in the classroom and the reduction of recess or cancelling it all together. Children who spend time outside everyday are proven to be less stressed about schoolwork and have a healthier overall well-being. Regardless of these findings, teachers are keeping children inside hoping to result in better test scores. Getting children outside benefits their physical growth and allows the brain to recharge so that they can be successful academically, socially, and cognitively. Students who learn outside tend to get better grades and have better health, increased motivation, better attitudes about the environment, better overall behavior, enhanced communication skills, increase in outdoor skills, and increased self-reliance. We can no longer question the benefits of the effects recess and outdoor learning have. A change in the sole focus on Common Core Standards needs to take place because mental and physical health is the basis of learning. Being outside heals the brain, body, mind, and soul, and this presentation focuses on these benefits of outdoor experiences in schooling.

Title: AUTISM AND ASPERGER SYNDROME

Presenter(s): Sabrina Blea

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: As a teacher, it is important to be understanding of all students' needs, whether they have a disability or not. All students bring something new and exciting to the classroom and having a diverse group of students is an advantage. However, without the proper knowledge of Autism and Asperger Syndrome, it can be difficult to provide an environment in which all students can succeed or be appreciated for their differences. With my project, I intend to shed light on Autism and Asperger Syndrome and explain ways that these differences can be celebrated within the classroom as well as present accommodations that can assist students throughout their academic career. While my presentation is focused largely around classroom techniques, it is appropriate for all people who may have the privilege of working with someone with Autism or Asperger Syndrome.

Title: TEACHING PRACTICES FOR AUTISM

Presenter(s): Paige Luke

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: Every child in elementary school deserves to receive the best education possible, including students with Autism. It is the responsibility of an educator to create a classroom that offers all diverse students equal opportunities to participate in all learning activities. Each child learns differently; therefore, the teachers need to utilize various teaching methods to facilitate effective learning. Adaptations and accommodations in the inclusive classroom will help a student with Autism reach his/her full potential. This poster will overview the best teaching practices for students with Autism.

Title: TEACHING SOCIAL SKILLS

Presenter(s): Allyson Nelson

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: Teachers have the rewarding job of teaching a diverse populations of students. There are a variety of ethnicities, religions, and even countries that students come from to create a diverse classroom, but students with disabilities also add to diversity in the classroom. This presentation is about teaching social skills to students with Down Syndrome. It focuses on the different aspects of social interaction that need to be addressed when teaching a student that has Down Syndrome. The presentation also explores the different strategies/activities that are currently used among educators along with an explanation as to why each strategy/activity is effective. The information provides insight into how social skills are taught in schools.

Title: MUSCULAR DYSTROPHY

Presenter(s): Sarah Benton, Allison Davis

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: This poster presentation introduces Muscular Dystrophy (MD). Two presenters describe this disability in detail and the impact it has on everyday life for these individuals. We share two personal stories that have touched our lives. One story illustrates a family who has two boys with Duchenne Muscular Dystrophy, while the other story illustrates a family who has a son with Limb Girdle Muscular Dystrophy. This poster also illustrates effective adaptations that teachers and families can use for people who have Muscular Dystrophy. In addition, we share personal family photographs as well as visuals of adaptive equipment that may be useful for people with this disability. Because we have lived with a close connection to Muscular Dystrophy, we strongly believe in increasing awareness of the high potential that these students have and the value of including everyone as equal members of the community.

Title: ADAPTED BOOKS, SONGS WITH MANIPULATIVES AND STRUCTURED TASKS

Presenter(s): Ashley Blankenbeckler, Mallory Havens, Kenzi Medina, Kaitlyn Pridy

Faculty Mentor: Ann Gillies

Track: 12B

Abstract: This poster presentation showcases adapted books, songs with manipulatives, and structured tasks for use with diverse learners in an inclusive classroom. Four Early Childhood Special Education candidates present handmade materials to use as strategies for teaching academic,

behavioral, and adaptive skills. Use of these tools are effective with all students through tactile, auditory, and visual learning styles. We encourage participants to interact with all of our learning materials to gain knowledge and understanding of how to implement these tools successfully within the inclusive classroom.

