



COLORADO MESA
UNIVERSITY



Eighth Annual
STUDENT 2017
SHOWCASE



Friday, April 28 • 1pm

**SHOWCASE
PROCEEDINGS**





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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. Showcase Proceedings contain the sessions' abstracts.

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PROCEEDINGS



Friday, April 28, 2017
Grand Junction, Colorado



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Kristen Yeon-Ji Yun

Music

Megan Zollinger

Theatre Arts



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ABSTRACTS



OPENING SESSION

Presenter(s): Taylor Cecil, Hunter Jetkoski-Defries, Bebly Machado-Herrera

Title: ALPHA CHI PRESENTS, "THE DILEMMA OF DIFFERENTIATION ABOUT GROUP IDENTITY, STEREOTYPES, AND TOLERANCE"

Faculty Sponsor: Adam Rosenbaum, Department of Social and Behavioral Sciences

Abstract: In an increasingly divided and contentious political atmosphere, we want to address the dangers of ingroup/outgroup thinking and the virtues of tolerance. This session will begin with an exercise that will literally divide the audience into separate groups. This will be followed by three short presentations: Assistant Professor of Archaeology John Seebach will discuss anthropological insights into the origins of group identity, Assistant Professor of Psychology Nikki Jones will address the psychological significance of self-fulfilling stereotypes, and Associated Student Government's past-president Josh Dillinger will talk about his campaign for tolerance, revelation, understanding, and education (TRUE). We will conclude the session with another exercise that will compel audience members to appreciate some of the things that we all have in common.

STUDENT SHOWCASE SESSIONS

Presenter(s): Jeri Abegglen, Eduardo Herrera, Grace Herrera

Title: VOLUME SALON

Faculty Sponsor: Warren MacEvoy, Department of Computer Science, Mathematics and Statistics

Abstract: Nowadays, it is expected that every business has a website and technology in order to shop and checkout quickly. Customers can become irritated or even stop shopping at a business that does not offer modern ways of viewing and paying for goods and services. Small business owners are often too busy to find, implement and maintain new technology. We came across a locally owned and operated business in need of a website, inventory and checkout software. After meeting with the salon owner, we established the needs of the business. The old inventory and checkout process that was time consuming, required unnecessary steps, and did not track inventory in a logical manner. We set the following goals: build a current website that features the salon, stylists and items sold in the shop that will require little maintenance; add a feature to make updates easy; create a more seamless point of sale and inventory system with a minimal number of clicks. In our presentation, we will feature the website, the administration page (to update the stylists and products) and the inventory and checkout software which also runs reports for inventory and tax purposes.

Presenter(s): Jeri Abegglen, Eduardo Herrera, Grace Herrera

Title: PROART

Faculty Sponsor: Warren MacEvoy, Department of Computer Science, Mathematics and Statistics

Abstract: "Never Judge a Book by Its Cover" can be applied many ways. Unfortunately, that phrase isn't always listened to. How many times have you judged a business by the lobby, cleanliness, or maintenance of the building? Those things have no impact on the actual services or products offered, but consumers may choose not to

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do business there based on those things alone. The same applies with a website. The validity and quality of a business is often judged by how appealing and user-friendly their website is. The website isn't a direct indication of the quality of product you will get from a business, however, it's perceived that way by consumers. Our presentation will feature an interactive website for a local artist who, much like this example, had a static website that didn't match the quality of work he produces. It lacked functionality and visual appeal you'd expect from an artist. We'll highlight the more technically difficult parts implemented: an administration page (to add, delete, and choose artwork to feature), organization of galleries, payment/project submission portal and a dynamic video header that works on all devices and screen sizes (created by partnering with Mesa County Libraries and a local videographer).

Presenter(s): Courtney Abellera, Avery Butcher, Hope Pfalzgraff

Title: CAN YOU HAVE DISORDERED EATING HABITS AND STILL FEEL GOOD ABOUT YOUR BODY? AN EXAMINATION OF THE EATING HABITS AND BODY IMAGE OF COLLEGE STUDENTS AND STUDENT-ATHLETES.

Faculty Sponsor: Jacob Jones, Department of Social and Behavioral Sciences

Abstract: The researchers examined the eating behaviors and body image of college students and student athletes. In a mixed method study, the researchers quantitatively compared the eating habits and body image of 585 students, university club athletes, collegiate athletes, and former athletes. The researchers found that wrestlers have significantly healthier eating habits compared to volleyball and football, respectively. Volleyball players had significantly healthier body image compared to wrestling and football. Women had a significantly healthier body image compared to men. NCAA athletes had a significantly healthier body image compared to former and non-athletes. University club athletes had a significantly healthier body image compared to non-athletes. Wrestlers reported that their eating habits can be explained by pressures to cut weight, gaining a competitive advantage. Volleyball players' lower body image supports previous research results that indicate women tend to have a less healthy body image when compared to men. NCAA, club, and former athletes had a healthier body image, but had more disordered eating habits when compared to college students. The pressures surrounding eating habits do not come exclusively from self-image; other factors such as convenience, money, coaching pressures, and family also influence eating habits.

Presenter(s): Joshua Abshear, West Castro

Title: SUNFLOWER - THE OPTIMAL, TRACKING SOLAR PANEL

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: Traditional solar panels can be optimized by adding servos and sensors to continually adjust their bearing throughout the day. This allows the panels to constantly face direct sunlight as well as avoid damage from wind and rain. The US Energy Information Administration suggests that solar panels' photovoltaic output can be nearly doubled by implementing dual-axis tracking as well as greatly increasing lifespan. We have built our own dual-axis tracking system using custom 3D printed materials, servo motors, photocells, and a single-board computer coded with Python to manage real-time data and analytics. This project demonstrates the cost-effective approach of dual-axis solar panels.

Presenter(s): Katarina Abts, Jacob Brooks, Taylor Rademacher

Title: SOS: I NEED HELP

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: In this research article, we explored the effectiveness of the suicide prevention programs in schools that use the signs of suicide (SOS) program versus schools that do not incorporate suicide prevention education into their regular school curriculum at all. The SOS program stresses the idea of suicidal ideation being directly related

to mental illness rather than being a reaction to high amounts of emotional distress. The program also teaches students how to detect signs of suicide in their peers and provides education on what to do if a student were to suspect that one of their peers is suicidal. This program also gives multiple resources on how to seek immediate assistance when going through an emotional crisis. The results of the studies we examined concluded that the SOS program is the most effective school based suicide prevention program. Research showed that this program results in a decrease in self-reported suicide attempts and an increase in suicide prevention education. The students that went through this training showed more effective and safe coping strategies related to depression and suicide.

Presenter(s): Cortnee Agan

Title: DECOMPOSITION RATES: AUTOPSIED VS. NON-AUTOPSIED HUMAN REMAINS

Faculty Sponsor: Melissa Connor, Department of Social and Behavioral Sciences

Abstract: This research investigates the potential for differential decomposition between autopsied and non-autopsied human cadavers. This topic is worth addressing because: (1) it allows researchers to understand the function of the microbiomes that facilitate endogenous decomposition; and (2) it informs future taphonomic studies by possibly allowing increased sample sizes if there is no difference between the two variables. The hypothesis is that autopsied remains decompose faster than non-autopsied, because autopsy cuts allow for earlier insect access, crucial for soft tissue removal. However, autopsied bodies may also decompose at a slower rate since bacteria that facilitate putrefaction are removed via evisceration. This research examined twelve individuals, six autopsied and six non-autopsied, to assess the trajectory of decomposition between groups. Accumulated-degree-days (ADD) are the calculated average of hourly temperatures within a 24-hour cycle, which provide a measure of thermal units that impel biological phenomenon. Total body score (TBS) is a quantified measurement of decomposition (Megyesi, et al., 2005). The TBS is based on meeting the criteria of different stages of decomposition. Sample groups were compared using paired ADD and TBS scores. Preliminary results show there is not a significant difference between decomposition rates in autopsied and non-autopsied remains.

Presenter(s): Abigail Akin, Isla Athey, Garrett Harrison, Lee Harrison, Lauren Heaton

Title: AMERICAN FUEL AND PETROCHEMICAL SOCIAL MEDIA CAMPAIGN

Faculty Sponsor: Timothy Hatten, Department of Business

Abstract: A group of nine MARK 432 Advanced Marketing students are competing against eleven other universities to win a challenge outlined by our client, the American Fuel and Petrochemical Manufacturers (AFPM) organization. The goal of the competition is to use social media to educate and recruit 16-22 years olds into craft skills positions within the fuel and petrochemical industry, specifically into jobs that are facing labor shortages. The challenge is to identify effective social media channels to engage this target market and elicit interest from them in industry jobs. The team's project is centered on the creation of a virtual reality video campaign to be used at recruiting events to give viewers glimpses into "a day on the job" for these craft skills positions. Additionally, the team will implement an "Everyday Hero" themed campaign highlighting the reach of the petrochemical industry. Both pieces will be promoted and supported through a social media campaign using a variety of platforms, reaching the largest amount of our target market possible. All pieces will promote the positive aspects of industry positions, lifestyle, and impact. The team will implement these ideas, measure their success, and then the three finalist schools will present findings to AFPM top management.

Presenter(s): Santana Alarid

Title: SEXUAL ASSAULT ON COLLEGE CAMPUSES

Faculty Sponsor: Christine Hein, Department of Languages, Literature and Mass Communication

Abstract: My objective is to analyze university responses to sexual assault cases, evaluate issues regarding the handling of those cases, and suggest policy changes required to address the problem. Included in my research will be an examination of current case studies, a review of college and university policies, and suggestions to improve campus and student safety. Most notably, this presentation will analyze the preferential treatment given to college males, specifically athletes, and I will explore a university's responsibility to the students it serves. Research will demonstrate that universities need to implement preventative policy changes to protect students as well as offer consistent justice to offenders.

Presenter(s): **Broderick Alexander, Bret Brouse, Jacob Hathaway, Matthew Hays, Logan McGovern, Tyler Morton**

Title: EARTH, WIND AND SUN: STUDENT KNOWLEDGE OF ELECTRICAL ENERGY PRODUCTION

Faculty Sponsor: Louis Nadelson, Department of Computer Science, Mathematics and Statistics

Abstract: The dependence on electricity for communication, transportation, construction and manufacturing requires reliable and effective sources of electrical energy. The balance of electricity generation with transmission costs and environmental impact, has led to an increase in the diversity of electrical energy production methods. The goal of our project was to determine college students' knowledge and perceptions of the benefits and limitations of various sources of electrical energy. We have created and distributed a survey to gather college students' attitudes, knowledge and exposure regarding the primary ways that electrical energy is generated. We are currently in the data collection phase of our project. We predict that the majority of students, will have constrained knowledge of the electrical energy field and will likely hold related common misconceptions. We predict that students studying in domains associated with electrical energy generation, or have a relatively close relationship with an individual who is experienced in electrical energy generation, will likely have greater levels of knowledge and hold fewer misconceptions. Our results will be based on the combination of our quantitative and qualitative data analysis.

Presenter(s): **Megan Alferos, Kaydie Murphy**

Title: INVESTIGATION OF CHANGING SOIL PHOSPHOROUS CONCENTRATIONS AROUND DECOMPOSING HUMAN REMAINS VIA AVAILABLE PHOSPHOROUS ANALYSIS

Faculty Sponsor: Kimberly White, Department of Physical and Environmental Sciences

Abstract: Estimation of the post-mortem interval remains a subjective process, one that indicates a level of human error that could be eliminated through the implementation of a more objective approach. Decomposition begins minutes after death through autolysis. During this process, cellular membranes begin to break down and release cellular constituents. This study will correlate available phosphorous concentrations in soils near decomposing human remains to the post-mortem interval (PMI), accumulated degree days (ADD), and the total body score (TBS). It is postulated that the decomposition of human cells will liberate phospholipids, the primary component of the human cell membranes and that the phosphorous contained within will leach into soils adjacent to the decomposing bodies. In order to determine this, soil was collected from designated locations at designated intervals per body from the time of placement to the end of active (wet) decomposition. Available phosphorous was determined via the Mehlich III extraction procedure. Pending results will be analyzed via normalization via body mass index as well as correlation to the PMI, ADD, and TBS which will be reported.

Presenter(s): **Bader Alkhamees, Joseph Lehr, Douglas Plock**

Title: ACTIVE INTELLIGENCE WITH GENETIC ALGORITHMS

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: Active Intelligence Solutions will discuss how genetic algorithms are constructing the future one random mutation at a time. Through repetition, fitness and longevity nature has shown that natural selection can be used to solve the most complex of problems. Linking nature's three simple rules to machine learning we will demonstrate how one genetic seed can grow, adapt and provide solutions to a vast array of problems; such as, making stock market predictions or determining the most efficient route to the Bahamas.

Presenter(s): **Taylor Allen**

Title: LORD OF THE RINGS ARRANGEMENT

Faculty Sponsor: Darin Kamstra, Department of Music

Abstract: Howard Shore was one of the creators of Saturday Night Live and was the musical director from 1975-1980. During this time, he composed scores for fifteen films of Director, David Cronenberg. Shore is most famous for the soundtracks from "Lord of the Rings" and "The Hobbit." This soundtrack has won Shore three Academy Awards, two Golden Globes, and four Grammy Awards. The presenter will be performing an arrangement that contains "Prologue: One Ring To Rule Them All," "Epilogue," "Bag End," "Old Friends" and "The Bridge of Khazad-Dûm." Each of these themes comes from "The Hobbit," "Lord of the Rings," or the "Lord of the Rings Musical." Throughout these different themes, several key changes occur. It begins in e minor and transitions through A major, D major, g# minor, f# minor, and ends back in the home key, a combination of e minor and G major. The last phrase of the piece has three of the previous themes played at the same time: "Bag End," "Epilogue" and "The Bridge of Khazad-Dûm."

Presenter(s): Daniel Allen, Matthew Cirkovic, Michael Digan

Title: TASKR: TASK AND PROJECT MANAGEMENT APPLICATION

Faculty Sponsor: Lori Payne, Department of Computer Science, Mathematics and Statistics

Abstract: The key to being a successful college student is effective time management; however, it is easy to become overwhelmed with all of the obligations associated with schoolwork, jobs, and extracurricular activities. Juggling all of these factors around leads students to become more stressed and results in a lower quality of work. Since this becomes such an issue, it is crucial to have an effective task management application that not only reminds students of deadlines for tasks, but also keeps them on track for large projects. Taskr will give students a pleasing and easy to use program that will help organize their life and reduce their stress.

Presenter(s): Gabriella Amorelli

Title: THE SCOURGE OF WAR: THE IMPACT OF WORLD WAR I ON INTERNATIONAL POLICY

Faculty Sponsor: Erika Jackson, Department of Social and Behavioral Sciences

Abstract: World War I was the first modern war; one with new technology but old tactics, and the cost of life was extreme. Around 200,000 soldiers lost their lives in the trenches alone, not counting the casualties of any of the battles. France and Great Britain fought against Germany while the United States remained neutral until the war affected all the people of a continent away. Woodrow Wilson's War Address to Congress pushed a nation into a war of epic proportions and the end result came in two forms. The forms were a victory and treaty that would affect Europe and the world for the next decade. The repercussions of countries' anger from World War I that resulted in the Treaty of Versailles also resulted in the Second World War twenty years later. Woodrow Wilson had idealistic views of an organization that would bring a new era into the world, but many did not share his view. Wilson's ideas nonetheless were significant in propelling the world to change in the future. This particular war had the outcome of creating an organization that would help the entire planet with justice and much more over the next decades.

Presenter(s): Nicholas Anderson, Matthew Gottschalk, Dalton Thornton

Title: LITEPOS FOR SMALL BUSINESSES

Faculty Sponsor: Lori Payne, Department of Computer Science, Mathematics and Statistics

Abstract: In any small business, it is important to be as efficient with your money as possible. It is important to get a personalized system running in order to get your business working as effectively as possible from day one. Many businesses that sell products directly to customers use a POS (Point of Sale) system in order to track at what rate they are selling their products as well as making sure they are giving correct change and making sure no money goes missing. The issue with these POS systems is that they are expensive, sometimes costing upwards of a thousand dollars. This program seeks to provide a quick and clean alternative for small business owners that does not cost an arm and a leg so that they can focus on getting their business off the ground. LitePOS will provide a simple and aesthetically pleasing point of sale system that can be used with minimal training and is quick to use in the hectic environment of daily business.

Presenter(s): Nicholas Anderson, Jacob Boyce, Jennica Rose Ramones

Title: MOBILE SCORECARD

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: The main purpose of our project is to provide a more convenient way to keep track of scores while eliminating the use of paper score cards in sports. What inspired us to come up with this idea was the hassle of carrying a paper and pencil around while playing disc golf and since people almost always have their phones with them, it would be a convenient way to keep score while playing any sport. For this project, we will be demonstrating the usefulness of this app specifically for personal use, but this project has the potential to grow to include a live stream of the scores for all spectators watching whatever sport interests them.

Presenter(s): Nicole Archambeau, Dakota Berry, Alan Carrasco, Caleb Ealey, Seth Mewhinney

Title: PID CONTROL DEMONSTRATION

Faculty Sponsor: Nathan McNeil, Department of Engineering

Abstract: Today, PID (Proportional, Integral, Derivative) control is used in many applications including automobile cruise control, flight controllers in airplanes, and propeller position control. A PID control system takes a

measurement of a control variable (such as position, temperature, light, etc.) and uses three parameters (the proportion, integral, and derivative—"PID") to set an output to correct for errors between a set point and the measured input. The three PID parameters together produce a control response that is both accurate and fast. The purpose of the PID controller that Team Average Joes built is to give a simple example of a pulley system operating a dial indicator that moves from one position to another. The angle of the dial is measured and compared to the desired angle. The PID parameters are controlled by three knobs on a control panel. The team will create a PID Controller where variables such as band material and tension on the pulley system can be adjusted in order to change system dynamics.

Presenter(s): Destiny Archuleta

Title: IMPERMANENCE

Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: Life can be taken away within a blink of an eye, but most of the time we are only reminded of this when it's too late. Colorado Mesa University has unfortunately lost at least one fellow maverick a year for the past four years. Some of the causes of death between 15-25 are traffic accidents, suicide, homicide, and drug and alcohol poisoning. There are struggles that can get in the way of life such as insecurities, bad habits and cruelty. The gift of life is often forgotten and this piece, "Impermanence", is an expression of the importance of this gift. It allows one to be reminded to never give up, even when life is difficult. As Barack Obama states "Change will not come if we wait for some other person or some other time. We are the ones we've been waiting for. We are the change that we seek."

Presenter(s): Camille Arnn, Nicholas Fischer, Jonathon Stelling

Title: DEVELOPMENT AND TESTING OF A SHOCK LOADING DEVICE AND ELECTRONICS SURVIVABILITY

Faculty Sponsor: Francisco Castro, Engineering Partnership Program, Colorado Mesa University and University of Colorado Boulder

Abstract: Capco, LLC is a Department of Defense (DoD) contractor in Grand Junction, Colorado, that specializes in both the mechanical and energetic markets of defense applications. Capco has recently extended their reach into the under-barrel grenade launcher market and would like to further extend their reach by providing grenade-launched projectiles. Before entering this market, a tester with the ability to provide and test shock loads ranging from 10,000 to 15,000 g's (the acceleration seen on Earth) is needed to develop an integrated electronics projectile capable of surviving these accelerations. The projectile is required to match the specifications of a 40 mm grenade.

Presenter(s): Kattia Arrascue

Title: AN IMMIGRANT'S JOURNEY

Faculty Sponsor: Jeanine Howe, Department of Theatre Arts

Abstract: This presentation is about the Arrascue family's long journey from Lima, Peru about nine years ago to the point where they are today. Specifically, this presentation will focus on one child: Kattia and her journey to make sense of her new life and choose her own career path separate from her family. She desired to maintain the traditions and customs of her home country while making her own mark. The journey begins at a young age when she became interested in theatre and follows her progress through Colorado Mesa University. The presentation will also explore the financial travails and time involved in acquiring dual citizenship. She plans to use her two degrees to serve her in the future while helping with her family's business. She will be applying to graduate school in Chile to pursue a Masters in Directing.

Presenter(s): Anthony Avalos, Erin Cooper, Jose Terriquez, Timothy Watrous

Title: EDGERTON PIDDLER

Faculty Sponsor: Sarah Lanci, Department of Engineering

Abstract: It has been demonstrated that the speed at which humans perceive smooth motion is around 30 frames per second. This is why movement in a movie looks smooth even though each frame is a still picture. The purpose of this project is to design a device to demonstrate that the opposite effect can be seen. An Edgerton Piddler is a device that cycles light and water at a similar speed. When the frequencies are matched the water from the pump appears to be frozen in air. This will demonstrate concepts such as high speed motion in a fixed frame and oversampling and undersampling frame rates.

Presenter(s): **Maria Avila, Samuel Byrne, Zachary Hagood, Zac Johns**

Title: MODIFIED ALUMINUM CASTING FURNACE

Faculty Sponsor: Sarah Lanci, Department of Engineering

Abstract: Metal casting has been around since 3600 B.C and has played a major role in developing the world today. The process involves melting solid metal into a liquid form which can then be poured into a mold to create a product. The goal of this project is to design and construct a semi-portable, electric-powered furnace that the engineering department at Colorado Mesa University can use in the engineering curriculum. The hexagonal shape allows for efficient heating and incorporates safety features such as recessed coils and a kill switch, which will turn the heating elements on and off by a rotating top-lid. This furnace system will also include an electrical control box for better control of the melt temperature. The furnace will be used to melt low-melting point alloys for casting parts and accessories, as part of an exploration in manufacturing processes.

Presenter(s): **Christine Barefoot, Samantha Torstveit, Maria Valencia**

Title: PEER SUPPORT IN HEALTH CARE

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: The many issues that surround mental illness are complex and difficult to manage. However, dealing with these problems becomes even more of a burden if done so alone. Copious research indicates that the use of peer support groups is beneficial in navigating the difficulties of mental illness and other conditions. Diabetes II patients who have peer support have better outcomes than those without. This suggests that peer support can be successful across the broader healthcare spectrum in improving how patients cope with their health issues. Pulling from current research, our poster will demonstrate how peer support could be more widely integrated within the larger context of healthcare to improve patient care outcomes.

Presenter(s): **Sierra Barton, Alison Bischoff, Ashton Collett, John Coughran, Henry Menjivar, Zachary Tabb, Megan Vorse**

Title: POETRY AND ACCORDION FOLD BOOK BINDING

Faculty Sponsor: Jennifer Hancock, Department of Languages, Literature and Mass Communication

Abstract: This collaboration between a Printmaking class and a Crafting Poetry class is a series of prints bound into accordion fold books by each poet or artist. The poets created ekphrasis poetry, or poetry inspired by art, and the printmaking class created artwork inspired by the poets' works. This collaboration is a demonstration in literary and artistic craft, and exhibits the varieties of ways in which art may be translated from one craft to another with an emphasis on variety in interpretation.

Presenter(s): **Timothy Bautista, Emilee Castleton, Marayna Flemming**

Title: THE POPSTOP INC.

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: Nowadays to grow a business, one must be as connected with technology as possible. In order to succeed, a business must utilize and manage social media accounts, a website, even a mobile app and more. We propose to build an application for our client The Popstop Inc., a small popsicle business. The app will include their catering menu and their weekly flavor listing. Customers will be able to order popsicles via the app so the owners can then easily track and fulfill the orders. The owners will be able to update their flavors, calendar, and automatically send notifications to the users of the app. Because The Popstop is a mobile business, the app's calendar and notification features will help constantly connect with its customers about its whereabouts.

Presenter(s): **Brant Bear, Aldrin Micua, Garrett Rodstrom**

Title: OPERATION R.O.V.E.R.

Faculty Sponsor: Scott Bevill, Department of Engineering

Abstract: The purpose of this project was to design an autonomous rover capable of GPS navigation, obstacle avoidance and delivering a payload at specified waypoints. The rover created for this project was an innovative design that uses two motors powering the rear wheels. The rover is powered by using a 12V battery source made by applying several AA batteries in series. The rear wheels are then connected to the front wheels by using a chain and sprocket design. The entire rover is controlled by a microprocessor that dictates the movement of the rover by utilizing GPS navigation, RF transmitter and the ultrasonic range finder. Once the microprocessor

is appropriately coded, the rover no longer require any user interaction. The designers will demonstrate the functionality of their autonomous rover showcasing their design thinking and programming techniques.

Presenter(s): **Sidney Bearden, Dylan Brown, Craig Moore, Sophie Rohkamper**

Title: DESIGN AND TESTING OF BENCH-SCALE AND PILOT BIOREACTORS FOR IN-SITU REMEDIATION OF EXCESS NITROGEN AND PHOSPHORUS FROM AGRICULTURAL RUNOFF IN THE GRAND VALLEY

Faculty Sponsor: Deborah Kennard, Department of Physical and Environmental Sciences

Abstract: Nitrogen (N) and phosphorus (P) in agricultural irrigation runoff can pollute waterways by fueling algae growth and depleting dissolved oxygen, a process called eutrophication. One approach to mitigating nutrient pollution in agricultural runoff is to use bioreactors, engineered devices that use either microorganisms or biochemically reactive material to remove certain chemicals. Denitrification bioreactors have been commonly used in the Midwest to mitigate pollution of the Mississippi River but regional differences in climate and water quality raise questions about the transferability of this technology to Western Colorado. The goal of our senior capstone project is to design and test bench-scale and pilot-scale bioreactors for in-situ remediation of excess nutrients in agricultural runoff. Optimal residence time will be determined and bench-scale testing will investigate the ability of various carbonaceous materials to aid microbial growth and remove N and P. Following pilot-scale demonstration of effective nutrient removal, recommendations will be provided for field-scale application.

Presenter(s): **Noah Beaver, Grady Harkins, James Kaku, Caleb Lone, Harrison Schutt**

Title: MOTORIZED WHEELCHAIR

Faculty Sponsor: Eric Goertz, Department of Engineering

Abstract: CGNC+J has designed and created a motorized wheel chair for the purpose of recreational use and consumer entertainment. The team used bike parts, an old wheel chair, and a 20-cc engine in order to construct a fully functional and rideable motorized wheelchair. The MW (motorized wheelchair) was constructed by using a wheelchair as a base and seat for the vehicle. The steering part of the MW was constructed by using the front half of a bicycle with a 50-cc engine mounted on the front part of the bike. A chain is attached around the engine to the front wheel of the bicycle in order to motorize it. The steering was then mounted on to the wheel chair by having parts of the frame latching on to the legs of the wheelchair. Exhausts pipes are connected from the engine to the back of the MW. Brakes and gas levers are all on the steering handle. The results of the MW were deemed successful when the MW was able to accelerate and decelerate at will. All in all, the MW proved useful for recreational use and consumer entertainment.

Presenter(s): **Efrain Becerra, Adam Childs, Nickolas Secosky**

Title: DIGITAL CHECKBOOK BALANCING

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: In today's world, it is much easier to spend money than to keep track of it. We propose a simple and user friendly application to aid in the balancing of one's finances. Our initial project idea is to develop a web application. Later, we plan on developing a mobile edition. This program should be useful to many who wish to easily balance their budget, but mostly to younger generations who need the most assistance in building a stronger financial future. The application will have a user friendly interface that allows quick tracking of deposits and withdrawals and will use simple inputs from the user. Monetary safety is a priority that we will address by not linking the program to any bank or credit account. By developing and making this app freely available, we want to enable a community build momentum towards a better financial future.

Presenter(s): **Curtis Beckel**

Title: BEHOLDING THE BIG BANG

Faculty Sponsor: Jody Kliska, Department of Engineering

Abstract: The universe is estimated to be 13.82 billion years old, beginning with the Big Bang. This value is near inconceivable considering the average human lifespan is 0.00000057% as long, but it is possible to put these values into proportion. Through an assembly of gears, the rotation of a basic motor can be slowed to the point that it will turn once every 14 billion years. The device created transforms a rotation of several hundred revolutions per second to once per second. Then once per minute. Then once per hour, day, month, year, and lifetime. Ending with a gear that will rotate at the current age of the universe, and so slowly that though encased in concrete, produces no measurable stress within the mechanism.

Presenter(s): John Beezley, Brenden Clark, Chandler Robertson
Title: ROCKET STOVE
Faculty Sponsor: Bill McCracken, Western Colorado Community College

Abstract: The rocket stove was built using skills learned in the machining and manufacturing classes and included technical drawings, 3d printing, manual machining, CNC machining, and welding. The team used other skills such as collecting technical data on the rocket stove, ordering materials, and testing. The testing on the rocket stove consisted of a burn test to find the point of ignition temperatures as well as the temperature of the exhaust from the chimney. The temperatures at the point of ignition are from 1000 degrees to 1500 degrees. This means a more efficient use of the fuel and the gases usually lost in the chimney. The continued testing of the rocket stove will show the amounts of fuel used over long period of time. The rocket stove was built using hot rolled steel and dry cement. The cement is used as the thermal mass to insulate the burn chamber. The hot rolled steel is used to build the outer wall as well as the burn chamber and parts of the chimney.

Presenter(s): Courtney Bell, Kerry Ribbens, Garrett Schulz, Jackson Shaw
Title: NEWTON'S LAWS AND FRICTION – A VISUAL REPRESENTATION
Faculty Sponsor: Jody Kliska, Department of Engineering

Abstract: Coefficients of friction vary by the material of the object and the surface it rests upon. The changing coefficients are best represented by a visual demonstration. The client gave Team Engineering Mafia the challenge of building an incline plane that accurately measures the angle of incline and the surfaces of the incline needed to be interchangeable with three or more materials. Additionally, the demonstration had to show how the coefficients change with static and kinetic friction. Friction is the measure of resistance to slippage which can be described as kinetic (moving) or static (stationary). The mass and material of the object placed on the device is constant. The angle measured varies, which affects the amount of force gravity has on the object. Dynamic-based evaluations were used to calculate the coefficients of friction and compared to known coefficients for materials. Design parameters considered visibility of the plane from the back of a classroom and the device had to accurately read to a degree.

Presenter(s): Nathan Bellew, Mitchell Bohn, Sarah Harvey, Austin Zaroni
Title: MATH HELP
Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: Learning the basics of math can be a difficult challenge for some people. Many of the basics of math like addition, subtraction, multiplication, division, exponentiation, and parenthesis are best learned through practice. This program will be a simple random math problem generator for basic math problems. It will have multiple tiers of difficulty ranging from addition and subtraction to expressions containing multiple parenthesis, exponents, and negative numbers. This program will give beginners the chance to keep working through random math problems until they begin to feel proficient with the basics of math.

Presenter(s): Lloyd Benedict, Taylor Boone, Catherine Darst, Anthony Pollard
Title: EFFECTS OF ACUTE SLEEP DEPRIVATION ON THE IMMUNE RESPONSE
Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Acute sleep deprivation has long been associated with alterations in immunity. However, varying opinions exist regarding the specific changes in white blood cell concentration and their subsequent effects on immunity. This poster presentation of our systematic review aims to summarize the current research on the effect of acute sleep deprivation on white blood cell concentration of healthy individuals through evaluation of current research articles. There is a long standing, and widely held, belief that lack of sleep results in lower immune system functionality and a reduction in available white blood cells. This belief is contrary to the existing body of research. While long periods of sleep deprivation did in fact result in this expected outcome, it appears that acute periods actually temporarily boost immune function to protect the body.

Presenter(s): **Kimberlyn Bennett, Chase Sims-Ekrem**

Title: WILDFIRE OR ARSON: FACTORS THAT INFLUENCE LEARNING FROM PAST TRAUMA

Faculty Sponsor: Susan Becker, Department of Social and Behavioral Sciences

Abstract: Trauma is an inevitable fact of life that reminds humans of their mortality. This study compares the effect of interpersonal and non-interpersonal trauma on coping self-efficacy. It is hypothesized that those exposed to an interpersonal trauma will have lower self-efficacy for coping. To test this hypothesis, participants read a scenario about either a wildfire burning down the individual's house by accident or by arson. They then rated their expected ability to cope with the scenario using the Coping Self-Efficacy Trauma scale. Death thought accessibility is predicted to influence perceived coping. Results will examine factors that predict post-traumatic growth.

Presenter(s): **Tyler Bennigsdorf**

Title: GIFTED/TALENTED STUDENTS

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: The role of an educator is to inspire, motivate, and cultivate the learning process within a student's mind. Public opinion has stressed the concept of No Child Left Behind when it comes to education. This realization is important, yet it tends to formulate around only one general area within the student population, struggling students. Without a doubt these students do need the necessary assistance to advance, however, what most miss is that there is another group of students that has been overlooked in the public view, that of gifted and/or talented students. Giftedness can be hard to recognize, especially if the student is reluctant or not given the proper assistance. This presentation will provide an overview of how students are defined as gifted/talented as well as how society and the education system classify such a student. General stages and assistance information from an in-depth interview will be shared along with video and audience input. Strong connections will be made between students who are gifted/talented and typical development. In education, teachers must be able to recognize and adapt to a variety of different mindsets and capabilities. It is only through recognition that proper learning can truly shape the individual.

Presenter(s): **Zoe Berg, James Durnan, Andrea Heiney, Carlee Reava**

Title: CONDOM USE AMONG COLLEGE STUDENTS

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Negative perceptions of condom use among college students can be a barrier to their use in preventing sexually transmitted infections (STIs). The purpose of this project is to identify the most effective ways to promote condom use among college students. The literature will be searched in order to identify the best way to promote condom use in college students. It will also examine if education on condom use has a correlation with decreased incident of STIs. The information found in the literature will be summarized in this poster in a visual manner with the intent of educating, empowering and informing students on campus.

Presenter(s): **Cameron Betz, Randy Hurshman, Kaitlin Stark**

Title: GRAND VALLEY COURT RESERVATION SYSTEM

Faculty Sponsor: Lori Payne, Department of Computer Science, Mathematics and Statistics

Abstract: For tennis players, it can be frustrating to go to a court and find that they are all taken. We are creating a reservation system for the public tennis courts in the Grand Valley to help prevent the inconvenience of showing up to a full court. There are 3 different locations in the Grand Valley, so we plan to allow people to reserve courts for the location they want at specific times. Depending on if someone is a public user or a member, they will be able to reserve a court for different amounts of time, with a login for members. There will be certain courts that are reserved just for the public, and other courts that are reserved for members.

Presenter(s): **Alexis Biller, Kayleigh Kochevar, Whitney Wanstrath**

Title: ALZHEIMER'S AND CAREGIVER FATIGUE

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Caregiver fatigue is a serious problem that affects the entire family. Caregiver fatigue is defined as long term stress that causes mental, physical, emotional exhaustion that may be apparent with a change in attitude. The focus of this project is to analyze research that observes coping strategies in families who care for patients with Alzheimer's Disease. These individuals provide around-the-clock care for their family member and often neglect

their own needs; this often leads to high levels of stress. Our project focuses on the research related to this topic. Our poster will include some strategies for caregivers to use in order to reduce their stress. Many sources identify that effective coping skills can prevent caregiver fatigue.

Presenter(s): **Tristin Bina, Jacob Condill, Matthew Hoffman, Jason Holman**

Title: THE NEWTON'S CRADLE AT THE JOHN MCCONNELL MATH AND SCIENCE CENTER

Faculty Sponsor: Arthur Gardner, Department of Engineering

Abstract: The Newton's cradle, named after Sir Isaac Newton, is a demonstration of conservation of momentum and energy. Despite the name, Isaac Newton did not discover the principles. Rather, John Wallis, Christopher Wren, and Christiaan Huygens all submitted papers to the Royal Society in 1662 which described the theories involved in a Newton's cradle. The John McConnell Math and Science center asked the Engineering program to construct a large scale demonstration of the Newton's cradle. The exhibit is interactive, and aims to accommodate people of all ages. Because the Math and Science Center is geared more towards younger children, safety and durability required the most attention in the design process. The Math and Science Center provided contacts to Chris Muir and Randy Patterson at All Metals Welding, and Phil, Paul, and Dale at SSD Plastics, who assisted in the construction of the exhibit, by providing materials and services at a discounted price. The Newton's cradle exhibit will be on display at the new Engineering building on campus upon its completion.

Presenter(s): **Charles Bisbee, Zachary Brown**

Title: ASBESTOS PAPERWORK MANAGER

Faculty Sponsor: Warren MacEvoy, Department of Computer Science, Mathematics and Statistics

Abstract: Have you ever wondered what the process of decontaminating a building built with materials containing asbestos involved? Well, it isn't surprising to say that there is a lot of manual labor involved to perform the demolition and rebuilding process, and it also requires a lot of paperwork and legal documentation. For every day that the project takes place, additional paperwork is needed. This easily amasses to literally hundreds of pages of paperwork per job, which is then copied and distributed to numerous different parties. Our project is to partner up with Valley Disaster Restoration and Construction, a company that does asbestos removal in the Western Slope and Four Corner's area, and design an Android mobile application that can be used on site to replace the need for paper. The goal is to conveniently digitize the paperwork involved and allow a user to input the required information on a tablet. This will enable the supervisors to not only manage all of the job-related documents, but also manage the employees and their corresponding files. At the end of each job, the supervisor will be able to export a fully electronic ob report, allowing them to easily view and distribute it.

Presenter(s): **Kaitlen Bishop, Kelsey Dancer, Katrina Mapp, Crystal Murten, Katherine Ward**

Title: HEALTHCARE AND CRISPR CAS9 GENE SPLICING

Faculty Sponsor: Authumn Lewis, Department of Health Sciences

Abstract: What changes would be affected in health care, specifically nursing, by a new wave of genetic modification? This question, only speculation until recently, is now a matter that merits attention. Scientists have been studying methods of gene splicing for years, but with the use of Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) and cas9 proteins, it became possible to regulate, edit, and target genomes faster and more cost effectively than ever before. The need for more lifestyle teaching on modifiable health risks such as those involved with precursors to non-genetic diseases will be required and of high priority. CRISPR has the potential to broaden the scope of practice for nurses as well as creating extended jobs and specialties. Breakthroughs such as "designer babies" or "super humans" are becoming conceivable realities. However, as new discoveries mean unexplored ground, the benefits of genome typing do not come without ethical and legal concerns. Therefore, with these genetic services practically within reach, healthcare professionals must ensure careful research and education into every aspect, not only for themselves, but also for their patients.

Presenter(s): **Kevin Blanco, Luke Caires, Erik Galvan, Tyler Ray, Justin Smart**

Title: STIRLING ENGINE

Faculty Sponsor: Chris Penick, Department of Engineering

Abstract: An old technology may have some answers for increasing use of alternative energy sources to generate power. The Stirling engine was patented in 1816 by Robert Stirling as a safer and more efficient answer to the steam

engine. The Stirling engine uses a closed system in which a gas (air, in this model) is alternately heated and cooled to drive a piston, to create mechanical energy. The closed system is more efficient when compared to gasoline and diesel powered engines. The Stirling engine is used in some submarines because it can quietly power batteries. The Stirling engine uses heat energy to run a fly wheel to produce electricity cleanly. The team created a small version of the beta (single-piston) stirling engine. The engine was connected to an alternator which was able to produce energy to power small devices.

Presenter(s): Fawn Bleazard

Title: THE MATHEMATIC MODELING OF AVALANCHE FLOW

Faculty Sponsor: Dan Schultz-Ela, Department of Computer Science, Mathematics and Statistics

Abstract: Did you know that avalanches can reach speeds of 80 miles per hour within 5 seconds? It's no wonder avalanches kill more than 150 people worldwide each year. The hazards posed by avalanches create a need for mathematical modeling of their processes. By solving depth-averaged mass and momentum equations for a two-dimensional dense snow avalanche model, we describe motion and deformation of an avalanche. This model describes the run-out distance, flow velocities and flow heights over the span of an avalanche path. The results of this model will be able reduce potential risk and to help land-use planners design the development of defensive avalanche structures.

Presenter(s): Alexander Boemker

Title: CONNECTING THE DOTS

Faculty Sponsor: Jeanine Howe, Department of Theatre Arts

Abstract: In today's creative industries, the most successful artists are the ones with a diverse set of skills who can create opportunities for themselves. As someone planning on moving to Los Angeles and starting a film career, a theatre degree might seem like an odd choice, but the toolbox of skills gained includes acting, directing, cinematography, writing, and editing from studies in both curricular and extracurricular settings. "Connecting the Dots" is a short film that tells the story of David and Amanda, two young people dealing with the realities of life in a bunker following a nuclear holocaust. They struggle with the conditions, lack of privacy, close proximity, and, of course, lack of entertainment. This project features peers: Tabitha Storm and Keith Mckay.

Presenter(s): Abigail Borchardt, Sarah Davis, Mariah Ehrman, Thea Morse

Title: BIPOLAR DISORDER

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: This research obtained from various literature reviews focuses on incarceration rates among people with bipolar disorder who receive treatment compared to those who do not receive treatment. We focused on the disease process and how soon treatment is started along with the effect treatment has on bipolar disorder. We explored how treatment affects the stigma around bipolar disorder and how self-medication can become a part of the treatment regimen. Findings suggest early treatment of the disorder can lead to better outcomes and can decrease incarceration rates. The bipolar disorder disease process can lead to a negative stigma without early and effective treatment.

Presenter(s): Mia Brabaek

Title: THE NEGATIVE CONSEQUENCES OF GENETICALLY MODIFIED ORGANISMS IN PRESENT DAY

Faculty Sponsor: Christine Hein, Department of Languages, Literature and Mass Communication

Abstract: Genetically modified organisms are dangerous and present a threat to humanity. The research will prove the existence of the negative impact of GMO's and inform the public of the risks humans are taking by investing into the furthering of genetic modification research. Much of the research can be obtained in scientific fields such as biology, genetics, and other topics related to the field of study, including research demonstrating large increases of complications in many fields of health for humans (a surge of allergies, auto-immune diseases, etc.) which resulted at the start of genetically modified organisms. The use of genetic modification will eventually reach unimaginable heights in the scientific field, and if it is not stopped, the bounds of morality shall be exceeded and quite possibly, the generations of the future will begin lose their humanity and suffer negative consequences due to scientific advances.

Presenter(s): Karolyn Bratschun, Dawn Knight, Kahealani Pangilinan, Melissa Sample

Title: SOURSOP BENEFITS IN CANCER

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: This project and poster offers a new treatment method perspective for patients diagnosed with cancer, that involves a less toxic approach than chemotherapy and contains multiple health benefits to help limit the cancer's progression or prevent the development in those not diagnosed, but may be at risk. A literary review of research articles show that the soursop plant (*Annona muricata*), specifically the leaf, helps to aid in the breakdown and killing of cancer cells in patients due to the deterioration the plant undergoes both pre and post harvest. The plant is safe to eat and the deterioration helps to produce enzymes that degrade the cancer cell wall, which disallows pathogens to gain access through the cell wall and rather focus on penetrating the outer barriers of the cytotoxic cells. The benefits of the plant come from all its parts such as the graviola fruit, oil and the ground seeds, that contribute to the attack on cancer cells in the body, without harming the healthy cells that remain due its high moisture nutritional composition and antioxidant activity. *Annona muricata* has been proven to aid in killing cancerous cells but also serves as preventative measures.

Presenter(s): Austin Bratt, Eric Burton, Callie Gafford, Erica Hovland, Dawn Schubmehl

Title: GJPD HOMELESS CAMPAIGN

Faculty Sponsor: Timothy Hatten, Department of Business

Abstract: Our project is focused on the programs available for the homeless community and educating the community about these programs they can donate towards. In 2004, the Grand Junction Police Department and nonprofit organizations started a program called "Spare Change Doesn't Make A Change." The effects of that campaign diminished overtime, and wasn't as successful as they had hoped it would be. So, in 2015 the Grand Junction PD filed a lawsuit to ban the homeless from panhandling within the Grand Valley. However, some advocates stepped in to support the homeless community's rights in regards to the 5th Amendment. The courts ended up favoring the advocates and panhandling is still an ongoing issue within Mesa County. Our group's purpose is driven towards finding a better solution that will decrease panhandling and increase donations towards programs that can benefit the homeless. We have been given this opportunity because we are current members of the target community with certain skills and knowledge needed to market these programs to the public. For our project we will be working with clients including Grand Junction PD, The United Way, and The Catholic Outreach to help them market to the community.

Presenter(s): Emily Brennan

Title: FACTORS WHY STUDENT ATHLETES CHEAT

Faculty Sponsor: Elizabeth Sharp, Department of Kinesiology

Abstract: This study was performed to better understand what motivates athletes to cheat and how they justify their actions. The goal was to determine the factors behind student athletes cheating and to understand the judgement of cheating acceptability. Journals reviewed determined the motivations behind academic dishonesty, however the fine line between what is considered cheating and advantage-seeking behavior is still unclear. Forty CMU student athletes and non-student athletes were surveyed using yes and no questions. Interviews were conducted with some participants. Data confirmed that there is still vagueness on the definition of what is cheating, although the motivations to cheat are clear: external pressures, a desire to excel, and fear of failure.

Presenter(s): Jason Brierley, Benjamin Coyle, Alethea Lewis, Jonathan Marker

Title: THE EFFECTS OF HIGH SCHOOL SEXUAL EDUCATION PROGRAMS ON STI RATES AMONG COLLEGE TEENS

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Over the last two decades, the reported rate of Sexually Transmitted Infections (STIs) in the United States have steadily increased with very few exceptions, and currently the reporting rate for the three most prolific STIs (Chlamydia, Gonorrhea, and Syphilis) are at all-time highs. Healthy People 2020 has stated that its goal for reducing the prevalence of STI rates is to "Promote healthy sexual behaviors, strengthen community capacity, and increase access to quality services to prevent sexually transmitted diseases and their complications." With the emphasis on prevention and not treatment, the methods of prevention must be assessed in order to evaluate their efficiency and ability to reduce the prevalence of this problem. Our group is researching the literature for pertinent articles. These will be summarized and included in this poster.

Presenter(s): Margaret Brooks
Title: THE IMPACT OF TOXIC STRESS ON STUDENTS
Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: The impacts of toxic stress on the brain are profound and lasting, and not obvious to the naked eye. What is seen in the classroom as misbehavior, laziness, or defiance may in fact be the effects of toxic stress. Toxic stress is the term used to define the kinds of experiences, particularly in childhood, that can impact brain architecture and brain chemistry. For many children, toxic stress can be the result of living in an abusive home. When taking into account the Adverse Childhood Experiences Study, or ACES, it forces educators to rethink how students function not only in the classroom, but as people. Research shows that repeated exposure to stress has a profound impact on nearly every aspect of a child's development from executive functioning skills to interpersonal relationships. With a better understanding of toxic stress, educators are able to approach learners with greater empathy and more meaningful and intentional instruction.

Presenter(s): Krista Broumpton
Title: COLLATERAL DAMAGE
Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: Since 1982, fatalities caused by drunk drivers have been reduced by 51 percent. Although this is an improvement, 35,092 people were killed in drunk driving accidents in 2015. Oftentimes a person under the influence feels they are able to drive no matter how many drinks they have had. In the blink of an eye a person loses their life because somebody decided to drink and drive. This dance piece titled "Collateral Damage" integrates music, dance and acting to show us what it is to face a tragedy like drunk driving. Performed by ten CMU dancers and touring group, Mesa OutLoud!, the story follows a young girl living a fulfilling life only to be taken too soon by a driver who was alcohol-impaired. Following her death we watch through her eyes as her family and friends cope with her death. This piece is inspired by the many lives lost to alcohol impaired driving whether they be the driver or the victim.

Presenter(s): Christopher Brown
Title: FIELD TESTING APOSEMATIC COLOR PATTERNS IN ECUADORIAN MOTHS
Faculty Sponsor: Thomas Walla, Department of Biological Sciences

Abstract: Aposematic coloration describes the bright warning patterns that signal to potential predators that a prey item is unpalatable due to defenses such as toxins, spines or stingers. Aposematic organisms often show bright red or yellow and black colors arranged in high contrast patterns easily recognized and learned by predators after an unsuccessful attack. It has been hypothesized that although aposematic patterns vary greatly among species they may share a common rule set which, once learned, can be generalized toward prey species outside previous predator experiences. If true, this would favor the repeated evolution of rule set aposematic color patterns in independent lineages. Interestingly, no experimental work has explicitly tested the generalization of aposematic color rules among wild predators. In this project, we designed field experiments to test the ability of wild avian predators to generalize an aposematic pattern typically found in tropical moth species on the eastern slope of the Andes in Ecuador. Wild bird attacks of manipulated moth color patterns showed birds generalized known color patterns to novel prey items, avoiding otherwise palatable prey. We predict that an aposematic rule set may be identifiable and that selection will favor the repeated evolution of similar patterns in diverse lineages.