- Title:** **LEARNING STYLES IN EARLY CHILDHOOD EDUCATION: STRUCTURED OR UNSTRUCTURED ART**
- Presenter(s):** Devyn McCallum, Bailey Rogers
- Faculty Mentor:** Vail Shultz-McCole
- Track:** 12B
- Abstract:** Art experiences offered to children vary from teacher to teacher. The presenters analyze the structured and unstructured learning experiences in early childhood art education to see which style is the most beneficial for allowing young children to express themselves authentically. Young children's minds are rapidly growing from birth to the age of three, creating the most neural connections in the brain compared to any other age. Art activities allow children to express themselves through hands-on learning and exploration of their imagination. In this poster presentation, we are specifically comparing the following: teachers who instruct children on how to demonstrate their creativity so that all of the art looks identical or very similar and teachers who guide and stand by to assist as needed but let the children express themselves through their own hands and experiences. We assert that children learn best through self-guided creation of visual art.

THEATRE

- Title:** **BASEBALL: THE MUSICAL**
- Presenter(s):** Joseph DeMers
- Faculty Mentor:** Paula Casey
- Track:** 13A
- Abstract:** "Baseball: The Musical" is a speech and presentation by Joey DeMers that holds two seemingly opposing disciplines next to one another in order to foster a multiplicity of viewpoints for discussion. The topic at hand is how musical theatre works to break down the history and literature of the American sport of baseball. The history of musical theatre is like a series of time capsules, each one unique and capturing the colloquialisms, representations, and emotions of its peoples. Here, some of these 'time capsules' are unearthed and opened up in the context of America's beloved game of ball and stick.
- Title:** **"THE VERSATILE PERFORMER: THE STRENGTHS AND CHALLENGES OF DANCE TRAINING FOR MUSIC THEATRE PERFORMERS IN EDUCATION"**
- Presenter(s):** Alexis O'Neil
- Faculty Mentor:** Meredith Lyons
- Track:** 13A
- Abstract:** In the world of Bob Fosse's Chicago and Casey Nicholaw's Aladdin, the world of music theatre has high demand for an extremely well rounded triple threat, a performer who sings, dances, and acts proficiently. But in training for music theatre, colleges and pre-collegiate offer different variations on what dances should be required for music theatre training. This presentation highlights research comparing the strengths and

weaknesses of the best music theatre programs in the country. This includes research on demographics, required dance classes for the major, how long it takes to change curriculum, the division between acting and dancing in pre-collegiate schools, and interviews. This research is meant advocate for a greater variety of dance classes in order to train a more versatile and hireable music theatre performer.

Title: OIL: THE INESCAPABLE US ADDICTION

Presenter(s): Espen Thune-Larsen

Faculty Mentor: Paula Casey

Track: 13A

Abstract: There have been many kings on this planet. Alexander The Great, Genghis Khan, King George, Caesar, and the list goes on. But as kings come and go, claiming to control the world, none truly control the world like oil does. So why is the US still in the Middle East? Would you believe me if I could answer that question with one word? Oil. After World War I, the world changed and became mechanized and "modern." The US has been arming militias in the Middle East to create a 'Western' Middle East and obtain its oil. But for every action, there is an equal and opposite reaction, and now the US has essentially armed its own enemies. To make matters worse, the US and the world now use oil in every part of our daily lives, so if we leave the Middle East and its oil, we leave every part of our daily lives behind with it. In this informative presentation, I will trace the interesting history of oil, and explain why there is no simple solution to our addiction to oil and its profits.

Title: CREATIVE, OR CRAZY?

Presenter(s): Marisa Jahnke

Faculty Mentor: Paula Casey

Track: 13A

Abstract: When you come across creative people, you may think they are "strange", and in fact they are. There should not be a negative connotation attached to the word, however, as creative people are not like everyone else. From Lady Gaga in her meat dress to Michael Jackson's obsession with plastic surgery, there are many famous people who have showcased how creative minds can work. In all walks of life, people often choose paths inspired by their creativity. This informative presentation will illustrate how creative people think differently, have unusual traits, and may be associated with deviant behaviors. Although others are often quick to judge creative people because they are dissimilar, it is their fascinating characteristics that make the study of creativity intriguing.