Presenter(s): Rebekah Brown, Sarah Davis, Kayla Lyall, Rachel Lyall
Title: THE EFFICACY OF ANTIMICROBIAL STEWARDSHIP PROGRAMS ON INCIDENCE AND COST-REDUCTION OF RESISTANT MICROORGANISMS
Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: The development of antibiotics in the past century has revolutionized the course of medicine. An unexpected consequence of this achievement, however, is the emergence of antibiotic resistant microorganisms. This has necessitated the development of new antimicrobial agents for effective treatment, which are often much more costly than traditional agents. The establishment of Antimicrobial Stewardship Programs (ASP) are based on addressing this issue to help reduce the incidences of resistant infections and the associated costs that arise. Our poster will break down the differences between hospitals who have enacted ASPs and those who have not, and what effect has occurred on the rates of resistant infections and the costs of the antibiotic usage and associated cares, as reported in peer-reviewed journal articles.

Presenter(s): Nathan Bryner

Title: OVERCOMING THE ETHICAL DILEMMAS OF STEM CELL RESEARCH

Faculty Sponsor: Christine Hein, Department of Languages, Literature and Mass Communication

Abstract: There is an ethical dilemma surrounding stem cell research and its place in research and treatment of health issues. Research related to the topic will include the promise and limitations that currently apply to stem cell research, including education regarding the different sources from which stem cells are harvested. There are four types of stem cell research including embryonic, somatic, induced pluripotent, and cord blood stem cells; for the purposes of this study, concentration will be limited to the most controversial and misunderstood, embryonic stem cells. The research will support the need for advanced studies and education related to stem cell harvesting.

Presenter(s): Shane Burdi, Johnathan Carlton, Jeremy Gilliam

Title: OPTIMIZATION OF COMPOSITE FILAMENT WOUND PIPE

Faculty Sponsor: Chris Penick, Department of Engineering

Abstract: The purpose of this project was to design a light-weight composite filament-wound pipe that could be manufactured on existing equipment by the Schauenburg Flexadux Corporation, located in Grand Junction, Colorado. The project specifically required that the improved composite filament-wound pipe design be reduced in weight by ten percent and have an increase in strength of five percent. Utilizing current composite materials theory for fiberglass filaments and phenolic resins, the Senior Design Team identified and developed multiple pipe design alternatives that were then built as prototypes. Completed prototypes were subjected to both destructive and non-destructive testing for buckling, bending, fatigue resistance and weight reduction to determine if design alternatives met the specified design criteria. The design team will present data and sample specimens collected during analysis to those interested in composite structures.

Presenter(s): Cristina Bustamante, Benjamin Hanberry, Matthew Rutter

Title: COLLEGE MATCH: A WEBSITE TO FIND THE PERFECT COLLEGE

Faculty Sponsor: Lori Payne, Department of Computer Science, Mathematics and Statistics

Abstract: Deciding what college will be the best for you can be a difficult decision. There is a massive amount of information out there, but it seems like it's segmented in so many different places. Usually you would have to visit each individual website for the schools you are considering, which can be very time consuming. College Match's purpose is to centralize important information when trying to decide on a college and organize it based on which aspects you find most important. Schools are displayed in order based on weight given to various aspects such as location, average tuition, and major specialties. Let College Match help guide you to a successful future today!

Presenter(s): Kelsey Cantwell

Title: ESCAPING THROUGH BUDDHA'S BODY

Faculty Sponsor: Randy Phillis, Department of Languages, Literature and Mass Communication

Abstract: Kelsey Cantwell will be reading a total of four poems. The collection is titled "Escaping Through A Buddha Body," and each will discuss a various theme of Buddhism. She will explore various forms and techniques that celebrate the ethic itself.

Presenter(s): Liana Caraang, Kayla Dinkel, Amber Saychek

Title: THE MARSHALL ISLANDS NUCLEAR FALLOUT: BIOLOGICAL EFFECTS AND APPLICATION IN RADIOLOGIC TECHNOLOGY

Faculty Sponsor: Olga Grisak, Department of Health Sciences

Abstract: The Marshall Islands nuclear testing fallout from 1946-1958 resulted in high doses of radiation that affected the population inhabiting four separate islands. There is extensive medical data on the Marshall Islands disturbance of the early consequences despite the unfamiliarity of the event to the general public. This data brings insight and support to the immediate radiation effects such as: itching, skin burns, vomiting, and diarrhea as well as long-term aftermath radiation effects. The research conducted on the outcomes of the accident also provides scientific basis for extrapolation of the dose-response relationship from high-dose, known radiation exposure into the low-dose, unknown radiation exposure. Such dose-response relationship is important and applicable

in diagnostic imaging. In recent decades, the use of diagnostic imaging has increased dramatically, leading to the increase in patient radiation dose. While radiologic technologists use lower doses of ionizing radiation, it is still essential for them to be knowledgeable about all possible harmful effects. The focus of this research is to analyze the biological effects of the victims of the fallout, to compare the ramifications of this accident to the similar events of high radiation exposure, and to assess its contribution to the field of radiologic technology.

Presenter(s): **Edurado Cardenas, Ryan Evers, Timothy Hunter, Brandon Murphy, Jeremy Seeyave**

Title: Y-VALVE STEAM ENGINE

Faculty Sponsor: Eric Goertz, Department of Engineering

Abstract: A steam engine is a cost effective and reliable energy source. It is a heat engine that performs mechanical work using steam as its power source. Steam is used to push a piston up and down which is then used to drive a mechanical system. The first steam engine was design in 1689 as a pump to remove water from coal mines. However, this steam engine had a very low efficiency, as it used the steam in only one direction. Team one 10% built a steam engine with a greater efficiency, since it uses the steam in both directions. They used two Y-valves at each ends of the air cylinder to switch the flow of steam, so that the latter is propelled back and forth by the steam.

Presenter(s): **Bryan Carei**

Title: POLITICAL SATIRE: ARISTOPHANES THROUGH SATURDAY NIGHT LIVE

Faculty Sponsor: Douglas O'Roark, Department of Social and Behavioral Sciences

Abstract: In this day and age with "fake news" being used as a means to shut down dissenting opinion, I believe it is important to take note of other avenues that have been used to sway public opinion. The purpose of the project is to define the role of satire in the public's discourse on politics. The project will define what the purpose of comedy was in the ancient era, how it was administered, and the effects it had on society. Specifically, I will be using the 4th century poet Aristophanes and the effects he had on Athenian politics and culture. Then, to bolster the evidence, I will take a look at the modern day equivalent, which is Saturday Night Live, and draw conclusions to see if satire is stronger than "fake news."

Presenter(s): **Josie Carlson, Isaac Dow, MaKayla Kovac**

Title: DEVELOPMENT OF MICRO IN-LINE DEGASSING SYSTEM FOR HIGH VISCOSITY FLUIDS DISPENSING SYSTEM

Faculty Sponsor: Francisco Castro, Engineering Partnership Program, Colorado Mesa University and University of Colorado Boulder

Abstract: GPD Global is an international company based in Grand Junction that manufactures high-precision fluid dispensing systems, sold internationally for the printed-circuit board industry. GPD's technology is used in the manufacturing of many consumer, medical and military electronics used today. The pumps produced by GPD can dispense viscous fluids, such as silicones, leaded and unleaded solder paste, and conductive adhesives, with a repeatability of 1% or better. To interface a fluid with a dispense pump, fluids are packaged in syringes that may contain air bubbles. When dispersed within the viscous fluid trapped air can cause too much, or too little, fluid to be dispensed which, can lead to failure of the end product. A compact, continuous flow degassing system for solder paste was designed by a team of three senior mechanical engineering students in partnership with GPD. The system has a small form factor and will degas solder paste between the syringe and point of dispense while installed on a dispense pump inside GPD's MAX Series Dispense System. The degassing system is designed to handle standard cartridge sizes of viscous fluids at flow rates consistent with the pumps available with minimal priming required.

Presenter(s): **Deion Carriaga, Gabriel Falcao, James Masterson, Calyssa Trautner, Martin Vezina**

Title: PEDAL POWER – USING BICYCLES TO GENERATE ELECTRICITY

Faculty Sponsor: Jody Kliska, Department of Engineering

Abstract: Understanding how much work it takes to power a light bulb may be the first step in understanding the value of electricity and why energy conservation is important. Work produces energy; understanding how much work is key to appreciating electrical power. The Math and Science Center in Grand Junction, Colorado had a power-producing bicycle that kids could pedal to illuminate a neon sign. Using "pedal power", the kids lit up a sign that signaled 100, 200, or 300 watts that demonstrated how much energy is consumed when a light is left on in their bedroom. The project consisted of creating two new bikes that are adjustable to fit a variety of users and possible gearing to illustrate the concept of "work"; two bicycles allows children to "race" one another. The sponsor requested the bikes to be "durable, sustainable, safe, and aesthetic." By creating two stationary

bikes with a belt around one of the tires of each bike connected to a generator, the display works well as an interactive interpretation of power generation. The display incorporates the calculated power generated as the user pedals the bike. The new bikes will be used in the Math and Science Center to create a fun, visual connection about the use of power to transfer energy.

Presenter(s): **Gregg Castanuela, Jonathan Crowell, Chad Forsett, Hannah More, Reece Reedy**

Title: MECHANICAL BRAKE FOR ELECTRIC MOTOR CONTROL LAB

Faculty Sponsor: Nathan McNeil, Department of Engineering

Abstract: The goal of this project was to design a mountable mechanical brake that could be used on motors between ¼ and 3 HP and could cheaply be reproduced for a total of six motors. Much like a general go-kart brake, the designed brake applies a constant load to the motor and is easily changeable. The purpose of this project was to provide an educational demonstration of the results of applying different loads to motors ranging in size. The set up contained a motor, a mechanism or belt that the motor ran, and the brake itself on the back. To help show the different values being generated, the brake was connected to a sensor and computer that took the data and displayed it on the screen as it was happening. These new motor-brake setups will be put to use in many different classes at the Archuleta Engineering Building.

Presenter(s): **Emilee Castleton**

Title: FRACTALS

Faculty Sponsor: Theresa Friedman, Department of Computer Science, Mathematics and Statistics

Abstract: In the movie Frozen, Elsa sings that there are “frozen fractals all around.” But what is a fractal? A key characteristic of a fractal is that it is made up of parts similar to the whole. There are many natural fractals all around us including ferns, coastlines, and snowflakes. In this presentation, we consider a theorem that is fundamental in the study of fractals, the Collage Theorem. This theorem suggests a method for reproducing a fractal (or any shape) using iterated function systems whose attractors are close to the fractal. This method enables us to describe some of the mathematics of fractals and to create dazzling computer visualizations of fractals. Come and enjoy the mathematics behind both “frozen fractals” and non-frozen ones.

Presenter(s): **Alexia Chapman**

Title: THE ROLE SEXISM PLAYS IN SOCIAL ACTION AMONGST LATINA AND NON-LATINA WOMEN

Faculty Sponsor: Nicole Jones, Department of Social and Behavioral Sciences

Abstract: The purpose of this study is to explore how cultural factors affect recognition of sexism and its contribution to the reinforcement of sexist systems, such as the way social action is inhibited in sexist environments. Specifically, I measured the extent to which women can identify benevolent and hostile sexist statements, compared to their willingness to engage in social action on a number of levels. The results of this study are compared with data gathered from female students at the University of Costa Rica. The results of the aforementioned study will be combined with information taken at Colorado Mesa University to perform a cross-cultural analysis of sexist ideologies and their effect on social action. Using a combination of Systems Justification Theory and the Linguistic Relativity Hypothesis as a model, my hypothesis is that: (a) Hispanic women will demonstrate a greater recognition of sexist ideologies than non-Hispanic women, and (b) higher recognition of sexism will be correlated with a lower system-justifying attitude, and therefore greater involvement in social action.

Presenter(s): **Victoria Chavez, Brady Hanas, Samuel Yenchick**

Title: MODIFIED UPWARD-FEED SAW USED TO CUT GREEN CERAMIC STOCK

Faculty Sponsor: Francisco Castro, Engineering Partnership Program, Colorado Mesa University and University of Colorado Boulder

Abstract: CoorsTek Medical, located in Grand Junction, Colorado, is an industry leading manufacturer of ceramic for medical devices including prosthesis and implants. The proprietary Cerasurf™ ceramic is a blend of various powdered elements initially pressed together into a cylindrical billet. In this unfired “green” state, the ceramic is similar to chalk in texture and material properties. Processing green ceramic consists of sectioning the billets into pieces with a band saw. This method raised concerns over operator safety, ceramic waste, and billet surface damage. In an attempt to address these issues, Coorstek invested in a semi-automated upward-feed cut saw to section the billets. The un-modified upward-feed cut saw caused poor cut quality and long cut times. The saw has been outfitted with a rotating clamping system used to spin the billet while it is being cut. The rotating

system helps to relieve unwanted stress on the billet during the cutting process. The rotating system also allows for a safety shield to be used during operation while also providing a cleaner cut to the ceramic. This cleaner cut reduces waste and the need for additional sanding processes before the ceramic can be milled into final form.

Presenter(s): **Jake Chiddix, Nathaniel Glennon, Connor Timms**

Title: AUTONOMOUS ROVER

Faculty Sponsor: Scott Bevill, Department of Engineering

Abstract: In an era of technology, society has become highly technology-dependent. As engineers we seek to challenge ourselves to innovate technology by creating an autonomous rover. The purpose of this project is to design and create a fully autonomous rover capable of navigating to two GPS waypoints and returning to its starting position, as well as being able to place individual markers at each waypoint. The rover will read GPS coordinates for navigation from radio frequency transmitters placed at each waypoint. Successful implementation of this project will require knowledge of microcontroller programming, engineering design, and innovation.

Presenter(s): **Adam Childs, Nickolas Secosky, Richard Talbot**

Title: CMU PACKAGING SYSTEM

Faculty Sponsor: Warren MacEvoy, Department of Computer Science, Mathematics and Statistics

Abstract: Dorm-Life is an integral part of the college experiences, and due to an ever increasing online shopping trend, more and more packages come to CMU each day. Currently Desk Attendants (DA) have to log packages twice. Once digitally through an online spreadsheet, and once through a paper form. The paper form is required so that the package recipient can sign for their package leaving a record of packages checked out. Finally the DA's must email students notifying them that they have a package as well as write the students name on a display board. This current package systems is slow and frustrating because DA's have to do everything multiple times. This project aims to streamline the package process by, Creating digital Signature process via Mavcard. We also plan on adding an Automated Notification System to email students when they receive packages. Finally we will automatically track the date and time the package is added and checked out to the student. The Resulting System improves both efficiency and security, creating a better Dorm-Life Environment for Residence, Coordinators, and Desk Attendants.

Presenter(s): **Connie Clark, Sebastian Nevin, Courtney Schmeltz**

Title: EFFICACY OF GLUCOSE MONITORING METHODS FOR GLYCEMIC CONTROL

Faculty Sponsor: Tracy Matthews, Department of Health Sciences

Abstract: Diabetes has afflicted humans since ancient times when an Egyptian healer first noted frequent urination as a symptom of a then unknown disease. Since then, diabetes has been a destructive disease that affects people their entire lives. Roughly 29 million people in the United States suffer from diabetes. Today, people with diabetes must monitor their blood glucose levels using invasive techniques by directly pricking their finger 3 to 10 times per day and sampling the blood for a glucose reading. Technology for monitoring diabetes has been advancing steadily towards less invasive and more effective techniques to monitor blood glucose levels. As science and technology are constantly seeking safer, less invasive methods for monitoring glucose, literature on new technology will be explored and compared with current invasive methods to investigate their efficacy for glycemic control of the future.

Presenter(s): **Jeremy Claussen, Jacob Doose, Cody Kem, Aerianna Preble**

Title: ALUMINUM ANODIZATION

Faculty Sponsor: Sarah Lanci, Department of Engineering

Abstract: Anodization is a form of surface engineering where a coating is created on the outside of a metal product that will protect it from corrosion, scratches, or other harmful factors. The process begins with a "remover" where any existing rust or oxidization has taken place, a "coater" where the part is to be dipped and coated, a "colorer" where the part can be colored, and finally a "sealer" where the anodization can be sealed and protected. There are also many instances where anodizing can also be used for the purposes of decorative coating, such as colored iPods and car parts. The purpose of this project was to create an aluminum anodization line where students in the engineering curriculum can observe the principles of surface engineering.

Presenter(s): Jeni Claypoole, Brittany Hoppe, Joshua Jens, Aiesha Mitchell, Ada Marie Vorse

Title: LOW FREQUENCY ULTRASOUND THERAPY AS AN ADJUVANT TO TRADITIONAL WOUND TREATMENTS

Faculty Sponsor: Authumn Lewis, Department of Health Sciences

Abstract: Emerging research indicates that low-frequency ultrasound therapy (LFUT) effectively reduces healing times for various wound types. This therapy has been utilized in the past for non-wound therapies, such as respiratory secretion collections. Current studies of LFUT follow real-time cases, economic reports, and evidence-based research. LFUT increases patient satisfaction when used as an adjuvant with traditional treatments. Research conducted on the use of MIST® machines provided data that demonstrates decreases in healing time for patients with chronic wounds. Problems related to wounds include infection, increased length of hospital stay, and readmission frequency. At an estimated annual cost of \$25 billion for more than 6 million Americans, there is potential for significant cost reduction in this area of health care. The purpose of this study is to include evidence of improved wound healing times, reduced cost due to shorter hospital stays, and less readmissions.

Presenter(s): Charles Cochran, Sarah Edmondson, David Gionco, Haley Jensen, Denise Martinez-Sandoval, Ping Yang

Title: ARE THEY WHAT THEY EAT? STUDENTS KNOWLEDGE AND PERCEPTION OF NUTRITION AND DIET TRENDS

Faculty Sponsor: Louis Nadelson, Department of Computer Science, Mathematics and Statistics

Abstract: During spring semester, we will be conducting a survey study to determine Colorado Mesa University (CMU) students' knowledge, and perceptions of nutrition and diet trends. Our goal is to develop an explanation of college students understanding of diet trend knowledge, weight loss, and misconceptions of nutrition. In our research we will gather knowledge and perceptions data of general nutrition and of diet trends such as juicing, gluten-free, and paleo diets. We hypothesize that most of the college students will hold constrained understanding of nutrition and diet trends, due to lack of research and exposure to the knowledge. We speculate that those students who have completed nutrition course work, have food allergies, or have worked as professional cooks are likely to hold fewer misconceptions and have greater knowledge of nutrition and diet trends. We will be collecting data soon and will have results to report in April. Our research will fill a gap in empirical documentation of the general college student population perceptions and knowledge of nutrition and diet trends. We anticipate our data could be used to encourage students to research nutrition especially different diet trends before they decide to use them.

Presenter(s): Mariana Coelho

Title: THE INTRODUCTION OF ALTERNATIVE THERAPIES IN NON-ACUTE HEALTH PROBLEMS

Faculty Sponsor: Christine Hein, Department of Languages, Literature and Mass Communication

Abstract: Medical care is a heavily contested issue in the United States whether arguing the current healthcare laws or the influence of major pharmaceutical companies. Research has demonstrated that holistic healthcare has valid benefits that are being avoided in favor of profit driven care. Doctors should be required to prescribe therapies in non-acute health issues, but as research has demonstrated doctors are overprescribing medications and surgeries. Pharmaceutical companies, doctors and insurance companies' profits are taking priority over proactive prevention and rapid recovery care for patients. Given this research, patients need to have more holistic and alternative options as well as physical therapies available in the care and treatment of non-acute health issues for the betterment of society.

Presenter(s): Gregory Coleman, Matthew Rea, Jeffrey Yanowich

Title: PIEZOELECTRIC PUMP DESIGN FOR DISPENSING NANO-VOLUME DROPLETS OF HIGH VISCOSITY FLUIDS

Faculty Sponsor: Francisco Castro, Engineering Partnership Program, Colorado Mesa University and University of Colorado Boulder

Abstract: As electronic products continue to become more compact, manufacturing companies find themselves needing new ways to adhere ever-smaller electrical components to their products' circuit boards. GPD Global, Inc., an equipment manufacturer located in Grand Junction, CO, designs and manufactures the machines needed to perform such tasks. GPD Global tasked the design team with designing, prototyping, and testing a new pump system capable of dispensing 0.7 nL droplets of solder pastes and liquid adhesives for the electronics industry. For the project, a proof of concept pump was designed and built for droplet sizes of 4-10 uL with a dispense rate of more than one drop per second. The pump was designed to use the vibration from a piezoelectric crystal to dispense fluids with dynamic viscosities up to 25,000 cPs. Fine-tune adjustments were made so that the size of each drop was within ten percent of a specified droplet size. Future project development will be the construction of the 0.7 nL pump that interfaces with GPD Global's current machines.

Presenter(s): Ashton Collett, Vincent Fronczek, Felicia Martinez

Title: CRITICAL WRITING OF VISUAL ARTS

Faculty Sponsor: Ramana Konatz, Department of Art and Design

Abstract: Over the course of the 2016-2017 semester, a review column appeared in the CMU newspaper discussing the latest exhibition openings at the CMU Art Gallery, also known as 437CO. These articles served to help inform the public of art shows taking place in the university gallery, as well as promoting the artists showing. Critical writing helps to provide exposure for an artist beginning their career and is a key component in their success. This has helped to increase influence among a wider community, as opening nights at the CMU gallery have had increased attendance recorded since the articles have been published. The art professors have responded positively to the reviews, and the artists themselves who have read the newspaper have stated that the column felt like a positive influence on their careers. This presentation will outline the importance of critical writing in supporting the visual arts that many professional artists and graduating students will be integrated into. We will also discuss the writing and critique process that comes with writing these articles. Examples of the articles we've written will be provided in our presentation, with permission from the Criterion to use them.

Presenter(s): Jessica Condon

Title: A FLORISTIC INVENTORY IN MCINNIS CANYONS NATIONAL CONSERVATION AREA: DEVELOPING COLLECTION PROTOCOL, AND COMPILING COLLECTION DATA

Faculty Sponsor: Steven Stern, Department of Biological Sciences

Abstract: McInnis Canyons National Conservation Area consists of 123,430 acres of public land managed by the Bureau of Land Management (BLM) in western Colorado. Within the federally designated conservation area 75,000 acres are protected as part of the Black Ridge Wilderness Area and adhere to wilderness regulations. The BLM's multiple-use-ethic provides diverse recreation and resource opportunities for the public that result in considerable traffic for the area. In 2012, the BLM granted permission and funding to conduct a full floristic inventory for McInnis Canyons National Conservation Area (MCNCA). The primary goal of this study was to develop a species checklist based on collected vascular plants that captures the species richness of MCNCA. Each plant on the species checklist has been collected with quantitative and qualitative information pertaining to the specimen, processed into herbarium specimen, and georeferenced. These data are input into a national herbaria network that is accessible by the public and can be used to create maps of species distributions. After two field seasons the checklist for MCNCA includes 434 species. A comparison between adjacent public land is being used to indicate where future collection efforts should be concentrated to ensure a complete inventory.

External Funding Source: This project was funded in part by BLM award L15SAC00128.

Presenter(s): Jessica Condon, Cynthia Coron, Thorin Hannigan, Kelsey Lindner

Title: SOIL HEALTH ANALYSIS: THREE-TIER COST AND COMPLEXITY RECCOMENDATIONS FOR TESTING SOIL HEALTH IN CONVENTIONALLY FARMED AGRICULTURAL LAND

Faculty Sponsor: Deborah Kennard, Department of Physical and Environmental Sciences

Abstract: Historically, conventional farming practices such as the use of synthetic fertilizers, flood irrigation, and inversion plowing have been shown to damage soil health. Soil function is degraded through soil compaction, loss of organic matter, increased salinity, and loss of essential nutrients. Farmers who are looking to improve their degraded soils need to have access to affordable and simple soil analysis tests in order to determine which soil health amendments may be necessary. The goal of this project is to compare the effectiveness of four soil tests for soil health: the Haney soil health test, an analysis of soil organic matter, soil fertility, and BIOLOG EcoPlate microbial community analysis. These tests will be conducted at two farm sites: one conventionally farmed and the other managed using no-till and cover crops. To determine if sampling intensity and pattern can affect testing results, each site will be Georeferenced and a soil organic matter map will be created. Using this information, we will develop options for testing in a three-tiered cost and complexity reference. This reference will help Grand Valley farmers test their fields in the most cost-effective and timely manner.