Title: LOOKING PAST THE RAINBOW: STORIES FROM THE QUEER COMMUNITY

Presenter(s): Kylie Banks

Faculty Mentor: Jill VanBrussel

Track: 13A

Abstract: Within the past several decades, the form of spoken word poetry, known as slam poetry, has swept across the United States. With its hard-hitting, lyrical, almost rap-like language, slam poetry allows disenfranchised and unsettled youth of America speak up about the problems plaguing today's society and celebrate the diversity in their communities. In this original collection of spoken word poetry, I take several different points of view to examine the rich and diverse history of the LGBT/Queer community.

Title: HOW TO RISE ABOVE IT ALL: EDUCATION AND BARRIERS IN AMERICAN CULTURE

Presenter(s): Patrice Harris

Faculty Mentor: Scott Andrews

Track: 13A

Abstract: Education has been, and remains, a vital part in the development of the American democratic experience. When the U.S. Supreme Court handed down its decision in the 1954 Brown v. Board of Education case, the impact was felt across the nation. More than simply a legal document, the ruling was a catalyst that sparked the civil rights movement, a movement we see continuing today in the struggle for LGBT rights, religious tolerance, and immigrant security. The Brown decision opened opportunities for African-Americans to liberate and empower themselves and to begin to break down the barriers that pit different groups against each other. However, some of these barriers remain today, and we need a renewed call to action. What Martin Luther King, Jr., Angela Davis, John F. Kennedy, Rosa Parks, Abraham Lincoln, and Gandhi shared is a conviction that more voices of reason and understanding can make any country a better place for all, for generations to come. Now more important than ever, this presentation shows that equal education can allow us to better work as a whole, as a more perfect union of differences.

Title: THOROUGHLY MODERN MILLINERY

Presenter(s): Sarah Bos

Faculty Mentor: Jill VanBrussel

Track: 13A

Abstract: The 1920's saw a major shift for women, not only in society but in fashion as well. In CMU's production of "Thoroughly Modern Millie," the audience saw a humorous take on what it meant to be a modern woman in 1922 New York City. Short skirts, bobbed hair, and cloche hats were crucial to defining an era and, in this story, help to mark Millie's journey. A designer needs to both understand history and be able recognize the limits of recreating it on stage. This presentation examines the challenges, concerns, and conclusions involved in creating and adapting historical headwear for theatre.

Title: FLOW STATES

Presenter(s): Chase Morris

Faculty Mentor: Meredith Lyons

Track: 13A

Abstract: This presentation is the final product of a thesis project regarding the optimal state of consciousness, known as flow state, and how this form of focus is and can be integrated everyday within society. The motivation to work on this project derived from personal experience and an epiphany through the art form of dance. This motivation also came from the beginning stages of my academic studies in Psychology. Readers of this project will need little background information about Flow States, for basic stepping stones in understanding the research are provided. Keywords or phrases that best summarize the research are: personal biography, historical understanding, neurobiological perspective, psychological perspective, and a take on a class room/educational setting. The significance of this project is closely intertwined with the constructs of human interaction and social awareness as well as the healing properties that result from optimal consciousness. The intended audience for this project includes teachers, neuroscientists, psychologists, and individuals that are interested in personal gain from optimal consciousness that flow states provide.

Title: **ÉVOLUENT: A SOLO EXPLORATION**
Presenter(s): Meri-Ashton Van Winkle
Faculty Mentor: Amanda Benzin
Track: 13B
Abstract: Évoluent is about the change of life. In our world today, there is a lot of change happening, and it affects our lives on a full spectrum. The process of change tends to feel easier when you have a support system by your side. This support system could include a best friend, sibling, mother or father, or someone with whom you feel a connection. However, change sometimes causes that support system to weaken. When this occurs, the question becomes "what happens when that support and relationship dissolves?" In its birth, Évoluent was choreographed as a duet exploring the concept of the internal and external forms of connection, along with the relationship between two individuals. This iteration of the work explores the idea of a solo connection between the environment, the space, and the audience. The presentation begins with a brief explanation of the values and significance of the work and concludes with a performance of the solo.