Presenter(s): Rikki Cook, Lindsay Hanson, Tanner Hoffman, Jess Smith, Samuel Speir, Justin Squier, Zachary Tabb

Title: SLAGITHA THE CUPOLA

Faculty Sponsor: Araan Schmidt, Department of Art and Design

Abstract: This year, members of the student run organization Sculpture Guild have come together to fabricate an iron-melting furnace known as a cupola. A cupola is a steel-bodied furnace lined with ceramic refractory that

reaches temperatures of over 2300°F. The motivation behind this project was to expand students technical knowledge of furnace building practices, as well as allowing students to operate and maintain the cupola in a safe and productive manner. Sculpture Guild and its cupola will also be attending the National Conference on Contemporary Cast Iron Art and Practices in Birmingham, Alabama in April to compete against other universities in a student cupola contest. This student cupola contest will test the effectiveness our teamwork, as well as our furnace's ability to reach melting temperatures and use materials efficiently. Our presentation aims to increase awareness of the use of cast iron as an art form, not simply as an industrial practice. During the Student Showcase, Sculpture Guild will be demonstrating our fabricated cupola through an iron pour on campus, during which we will be casting various complicated sand molds and open faced molds. In total, Sculpture Guild will be melting down over five-hundreds pounds of recycled metal.

Presenter(s): **Corbin Cooper, Eric Hartline, Robert Millican**

Title: PHYSICAL/ENGINEERING COMPUTATIONAL PROBLEM SOLVER

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: The purpose of this program is to design and construct a virtual scientific problem solving calculator aimed towards students in the Physical/Engineering Sciences. The idea is to construct software that allows students in scientific fields to quickly solve/check solutions to problems that would otherwise be tedious to solve by hand. The program utilizes an open source programming language known as Python and uses a Linux operating system to solve various types of problems. Such problems include Newtons Second Law, Kinematics, and basic Electromagnetic Theory equations. The program also features a user interface designed in Linux to assist with ease of use for students who are unfamiliar with the execution of the Python programming language.

Presenter(s): **Jonas Cooper, Dalton Hemenway, Taylor Larrechea, Zachary Reeder**

Title: DORM SWAMP COOLER

Faculty Sponsor: Nathan McNeil, Department of Engineering

Abstract: Evaporative cooling is a well-established method of cooling buildings in arid climates, even on an industrial scale. The principle of evaporative cooling is to use outside air blown through a water saturated porous fiber mat. The water in the mat absorbs heat from the air thus dropping the temperature of the air. A small scale evaporative cooler prototype was built to provide cooling for a single dormitory room.

Presenter(s): **Corbin Cooper, Lance Matosky**

Title: AUTONOMOUS TRACKED ROVER

Faculty Sponsor: Scott Bevill, Department of Engineering

Abstract: The purpose of this project is to design and build a small tracked vehicle that navigates to GPS coordinates autonomously while avoiding obstacles. The chassis consists of a DC motor-driven gearbox powering a tank tread style suspension system. The vehicle is controlled by a programmed micro-controller and once it is launched it receives no feedback from the user, only from it's on-board ultrasonic range finder, GPS module, and radio frequency receiver. It is powered by a 12V battery source to drive the chassis, as well as a 9V source for the logic circuit. The vehicle demonstrates several hardware and programming techniques that are being utilized in the growing automated vehicle industry.

Presenter(s): **Trevor Courkamp, Aaron Morrison, Cordell Ridings, Josiah Wilson**

Title: HEAVY FEATHERS: A DEMONSTRATION OF THE GRAVITATIONAL CONSTANT

Faculty Sponsor: Sarah Lanci, Department of Engineering

Abstract: Galileo was the first to propose that all objects, regardless of their mass, shape, or volume, accelerate at the same rate due to gravity when air resistance is not a factor. However, the world is filled with air and air resistance is always a factor. Intuition says that a bowling ball should fall faster than, say, a feather. This however, does not align with the laws of physics and gravity. A vacuum chamber can be used to demonstrate that intuition should be tempered with empirical observation. The focus of this project was to construct a vacuum chamber for classroom demonstration purposes. The team used a split-chamber design, allowing for the observation of falling objects in both air and under a full vacuum.

Presenter(s): Elizabeth Cripps, Kristina Liston
Title: LAP-BAND VS. GASTRIC BYPASS
Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: We performed a literature search to find articles on the outcomes of lap band and gastric bypass surgery. On our poster we plan to compare lap band surgery to gastric bypass surgery to determine which has the largest impact on Body Mass Index (BMI) and comorbidities in obese patients. We will start with explaining the difference between the operations and what requirements make the patient eligible for the procedures. Next, we will go into detail on the risk of the operations. Then we will compare the differences in BMIs before and after the operations. We will determine which is more successful in reaching a lower BMI. After this portion, we will compare the effect of both lap band and gastric bypass on different comorbidities. This will help us inform obese individuals on the risks and benefits of different weight loss surgeries. Our poster will have a comparison set up with information about the BMI change, the effects of the bypass or lap band on the comorbidities, and will also have images of each to visually depict the difference between both.

Presenter(s): Theodore Cristan, Nicole Gardner
Title: MILLENNIAL JOB EXPECTATIONS AND SELF-ESTEEM: A COMPARTIVE STUDY ON THE INFLUENCE OF PARENTING STYLES, CULTURE, AND LOCUS OF CONTROL
Faculty Sponsor: Brian Parry, Department of Social and Behavioral Sciences

Abstract: The purpose of this study was to investigate factors relating to inflated career expectations held by the millennial generation. Recent studies suggest that the millennial generation has difficulty transitioning into the workforce due to conflicting values of previous generations. One likely factor that can influence millennial workers to harbor heightened career expectations is self-esteem. To gain a better understanding of the potential factors contributing to higher self-esteem, further examination of different socializing variables, including parenting styles, locus of control, and cultural influences were analyzed. Data was collected using a compilation of surveys among individuals aged 18 and older in order to compare career expectations and social influence factors between the millennial and previous generations upon entering the workforce. Findings from this study will help clarify potential conflicts in the workplace and provide solutions on how to better integrate the millennial generation while still maintaining their expectations. Both first-time and veteran workers can benefit from the relationships and discussion from this study.

Presenter(s): Ashley Cross
Title: GIFTED AND TALENTED STUDENTS
Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Every student has the right to receive a quality education, no matter a student's individual strengths or weaknesses. When a student performs, or shows the potential to perform, with high levels of knowledge and achievement, he or she is considered to be a gifted and talented student. Adaptations made within a classroom are just as important for a student who is gifted as for a student who may have a disability. Every student deserves to be challenged in order to further his or her learning and continue to build upon his or her knowledge. It becomes a delicate balance while working with students who are gifted, due to the fact that these students, just as other students do, need to continue to show growth throughout their learning experience. While observing a student who is considered to be gifted and talented, it became apparent to the presenter that he might also be considered a learner who is twice exceptional. The importance of knowing the needs of each individual student is great; this knowledge will guide teachers in supporting each of their students as they to continue to grow.

Presenter(s): Cameron Crow, Amanda Smith, Austin Zanoni
Title: D&D CHARACTER CREATOR
Faculty Sponsor: Lori Payne, Department of Computer Science, Mathematics and Statistics

Abstract: Dungeons and Dragons (D&D) is a fantasy role-playing game that has been around since 1974. Before the game can be played, players must first create characters. This creation process is lengthy, regardless of familiarity with the process. With key features like race, classes, backgrounds, feats, items, and spells, starting a character can be intimidating for any player to even know where to start, especially those who choose Spellcasters. In this program, the character creation process will be greatly simplified for all users.

Presenter(s): Josh Currier, Joseph Lehr, Douglas Plock
Title: VICTIM SERVICE TRACKING SOLUTIONS
Faculty Sponsor: Lori Payne, Department of Computer Science, Mathematics and Statistics

Abstract: Victim Service Tracking Solutions (VSTS) will demonstrate a clean and simple workflow for victim advocates, police departments and other third party organizations that require a means to track the services they provide to victims of crimes and to create the essential reports they need that comply with The Victim of Crime Act of 1984. The new software will also be FIPS (The Federal Information Processing Standard) and NIST (National Institute of Standards and Technology) compliant to assure confidence in the integrity and security of the organization's data.

Presenter(s): Brett Dana, Katherine Havens, Tyler Stewart
Title: DEVELOPMENT OF A BRAID MACHINE MONITORING ROBOT
Faculty Sponsor: Chris Penick, Department of Engineering

Abstract: Innovative Textiles Inc. a manufacturing company based in Grand Junction, CO, produces Power Pro fishing line. The company has thousands of machines. Each machine braids multiple fibers into a single fishing line. The scope of this project is to design and build a prototype system able to determine the operating status of the braiding machines and report the status to a data collection software program. The system incorporates a robot operating on an frame above a row of machines. Machine operating status is determined by a photoelectric sensor on the robot detecting the movement of the bobbins on the machine. A barcode scanner is utilized to identify which machine the robot was observing while the sensor determines machine operation status. The machine status and machine identification number is then transmitted via Wi-Fi to data collection software. The data collected from the system will be used to monitor and determine the efficiency of the braid room.

Presenter(s): Shelby Danna
Title: THE RWANDAN GENOCIDE AS A CASE FOR MULTI-LEVEL PEACEBUILDING
Faculty Sponsor: William Flanik, Department of Social and Behavioral Sciences

Abstract: How can countries build sustainable peace in the aftermath of ethnic conflict and genocide? Some peacebuilding scholars favor "top-down" approaches leveraging international and state-level actors. These scholars feel that only external actors have the will and the capacity to disarm and demobilize combatants, bring perpetrators of atrocities to justice, and build inclusive political institutions. Contrariwise, other scholars recommend "bottom-up" peacebuilding. "Bottom-up" approaches rely on local, grassroots groups. Local groups may lack the resources of the international community, but they have the legitimacy and ground-level expertise that external actors lack. This study conducts a systematic, qualitative analysis of both "top-down" and "bottom-up" peacebuilding in the case of Rwanda. The Rwandan case is unique in that it was the first country where both approaches were conducted in tandem. After assessing the strengths and weaknesses of "top-down" and "bottom-up" peacebuilding strategies, the study concludes that both approaches were necessary to build sustainable peace in Rwanda. Although each post-conflict society is different, it is likely that this finding can be generalized to other cases as well. The study therefore has important policy implications for present and future peacebuilding efforts in Rwanda and beyond.

Presenter(s): Kassidi Day, Tyler Eichhorst, Emma Gardner, Paul Smith
Title: LAVENDER OIL DISTILLATION APPARATUS
Faculty Sponsor: Chris Penick, Department of Engineering

Abstract: The use of essential oils is growing in popularity due to the homeopathic benefits, and essential oils can be extracted from a variety of plants. Distillation is used to produce high quality oils. For this project lavender was chosen as raw plant material; steam distillation was the process for oil production. The process raises the temperature of the oil glands in the plant and causes the oil to vaporize, which is then funneled into copper tubing and passed through a condenser to cool the vapor into liquid using cold water. The liquid is then collected and the lavender oil rises to the top leaving hydrosol, a scented water, on the bottom. This allows the oil to be collected separate from the hydrosol. Finding the proper balance of low pressure and low temperature is the key to producing a quality product. This apparatus can be scaled and used in a commercial or personal operation to produce high quality lavender oil to be sold or for personal use.

Presenter(s): **Alain De la Bastide, Justin McKernan, Taylor Pettit, Isac Sotelo, Jaydon Weiss**

Title: OPEN AIR HONEYBEE HIVE

Faculty Sponsor: Jody Kliska, Department of Engineering

Abstract: Honey Bees are an important factor in the world of crop reproduction. They are responsible for 80% of all plant pollination and 1/3 of all food consumed by the human population. Yet while they play a significant role in our world, very few people have had the opportunity to see how a hive operates up close. This design allows for viewing a functioning hive while incorporating a lift system, ventilation and maintenance systems. Research on the functionality of the open-air hive concludes that the hive design may have a significant impact on rebuilding the declining honeybee population. The housing for the hive is a hexagonal glass container, measuring 3'x3', providing plenty of room for a strong hive. The design has ventilation ports to allow for air passage, along with a tube leading outside for bee passage in and out of the hive. The tube also contains an adjustable door to open or close access to the hive, helping provide the bees a defense mechanism to protect against another attacking bee hive. The hive is located for viewing in the Math and Science Center.

Presenter(s): **Michelle Delacastro, Hana Peterman, Jordan Schneider, Amanda Wenzel**

Title: ARE SLEEPY NURSES SAFE NURSES?

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Sleep is one of the most important activities we do to stay alive and healthy. When we do not get enough good, productive sleep, our bodies and minds cannot perform at their peaks. So then, it is crucial that nurses are able to acquire quality sleep so they can perform well in clinical settings. Research has been done on how a lack of sleep reduces the performance of health care workers. The aim of this literature review poster is to summarize the results of studies which evaluated the influence that sleep deprivation has on medical errors and cognitive functioning on nurses working in hospitals or acute care settings. In the poster, we will also apply the research findings to clinical practice.

Presenter(s): **Riley Diederich, Christine Hall, Cody Hedrick, William Livingston**

Title: ENGINE TEST STAND

Faculty Sponsor: Nathan McNeil, Department of Engineering

Abstract: Engine test stands allow one to conduct a variety of tests on a motor and can help to understand and improve upon a motor. The engine test stand was created for a 5-horse power gas or diesel engine. The test stand needed to be designed in a which a generator could be attached and powered by the motor. In order to do that, considerations had to be made so that vibrations caused by the motor would not interfere with the motor generator system. The stand also had to be modified so that various sensors and could be attached to the motor. The motor mount was created with vibration dampening material because previous attempts of this project were impractical because of the violent vibration of the motor on the stand. The stand's construction is primarily metal to increase stability and where the actual engine mounts, there are two bolt patterns to accommodate the diesel engine and the other for the gas engine. The result of this project was a working engine test stand that can be used to test various aspects of the engine.

Presenter(s): **Joshua Dillinger**

Title: THE TRUE CAMPAIGN

Faculty Sponsor: Nicole Grider, Department of Theatre Arts

Abstract: After a polarizing election cycle, acts of hatred and aggression, and seemingly endless close-minded opinions flooding our newsfeeds-something must change. It has become so easy for us to comfort ourselves by pointing the other way, but the truth is that we are all to blame for the state of the world around us. By simply shifting our mindsets, and demonstrating a willingness to enter conversations we can create an environment that encourages individuals to be themselves while working to understand others, in order to create a better world for all. This work was developed to be that change. Through implementing this process, people in all walks of life will engage in conversations that challenge the status quo and encourage change. TRUE is a process that, if implemented, could change the way we operate when presented with dissenting opinions. Tolerance gets us in the door; Reveal encourages us to share our thoughts; Understand prompts us to think about the other side of the story; and Educate helps set us up for lasting change. Such a simple solution could be the answer we have all been looking for, but it must start with you and from there it will spread like fire.

Presenter(s): **Amanda Dix, Kylie Hodges, Rachel Scutt**

Title: VALIDATION OF WEARABLE HEART RATE MONITORS AT REST AND AT INCREASING INTENSITIES

Faculty Sponsor: Brent Alumbaugh, Department of Kinesiology

Abstract: Wearable activity trackers provide valuable information, including heart rate (HR), throughout daily activities and during exercise. **PURPOSE:** To determine the accuracy of the HR monitor in the fitbit Blaze (FB) and Garmin chest strap (GCS) at increasing intensities. **METHODS:** Data were collected from four female participants during a 5-minute resting phase, and then while running on the treadmill for 5 minutes at 80.5 m/min, 134.1 m/min, and 187.8 m/min. All four conditions were followed by a two-minute resting phase. The first three minutes of each condition were to achieve a steady state HR and the last two minutes were used for data collection. Subjects were connected to a five-lead electrocardiogram (ECG), the FB, and the GCS. **RESULTS:** As intensity increased, the GCS and the FB produced significantly ($p < .05$) different measurements in comparison to the ECG. During the 187.8 m/min phase, both the FB and GCS produced significantly higher heart rates in comparison to the ECG in all subjects. **CONCLUSION:** When compared to a five-lead ECG, there was a decrease in the accuracy of the FB and GCS as intensity increased.

Presenter(s): **Jessica Donez**

Title: I WILL BE

Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: Many times we think that children who have been abused or exposed to violence have tendencies to become violent or abusive in their adulthood. This can be true when we begin to see physically, emotionally, or sexually abusive relationship patterns evolving in the homes of those who may have witnessed it, or have been in an abusive relationship themselves. In these circumstances some do not realize that they have the choice to stop the cycle of violence and proceed to follow in the footsteps of their abuser. Even though this can be an outcome, it is not true in all cases. What happens once that cycle is broken? This piece delves into exposure on children, and how a cycle can be created and broken, as their self-awareness through a lifetime of transitions continues to develop.

Presenter(s): **Rowan Dunn, Shae Peterson, Baylee Reeves, Shafer Rubalcaba**

Title: REDUCING NAUSEA WITH CHEMOTHERAPY

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: The following information was obtained from research articles. The information found will be presented to the public by way of a poster board. The purpose of this paper is to determine whether music therapy or guided imagery has a bigger impact on nausea for patients receiving chemotherapy. It is indicated from the research found in literature resources that music therapy reduces the frequency of nausea patients undergoing chemotherapy experience. Singing may also reduce nausea and vomiting due to the lung's capability of receiving more oxygen compared to the amount received by speaking alone. Guided imagery has been indicated to increase patient comfort and provide psychological support. However, there is no compelling evidence that guided imagery has positive effects on physical symptoms such as nausea or vomiting. The research found from other sources concluded that music therapy is more effective in reducing nausea associated with chemotherapy.

Presenter(s): **Ryan Elliott, Benjamin Hord, Blake McCallister, Dylan Wright, Dale Young**

Title: KEFIR FERMENTATION CHAMBER

Faculty Sponsor: Jody Kliska, Department of Engineering

Abstract: Kefir is all the talk throughout health food enthusiasts, but what is kefir? Kefir is a fermented milk that contains cultured probiotics. Other than being available on the shelf of your local Natural Grocers, Kefir is rarely made outside of commercial producers. Though many people do indeed ferment the concoction themselves, the problem they consistently run into is that Kefir is time consuming. The project team created a consumer-friendly kefir fermentation chamber that is portable and convenient for personal use. The cost-efficient design incorporates a temperature-regulated chamber. The chamber is accessible for the placement of a half-gallon mason jar that contains the solution. Since Kefir is acidic, glass containers are used instead of metal due to the fact that metal will erode. The chamber is filled with temperature-regulated water. This allows the kefir to maintain the proper temperature range of 68-72 degrees Fahrenheit. Maintaining proper temperature is important during the fermentation process, because if the temperature is too high the kefir will be more acidic. If the temperature is too low during the fermentation process then the kefir won't form. Temperature regulation in the process was the key to a quality kefir product.

Presenter(s): Justin-shay Ellsworth, Norman Marroquin, Michael Medina, Peter Stefanick

Title: EFFICIENT THERMOELECTRIC GENERATOR

Faculty Sponsor: Sarah Lanci, Department of Engineering

Abstract: Peltier devices are thermoelectric generators that convert heat energy into electric current, however they are highly inefficient. This project was designed to create an environment for four connected Peltier devices in a way that maximizes the thermal efficiency of the entire system. In order to optimize the system, a copper plate was placed between the devices and the heat source and a well-insulated container filled with ice water was placed on the opposite side in order to ensure the greatest change in temperature between the two sides of each device. To visually demonstrate the conversion of heat energy to electric current, the system was connected to a set of LED lights that illuminated as the devices converted the heat energy into an electric current. This demonstration will be used by thermodynamics instructors to display that assemblies can be created to increase efficiency of Peltier devices which can then be used in many applications to harvest waste heat energy and boost the efficiency of the entire system.

Presenter(s): Kristy Emerson, Jamie Nordine, Jenifer Sawyer

Title: OUTCOMES OF AMBULATION ON CRITICALLY ILL PATIENTS

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Immobilization is common among critically ill patients because of the misconception that they are too sick and too weak to complete activity. It is well documented that the longer a patient is immobile, the more likely he/she is to experience neuromuscular issues. This can result in a poor outcomes and decreased quality of life for patients. Those who do not ambulate during ICU care may experience muscle wasting, longer hospital stays, longer time on mechanical ventilators, and physical dysfunction. We will be completing a literature review to determine if physical activity in critically ill hospitalized adult patients improves neuromuscular outcomes. Our poster will highlight studies that have included activity as an intervention for critically ill patients. We will showcase the outcomes to inform others if these interventions should be implemented for patients who meet the criteria.

Presenter(s): Justin Endicott, Abraham Selenke, Nicholas Wright

Title: CORRECTLY MODELING THE SIMPLE PENDULUM BEYOND THE FAILURE OF THE SMALL-ANGLE APPROXIMATION

Faculty Sponsor: Brian Hosterman, Department of Physical and Environmental Sciences

Abstract: The period was measured for a simple pendulum for angles from 0.5 to 25.0 degrees which demonstrated the failure of the commonly-used solution guided by exploiting the small-angle approximation. The pendulum's period increased with amplitude. This result is in agreement with an improved solution to the equation of motion. The period fit this improved model well, having R^2 to 0.99825. The intercept of this fit gives an acceleration of gravity accurate to 0.9% of the known value of the acceleration of gravity in Grand Junction, CO.

Presenter(s): Arminel Estevez Zárate

Title: THE PATRIARCHAL SYSTEM THROUGH THE EYES OF WOMEN IN COMO AGUA PARA CHOCOLATE AND LA CASA DE BERNARDA ALBA, EL PATRIARCADO A TRAVÉS DE LAS MUJERES EN COMO AGUA PARA CHOCOLATE Y EN LA CASA DE BERNARDA ALBA

Faculty Sponsor: Mayela Vallejos Ramírez, Department of Languages, Literature and Mass Communication

Abstract: Literature often presents us with strong female characters, like Bernarda from "La casa de Bernarda Alba" and Mama Elena from Como Agua Para Chocolate. Readers erroneously call these characters matriarchal, but the reality is that their actions and aspects of living support patriarchal values. They live and act through the same standards that society has set for women; they don't resist the expectations because they gain from those already established. This essay will compare the two strong female characters and their relationship with their youngest daughters Adela and Tita. Examples will be given of how the authority of their mothers marks their lives forever depriving them of a good life.

Note: This presentation will be in Spanish.

Presenter(s): Taylor Evans, Connie Kim, Austin Reed

Title: ELICITING POSITIVE LIFESTYLE MODIFICATIONS WITH MOTIVATIONAL INTERVIEWING

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Motivational interviewing has been identified as evidence-based practice for its persuasive properties with regards to progressive lifestyle modifications. It has been determined to be a difficult task to convince patients to relinquish or reduce the use of tobacco or to increase nutritional dietary intake in those predisposed to fatal morbidities; informing patients of the scientifically supported risks and complications correlated with these customs has demonstrated to be an unsound approach. This poster evaluates the use of motivational interviewing to influence realistic, proactive lifestyle modifications for the reduction of hypertensive complications in patients at or above the age of 65 with the diagnosis of essential hypertension. The researchers analyzed several articles that assessed the utilization of motivational interviewing with regards to smoking cessation, decreased cholesterol intake, and increased exercise.

Presenter(s): Ulondaa Feistner

Title: TEMPORARY HOME

Faculty Sponsor: Nicole Grider, Department of Theatre Arts

Abstract: Steenbakkers stated "sharing stories about the past and about being in [foster] care can help adolescents placed in foster families make meaning of their experiences." Conversely, foster children are often not encouraged to engage in future stories, such as "what do you want to be when you grow up?" Thus, this narrative-based presentation will discuss the presenter's journeys as an abandoned child in Foster Care to an emancipated adult who discharged herself from high school at seventeen, with few life skills and some education. As such, the presenter became part of a statistic, yet was simply operating on Maslow's Hierarchy of Needs.