Title: **PERFORMING ATHLETES: DANCE MEETS STRENGTH AND CONDITIONING**
Presenter(s): Grace Shively
Faculty Mentor: Amanda Benzin
Track: 13B
Abstract: The study of dance through the lens of kinesiology is a new and evolving field of research. In the performing arts, the level of research and implementation of kinesiology has not been accepted or applied as it has in athletics. There are essential benefits to be gained through the implementation of a strength and conditioning program that includes injury prevention as well as improved technique, endurance, and performance. Considering the demanding schedules of dancers, the strength and conditioning program will be incorporated into the dance class, where dancers will develop their technical skills while focusing on strength training measures. Research has shown that dance alone is not able to adequately prepare dancers for the demands of performance; rather, outside stimulus (strength and resistance training) are needed to improve dancers' technique and performance. Incorporating a strength and conditioning program into a dance technique class acknowledges the time and energy demands in dancers' lives and reaps the aforementioned benefits. This presentation will demonstrate such a class format. It is time dance and kinesiology come together to optimize the potential of performers in a manner that is effective, efficient, and relevant for today's dancers.

Title: **TRAUMATIZATION TO ALLEVIATION DEDICATED TO DYLAN SCHUETZ**
Presenter(s): Ayla Schuetz
Faculty Mentor: Amanda Benzin
Track: 13B
Abstract: It was a perfect day in Idaho Springs, Colorado. My big brother and two of his friends were heading to Saint Mary's Glacier to free climb in a new spot on the mountain. It started out as an easy climb, but one slip of my brother's grip caused him to fall over 150 feet down the mountain. His life changed in a matter of seconds. The story of his fall and recovery has been told through many perspectives, including his own version as well as from his friends, family, nurses and doctors, and news coverage; but which version is true? How did his personal trauma affect the people around him? How can he use the people around him and their experiences to

find acceptance in what happened to him? This solo dance performance encompasses how my brother was, and still is, recovering from a horrific trauma and how friends, family, and news coverage did, and still can, aid his recovery.

Title: EXCERPT FROM "BLACK SHEEP"

Presenter(s): Quiana McElroy

Faculty Mentor: Jeremy Franklin

Track: 13C

Abstract: "Black Sheep" is a cabaret that focuses on the struggles children are battling on a day-to-day basis. They are constantly making new relationships, sometimes with very little guidance. This cabaret shows a variety of relationships and their effects on the child. This excerpt acknowledges the relationship between the performer, her father, and her overbearing grandmother. The presenter performs "The Letter" by Kehlani and "Listen" from the musical "Dreamgirls."

Title: EXCERPT FROM "SINCE I LOOK LIKE A HIGH-SCHOOLER ANYWAY"

Presenter(s): Michael Robinson

Faculty Mentor: Jeremy Franklin

Track: 13C

Abstract: "Since I Look Like a High-Schooler Anyway..." is a cabaret written and performed by Michael S. Robinson, featuring piano accompaniment by Douglas Morrow. The performer presents the first two songs from the show "Normal" by Michelle Elliott and Danny Larsen as well as "Looking at You" by Cole Porter. The cabaret tells the story of a shy, awkward, anxious young man (Michael), and the worst day of his high-school career. While the events depicted in the cabaret are fictional, the character is loosely based on the performer's own life experiences. The cabaret is meant to remind the audience that even when life seems its loneliest, there is always a way to push through and find true belonging.

Title: EXCERPT FROM "AN ODE TO THE PAST, PRESENT, AND FUTURE SELF"

Presenter(s): Alexis Bonsante

Faculty Mentor: Jeremy Franklin

Track: 13C

Abstract: "An Ode to The Past, Present, and Future Self" is an original cabaret written and performed by the artist with piano accompaniment by Douglas Morrow. The cabaret explores the depths of a performer through who she is and who she wants to become by looking through places of joy, laughter, and darkness. The songs showcased here will be "Maybe This Time" from "Cabaret" and "Climb Every Mountain" from "The Sound Of Music".