Presenter(s): Mellodi Felix, Kayla Nored, Kaylee Tapscott

Title: RISKS AND BENEFITS OF MAMMOGRAPHY SCREENING FOR HIGH RISK WOMEN

Faculty Sponsor: Olga Grisak, Department of Health Sciences

Abstract: According to the American Cancer Society, 1 in 8 women will be diagnosed with invasive breast cancer. In 2017, it is estimated that around 255,180 women will be diagnosed with breast cancer alone. Currently, a mammogram is the screening exam used to diagnose this type of cancer. The American College of Radiology states that 40 is the recommended age to begin the screening. However, this recommendation does not include the younger population of women who are at a high risk of developing breast cancer. A high risk woman would be any pre-menopausal female who has a close family history of breast cancer. There is difficulty in diagnosing this group of patients; due to their age, they are presented with more glands and ligaments within the breast tissue, which can obscure the image and make it harder to diagnose. Should there be different guidelines for younger, at risk women to be screened earlier than the recommended age, or would the added radiation dose be more harmful than the potential benefits? The purpose of this research is to bring awareness and explain controversies about breast cancer screenings for high risk women.

Presenter(s): Blake Ferguson, Eric Lammon, Zachary Moore, Derek Oakley

Title: MODEL STEAM ENGINE

Faculty Sponsor: Eric Goertz, Department of Engineering

Abstract: Starting with its invention in 1698, no technology was more important to the Industrial Revolution than the steam engine. Powering important inventions like the locomotive, these engines convert heat energy into mechanical energy through the use of steam. The purpose of this project was to create a small showcase model of a steam engine that runs on 15 psi steam and turns a small generator. A valve sends high pressure steam to alternating sides of a piston to drive the motor. An arm connects the piston to the crank shaft, where the linear motion of the piston is converted into the circular motion of the drive shaft. The designers demonstrated thermodynamic efficiency, which is the ability to convert thermal energy into mechanical energy, through a working steam engine capable of generating electricity.

Presenter(s): Krista Ferguson, Kaitlyn Habert, Terralea Neebling

Title: BREAST MILK IMMUNOLOGY

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: This research project focuses on how the components of a mother's breast milk adjust to the needs of her infant's immune system. When a mother breast feeds her infant, the baby's saliva will trigger a response to alter the components of the breast milk the baby will receive. The mother's body offers an extra boost to the infant, allowing the infant to develop a stronger immune system. We will explore different literature about the changes of the immune components in the breast milk and how it affects infants with various illnesses. These results will be presented on the poster during the Student Showcase. The presenters hope to educate more mothers and nurses about the power of breast milk.

Presenter(s): Marayna Flemming

Title: HURRICANES, TSUNAMIS, AND WAVES... OH MY!

Faculty Sponsor: Marc Fischer, Department of Computer Science, Mathematics and Statistics

Abstract: Nature can be a pretty scary force when acting on water. Bodies of water can cause flooding, hurricanes, and other storms. The presenters want to use shallow water equations to try and predict these natural disasters. The shallow water equations can model ocean waves and tsunamis. By predicting these natural phenomena those who live on the coast can be better prepared for these conditions. The shallow water equations determine what the surface of a shallow body of water is going to do. The presenters will be modeling solutions to the shallow water equations in MATLAB. The presenters will compare different numerical solutions to equations, such as time and space discretization. The presenters can compare these solutions by looking at the accuracy and stability of the solutions along with the computational effort put into solving them. In the end, the presenters will be using the pictures produced by our code for our analysis. We will show the benefits of the solutions for the shallow water equations.

Presenter(s): Devin Freda, Tess Skoe

Title: EFFECTS OF WEIGHT AND NON-WEIGHT BEARING SPORTS ON BONE QUALITY IN MALE COLLEGIATE ATHLETES

Faculty Sponsor: Kristin Heumann, Department of Kinesiology

Abstract: Bone health has been related to type of sport, experience, weight bearing (WB) or non-weight bearing (NWB) activity, and multidirectional forces applied. **PURPOSE:** To determine if there are differences between WB and NWB sports on bone quality in male collegiate athletes. **METHODS:** Ten healthy male collegiate athletes (20.8±1.2yrs) were selected from each NCAA Division II soccer, football, cross country, swimming, and USA cycling Division I teams. For analyses, soccer, football, and cross country were considered WB; swimming and USA cycling were considered NWB. The broadband ultrasound attenuation (BUA), speed of sound (SOS), and stiffness index (SI) were compared between sport, WB vs. NWB, and foot dominance using a two-way ANOVA with repeated measures. **RESULTS:** No significant differences were found between dominant and non-dominant foot for sports or WB vs. NWB. There were significant differences between BUA scores for sports and WB vs. NWB ($p=0.026$ & $p=0.015$), respectively. The SOS scores were significant for sports and WB vs. NWB ($p<0.001$). SI scores were found to have a significant difference between sports type and WB vs. NWB ($p<0.001$). **CONCLUSION:** Weight bearing vs. non-weight bearing sports significantly effect bone health in male collegiate athletes.

Presenter(s): Cody Freischlag

Title: A COSMIC GROUNDHOG DAY: SPRING '17 PRODUCTION OF "CONSTELLATIONS"

Faculty Sponsor: Jeanine Howe, Department of Theatre Arts

Abstract: The play "Constellations" was produced in spring 2017 at the Mesa Experimental Theatre. The presenter, who was the director of the production, will discuss the origins of the production and his personal journey with it. He will also talk about the research and process of creating this piece, as well as the scientific concepts surrounding the play. This presentation will explain how a play can inform our own personal search for life's meaning. The presenter will address how to push past fear in the creative process by using "Constellations" as an example.

Presenter(s): Emily Friesen

Title: EXCERPT FROM "A HERO OF MY OWN"

Faculty Sponsor: Jeremy Franklin, Department of Theatre Arts

Abstract: "A Hero of My Own" is a cabaret written and performed by Emily Friesen with piano accompaniment by Doug Morrow. The presenter will perform "What'll I Do" by Irving Berlin and "Game On" by Andy Roninson and Greg Edwards. The cabaret focuses on the realization that the only person needed for happiness is one's self. It is a look into the artist's life and her experiences as seen through the eyes of a fairy tale princess stuck in a tower. While it does help to have friends and family around, one can save themselves from any trouble they come across. A princess can save the day and slay the dragon. In essence, they can become the hero of their own story. The songs are taken from the section of the cabaret where the princess struggles with the realization that the prince didn't save her and then she comes to the realization that she can save herself.

Presenter(s): Kylie Garcia

Title: THE FIAT SHAMIR PROTOCOL EXPLAINED

Faculty Sponsor: Markus Reitenbach, Department of Computer Science, Mathematics and Statistics

Abstract: Pretend for a moment that you're trying to get into a top secret room on the Colorado Mesa University campus. The only way to get in is with your 700 number. However, when you go to the room there is a guard, named Victor, who is asking for your 700 number. You cannot give your 700 number to Victor and need to get into the room. How do you prove to Victor you have the right 700 number without giving it to him? The method you would use is called a zero knowledge proof. In this project we aim to focus on a specific zero knowledge proof called the Feige - Fiat - Shamir protocol and explain how and why it works.

Presenter(s): Sara Garcia

Title: USING ALS TO VISUALIZE TATTOOS ON DECOMPOSED HUMAN REMAINS

Faculty Sponsor: Melissa Connor, Department of Social and Behavioral Sciences

Abstract: The use of an Alternate Light Source (ALS) has potential to reveal tattoos not previously visible, or only partially visible, on bodies in various forms of decomposition. An ALS is a device that allows an item or area to be viewed under light of a specific wavelength, which can then allow specific items to be visualized or enhanced. In an attempt to locate and/or enhance possible tattoos the remains were examined with a blue light with a wavelength between 420-470nm and a green light with a wavelength of 525nm, and viewed with orange and yellow filter goggles. Areas of interest were photographed using either an orange or yellow camera filter. The photographs were then imported into Adobe Photoshop Lightroom®, where various digital filters were applied. The digital filters include green filter, infrared, orange filter, red hi-contrast filter, and yellow filter. The type of filter selected depends on the wavelength of light applied to the remains. When these digital filters were applied to the photographs the tattoo became somewhat more visible. The use of an ALS in the infrared spectrum may produce better results.

Presenter(s): Aspen Garcia, Lydia Skalberg

Title: WATER BIRTH VERSUS LAND BIRTH

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Water birth has gained popularity in many different parts of the world and has been shown to be a beneficial alternative to traditional birthing methods for both the mother and the baby. Some accounts of water birth can be traced back into ancient times, however, the widespread practice surfaced in the 1980s. Water birth involves immersing the mother in warm water during the labor, delivery, or both. The research articles we found were drawn from different literature sources to compare the physiological and psychological effects of water birth on both the mother and the baby. Our poster will include both the benefits and drawbacks of water birth in comparison to traditional birthing methods. Also, we will have an overview of the water birthing process.

Presenter(s): Abigail Garton

Title: SEX: A WORK IN PROGRESS

Faculty Sponsor: Randy Phillis, Department of Languages, Literature and Mass Communication

Abstract: Abigail Garton will be reading a collection of poems exploring the topic of sex through the experiences of an individual. Through this topic, indoctrination, manipulation, and exploration will be discussed.

Presenter(s): Michael Getz

Title: CLIMATE CHANGE EFFECT ON GEOMORPHOLOGY ON THE COLORADO PLATEAU

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: The purpose of this project is to research and review the effects that climate change has had on geomorphologic processes in the Colorado Plateau. Climate change has intensified in the past decades and has a clear effect on erosion. The area of study will be located within the bounds of the Colorado Plateau. The time frame of this study focuses on the Holocene epoch. The hypothesis of this project is that intensified climate change has accelerated erosion in Colorado. If there is a connection between climate change and erosion then the landscape is changing faster than it would naturally. If climate change hasn't had an effect on erosion, then there must be other variables in play. Literature will be reviewed to link climate change with rates of erosion. Climate and precipitation records will be examined to help determine rates of erosion.

Presenter(s): Daniel Gillson, Matthew Hays, Shawn Pacarar, Richard Sterling

Title: MEALHUB: A PEER-TO-PEER HOME-COOKED MEAL EXCHANGE WEBSITE

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: Many struggle to find time to cook, while others enjoy plenty. MealHub is a peer-to-peer local-meal sourcing platform that connects busy and/or cash-strapped people in search of affordable, home-cooked meals (Mouths) to those with interest in monetizing their kitchens and culinary skills (Chefs). Mouths interested in purchasing meals will be able to search for Chefs by location. Chefs will advertise the meals they are willing to provide, as well as meals they have currently available. Chefs can post information such as ingredients, number of servings, price, and availability time for each meal they cook. Mouths will be able to rate Chefs and individual meals based on their eating experiences. All financial transactions will be negotiated and conducted independently between the Mouths and Chefs. The MealHub platform will provide Mouths access to rare authentic food from a diverse range of cultures and ethnicities without paying restaurant premiums and provide Chefs access to a marketplace without investing in full scale restaurants.

Presenter(s): Kaitlyn Gilmore

Title: COLOR DIFFERENCE ARISING DUE TO MINOR STRUCTURAL VARIANCES IN NOVEL GOLD(III) COMPLEXES

Faculty Sponsor: David Weinberg, Department of Physical and Environmental Sciences

Abstract: Two novel gold(III) complexes containing amide derivatives of 8-aminoquinoline were synthesized. These complexes differ only in the alkyl group attached to the amide. In one complex the amide was attached to a t-butyl group and in the other complex the amide was attached to a 3-pentyl group. These minor structural changes caused the t-butyl containing complex to be green and the 3-pentyl containing complex to be yellow. Using UV-Vis (Ultraviolet-Visible) spectroscopy, it was observed that these colors arise due to two absorbance peaks in the visible range of the spectra. These peaks are shifted to lower energies in the t-butyl containing complex. As evidenced by variances in the single crystal x-ray diffraction structures, this shift may be due to ground state energy differences. In the 3-pentyl containing complex, the amide adopts a geometry that allows the nitrogen lone pair to be stabilized through conjugation with the π -bond of the carbonyl. In the t-butyl containing complex, the steric bulk of the t-butyl group prevents the amide from adopting the same geometry. This blocks conjugation between the nitrogen lone pair and the π -bond of the carbonyl leading to a higher energy ground state, lower energy absorbances, and the observed green color.

External Funding: Acknowledgement is made to the donors of The American Chemical Society Petroleum Research Fund for support of this research.

Presenter(s): Jesse Gish, Austin Hallock, Jessie Parra, Christopher Quintana

Title: THE EFFECTS OF GRADED RUNNING ON MUSCLE ACTIVATION OF THE QUADRICEP AND HAMSTRING MUSCLES

Faculty Sponsor: Michael Reeder, Department of Kinesiology

Abstract: PURPOSE: To observe differences in muscle activation of the quadriceps and hamstrings during graded running. METHODS: Four runners of different athletic backgrounds were chosen for this study. Each subject ran (134.11m/min) for 3 trials, each at different grades, which were completed consecutively. Electrodes were placed on rectus femoris (RF), vastus medialis (VMO), biceps femoris (BF), and semitendinosus (ST). Each subject warmed up on a level treadmill at their selected pace. Data was collected during 3 running trials at different grades beginning with 0°, then randomized to +5.0° or -5.0°. Subjects ran at the prescribed grade for two

minutes to reach a consistent running pattern. Data were analyzed in Excel using a two-way ANOVA. RESULTS: Mean activation of VMO was typically highest during level running and lowest during decline running, however, peak activation varied between subjects. There were no significant similarities between each subject's mean activation. CONCLUSION: Mean muscle activation varies between subjects during graded running. VMO shows the greatest variation between different grades while RF, BF, and ST have a constant mean activation dependent on the individual athlete. Our sample was too athletically diverse to draw conclusions between grades.

Presenter(s): Sara Gladding, Steven McKenzie, Nathaniel Ploeger, Duval Sutherland, Zachary Wood
Title: EDUCATIONAL MASS-SPRING-DAMPER SYSTEM
Faculty Sponsor: Francisco Castro, Engineering Partnership Program, Colorado Mesa University and University of Colorado Boulder

Abstract: Mass-Spring-Damper systems are commonly used in vehicle suspensions systems, such as car and bike shock absorbers. These systems, in a car or vehicle, consist of a spring around a cylinder with different damping fluids to slow down and eventually stop the oscillation of a car, and are also known as shocks. A small portable Mass-Spring-Damper system has been created to demonstrate how these systems work. This demonstration can display how the system behaves, and has the ability to vary the three most important factors that affect its motion: the weight of the mass, the damping coefficient, and the spring constant. The motion of the mass on the system was analyzed and graphed to display the motion of the mass when oscillating. The Mass-Spring-Damper system is a good educational tool for Science, Technology, Engineering, and Mathematics (STEM) students to visualize and aid in comprehension on how the system works.

Presenter(s): Mariel Goffredi
Title: SONGOLOGUE MISH-MASH
Faculty Sponsor: Jeremy Franklin, Department of Theatre Arts

Abstract: "Songologue Mish-Mash" is a compilation of lyrics taken from popular songs and fused together to make a story of one girl's emotional journey. The piece is written and performed by Mariel Goffredi, and includes song lyrics such as "Baby" by Justin Bieber and "Girls Just Wanna Have Fun" by Cyndi Lauper. Goffredi has selected specific lyrics from songs and added her own original dialogue to make a completely new character and story. Hearing the lyrics out of context is meant to illustrate to audiences both the ridiculous usage of words in the lyrics, and the incredible power some of the words can have in the right circumstances. While the piece is mostly comedic as you follow this girl through her adventures, it also has dramatic points that will make audiences rethink the songs they hear on the radio.

Presenter(s): Abigail Gonzales
Title: FRAGILE X SYNDROME AND THE BENEFITS OF PHYSICAL ACTIVITY AND INDIVIDUAL INSTRUCTION
Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Fragile X Syndrome is one of many intellectual disabilities that future educators are likely to face in their career. This presentation explains the causes and characteristics of Fragile X Syndrome to provide teachers with background knowledge for work with students with this condition. Like all intellectual disabilities, students with Fragile X Syndrome can make great progress through the use of research-based strategies employed by an excellent educator. This presentation provides teaching tips and techniques that benefit students with Fragile X Syndrome. Further, this presentation focuses on two specific research-based strategies: physical activity and one-on-one work with a teacher or a professional. Both of these methods have been proven to be beneficial for all students regardless of ability. Ways to incorporate these strategies in the classroom to reach all students will be provided. The presenter experimented with these techniques in the field with a young boy who is in the process of being diagnosed with Fragile X Syndrome. She supplemented her discoveries with literature and research. The combination of real world experience along with scientific findings and other teachers' experiences helped the presenter to confirm the importance of physical activity and one-on-one work with all children.

Presenter(s): Colin Gordon, Benjamin Skogen, Jessica Switzler
Title: 50 SHADES OF PAIN
Faculty Sponsor: Warren MacEvoy, Department of Computer Science, Mathematics and Statistics

Abstract: 50 Shades of Pain, an intimidating title I know. However, for a tattoo shop it is a compelling name. A name that is completely transparent, tattoos are painful, but for most they are a worthy pain. Tattoos are being used for a wide variety of different reasons in today's society, a few of those reasons follow: honoring the memory

of a lost loved one, individuals capitalizing on their right to self expression and even making a scar caused by a painful memory beautiful and more meaningful. We are designing a website that is not only beautiful and inviting for their users, but that is also easy for the clients to use and update. Our website will not only showcase each artists individual capabilities, but provide some crucial information for a person looking to get a tattoo. Presenting information will range from the longevity and pain of specific tattoo placements, and pre/post care for tattoos. We are hoping that this website will help to bring the community to consider this local tattoo shop for all of their tattoo needs.

Presenter(s): Samantha Gould

Title: TWICE EXCEPTIONAL CHILDREN

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Teachers are faced with the task of educating a wide variety of students in their inclusive classrooms, meaning the classroom will consist of students with and without exceptionalities. There are a wide range of exceptionalities that are evident in the classroom, and it is the job of the teacher to be prepared for all students. In order to further educate teachers about exceptionalities in an inclusive classroom, the presenter will inform guests about students who are Twice Exceptional with an emphasis on behavior. The presenter will provide experience from the field in connection with knowledge gained through research and literature. The presentation will include information about students who are Twice Exceptional as well as research-based teaching strategies, and tips for teachers to use in the classroom. The audience will leave with an appreciation for inclusive classrooms and awareness of students who are or who may be Twice Exceptional.

Presenter(s): Samantha Gould, Kaelyn Kresyman, Katharine Rogowski, Mariah Talucci

Title: EVERYONE BELONGS HERE! MEANINGFUL INCLUSION THROUGH COMMUNITY-BUILDING

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: This poster was constructed by the officers of Colorado Mesa University's Council for Exceptional Children Student Chapter (CEC Club). The feeling of belonging is important to all students because it is the foundation of successful inclusive education. Many positive benefits come with a teacher's efforts to promote belonging in the classroom that positively impact the classroom climate, classroom management, peer relations, and learning in all areas. Information shared on this poster will translate directly to improved practice in inclusive classrooms by building community among students, creating a safe and healthy classroom climate, and effective classroom management. When students feel they belong in a classroom with the teacher and one another, healthy feelings of confidence and security develop, students help and support one another, and disruptive, challenging behaviors are reduced. Community-building practices will be shared as will photographs of actual community-building activities done successfully in inclusive CMU classrooms. Recommendations outlined will provide teachers with a wealth of ideas to put to use in their classrooms that will engage their students and promote feelings of belonging for everyone. This poster will also be presented at the 2017 Council for Exceptional Children Convention and Expo in Boston, Massachusetts on Friday, April 21.

Presenter(s): Preston Grandbouche

Title: PREDICTING THE RESULTS OF NHL GAMES

Faculty Sponsor: Richard Ott, Department of Computer Science, Mathematics and Statistics

Abstract: The American Gaming Association estimates the people of the United States placed \$149 billion in total sports bets in 2015. Although hockey accounts for only a small portion of this total when compared with other major sports leagues, it is still a part of the conversation. Any hockey team can tell you that winning games in the NHL is no easy task, but by using logistic regression we are able to create a model to decide which variables are the most influential in predicting which team will win a particular game. The effectiveness of our model will be determined by the amount of money we win or lose betting \$100 on the oddsmakers' money lines each game. In this presentation, we demonstrate how creating a logistic regression model can potentially help you return from Vegas as a big winner.

Presenter(s): **Amanda Grigsby, Chelsea Howey, Chelsy Mills**
Title: EFFECT OF EXERCISE ON THE STRESS LEVELS OF COLLEGE STUDENTS
Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: College students are universally known to be under extreme amounts of stress. This stress stems from high work load, financial strain and social expectations, and can have negative impacts on a student's mental health. It has been suggested that exercise will reduce stress due to release of various hormones and neurotransmitters. There is evidence that a connection may be able to be made between the amount of stress college students face and the possible reduction in stress via exercise. The question behind our research analysis is: can physical exercise effectively reduce stress in college students? This poster will focus on the advantages of exercise and the effect it has on stress, based upon research information that we have compiled from articles found online. The goal of this study is to attempt and find a healthy outlet for college students to relieve stress that is both practical and efficient.

Presenter(s): **Christine Hansen, Heather Keller, Samantha Main, Adriana Ramos-Gonzalez**
Title: THE IMPORTANCE OF MEDICAL LABORATORY TESTING IN THE DIAGNOSIS OF NEUROSYPHILIS
Faculty Sponsor: Tracy Matthews, Department of Health Sciences

Abstract: Neurosyphilis is a form of syphilis that affects the brain and spinal cord and is caused by *Treponema pallidum*. Symptoms of neurosyphilis can include blindness, deafness, paralysis, and dementia. Understanding the latest technology is crucial for providing the earliest, most accurate diagnosis of neurosyphilis. The newest forms of technology are more efficient for the detection and differentiation of neurosyphilis through various stages of the disease. Scientific literature was reviewed to understand how neurosyphilis is identified and quantified in the medical laboratory.

Presenter(s): **Daniel Harbert, Nathan Hawley, Morgan Patton**
Title: DESIGN AND DEVELOPMENT OF A KNOT-TYING DEVICE FOR THE AEROSPACE INDUSTRY
Faculty Sponsor: Chris Penick, Department of Engineering

Abstract: Industrial lacing tape is used by the aerospace industry to secure wire bundles located throughout their aircrafts. Currently, the knots are tied by hand which leads to various laceration and repetitive motion injuries to employees. Western Filament, a lacing tape manufacturing company in Grand Junction, Colorado, has requested the development of a device to aid in the knot-tying process. The knots must pass the Federal Aviation Administration (FAA) vibration test and are historically done via a clove-hitch with either a square or surgeon knot. Therefore, the prototype is designed to tie a modified clove-hitch square knot combination already approved by the FAA. The purpose of this project was to create a prototype of an ergonomic device capable of aiding the knot-tying process and alleviating stresses on the operator's hands to reduce injuries. The prototype was manufactured out of plastic using additive manufacturing technology with the addition of metal components such as springs, pins, and gears. The knot-tying device is hand-held, weighs less than three pounds, and is effective at tying the clove-hitch square knot combination.

Presenter(s): **Caleb Hardaway**
Title: PROTO-FEMINISM AND ITS TIES TO RELIGION IN CHARLES BROCKDEN BROWN'S WIELAND
Faculty Sponsor: Randy Phillis, Department of Languages, Literature and Mass Communication

Abstract: Early American gothic novel *Wieland* has been a high point of many scholarly debates since its first publication in 1798. Although the novel is groundbreaking on various levels, there is a lot of controversy surrounding the key themes that are found in this piece. Many literary critics and scholars approach the novel from what seems like a pre-determined amount of set themes (religious fanaticism, mistrust in sensory perceptions, insanity, the law, etc.). Although these basic themes can be found within the novel they are far from qualified to present themselves as the primary purpose of *Wieland*. Charles Brockden Brown was indeed making claims about religious fanaticism, mistrust in sensory perceptions, as well as their connection to insanity, but all these claims can fall under the conceptual umbrella of gender. Brown uses the main protagonist/narrator to make proto-feminist claims in an attempt to highlight and dismantle socially constructed norms. The significances of the author's proto-feminist claims lie within the contextual social norms of the time and how the piece breaks down these political and social barriers.

Presenter(s): Donovan Harwell, Ashley Hoefer, Michael Saavedra, Nicole Troester, Wendy Walters

Title: SOCIAL MEDIA: THE NEW SMOKE-BREAK

Faculty Sponsor: Patrick Schutz, Department of Business

Abstract: The presentation entitled "Social Media: The New Smoke Break?" is a student created illustration of how employees interacting on social media platforms while at work can be a positive situation for any company. In the presentation, we will explain how accessing social media platforms is the new addiction for millennials. This will be further explained by using a psychological evaluation of how the brain is stimulated by social media, similar to an addiction to a drug. Also, this presentation explains how a social media presence can be viewed as a positive attribute for any company in the aspects of marketing and human resources. This is further explained using three main platforms: Facebook, Twitter and LinkedIn respectively. Since the usage of social media in the workplace is such a fresh concept, this presentation will briefly discuss the policies most companies have in regards to social media usage at work and will make suggestions on how to make those policies more "Millennial friendly" for the new incoming workforce. We will also explain how important it is for all companies to understand why this kind of change will be beneficial for them and why failure to change could negatively impact any company.

Presenter(s): Kristin Heberlein

Title: YOGA AND DANCE

Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: Yoga for thousands of years has been known for its great ability to connect one's mind to the body and create a sense of strength through balance and flexibility. It is used to strengthen and on some level present a sense of spirituality through the practice. Applying yoga to dance helps dancers in their art form, and furthers their abilities, allowing their bodies to stretch and strengthen in a natural way. Yoga can also be used as a tool for physical therapy and provide dancers a shorter transition time from injury to studio. In order to research which genres can be best applied and most beneficial to dancers, the experience of all styles of yoga will be explored.

Presenter(s): Audra Hedberg, Bethany King, Katharine Kirby, Joanne Rowe

Title: THE AFFECT OF BMI ON EMERGENCY CONTRACEPTION

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: In today's society both the topics of obesity and the use of contraception are very prevalent. Our group wanted to try to combine these two ideas and see if there is a correlation between the efficacy of emergency contraception use and increased body mass index (BMI). We decided to approach this idea through researching the most commonly used emergency contraception, the plan-B pill, and comparing the effectiveness of the pill in patients with a BMI between 18.5-24.9 versus a BMI greater than 30. Our poster will include information on BMI, explanation of the plan-B pill and how BMI changes its effectiveness, and a summary of our research findings.

Presenter(s): Leah Hendrick, Shelbi Peters

Title: PRECOOLING WITH AN ICE VEST: EFFECT ON CORE TEMPERATURE WHILE SWIMMING

Faculty Sponsor: Michael Reeder, Department of Kinesiology

Abstract: Precooling has been shown to improve athletic performance by decreasing core body temperature (CT) before exercise, thus delaying the onset of core heating during training. Previous research used precooling on land sports, but little research exists involving CT in swimmers. **PURPOSE:** To observe the effect of precooling on CT prior to swimming. **METHODS:** Two female collegiate swimmers performed two swimming trials, precooling and non-precooling, 45-60 minutes in duration. Trials were randomized and one week apart. Each trial included 15 minutes of warm-up consisting of a 400yd swim, 200yd kick, and 4x50yd drill and a 200yd cool-down. CT was measured every 200yd for a 1600yd swim at 75% of fastest mile pace. CT, heart rate, and rating of perceived exertion were measured before and after warm-up and every 200yd until trial completion. **RESULTS:** Single-subject analysis showed significant differences ($p < 0.01$) between CT for precooling and non-precooling. CT remained lower throughout the duration of exercise with precooling compared to non-precooling. **CONCLUSION:** Precooling, using an ice vest before exercise, significantly reduced CT during swimming compared to non-precooling.

Presenter(s): **Briana Hendrickson**

Title: THE MATHEMATICS OF PHYLLOTAXIS

Faculty Sponsor: Lisa Driskell, Department of Computer Science, Mathematics and Statistics

Abstract: What do Fibonacci numbers and the golden angle have to do with plants? Some of the more visually appealing plant patterns in sunflower seeds, pinecones, and succulent plants appear in spiral formations, which display consecutive Fibonacci numbers and the golden angle. Arrangements of leaves on a stem, known as phyllotaxis, also exhibit these patterns. We will describe dynamical models of phyllotaxis and related bifurcation diagrams to explain why growth patterns of leaves favor the Fibonacci numbers and the golden angle.

Presenter(s): **Brittany Heye**

Title: NATIVE AMERICAN BOARDING SCHOOLS: ASSIMILATION OR DESTRUCTION?

Faculty Sponsor: Steven Schulte, Department of Social and Behavioral Sciences

Abstract: This paper focuses on Native American Boarding Schools with an emphasis on the Carlisle Indian Industrial School. It asks the question: were the Boarding Schools beneficial to the assimilation process, or a destructive force for the Native Americans? The scope of the research includes influential policymakers and an analysis of key documents. The paper utilizes accounts from Captain Pratt, native peoples, and photographs from Carlisle boarding school. The Meriam Report and Captain Pratt's writings on the Carlisle Institute are two sources that provide insight into both the creation of the Boarding School Movement and the reforms to that existing system. The conclusion is based on analysis of the health of students, education standards, and environments these schools had. This paper concludes that the system was more destructive than beneficial to the assimilation process.

Presenter(s): **Aaron Hicks, Katelin Olson, Grayson Young,**

Title: SMOKING INTERVENTIONS, ARE THEY NECESSARY?

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: We chose to look at smoking cessation techniques in the young adult population. Due to the amount of medical problems associated with smoking, we as health care providers, want to help assist our patients during the smoking cessation process. Because smoking cessation can be difficult, we formulated this question in hopes of gathering information over how to best achieve smoking cessation outcomes. The goal is to help assist patients in the prevention of developing chronic health conditions as a result of smoking. With our research question, we want to know if providing evidence based smoking cessation techniques to our patients will in fact have a more successful outcome rather than having the patients quit on their own. Our poster will summarize both experimental and non-experimental articles that will provide information over the best evidence based cessation techniques currently being implemented and their success rates. We will also utilize articles with quantitative data over the success rates of patients who quit without the assistance of cessation techniques.

Presenter(s): **Jordan Hoffman**

Title: WILLIAM JOHNSON AND LAND RIGHTS DURING THE AMERICAN REVOLUTION

Faculty Sponsor: Justin Liles, Department of Social and Behavioral Sciences

Abstract: Land has been crucial since America's founding as a country. The business mindset of European colonists trading with Indians for new land purchases fueled the fight for tremendous conflict. Studying America's Revolution and the fight for land west of the seaboard colonies between colonists and Indians created a chaotic environment in the American west. Colonial challenges to imperial authorities on land policies in the west, fits profoundly into the wider struggle of American Independence and eventual nation building. The tenuous relationship between British officials and colonists in the late eighteenth century in response to a clash of interests on land affairs, opened a complicated debate on sovereignty over land in the west. Focusing on British Indian Superintendent William Johnson's experiences as a negotiator between Indian and colonial interests, he struggles to solve the land conflicts. Failure to discourage colonists from taking Indian lands reveals the emergence of America's legacy to challenge authority. Johnson's letters to local leaders as the main collection of primary sources, and the presentation of the frontier from a British perspective provides insight into an overlooked and defeated policy on land rights that reveals the problems associated with American Independence.

Presenter(s): William Holmes

Title: SELECTED SONGS "WALL LOVIN'" AND "BUT NOT FOR ME" TO BE PERFORMED AS A CUTTING OF THE LIFE OF RILEY

Faculty Sponsor: Jeremy Franklin, Department of Theatre Arts

Abstract: The Life of Riley is a cabaret portraying an autobiographical account of the college experience of Wm. Riley Holmes. It is performed by Wm. Riley Holmes with piano accompaniment by Douglas Morrow. The portion presented here will be a section cut from the middle of the show and are Sam Carner and Derek Gregor's "Wall Lovin'" and George and Ira Gershwin's "But Not for Me". This section of the cabaret highlights the hopes for romance by the performer and the disappointment that comes from not having those hopes met. The songs will display a range in the singer's ability to tackle different styles as well as different emotional qualities.

Presenter(s): Tara Honnen

Title: PREPARING FOR ENGLISH LANGUAGE LEARNERS

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: As an educator, it is essential to know students and to strive to meet their individual needs. English Language Learners are students who have native or home languages other than English. When working with English Language Learners, educators need to keep several factors in mind in order to be better prepared. It is important to consider the behavioral differences among English Language Learners, family dynamics and how they play a role in the student's learning, and the academic challenges and opportunities English Language Learners will face. Included is information on work done in the field with two English Language Learners, second and fourth grade.

Presenter(s): Mira Hopkins, Franli Laubscher, Daniel Lionberger

Title: EVALUATION OF VARIABLE STIFFNESS FOOTWEAR FOR KNEE OSTEOARTHRITIS

Faculty Sponsor: Scott Bevill, Department of Engineering

Abstract: Knee osteoarthritis is the degeneration of cartilage in a person's knee. A main predictor to the severity of this condition is the external knee adduction moment (EKAM), which is a frontal plane moment exerted on the knee by the ground reaction force as a person walks. Current studies suggest the use of variable stiffness shoes (shoes with different stiffness values on the medial and lateral sides of the sole) can slow the progression of knee osteoarthritis by reducing the EKAM during walking. The current method for predicting whether a given variable stiffness shoe might be beneficial to a subject is by using expensive, specialized equipment (including optoelectronic motion capture cameras and inverse dynamic software). The goal of this project was to develop a device (dimensions less than 4" x 4" x 2") to determine if a given variable stiffness shoe might be beneficial to a person outside of a laboratory setting. This was done by measuring the change in ankle angle, defined as the angle that forms between the heel and the ankle, of 10 individuals. This change was measured and recorded with the use of a microcontroller and two angle measurement sensors known as gyroscopes.

Presenter(s): Robert Howard, Steven Lawson, Brandon Taulbee

Title: TESLA TURBINE

Faculty Sponsor: Bill McCracken, Western Colorado Community College

Abstract: In 1913 Nicola Tesla started inventing the bladeless centripetal turbine also referred as a multi-disc, centrifugal pump. Our model of the Tesla Turbine incorporates 12 aluminum discs with exhaust ports, steel casing, aluminum shaft, steel bearings, steel plates, acrylic plates, steel bolts, 3d ABS plastic and steel pipe for casing (stator). Software used was FeatureCAM, Autodesk Inventor and Solidworks. Our team is exploring new and more efficient ways to use the Tesla turbine for current everyday use. Our idea is to use the turbine to power a compressor. The compressor sends air back into the turbine which has an external shaft that is connected to gears or a pulley system that generates more power. Tesla turbines have been used to power lights, generators and compressors.

Presenter(s): Carlos Ibarra, Jeremy Jenkins, Roy Perez

Title: MOBILIZATION OF VIRTUAL REALITY WELDING SYSTEM FOR USE BY DISABLED PERSONS

Faculty Sponsor: Chris Penick, Department of Engineering

Abstract: EnergynTech Inc., a manufacturing and welding company located in Lakewood, Colorado, estimates shipyards are currently in need of over 8,000 welders to work on various projects within the shipbuilding industry. These welding jobs could be filled by skilled veterans that have limited mobility from the waist down. EnergynTech, Inc. has designed a mobile welding robot that is controlled by a virtual reality system (VR). The purpose of this project was to incorporate EnergynTech's VR system into a vehicle operable and drivable by a disabled veteran. A John Deere Gator™ utility vehicle was modified so a person in a wheelchair could board the vehicle via a ramp and drive it using hand controls. An innovative floor design was incorporated onto the vehicle to accommodate a person in a wheelchair and all components of EnergynTech's VR system. The designers will demonstrate functionality of the modified vehicle and show that it is possible for a person with limited mobility from the waist down to perform welding operations with the robot up to 500 feet away from the vehicle. The team's desire is to make it possible for veterans in wheelchairs to fill the welding jobs in the shipyards.

Presenter(s): Steven Inman, Herman Larsson, Colton Oglesbee, Trevor Price

Title: DESKTOP GEAR BOX MODEL

Faculty Sponsor: Francisco Castro, Engineering Partnership Program, Colorado Mesa University and University of Colorado Boulder

Abstract: Gears are used to transfer power at a specified angular speed. The purpose of the desk top gear box model was to provide an educational gear box module that allows the user to measure the angular speed of the shafts under different conditions of torque load, the inertia of the gears, and the fluid in contact with the gears. The design of the gear box was simple, effective, and it consists of a transparent acrylic tank surrounding two 3-D printed gears with precisely placed holes to accommodate interchangeable weights. Demonstrations using this model showed that gears run differently when parameters such as the weight used to apply the load, the moment of inertia, or the fluid inside the gear box are changed. The system was powered by a small electric motor to move the gears fast enough to test for angular velocity but slow enough to avoid splashing from fluids. The device will demonstrate how different variables like those listed earlier will affect the angular speed of the gears.

Presenter(s): Bobbie Iwamoto, Ang Sherpa, Sophia Suarez

Title: EXCESSIVE USE OF SOCIAL MEDIA LINK TO MENTAL ILLNESS IN CHILDREN

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: With the growing use of technology and social media, our group wondered whether or not excessive use of social media could contribute to mental illness such as depression, low self-esteem, addictive disorders, or others. This was a topic of interest to us because we feel that mental illness is an important and relevant topic that is not discussed enough. Although we know that people use social media in a healthy and safe way, we also know that use of social media can be a source of cyber-bullying, social comparison, and can also lead to isolation. In our poster, we will report information that we gathered from research articles defining what excessive use of social media is, report data showing a relationship between the excessive use of social media and mental illness in children, and interventions to provide guidelines for use of social media in our increasingly technological world.

Presenter(s): Donald Jarrin

Title: GRAVIMETRIC DETERMINATION OF THE THICKNESS OF TAKU GLACIER

Faculty Sponsor: Richard Livaccari, Department of Physical and Environmental Sciences

Abstract: High resolution measurements of spatial ice thickness variability on the Juneau Icefield are critical to an understanding of current glacial dynamics in the Coast Mountains of Southeast Alaska. In particular, such data are lacking on the Taku Glacier, a tidewater glacier in the Juneau region whose unique advance has slowed in recent years. Significantly, such information is necessary to develop an accurate description of ice dynamics as well as sub-surface hydrology and bedrock erosion. Utilizing relative gravimetry, we sought to modify existing parameterized models of ice thickness with field measurements taken along the centerline of the Taku. Here we present a three dimensional profile of ice thickness for the Taku, representing in situ observations from July 2016. As the glacier approaches a potential period of rapid terminal retreat, this data gives refined physical information prior to this potential juncture in the tidewater cycle—an observation that may yield insight into marine ice sheet instabilities more broadly.

Presenter(s): Tiana Johnson

Title: NOT ALL INTROVERTS ARE ALOOF, WITHDRAWN, AND SHY: RESILIENT COPING AND PERSONALITY STYLE

Faculty Sponsor: Susan Becker, Department of Social and Behavioral Sciences

Abstract: A critique of the extraversion literature has argued that introversion may not be merely the opposite of extraversion but a personality dimension in its own right. One argument is with the operational definition of introversion, which typically has negative connotations. For example, the Big Five Personality Scale (BFI-54) implies that introverts are shy or inhibited (Donahue and Kentle, 1991). The Neo-PI (Costa and McCrae, 1992) defines introversion as aloof, withdrawn and shy. Cain's (2012) critique suggests that introversion may include many positive qualities such as good listening, analytic thinking, thoughtfulness and being self-reflective and that being withdrawn or shy may be another dimension entirely. This study redefines introversion and identifies introverted sources of coping. Results support refining measures of resilience to include introverted forms of positive coping.

Presenter(s): Samuel Jordan, Michael McKnight, Seth Ogden, Alan Wheeler

Title: TONE GENERATOR

Faculty Sponsor: Eric Goertz, Department of Engineering

Abstract: A tone generator (wheel version) uses wheels that rotate against pickups at various frequencies to produce a tone. The purpose of this project was to design a tone generator comprised of six or more wheels which could all be changed in under a minute. The tone generator created was a compact version where all the wheels are on a single shaft. A hinged support placed opposite the motor allows for quick access to the shaft and wheels for quick and easy interchangeability. The designers will demonstrate the functionality of their device and hope to shed some light on engineering's contributions to the world of music.

Presenter(s): Andrew Karnowka, Jordan Merrill, Ismael Ruiz

Title: OXYHYDROGEN FUEL CELL

Faculty Sponsor: Sarah Lanci, Department of Engineering

Abstract: Water is not traditionally thought of as a form of fuel nor is it thought of being a combustible material. But what if that all could change? This concept is a paradigm shift that shows the power of science and engineering. The purpose of this project is to show that water can be combusted using what is called an oxyhydrogen fuel cell. Using electrical currents, it is possible to separate the molecules of water to a gaseous state which can then combust under the right circumstances. This device was designed to incorporate three electrically-charged stainless steel plates, spaced 0.036 inches apart, that will split the water caught in between them and produce oxyhydrogen gas. The oxyhydrogen fuel could create an eco-friendly alternative to something like petrol.

Presenter(s): Brianna Keaney

Title: A PERFORMANCE OF "NOTHING BUT EVERYTHING" BY BRIANNA KEANEY

Faculty Sponsor: Jeremy Franklin, Department of Theatre Arts

Abstract: In the creation of "Nothing but Everything", the topic in question is whether or not performance art maintains value when its purpose is one of entertainment and enjoyment rather than to change the world. There are common misconceptions in society today about the purpose, value, and meaning of art. Many current actors, singers, and dancers, have created works that make political statements or correspond with opinions and emotions around controversial topics in society. This cabaret follows a performer as she questions the value of her work and begins to understand and accept her purpose in the theater industry. Brianna Keaney, who will be performing "Nothing but Everything", also wrote the cabaret. The two pieces being performed from the cabaret fall into the contemporary commercial music genre and include "Mercy" by Duffy which serves as the climax of internal struggle in her journey, as well as "The Story," by Phil Hanseroth which serves as the transformation of the character.

Presenter(s): Hilary Kennedy

Title: "SHOULD ARTIFICIAL INTELLIGENCE (AI) BE REGULATED?"

Faculty Sponsor: Don Carpenter, Department of Business

Abstract: This presentation briefly introduces the issue "Should Artificial Intelligence (AI) be regulated?" Based on a review of the literature, the following arguments are presented in support of the issue: (1) scientific and medical value of utilizing AIs in place of humans in high stress and dangerous environments and in limiting and

preventing human error, (2) uniform growth and advancement of the technology behind creating an AI machine, and (3) implementation of legal repercussions for the AI or its creators in cases of conflict or in violation of moral or ethical boundaries. Then the following arguments are presented in opposition of the issue: (1) rapid advancement of AI technologies for areas of AI utilization, (2) conflict between countries or cultures when advancing the AI technology, (3) the concerns behind enforcing legal penalties when the AI or its creator are in conflict with the law. The presentation finishes with the conclusions that this author has drawn regarding the issue, specifically that unless all of the developers of AI technology, world-wide can agree on laws, penalties, and are willing and able to enforce those penalties, the regulations would fail to serve their purpose.

Presenter(s): Nick King, Carson Odhner, Adam Roll, Amanda White

Title: SITE ASSESSMENT AND RESTORATION PLAN FOR PREVIOUSLY MINED GRAVEL PIT ALONG THE COLORADO RIVER

Faculty Sponsor: Deborah Kennard, Department of Physical and Environmental Sciences

Abstract: Gravel mining in alluvial deposits along the Colorado River is a fairly common practice that has resulted in numerous abandoned pits. If properly restored, these mine pits may function as backwaters and provide important habitat for both fish and waterfowl. The goal of our senior capstone project is to assess the structure, composition, and function of a previously mined gravel pit that is currently a pond and use this information to develop a restoration plan. To achieve this goal, we will accomplish these key objectives: 1) assess overall vegetation presence and evaluate previous restoration attempts of native plants. 2) assess soil health and stability along banks, within the pond bottom, and the adjacent drainage ditch. 3) assess water quality parameters in an adjacent drainage ditch and in the pond. 4) complete a depth profile up to 20 feet from the banks of the pond and around the island perimeters. 5) develop a restoration plan for the pond that includes: a seeding list for native plant establishment, suggestions for mitigating soil and water quality problems, and recommendations for creating a more natural depth profile.

Presenter(s): Reanna Kissner

Title: WHY ARE CHALLENGING BEHAVIORS OCCURRING IN THE CLASSROOM?

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Challenging behaviors that take away from instructional time are a growing problem in public schools. Some challenging behaviors that frequently reoccur in classrooms include: noncompliance, students out of their seats, students ignoring directions, students talking out, and students being off task. It has been found that many teachers have different perceptions of why problem behaviors continue to occur at school. An important question, "Why are challenging behaviors occurring in the classroom?" was asked to teachers and many responses indicate that teachers perceive that behavior is student based. Due to this, teachers utilize interventions based upon emotion and past experiences, but rarely use evidence based assessment. Studies show that teachers who receive professional development in Functional Behavior Assessment understand the relationship between the function and the behavior. This understanding will create function based interventions rather than emotion based interventions that will empower the teacher and help students access general education.

Presenter(s): Mason Klahn

Title: DEVELOPMENTS IN HISTORIOGRAPHY: A MORE REALISTIC VIEW OF QUEEN ELIZABETH I OF ENGLAND

Faculty Sponsor: Vincent Patarino, Department of Social and Behavioral Sciences

Abstract: During the 1990s and early 2000s, the historiography on Queen Elizabeth I of England has changed drastically, developed by both social historians and post-modern scholars of what historians call "the cultural turn." Before about 1990, historians mainly portrayed Elizabeth in a positive light, especially in regards to her use of propaganda to support her reign – the reign of a woman in an overwhelmingly patriarchal society. This was due, in part, to her great popularity in both art and poetry, which continued in the modern era through television and film. Her legacy was so central to English identity, that few scholars were willing to take a negative approach to her reign or deconstruct her personal behavior. Roy Strong, an English writer and art director, received strident criticism for his 1977 examination of Elizabeth's portraits and pageants as a tool of propaganda. Strong's work, however, opened a floodgate for historians such as Susan Doran and Carole Levin to look at Elizabeth I from a more realistic viewpoint, using several different approaches and innovative methodologies. In addition to academic works, Elizabeth has appeared several dozen times within modern film. As the result of historians like Strong, Levin, and Doran, Elizabeth's image has been the focus of several comparative studies that have strived to juxtapose her personality on film with her historical portrayal. Since her portrayal in the 1998 film Elizabeth, the queen has remained a focal point as well as a point of contention for early modern cultural and social historians.

Presenter(s): David Koons

Title: SUBSURFACE CONTOUR MAP OF GROUNDWATER FLOW IN THE GRAND VALLEY

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: This proposed research project is to determine if the groundwater levels in Grand Junction are controlled by the geometry of the underlying alluvium and Mancos Shale. The study area will extend from Palisade to Fruita and from Patterson Road to Whitewater. Data collected from 257 wells will be used to find three surfaces: surface elevation, water depth, and bedrock depth. These three surfaces will be used to chart the ground water surface throughout the Grand Valley. Petra software will be used to create multiple detailed contour maps of the groundwater surface. This visual representation will show how the groundwater moves below the valley floor to see if it follows the contour of the Mancos Shale.

Presenter(s): Kayla Laken

Title: RELATIONSHIP BETWEEN HANGING VALLEY RELIEF AND SNOW-SHED AREA IN POST-GLACIATED BASINS OF THE SAN JUAN MOUNTAIN RANGE

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: In the field of glacial geomorphology, the relationship between hanging valley relief and snow-shed area is not understood. Hanging valley relief and snow-shed areas in 45 post-glaciated basins selected from the San Juan Mountains, Colorado, will be quantified in order to better understand glacier processes. The ratio between snow-shed area and hanging valley relief will be compared graphically and statistically to determine a correlation between the variables. Anticipated results are that the smaller the snow-shed ratio, the more topographic relief the hanging valley will have. If the variables do not show a positive correlation, then it is possible that other variables, such as lithology and paleoclimates, may affect hanging valley relief.