Title: EXCERPT FROM "A BITCH... BUT A NICE ONE"

Presenter(s): Samantha Cage

Faculty Mentor: Jeremy Franklin

Track: 13C

Abstract: "A Bitch... But a Nice One" is a cabaret that explores the many different lenses through which Samantha Cage has been viewed. It looks at Samantha in many lights and sees her in every way you might actually encounter her. This excerpt includes "Bitch" by Meredith Brooks and "My Grand Plan" from "The Lightning Thief," music and lyrics by Rob Rokicki. These songs analyze the word "bitch" itself and show that it may not be the negative, terrible word that it has come to be for some people. This

is just the tip of the iceberg in examining the many different personalities Samantha can exhibit. The cabaret is accompanied by Doug Morrow on piano.

Title: EXCERPT FROM "I CAN SING THE MELODY TOO"
Presenter(s): Taylor Bowns
Faculty Mentor: Jeremy Franklin
Track: 13C
Abstract: "I Can Sing The Melody Too" is an autobiographical cabaret written and performed by Taylor Bowns with piano accompaniment by Douglas Morrow. The presenter performs "Faithfully" written by Journey, followed by "Goodnight My Someone" written by Meredith Willson from the musical "The Music Man." This section of the cabaret explores the idea of typecasting with gender and voice type.

Title: EXCERPT FROM "THE HERO'S JOURNEY" BY JOEY DEMERS
Presenter(s): Joseph DeMers
Faculty Mentor: Jeremy Franklin
Track: 13C
Abstract: The Hero's Journey is an autobiographical cabaret written and performed by Joey DeMers with piano accompaniment by Douglas Morrow. The cabaret in its entirety follows a "hero" in his attempt to overcome self-doubt and deprecation to cultivate happiness and confidence. The work jumps between a video game persona and real college experiences. This excerpt from the complete work will include "Like It Here" by Michelle Elliott and Danny Larson and "The Happy Time" by John Kander and Fred Ebb.

Title: EXCERPT FROM "THE POWER OF VOICES"
Presenter(s): Alexis O'Neil
Faculty Mentor: Jeremy Franklin
Track: 13C
Abstract: "The Power of Voices" is an original cabaret portraying an autobiographical account of how negative words and bullying have shaped the artist. It is performed and written by the artist with piano accompaniment by Douglas Morrow. The portion presented is a section from the middle of the cabaret and includes the songs "I'm in Love With A Wonderful Guy" from Rodgers and Hammerstein's "South Pacific" and "Pretty Funny" from Benj Pasek and Justin Paul's "Dogfight." This section of the cabaret highlights one of the coping mechanisms the artist utilized to deal with bullying.

CAREER AND TECHNICAL EDUCATION

Title: ARLO COLLISION AVOIDANCE
Presenter(s): Austin Krebill
Faculty Mentor: Steve McGraw
Track: 14
Abstract: The project involves assembly of a self-driven Arlo robot, programed to move through hallways without colliding with objects or people. The key question of the project: "Is it possible to program collision avoidance behavior into a robot that only uses a single Arduino computer?" The

project probes the extent of robot programming for a computer as small as an Arduino and explores technology from the basics of robotics, IR, Ultrasonic sensors, C++ programming, collision avoidance programming, and multiple types of sensors. The fact that something as complicated as collision avoidance can be programmed on equipment as small as the Arduino shows that advanced robotics can become common place in today's world.

Title: AN INTERACTION OF FILM AND ANIMATION

Presenter(s): Davis Devereux

Faculty Mentor: Sundial Hoffman

Track: 14

Abstract: This project demonstrates how live action film and animation can interact with each other through the art of staging and composition. The project will feature a live actor performing with a traditionally animated character. Utilizing the 12 principles of animation, film theory, and foundational art concepts, this project will show how a two-dimensional character can interact with the physical world. Digital animation will be done using Adobe Animate, the video footage will be edited in Adobe Premiere, and the final compositing will be put together in Adobe After Effects; all industry standard programs. The project is motivated by the evolution of media where very few products are entirely live action or entirely animated, rather they are a merger of the two. It plays to both the strengths of filming and animation, and the importance of emerging members of the industry being trained in both disciplines.