Presenter(s): Jaclyn Levitt

Title: RECESS IN PIECES: A MIXED METHOD STUDY EXAMINING THE RELATIONSHIP BETWEEN DECLINING RECESS TIMES, OBESITY, AND RATES OF ADHD DIAGNOSIS

Faculty Sponsor: Jacob Jones, Department of Social and Behavioral Sciences

Abstract: My study examines the relationship between recess length, childhood obesity, and rates of ADHD diagnosis in elementary school children. I examined the top 10 largest districts in the states with the two highest (Kentucky and Arkansas) and two lowest (Colorado and Nevada) ADHD rates in children. Out of 7 responses each, Nevada had an average recess time of 40 minutes (2 responses) and Colorado had an average of 30-35 (2 responses each). The lowest time across both states was in Colorado (30 min; two responses). Out of 7 and 9 responses respectively, both Arkansas and Kentucky had an average recess time of 20 minutes (4 and 8 responses). The lowest time across both states was in Kentucky (15 min; one response). Schools in Nevada and Colorado have 10-20 minute longer recesses than those in Kentucky and Arkansas. In addition, Nevada and Colorado have less adolescents that are obese (11.4% and 7.3%) or overweight (14.6% and 10.7%) than Arkansas (17.8% obese, 15.9% overweight) and Kentucky (18% obese, 15.4% overweight). These results support my hypothesis that declining recess times may be contributing to an increase of ADHD diagnosis and obesity in elementary school children.

Presenter(s): Rachael Lind

Title: AVANT-GARDE AND SELF-MUTILATION

Faculty Sponsor: Barry Laga, Department of Languages, Literature and Mass Communication

Abstract: An artist crucifies himself on the back of a Volkswagen Beetle. Another climbs a spiked ladder. Still another endures nine separate cosmetic surgeries while staying awake and commenting on the artistic process. How do we make sense of this confusing and unnerving art? Is self-mutilation a useful way to challenge expectations, or is it merely masochistic? Can mutilation be a path to healing? Should we read these acts of mutilation as a death wish, a form of insanity, or a way to satirize social ideologies? My presentation explores acts of self-mutilation in avant-garde performance art and outlines ways to understand the motives, techniques, and purposes of these extreme works.

Presenter(s): Calvin Lindberg, Martin Selby
Title: POP MUSIC OF STEVIE WONDER AND JOHN FOGERTY
Faculty Sponsor: Kristen Yun, Department of Music

Abstract: In this performance we will be playing "Proud Mary" by John Fogerty and "Boogie on Reggae Woman" by Stevie Wonder. Both of these works are classic pieces of pop literature. We are both musicians that very much enjoy the work of these artists and want to show the innovation of these artists to people who may tend to dismiss them as simple pop artists. Of course, part of the beauty of these pieces is their simplicity and repetition in the gross aspects of their form. As electric instruments became more prominent in recording artistry in the 1960's, many artist found ways to push their instruments and compositional skills to new shapes. Many of these artists also took verse/chorus/bridge forms from jazz and blues music, which were their pop predecessors. We will be playing these songs on acoustic instruments to bring out the compositional elements that many listeners may miss due to the prominence of electric effects in the original recordings. We hope to illustrate the brilliance of two modern masters of popular music while bringing in some of the influence of our academic training. These are songs composed to help people have a good time, dance, and have a bonding social experience. We implore the audience and judges to take note of this in their reactions that may include the impulse to tap their feet, sing along, and groove in their seats.

Presenter(s): Mandy Lindbo
Title: JEHOVAH'S WITNESS STUDENTS IN THE CLASSROOM
Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Teachers today have a very diverse group of students they are responsible for teaching. Students have different ethnic backgrounds, speak different languages, come from different families, and practice different religions. This presentation will be focused on the Jehovah's Witness religion. It will briefly go over background information including what Jehovah's Witness' believe and how they practice their religion. Also included will be characteristics of the religion such as holidays, Military Service, and Government voting. Then, the presentation will go into greater detail about how educators may come across some of these differences and how educators will have to adapt their lessons to accommodate students who are Jehovah's Witness. The presentation will encourage teachers to become more culturally responsive so they can make changes to certain lessons instead of excluding a Jehovah's Witness student entirely. Lesson plan accommodations and modifications will be explained to ensure Jehovah's Witness students can participate in class activities along with other students. The tips presented will allow teachers to be prepared to be more culturally adaptive for a student in class who observes this religion.

Presenter(s): Amy Lindbo
Title: MORMON RELIGION
Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Teachers must be prepared to teach students who follow a variety of faiths and identify with a variety of religions. The more teachers understand about a student's religious practice and experience, the better the teachers can relate to, connect with, and appreciate the students. This presentation introduces the Mormon religion and outlines how it is different from other religions. Information from personal interviews with a family who is a part of the Mormon religion will be shared, along with published literature, to give an understanding as to what Mormonism is all about. History, the bibles, church experience for all age levels, baptism, marriage, heaven, The Temple, as well as other traditions will be shared to illustrate how unique this religion really is.

Presenter(s): Jane Lionberger
Title: DETERMINANTS OF SUCCESSFUL DEVELOPMENT AID: COMPARING HAITI AND THE DOMINICAN REPUBLIC
Faculty Sponsor: William Flanik, Department of Social and Behavioral Sciences

Abstract: The share of the world's population in extreme poverty has fallen, but the absolute number remains unacceptably high: an estimated 1.3 billion people subsist on \$1.25 per day or less. Shocking poverty persists despite rich countries spending over \$2.3 trillion on development aid over the last 50 years. Although foreign aid has a poor track record overall, the literature shows that on some occasions, in some contexts, it does promote development. To help scholars and policymakers design more effective aid programs, the paper identifies the specific conditions under which development assistance does and does not work. It uses a most-similar systems comparison between Haiti, a low-income country, and the middle-income Dominican Republic. The two countries are similar except for the key variables of property rights, corruption, technological adoption, and educational attainment. The analysis points to these factors as key determinants of foreign aid's efficacy.

Presenter(s): Lauren Lipski

Title: THE WEIRD: AESTHETIC EFFECT AND POWER

Faculty Sponsor: Barry Laga, Department of Languages, Literature and Mass Communication

Abstract: Jim Sharman's *Rocky Horror Picture Show*, Edgar Allen Poe's *The Fall of the House of Usher*, and Rod Sterling's *The Twilight Zone* are all weird, a label that can seemingly encompass anything. But what makes these texts weird? My presentation examines the concept of weirdness beyond its contemporary use as a value judgment. Similar to Sianne Ngai, who describes cute, zany and interesting as aesthetic effects with which to discuss postmodernity, my presentation also describes the weird as an aesthetic effect. By drawing upon its etymology, my project establishes the weird as a specific power, "an effect that holds an audience in thrall." Occurring either via ruptures of coherency or when distinct boundaries are blurred, the weird has the potential to examine our contemporary preoccupation with destabilization. My presentation poses several questions: Can the weird be reclaimed from a subjective judgment to one of critical application? How is context important in determining what is weird and what is not? How does the weird challenge what society considers normal, logical, and stable? By establishing the weird as an analytical term, my project provides a lens with which to examine texts that perplex and discomfort, yet simultaneously enthrall, an audience.

Presenter(s): Lauren Lipski

Title: BOTTLE-BROKEN, UN-BLESSED #1-3

Faculty Sponsor: Randy Phillis, Department of Languages, Literature and Mass Communication

Abstract: I will be reading three poems, all dealing with people who find solace, as well as trouble, within different kinds of bottles. They describe, respectively, a woman who dates an alcoholic, a girl who begins taking anti-depressants, and a girl who becomes addicted to prescription painkillers. These narrative poems, though they describe rather specific circumstances, leave their subjects unnamed in order to comment on the way we as a society tend to catalogue people's problems as statistics, rather than respond empathically to them as individuals.

Presenter(s): Lauren Lipski

Title: PERFORMANCE AND TRANSVESTISM IN DORELIA BARAHONA'S "LA SEÑORITA FLORENCIA", LA ACTUACIÓN Y EL TRAVESTISMO EN "LA SEÑORITA FLORENCIA" DE DORELIA BARAHONA

Faculty Sponsor: Mayela Vallejos Ramirez, Department of Languages, Literature and Mass Communication

Abstract: In the Hispanic world, the term "transvestite" describes individuals who dress in contrast to the gender assigned at their birth, with a heavy emphasis on the clothing, makeup, and accessories of the opposite gender. Dorelia Barahona's "La Señorita Florencia" focuses on the performance of transvestism, as well as the performance of assigned-female gender roles. As a character, la señorita reflects the need for both women and transgender people to use disguises or masks in order to function within a patriarchal, hetero-normative society. My project seeks to answer the following questions: can individuals adopt masks and still remain authentic to themselves? Is identity concrete or does it evolve? What is the significance of transformation? And, finally, can transformation itself be a performance? By analyzing transvestism in regard to the female gender, my project seeks to discuss the function of masks as a strategy of both protection and performance.

Note: This presentation will be in Spanish.

Presenter(s): Tabitha MacMillan

Title: DON'T WHISTLE WHILE YOU WORK: RESPECTING THESPIAN TRADITIONS

Faculty Sponsor: Jeanine Howe, Department of Theatre Arts

Abstract: When traveling to a new, unfamiliar place, it is vital to educate oneself on the culture in order to seamlessly merge into a society. This showcase will include a brief discussion on culture and how cultural concepts can and should be applied to the theatre. This presentation will also demonstrate the strong bonds between members of a theatre department, using Colorado Mesa University's Department of Theatre Arts as an example of a micro-culture. However, the information can easily be applied to most any theatrical community. The main purpose of this presentation is to explore and understand the culture and traditions of a theatre and how to achieve mutual respect between those who live and breathe theatre and those who are new or unfamiliar with theatre culture. Tabitha Storm is an Acting/Directing major with a minor in Speech. The knowledge gained from the Speech minor has informed her perception of her surroundings.

Presenter(s): Audrey Maddox

Title: WAR AND BANANAS IN GABRIEL GARCÍA MÁRQUEZ'S CIEN AÑOS DE SOLEDAD, LA GUERRA Y LAS BANANAS EN CIEN AÑOS DE SOLEDAD DE GABRIEL GARCÍA MÁRQUEZ

Faculty Sponsor: Mayela Vallejos Ramírez, Department of Languages, Literature and Mass Communication

Abstract: The history of the oppressed is a story seldom told. Gabriel García Márquez's Nobel-prize winning novel *Cien Años de Soledad* (One Hundred Years of Solitude) uses fiction to describe major events in Colombian history through the perspective of a small, isolated, fictional village named Macondo. What starts off as a utopic, rural community transforms due to the influence of the Colombian Civil War and a large, U.S. owned banana company. Through the tale of one hundred years in Macondo, in-depth characters, and magical realism, the novel reveals how history becomes contrived and biased in order to serve those who write it.

Note: This presentation will be in Spanish.

Presenter(s): Lindsey Manning

Title: REVIEW OF THE LEVEL-OF-CARE PRICING STRATEGY WITHIN HILLTOP'S SENIOR SERVICES DIVISION

Faculty Sponsor: Don Carpenter, Department of Business

Abstract: In partnership with Colorado Mesa University's Master of Business Administration program and Hilltop Community Resources, Inc. (Hilltop), research was conducted to investigate the efficiency and areas of improvement for Hilltop's current Level of Care billing structure. Hilltop operates three assisted living communities which provide care for senior residents. Each resident is billed for care based on the time care-staff is needed to help the individual. Through this practicum project, observation and literature review were completed to gather best practices and industry standards. A process simulation model was created to model Hilltop's ideal operations as it pertains to the current Level of Care billing structure. Changes to the process simulation model were made incrementally shifting from the ideal to the observed informal operational structure. Twenty changes were statistically analyzed and assessed for feasibility and limitations. In conclusion, Hilltop's operational strategy can make several feasible and cost effective adjustments to align with the Level of Care billing structure. Additionally, industry standards show assisted living communities employ various types of pricing strategies that could benefit Hilltop. Ultimately, the business operations should match the billing structure to have optimal performance and capture maximum revenues.

Presenter(s): Jose Marin Garcia, James Nimtz, Alexander Wood

Title: ENERGY SAVINGS THROUGH METAL CONDITIONING

Faculty Sponsor: Chris Penick, Department of Engineering

Abstract: The sponsor of Team OmniLinen, Roger King, has identified a potential area of investment in the western Colorado oil and gas industry. In this industry, drilling stations consume upwards of 15,000 gallons of diesel fuel each day during normal operations. Engine oil additives have the potential to increase diesel fuel efficiency and reduce wear leading to significant savings for companies involved in this industry. The purpose of this project was to develop a testing method and carry out preliminary tests evaluating Lofrix® Original metal conditioner. The testing method developed by Team OmniLinen was designed to determine the effects of the Lofrix® additive has on engine temperatures, wear, and fuel consumption. The data was collected using programmed Arduino UNO® microcontrollers and various sensors. The test was a 500-hour duration stress test with one hour of down time each day to simulate the extreme long-run and high starting and stopping cycles conditions that industry equipment may experience. The results of this study will be used to evaluate how Lofrix® Original performs against the manufacturer's performance claims.

Presenter(s): Edwardo Martinez, Matthew Stokes, Joseph Stults, Mark Sutrina

Title: BOTTLE ROCKET EXHIBIT

Faculty Sponsor: Sarah Lanci, Department of Engineering

Abstract: Newton's Third Law states that for every action there is an opposite and equal reaction. This can be demonstrated by the buildup of pressure inside of a bottle. The purpose of this project was to design and build a bottle rocket exhibit for the John McConnell Math and Science Center. The exhibit will be a permanent installation, allowing audiences to experience Newton's Third Law in a fun and interactive way. Pressure will be built up inside of a bottle and released through an opening at the bottom. This will act as a propellant and force the bottle in the opposite direction. Two operators will be able to compete by pumping air into their bottle to try and get the optimal pressure needed to reach the top of the exhibit first. With the exhibit being user-friendly, entertaining, and informational, it will be a "blast" for all ages.

Presenter(s): Destini McGhehey, Sara Romme, Meredith Wirtz
Title: IMPROVING QUALITY OF LIFE IN END STAGE CANCER
Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: We chose this question due to the amount of patients we see in our community with terminal illnesses, and more specifically, cancer. We plan to research what factors currently affect quality of life, research that currently exists to improve quality of life, and look into the EBP that nurses utilize to improve quality of life. Our research will involve articles that have experimental and non-experimental designs to show the different means in which data was collected. We will study qualitative data to show that this research has significance. Because this type of research is more meaning-based, it will likely not provide much quantitative data. We could face difficulties finding articles that pertain directly to terminally ill cancer patients, bias based on institutions conducting the research, or data showing that evidence-based practice is being utilized. However, with time and proper evaluation of articles, we should be able to gather enough information to put together a quality paper and presentation.

Presenter(s): Timothy McGreer
Title: BETWEEN AUTOCEPHALY AND AUTONOMY: THE ECCLESIASTICAL EMPIRE OF THE RUSSIAN ORTHODOX CHURCH
Faculty Sponsor: Douglas O'Roark, Department of Social and Behavioral Sciences

Abstract: The identity of the Russian Federation and the former Soviet states balances on the fault lines of geography, culture, history, and politics. Such fault lines are moving with time and creating abrasions with the past. The collision of political plates sends tremors through Russia and distributes shock waves internationally. A neighboring nation's proximity to the Russian epicenter determines the salience of events and how they react toward political developments. The one uniting factor between the development of politics, culture, history, and geography is religion. The influence of the Eastern Orthodox Church, and especially of the Moscow Patriarchate, created the modern structure of Slavic countries beyond the Carpathian Mountains. Essentially, the framework for the political states began with an ecclesiastical government in the medieval church. Therefore, to understand the nations of Russia, Ukraine, Belarus, and the Baltic States there must be an understanding of the Russian Orthodox Church. "Between Autocephaly and Autonomy" builds upon scholarly research in English, Koine Greek, and Russian. It attempts to understand one question: How did the borders of Eastern Slavic nations develop during Medieval Russia through the framework of the Eastern Orthodox Church? This is a vital question to answer because such borders are under question today.

Presenter(s): Keith McKay, Isaac Stackonis
Title: DIDN'T SEE THAT COMING
Faculty Sponsor: Jeanine Howe, Department of Theatre Arts

Abstract: The two presenters will talk about the different points/"rules" of improv, how they influence and enhance not only the creative process, but also everyday life. Isaac Stackonis (aka Lil Stax) and Keith McKay (aka L3d Foot) have 11 years of performance based improv experience and 44 years of EVERYDAY improv experience. Many of the "rules" of improv that are applicable to many parts of the real world are simple: commit full force, never shoot down someone's idea, listen, and react. They will provide, not only hypotheticals, but also real life anecdotes of how improv has helped the two of them and others problem-solve, adapt, and thrive in a highly competitive world. To finish the presentation, the two of them will get several suggestions from the audience and do their utmost to make a scene out of what they have been given.

Presenter(s): Keri Metcalf
Title: HARD OF HEARING STUDENTS IN THE CLASSROOM
Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Imagine having a student in a classroom who is hard of hearing. This student may require special accommodations that are different from a student who is deaf who relies mostly on sign language. What strategies would work to accommodate a student who is hard of hearing? As a teacher, it is very important to ensure that each student in the classroom has his or her unique needs met. Differentiation for students who are hard of hearing can be a challenging, yet rewarding task. This presentation will discuss various research-based strategies for how to accommodate these unique students and allow them to reach their full potential. In addition, the presenter will share personal experiences from working with an elementary student who is hard of hearing.

Presenter(s): Kelsey Miller

Title: THE EFFECT OF A TWO-WEEK SPRINT INTERVAL TRAINING PROGRAM: A PILOT STUDY

Faculty Sponsor: Carmine Grieco, Department of Kinesiology

Abstract: The purpose was to determine if a two-week Sprint Interval Training (SIT) program was of sufficient duration to alter metabolic and anthropometric measurements or mood. Nine college-aged subjects of varying training experience were chosen based on guidelines provided by the American College of Sports Medicine; subjects were young, healthy, and considered at low risk for cardiovascular disease. Each subject completed an exercise program consisting of a two-week SIT regimen—a type of training characterized by short periods of maximal effort. All interval training was performed on a cycle ergometer and the resistance utilized during maximal effort was 7.5% of the subject's body weight. Measurements of maximal oxygen consumption, body weight, body fat percent, waist circumference, resting heart rate, and pre- and post-exercise blood lactate were taken one week prior to and one week following training. Participants completed a Brief Mood Introspection Scale (BMIS)—a questionnaire used to rate mood—before and after each interval training session. A paired t-test was used to determine whether there were significant differences in any of the variables from pre- to post-training. Two weeks of sprint interval training was of sufficient duration to demonstrate a significant decrease in waist circumference and resting blood lactate.

Presenter(s): Bryan Miller

Title: THERE HAS NEVER BEEN A BETTER TIME TO BE A PILOT!

Faculty Sponsor: Daniel Ashton, Western Colorado Community College

Abstract: There has never been a better time to become a pilot. Currently there are more positions than pilots to fill cockpits. A 2012 study by MIT shows pilots are retiring at an increasing rate compared to the number of new pilots learning to fly. The study also shows that instructional hours have decreased a significant 53% from 1990 levels and continue to decline. The Bureau of Labor and Statistics predicts that between now and 2024 there will be 19,300 job openings or replacements with an average salary of \$117,290 for pilots. Colorado Mesa University and Western Colorado Community College are helping aspiring students accomplish the first step in becoming a professional pilot by facilitating the education from Private Pilot, Instrument Pilot, Commercial Pilot, and Instructor Rating courses. This is just the first step, all that is left is to gain a little more experience. This poster presentation will visually show the need for aviators today, how instruction is done and the prospects of gainful employment in today's world. There has never been a better time to be a pilot.

Presenter(s): Aleigha Mittelstedt, Lexie Sutcliffe

Title: EFFECTIVENESS OF SPINAL MANIPULATION IN MANAGING BACK PAIN

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: Acute and chronic back pain costs nearly \$240 billion in health care expenditures and lost productivity in the United States annually. There are many approaches to pain relief associated with back pain, including the non-pharmacological spinal manipulation. This study intends to examine past research on chiropractic care and spinal manipulation on acute and chronic back pain to form a definitive statement on the effectiveness of this method of pain control. This study evaluates research published by the Cochrane Review, Ebsco Host, and the National Institute of Health.

Presenter(s): Kaylee Moore

Title: THE NECESSITY FOR CHANGE IN WOMEN'S RIGHTS IN THE MIDDLE EAST

Faculty Sponsor: Christine Hein, Department of Languages, Literature and Mass Communication

Abstract: The purpose of my research is to analyze women's rights in the Middle East and the necessity for change. I will evaluate religious traditions and cultural backgrounds based upon Sharia law and examine the inequalities of men and women within the respected culture. Research will include biographies, journals and articles related to women's rights. My research will support the contention that the rights of women are severely lacking in certain cultures resulting in inequality, harsh punishments, and even death.

Presenter(s): Kristina Morben

Title: QUANTIFYING PROXIMATE BODY COMPOSITION IN CATOSTOMIDS USING BIOELECTRICAL IMPEDANCE ANALYSIS

Faculty Sponsor: Eriek Hansen, Department of Biological Sciences

Abstract: Measurements of proximate body composition (PBC; water, lipid, and lean masses) are used as indices of fish health or condition. PBC measurements are more sensitive to changes than traditional length-weight measurements. However, standard methods are lethal. Bioelectrical impedance analysis (BIA) can be used as nonlethal method to quantify PBC. BIA measures the resistance and reactance of tissues and has been used to quantify human PBC. Our objectives were 1) compare effects of invasive needle electrodes (traditional method) versus noninvasive surface electrodes, 2) compare electrode positions using landmarks that vary with fish length versus a fixed electrode distance, 3) develop multiple regression models for predicting PBC, and 4) develop a temperature correction factor to standardize resistance and reactance measurements taken at variable temperatures to 19°C; the temperature used to develop multiple regression models. White Sucker (*Catostomus commersonii*) was used as a representative for native Catostomids. For objectives 1 and 2, all three electrode types were comparable. For objective 3, multiple regression models improved predictions of all components of PBC. For objective 4, development of a temperature correction factor allows for field application at variable temperatures. After further development, this BIA technique could be used to study sensitive, threatened, and endangered fishes.

Presenter(s): Chance Morgan

Title: [PAUSE.]- HAROLD PINTER AND THEATRICAL ABSURDISM

Faculty Sponsor: Jeanine Howe, Department of Theatre Arts

Abstract: In most forms of storytelling, theatre included, clarity of story and character are regarded as the ideal. In absurdism, that idea is outright inverted, and few playwrights are as well-known for their work in this style as Harold Pinter. The presenter will explore the techniques and ideas common to absurdist theatre through the lens of a theatrical production "An Evening of Harold Pinter" which was produced in the fall of 2016 at the Mesa Experimental Theater. The presenter, who was the director of this production, will discuss the research and process of producing this show in the absurdist style, which is a series of shorter, stand-alone works by Pinter as performed by an all-female cast and using minimalistic technical elements. The presenter will also discuss the significance of absurdism as a genre, its place in theatrical history, and the importance it will continue to have to the art form.

Presenter(s): Chance Morgan

Title: WITH A LITTLE BIT OF LUCK: THE MAKING OF "MY FAIR LADY"

Faculty Sponsor: Maurice LaMee, Department of Theatre Arts

Abstract: For the average audience, the only aspect of theatrical production that they experience is the finished show. Thus, many people are not very familiar with the intricacies of the many fields of theatre and how those fields interact and cooperate to create cohesive and entertaining theatre. In this presentation, the presenter will discuss the processes and work of a variety of theatrical disciplines as they contributed to the recent production of Lerner and Lowe's, "My Fair Lady" at Colorado Mesa University. The presenter, who worked as assistant director and fly captain for the show, will present excerpts from rehearsal footage and video interviews with various members of the production, including the director, lead performers, music director, choreographer, and designers. With this presentation, the presenter intends to shed light on the behind-the-scenes work that goes into theatre, thus allowing audiences to gain a deeper appreciation of other productions they experience.