Title: DRIFT TRIKE

Presenter(s): Mathew Abercrombie, Lucas Clarke, Samuel Coleman, Ethan Davis, Michael Hendricks, Caleb Lone, Daylon Ponce

Faculty Mentor: Michael Carlton

Track: 14

Abstract: If you've ever ridden a "Green Machine" as a child you can appreciate the idea of a gas powered version for "bigger kids". This project is the manufacture of a "Drift Trike". The Job Shop team will present a demonstration of the manufacturing, machining, and fabrication processes to produce the trike from stock materials. The emphasis for this presentation is on in-house manufacturing rather than off-the-shelf assembly of components. Approximately 85% of the individual components will be machined/fabricated by the team members. The first step is to create a simple design utilizing components based on commercially available products. Next, the team selects which parts they will manufacture relative to the order of construction. Fabrication of the chassis, engine mounts, and wheel/axle assembly will transform the project into a complex final product. The team members will organize this project by implementing individual work and cooperation between members to facilitate a streamlined process. The end goal? FUN!

Title: EMOTIONS THROUGH ANIMATION

Presenter(s): Joshua Park

Faculty Mentor: Daniel McClintock

Track: 14

Abstract: When it comes to film, there's great potential to convey emotions. Animation specifically has great potential to influence the mood of an audience. Every little object in a scene needs to be placed with reason.

Lighting is also an important aspect of scene building. With proper lighting, you can alter colors and textures as well as bring attention to certain details. My goal is to demonstrate the influence of lighting and color on viewers' experiences. This project will present a scene displaying two different sets of emotions. I will construct and render the scene using digital modeling software— Maya and ZBrush. Some of the differences between the two scenes will be subtle, like prop changes and facial expression, while others will be more obvious, like lighting and color shifts.

Title: IMPLEMENTING CRITICAL THINKING IN AGRICULTURE

Presenter(s): Natalie Danielson

Faculty Mentor: Katy-Jane Angwin

Track: 14

Abstract: Equipment maintenance is an important part of agriculture, as machinery is one of the largest overhead expenses of an agricultural operation. Learning how to repair and maintain equipment is therefore an important skill. In this project, students were presented with a disc implement, typically used for preparation of a seedbed prior to planting. The disc implement no longer functioned the way it should have due to a worn axle, weak chains, bald tires, metal erosion, and a chain key lock that needed to be re-manufactured. Students first evaluated the project and designed necessary repairs. The students formed groups to efficiently complete the project, taking turns to cut, weld, sand, and grind different parts of the equipment for improvements. This included filling in weak spots on the metal frame, replacing parts, sanding, and repainting. In ten class periods, the students were able to turn an almost useless piece of backyard junk into an efficient implement that can be used for several more years. This project showcases the practical skills students learned from the class and their creativity in problem solving in a real world situation.

GRADUATE STUDIES

Title: THE LOST ART OF MOVEMENT

Presenter(s): Sean Blackmer

Faculty Mentor: Ann Gillies

Track: 15

Abstract: Is our educational system the source of the problem when it comes to the rise in childhood obesity, mental health crises, and lack of creativity? As more and more schools continue to cut physical education, recess, and extra-curricular activities, it's hard not to blame the system. These cuts are causing students to sit for longer periods of time, even though research has shown students benefit from being active at school and the majority of students are Kinesthetic Learners. Movement allows the brain and body to work together to create more neural pathways that help us process information quicker, recall memories more efficiently, and make a positive impact on students' overall well-being. But how are students supposed to get their wiggles, extra energy, and frustrations out, as well as gain all the benefits from movement, when there is no recess or physical education class? This presentation will show the effectiveness of establishing movement in the classroom to decrease behavior issues, boost student and school test scores, and improve mental health well-being.

Title: TRAUMA IN OUR NATION'S SCHOOLS

Presenter(s): Mykenzie Fox

Faculty Mentor: Ann Gillies

Track: 15

Abstract: Trauma is not a word that we want to hear, especially when it is being used in reference to our schools and our nation's children. Yet, no matter how much we avoid the topic, the reality is that trauma is sweeping through our nation's schools. One in five children will experience some sort of trauma in their lives, and around 35% of these children will experience more than one form of trauma. The data is concerning, and it has a strong impact on education. Teachers can no longer come into the classroom just ready to teach the basics of reading, writing, and math. Teachers have to be equipped with strategies to help their students develop strength and empathy. Our nation is experiencing an epidemic. It is almost guaranteed that a teacher will have at least one student in his/her classroom who has been impacted by trauma, which may cause behavioral or social-emotional problems. Yet, the training is still not there! It is time to educate and equip our teachers with strategies to help our children succeed, which is discussed in this presentation.

Title: NEW AVENUES OF EXPRESSION

Presenter(s): Sandra Currier

Faculty Mentor: Ann Gillies

Track: 15

Abstract: This presentation discusses why creating new avenues of expression is a present moral issue to address in order to appropriately support people with physical and cognitive disabilities. It also applies to people incorrectly diagnosed with disabilities, such as second language speakers for example. Limited opportunities for expression obstruct the social, emotional, and educational development of people with disabilities. It can also cause economical marginalization. A social and artistic life can be key to a fulfilling and fruitful life.

Multiple social settings and businesses do not create avenues where people with disabilities can experience creative day-to-day activities and/or scenarios. The rejection of creating or adapting avenues of expression brands people with disabilities as outcasts of society, and it perpetuates a pattern of social rejection. Educators, public places, businesses, museums, musical opportunities, libraries, and other social services need to adapt all services and opportunities to allow people with disabilities to experience everything they offer. This can be achieved by building a community that treats everybody equally, accommodates services, and treats people with disabilities no different than others; communities must trust and not be afraid of people with disabilities by exploring their extraordinary qualities and attributes.

⊕ PLANNING COMMITTEE

STAFF:

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Emily Dodson, Academic Affairs
Erin Rooks, Academic Affairs
Lisa Smith, Marketing

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Suzie Garner, Art and Design
Ann Gillies, Teacher Education
Olga Grisak, Health Sciences
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Deborah Parman, Business
Brian Parry, Social and Behavioral Sciences
Benjamin Regiel, Theatre
Jon St. Peter, Western Colorado Community College
Jared Workman, Physical and Environmental Sciences
Bill Wright, Languages, Literature and Mass
Communication
Kristen Yeon-Ji Yun, Music

⊕ SESSION FACILITATORS

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Cathy Bonan-Hamada	Paul Hampton	Chris Murphy	Bill Wright
Tim Casey	Chelsie Hess	Deb Parman	Kristen Yun
Michael Delaney	Larry Jones	Lori Payne	
Susie Garner	Sarah Lanci	Chris Penick	
Ann Gillies	Sam Lohse	Benjamin Reigel	



Nancy Alex	Daniel Crumly	DJ Jacob	Luis Silva-Villar
Tyler Anderson	Gerald Daub	Juli Jacobson	Diana Sirko
Mark Austin	John Dobbs	Eliot Jennings	Laura Slaymaker
Ram Basnet	Valerie Dobbs	Brian Krinke	Matt Smith
Tom Benton	Abigail Ferolla	Mark Lewis	Britt Smith
Chuck Birch	Rebecca Fleishman	Mac Lewis	Lisa Smith
Peter Booth	Paul Gardner	Meredith Lyons	Doug Sorter
Lee Borden	Kaitlyn Gilmore	Stephanie Matlock	Matt Stansbury
Sonia Brandon	Dana Hansen	Robin O'Connor	Richard Vail
Esther Broughton	Jeremy Hawkins	Erik Packard	Jill Van Brussel
Holly Buglewicz	Sarah Hays	Jim Parman	Lindsey Walt
Trevor Burrel	Brett Hensley	Brian Parry	Brenda Willhelm
Karl Castleton	Denise Hocht	Randy Phillis	Freddy Witarsa
Jose Chavez	Brian Hosterman	Steve Renner	Phillip Wyse
Jeremy Cleveland	Joy Hudak	Joe Richards	Kathy Young
David Collins	Trisha Hyatt	Ed Schrader	
Julia Crocetto	Ericka Jackson	Dan Schultz-Ela	



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Sciences

Jared Workman,
Physical and Environmental
Sciences

Kristen Yeon-Ji Yun,
Music

Megan Zollinger,
Theatre Arts



⊕ STUDENT SHOWCASE

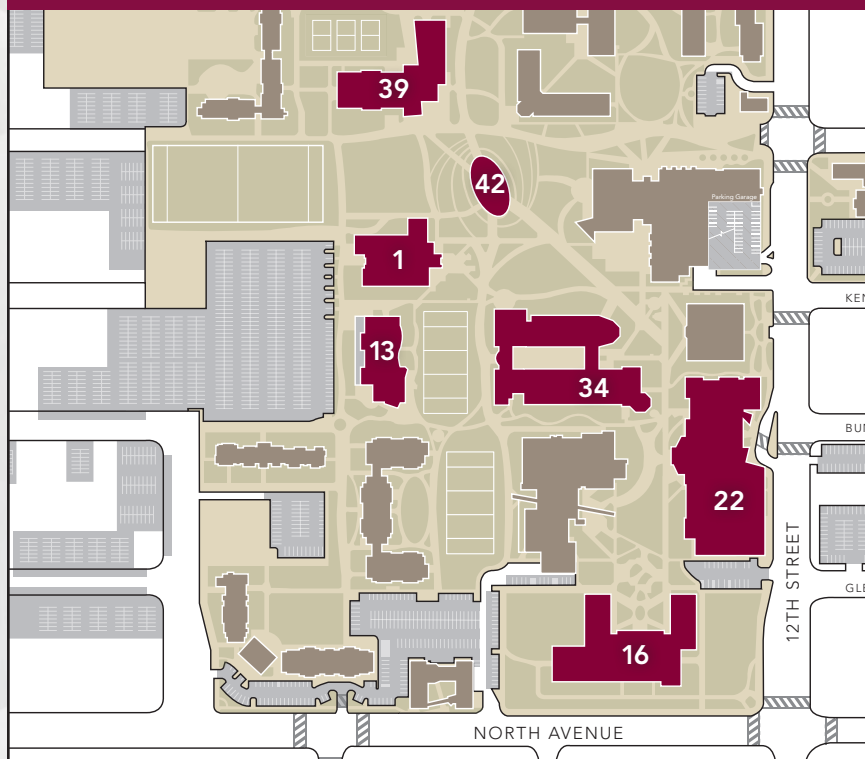
NOTES:

This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings on the page.



ACADEMIC AFFAIRS
coloradomesa.edu/showcase
 970.248.1881
 1100 North Avenue
 Grand Junction, CO 81501-3122





STUDENT SHOWCASE

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



Dominguez Hall (DH)..... 1

Business
Graduate Studies
Teacher Education

Escalante Hall (EH)..... 39

Computer Science, Mathematics and Statistics
Languages, Literature and
Mass Communications

Fine Arts Building (FA)..... 13

Art and Design
Bronze Pour Demonstration

Houston Hall (H) 16

Biology
Career and Technical Education
Health Sciences
Kinesiology
Social and Behavioral Sciences

Plaza (tent) 42

Career and Technical Education
Engineering — First-Year Design Expo
Engineering — Open Design
Engineering — Senior Design Design

Moss Performing Arts Center (MPAC)..... 22

Awards Ceremony, 4pm
Registration
Music
Theatre Arts

Wubben Hall & Science Center (WS) 34

Biological Sciences
Computer Science, Mathematics and Statistics
Physical and Environmental Sciences
Theatre