Presenter(s): Hannah Moschetti

Title: COMPARING BIOLOGICAL TO SELF-REPORTED ANCESTRY IN HUMAN CRANIA

Faculty Sponsor: Melissa Connor, Department of Social and Behavioral Sciences

Abstract: Accurately estimating ancestry is a critical component for correctly identifying unknown human remains. However, biological ancestry is often more complicated than how people would identify themselves. In the current population with complex biological ancestries, do self-identified ancestries and biological ancestries match up? The purpose of this research was to determine if craniometric along with macromorphoscopic methods for estimating ancestry from skeletal crania would provide the same information that people provided on themselves. The sample consisted of 10 skulls from the Forensic Investigation Research Station human skeletal collection. For nine of these, ancestries were identified by the donor. To perform the craniometric

analysis, each skull was measured on two separate occasions at least 24 hours apart, and the measurements were analyzed through the program ForDisc®. The macromorphoscopic data was collected by utilizing the program Osteoware®. After the data were collected, a final biological estimation of ancestry was determined. Five of the nine individuals (55%) were not identified biologically in the same ancestry category in which they identified themselves. This implies that in half of forensic cases, the biological ancestry determined by the anthropologist will not match the ancestry category that individuals choose for himself or herself. This has significant implications for the identification of unidentified skeletal remains.

Presenter(s): Jeremiah Moskal

Title: GENERATING SYNTHETIC AFTERGLOW SPECTRA FOR GAMMA RAY BURSTS USING SEMI-ANALYTICAL TECHNIQUES AND PYTHON

Faculty Sponsor: Jared Workman, Department of Physical and Environmental Sciences

Abstract: Gamma Ray Bursts (GRBs) are objects of great interest to the astrophysical community. Long duration GRBs are formed by the death of a certain class of massive star. As these stars begin to die, black holes are formed at their core upon which matter begins to accrete. The accompanying large deposition of mass onto the black hole releases energy in the form of binary, relativistic jets that tear through the star. These jets cause the star to explode and release energy on the scale of 10^{51} ergs. As the jets proceed into the interstellar medium they slow and produce shocks, which generate an "afterglow" phase that is observable at Earth. This study uses numerical techniques in conjunction with semi-analytic solutions developed by Sedov(46) and Taylor(41) and Blandford and McKee(76) to model the time evolving, hydrodynamic properties of long duration GRBs and their resultant afterglows. The results of the hydrodynamic simulations are then used in conjunction with a numerical solution to the radiative transfer equation to generate a synthetic afterglow spectrum. Synthetic spectra are generated for an example GRB. Future work planned is to enable the inverse modeling of the observed spectrum to determine the physical properties of their progenitor systems.

Presenter(s): Tanner Neil

Title: DETERMINING AGE DATES FOR SLUMPING AREAS ON THE WESTERN FLANK OF GRAND MESA, COLORADO

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: The history, relative age, and lithologies of slumps and landslide events on the western flank of the Grand Mesa, located in Western Colorado can be determined using aerial photographs. This information can be used to better understand the instabilities in the subsurface. Slumps and landslides in the area are common due to abundant moisture and weak, unconsolidated material under the mesa's basalt cap. Historical photos from 1967 to the present will be used to show the evolution of the landscape. Accurately identifying areas prone to slumps and landslides might lead to an ability to predict areas susceptible to mass wasting. A final map will be constructed to illustrate where the western flank of the Grand Mesa has been unstable.

Presenter(s): Josiah Norfleet, Joseph Timbreza

Title: CMU PUZZLE GAME

Faculty Sponsor: Ram Basnet, Department of Computer Science, Mathematics and Statistics

Abstract: Staying physically healthy has always been a common goal of society, but not as many have forgotten to work out their brain. Video games are a major part of everyone's daily lives. Whether it be Angry Birds or Clash of Clans, every game has its own gameplay and style along with its own strategies to beat the game. Puzzle games have been known to be very effective in positive brain functions and simple problem solving can help with everyday life. That is where our text based puzzle game comes in. The game will make the player read into every word and make them have to pay closer attention to details in order to solve the puzzles since there are no visuals as well as promote better reading skill which some college students lose after graduation. In conclusion, this game will be for anyone who needs to relax and get lost inside a small story for a few minutes to help build mental skills to get through the day.

Presenter(s): Christopher Pack

Title: COLORADO FLOOD FREQUENCY AND CLIMATE CHANGE STUDY

Faculty Sponsor: Gigi Richard, Department of Physical and Environmental Sciences

Abstract: General understanding of expected impacts of climate change on flood regime suggests that snowmelt floods may decrease in magnitude, while rainfall-driven floods may increase in magnitude. Our objective is to test this hypothesis using Colorado streamflow data from unregulated watersheds in the Upper Colorado River Basin in snowmelt regime basins and on the Front Range where floods may be generated by rainfall. In this project we analyze flood data for select stream gauges in Colorado to identify if there is a discernible shift in the magnitude-frequency relationships associated with increased temperatures in Colorado (~1985) and if that shift varies with the river's flood regime. Historical daily mean stream discharge data were downloaded from the U.S. Geological Survey website and run through The Nature Conservancy's Indicators of Hydrologic Alteration (IHA) software. The hydrologic data were assessed using the IHA software to determine the timing of pre- and post-1985 1-day, 3-day, 7-day maximum flows and Date of Maximum flows. The mean and variance of these values were calculated to conduct comparative analysis over the two different time periods (pre- and post-1985) as well as to identify any trends between rainfall-driven floods (watersheds below 6600 feet) and snowmelt floods (watersheds above 6600 feet).

Presenter(s): Christopher Pack

Title: CASE STUDY OF POLLUTION ON US MILITARY BASES IN SOUTH KOREA

Faculty Sponsor: Timothy Casey, Department of Social and Behavioral Sciences

Abstract: With a truly worldwide footprint, there is hardly a place on the globe that is untouchable by the US military and while in the big picture of global pollution, the US military is but a small contributor; this contribution is often overlooked and given a free pass due National Security. Since 2002 US Forces in Korea have been undertaking a relocation of forces from the Seoul Metropolitan Area and areas north of Seoul to less populated areas to the south. During this process former US bases and associated land are being handed back over to the Korean people. Years of military operations that have left many of these bases with soil and groundwater pollution and huge cleanup costs that to this date have been paid by South Korea. This research traces the history of past government actions by both the US and South Korea regarding the environmental cleanup needed upon transference of these bases, and scrutinizes multiple stakeholders' positions on the topic. Further, based on the research in this project, preliminary answers are offered to the question of who should burden the expense of pollution mitigation on the former US Bases in Korea?

Presenter(s): Amber Pagone, Bricelyn Schultz, Karen Shuman, Kelbie Stahl

Title: STRESS IN THE NEONATAL INTENSIVE CARE UNIT

Faculty Sponsor: Sandra Nadelson, Department of Health Sciences

Abstract: PICO Question: For families and patients in the neonatal intensive care, does the use of interventions reduce stress? Stress is well known to have an impact on the healing of patients, compromising the patient's ability to fully heal. The family is also impacted by stress, especially in the neonatal setting. The stress of the family can add stress to the neonate feels during cares. Through our research of the literature, we will identify causes of stress in the neonatal setting. We will also include information on what interventions can reduce stress. By educating both staff and family on the different interventions to prevent stress, the neonatal setting can promote more healing. To entice people to our read our poster, we will be providing takeaway information and resources that are appealing to the collegiate population.

Presenter(s): Kathryn Panega

Title: RHYTHM IS EVERYWHERE- YOU JUST HAVE TO LISTEN!

Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: "Tap originated in the United States through the fusion of several ethnic percussive dances, primarily African tribal dances and Scottish, Irish, and English clog dances, hornpipes, and jigs." (Frank, 2009). Rhythm tap is based solely on percussive sounds, and can be created through the tap shoes alone, or with the use of the body for additional sounds. Through heavy use of layering rhythms and melodies, this exploration focuses directly on accapella tap and musicality. With inspiration from Michelle Dorrance, this artistic process focuses on using specific parts of the tap shoe to create a wide variety of sounds through the metal and soft edges of the shoe, without the addition of music. There is a constant "base beat" that, in comparison to the opposing sounds of melodic soft tap dance, creates a harmonious juxtaposition.

Presenter(s): Evan Pellowski

Title: SMALL-SCALE STRUCTURES OF BULL CANYON-FLUME CREEK FAULT

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: The Bull Canyon-Flume Creek fault of the northern Uncompahgre uplift of Colorado is a left-lateral oblique-slip WNW – ESE faulting system that formed during the Laramide Orogeny (80-40 Ma). Small-scale structures associated with this fault support left-lateral movement. These structures include joints, tension gashes and en echelon veins found in the Jurassic, Kayenta, Wingate, and Entrada Formations. Data points (n=1,530) collected were in the form of jointing, en-echelon veins and tension gashes (Mode-I), R'-shears, R-shears and slickenlines (Mode-II) and scissor shearing (Mode-III). The Mode-I structures of jointing and tension gashes strike mostly in a SW-NE orientation for both Devils and Flume Canyons. The majority of calcite veins were found in Flume Canyon and range from fine to coarse grains also orientated in a SW-NE direction. The Mode-II and III structures are mostly in Flume Canyon and are right-lateral R'-shears striking in a NE-SW direction. There are also possible left lateral R-shears in both Flume and Devils Canyons with a strike more WSW-ENE. When the data points are plotted on stereonet, the data supports main left-lateral movement that is accompanied by possible right lateral R'-shearing stresses striking NE-SW throughout Devils and Flume Canyons.

Presenter(s): Mary Peplin

Title: LACK OF STUDENT EXECUTIVE FUNCTIONING SKILLS CORRELATION TO OVER-IDENTIFICATION IN SPECIAL EDUCATION

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Over-identification of students in special education with learning disabilities has been on the rise, especially with the English Language Learner (ELL) population. It has been a specific interest in Colorado with our large increase in population of ELLs over the past decade. Not only are educators concerned about acknowledging cultural factors, but also home and school environments. More recent research is shining the light on the lack of executive functioning skills in students that may mask as academic deficits. There is clearly not enough emphasis on the fact that children are not born with executive functioning skills. In addition, even less attention is placed on the evidence that children need to be explicitly taught executive functioning skills because they are not innate. When examining recent research, it has become evident that there is a correlation between the lack of executive functioning skills and the lack of academic success. This gray area becomes even more muddled when considering students who have more than one language or culture. Who is responsible for teaching executive functioning skills? Depending on the stage of development, it varies from home to school. However, explicit instruction in these skills appears to be disappearing across the spectrum.

Presenter(s): Dalton Peters

Title: DEAR LOVER

Faculty Sponsor: Randy Phillis, Department of Languages, Literature and Mass Communication

Abstract: This short story was written last semester for my Creative Writing: Fiction class, and was inspired by the spoken word poem "A Letter from Cancer" by Kevin Kantor. The story is written in epistolary format, as a series of letters from a personification of Cancer to its victim, aka its lover. I wanted to expand on Kevin Kantor's original idea, but really characterize Cancer as an abusive and possessive lover entirely from that point of view, so the reader could really understand and feel what Cancer was doing to this person. With that initial idea, I coupled it with my own experiences watching and taking care of my mom when she had breast cancer when I was 17. With this story, I hoped to give an authentic and emotional take on the effects of cancer from an unexpected point of view.

Presenter(s): Alena Pinel

Title: THE EFFECTS OF DOUBLESEX TRANSCRIPT DEPLETION ON THE SEXUAL DIMORPHISM OF PHOTURIS FIREFLY LANTERNS

Faculty Sponsor: Matthew Stansbury, Department of Biological Sciences

Abstract: How novel traits arise and subsequently diversify is a question that remains largely unresolved in the field of biology. Firefly lanterns, or photic organs, are a striking novel feature used for mate attraction in adults, and they exhibit sexual dimorphism in many firefly species. While the adaptive role of this novel trait is well understood, the underlying genetic controls that facilitated the evolution of lanterns have only recently begun to be explored. Here, we investigate the function of a gene hypothesized to control sexual dimorphism in the photic organs of *Photuris fireflies*. This gene, doublesex, is known to influence the development of sexually dimorphic traits in *D. melanogaster* where alternate splice variants yield male and female protein isoforms

with sex-specific functions. Via RNA interference (RNAi), we experimentally inhibited a doublesex gene region common to both female and male *Photuris* during pupal development, and the effects on the adult photic organ were examined. We found that inhibition resulted in the formation of lanterns that were phenotypically intersex. This experiment demonstrates that doublesex controls sexual dimorphism in lanterns, and therefore plays a role in the diversification of this trait.

Presenter(s): Logan Pocsik

Title: STATIC SPARK GAP TESLA COIL TRANSFORMER

Faculty Sponsor: Eric Goertz, Department of Engineering

Abstract: Traditionally, Tesla Coils were used as a mechanism to transfer electrical energy between circuits very similarly to a transformer that is so commonly used today in power lines. However, Tesla Coils demonstrate aspects of electrical engineering, circuitry, and electrical systems, therefore they have been adopted as a very common demonstration tool for classrooms. The CMU physics club asked that a Tesla Coil be made for demonstrational purposes allowing for safe use in a classroom setting and have a high durability so it can be used without fear of breaking. One key element of this project was the safety aspect of the apparatus. The Tesla Coil had to be made so the two coils would resonate together and convert the incoming power to voltage not amperage. Also, the whole system had to be grounded properly so no bystander would be shocked. With these safety features along with a more than adequate capacitor bank to store energy and a properly sized toroid, the Tesla Coil properly converts incoming power to voltage which in turn produces spark/lightning (visible electrical energy) that the coil is famous for.

Presenter(s): Debra Ramirez

Title: IS THE "MY PLATE" PROGRAM BAD FOR US?

Faculty Sponsor: Christine Hein, Department of Languages, Literature and Mass Communication

Abstract: The purpose of this presentation is to demonstrate the negative impact of the food pyramid as promoted by the Food and Drug Administration, commonly referred to as "My Plate." The current government recommendations for dietary choices and servings are both expensive and create long-term health problems. Research will include the history of the food pyramid and analyze the arguments based on each food category, as detailed by scholarly articles and scientific studies. Research will support the proposition that the current food pyramid needs to be modified for the benefit of consumers and the modification of the current standards will promote greater health benefits.

Presenter(s): Cindy Rascon

Title: LITTLE "D" DEAF CULTURE

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: As a teacher, it is crucial to gain knowledge about students' different backgrounds and cultures in order to establish a socially accepting classroom. Every student is going to be different, and it is important to accept students for their differences and learn to appreciate and value all differences. One of the cultures that teachers need to be aware of is the deaf community. They are two main categories inside the deaf culture: those who get hearing technology and those who wish to embrace their disability. However, there are controversial issues relating to cochlear implants. Learning how to include students with deafness into the classroom, specifically those with cochlear implants, can be significantly useful for teachers. This presentation includes research and an inclusive interview about a person who is integrated in the culture itself.

Presenter(s): Sophia Reck

Title: CORRELATION OF BIOELECTRIC IMPEDANCE METRICS TO ACCUMULATED DEGREE DAYS AMONG BODY SEGMENTS USING GEL PAD ELECTRODES

Faculty Sponsor: Eriek Hansen, Department of Biological Sciences

Abstract: Accurate estimates of the postmortem interval (PMI; time since death) facilitate the progression of forensic investigations. The subjectivity of existing estimation methods necessitates development of an objective, quantitative method of predicting PMI. The dielectric properties of human tissue result in the body functioning as an electrical circuit. Bioelectrical impedance analysis (BIA) was used to quantify postmortem compositional changes to the biological circuit. Gel pad electrodes attached to human remains at specific anatomical landmarks divided the body into segments (i.e., circuits). A current was passed through each body segment, and temporal

changes in resistance and reactance of the current were measured using a BIA unit. Accumulated degree days (ADD; °C) were used as an indice of PMI to account for seasonal temperature differences and decomposition rates. This study was designed to identify which BIA metrics best correlated with ADD, while simultaneously representing the changes that occurred throughout different body segments. Using Pearson's Product Moment Correlation Coefficients ($r=0.05$), fifty-one percent of the examined relationships significantly correlated with ADD. Nineteen of the significant correlations exceeded 0.90. The results of this research will be used to select the BIA metrics and body segments for incorporation into random effects models for predicting PMI.

External Funding: This project was supported by Award No. 2015-DN-BX-K015, awarded by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice.

Presenter(s): **Scott Reid, Michael Yagi**

Title: THE EFFECT OF REPETITIVE CLIMBING ON HEART RATE IN COLLEGIATE MALE CLIMBERS

Faculty Sponsor: Brent Alumbaugh, Department of Kinesiology

Abstract: PURPOSE: To determine if there was a HR response to repetitive climbing by observing changes at various climbing speeds. METHODS: Five collegiate, male rock climbers performed 8 sessions on a bouldering route at preferred, easy, intermediate, and fast speeds. Each session consisted of a warm-up and 2 sets of 5 climbing trials. Climbers performed the trials at random speeds and were given a 5-10 minute break after warm-up and between sets to allow HR to return to within 10 bpm of resting. Changes in HR were represented by the percent change in pre and post trial HR. RESULTS: There was no statistical significance between the climbers' changes in HR during session 1 compared to session 8 ($p = 0.13$). However, it was observed that every participant was able to climb at faster speeds and at lower mean changes in HR in session 8 relative to session 1. CONCLUSION: The results implied that there was a learning effect when climbing repetitively. Since HR is an indicator of economy, lower changes in HR during the last session suggest that repetition allowed the participants' to improve their climbing economy by learning how to proficiently perform the route movements.

Presenter(s): **Wyatt Rollins**

Title: JAZZ AND SONGWRITING

Faculty Sponsor: Arthur Houle, Department of Music

Abstract: Many people assume that to compose a work of music, one must sit at an instrument and be stricken with a godlike idea that overwhelms them and explodes onto the page like a melodic waterfall. I maintain this is not true, and that good music can be composed using as little as 3-5 notes as a simple starting block. I will be explaining the process I use to compose a work of music as well as performing my latest work (Josie's tune) and then writing an impromptu tune during the presentation. Using audience interaction, I will "compose" a short melody and chord progression and then play it for the audience to demonstrate how songwriting is more a developing process than a magical idea that springs to mind from the wild blue yonder.

Presenter(s): **Taylor Schultz**

Title: IMPROVING MUNRO SUPPLY'S ORDER-TO-FULFILLMENT PROCESS FLOW

Faculty Sponsor: Don Carpenter, Department of Business

Abstract: Munro Supply (MS) is a Western Slope based industrial distribution manufacturing company with products within hose, pumps, valves, fittings and other industrial goods. The presentation will give an introduction into MS and its history. It will then focus on ways that MS can improve its process flow from an order received to an order-fulfillment, and answering the questions to improve this process. A Literature Review presents articles that are a brief overview of the industry and best practices in the industry. A swim-lane diagram demonstrates MS processes. The processes are then modeled in Arena™ simulation software from Rockwell, which will be modified to be evaluated for improvements. A baseline model will allow the modifications to the model to be analyzed using SPSS™ analytic software. With the evaluation of the model and the changes made to improve MS, the presentation will show the changes with a statistically significant increase to the order-to-fulfillment process that show feasibility from different perspectives. The presentation looks into the limitations, conclusions, and recommendations for the changes to MS.

Presenter(s): Nickolas Secosky, Shawn Pacarar, Richard Sterling

Title: WATERFALL MINERALS INVENTORY SYESTEM

Faculty Sponsor: Lori Payne, Department of Computer Science, Mathematics and Statistics

Abstract: One of the most important factors to consider when starting your own business is the efficient organization of inventory and sales. We plan on solving this for a local business, Waterfall Minerals, by creating a program that is simple to use and easy to maintain. Our program will do this by organizing and storing all sales and inventory information into a searchable database. This will allow concurrent activity from multiple locations and provide a quick means for members of the business to stay up to date with inventory while in separate locations. Some key items this program will track are shipping cost and rarity of samples. We want to give back to our community by helping Waterfall Minerals stay organized.

Presenter(s): Anthony Seuga-Duncan

Title: USING CASTLEGATE SANDSTONE SUBSURFACE DATA TO AGE DATE THE DOUGLAS CREEK ARCH UPLIFT

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: The Douglas Creek Arch is a broad north-south striking anticlinal structure that is located in northwestern Colorado near the border of Utah. The timing of deformation along the arch is debated in the literature. Some authors believe the arch began to form before the Laramide Orogeny based on thinning of the Mancos Shale across the arch. Another author suggests that movement began at least as early as the Late Cretaceous based on the Mesaverde Group thinning. Other studies propose that uplift of the arch began 74 Ma based on age dating the youngest rock beneath the Cretaceous-Tertiary unconformity. The purpose of this study is to test the hypothesis that movement on the Douglas Creek Arch occurred during the deposition of the Castlegate Sandstone which is dated at 77.5 Ma. To provide a more precise age range for the beginning of the uplift, thinning relationships of the Castlegate Sandstone along the arch will be investigated using structure contour maps, isopach maps, and well-to-well cross sections created from IHS Petra software.

Presenter(s): Ian Shafer

Title: GEOCHEMICAL AND MINERALOGICAL COMPARISON OF BATTLEMENT MESA BASALTS WITH GRAND MESA BASALTS

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: The purpose of this project is to compare the geochemical and mineralogical composition of the Battlement Mesa basalts with Grand Mesa basalts in western Colorado. Previous studies of the nearby basalt fields, including Grand Mesa, have used X-Ray Fluorescence (XRF) and X-Ray Diffraction (XRD) techniques to determine major, minor, and trace element concentration and mineral abundance. Battlement Mesa and Grand Mesa are the same elevation (~11,000') and are capped by basalts of similar age (11Ma – 9Ma), so the geochemistry and mineralogy might be similar. If so, it is likely that the two basalt deposits originated from the same magmatic source. To determine this, XRF, XRD, and petrographic techniques will be used to compare samples collected from Battlement Mesa with samples previously collected from Grand Mesa.

Presenter(s): Ian Shafer

Title: GEOCHEMISTRY AND MINERALOGY OF BASALTIC ROCKS IN THE EASTERNMOST GRAND MESA VOLCANIC FIELD (GMVF)

Faculty Sponsor: Rex Cole, Department of Physical and Environmental Sciences

Abstract: This study characterizes the geochemistry and mineralogy of basaltic lavas at Mt. Hatten, Crater Peak, Green Mountain, Mt. Darline and the Lombard dike. Based on previous $^{40}\text{Ar}/^{39}\text{Ar}$ analyses, rocks in the study area range in age from 10.16 ± 0.11 Ma to 10.48 ± 0.06 Ma. Geochemical analysis was by Energy-Dispersive X-Ray Fluorescence (XRF), which provided major-element concentrations (as oxides). Mineralogic analysis was done by X-Ray Diffraction (XRD), using seven representative samples that had been pulverized to -360 mesh. Using a TAS plot (SiO_2 vs. $\text{Na} + 2\text{O} - \text{K}_2\text{O}$), the samples classify geochemically as shoshonite (N=15), basaltic andesite (N=10), potassic trachy basalt (N=2), and basalt (N=1). Using CIPW-normative calculations based on the oxide values, the dominant minerals are plagioclase, pyroxene, olivine, ilmenite, and magnetite. Mineralogy derived from XRD analyses was compared with the CIPW values with reasonable agreement. Overall, the flows in the eastern GMVF are geochemically and mineralogically similar. The Lombard dike is noticeably different and has higher silica and alkali values. The results also show that the eastern GMVF is as geochemically and mineralogically complex as the rest of the field to the west.

Presenter(s): Jessica Sheldon

Title: LINEAR PROGRAMMING: FINDING OPTIMAL SOLUTIONS TO THE BACKPACK PROBLEM

Faculty Sponsor: Philip Gustafson, Department of Computer Science, Mathematics and Statistics

Abstract: Before the Kids Aid Backpack Program, more than 2000 kids went hungry every weekend in this valley. The Backpack Program is a local non-profit organization that provides food to more than twenty schools throughout the valley with the help of more than 140 volunteers. Each week, more than 2000 backpacks are filled with a weekend's supply of food; this includes two breakfasts, two lunches, two dinners, and three snacks. Each backpack consists of single-serve food items, which are selected according to availability constraints as well as dietary and weight constraints. This presentation will demonstrate how mathematical modeling can be used to help this non-profit create an optimal backpack. In particular, we will see how linear programming can be used to optimize a linear objective function subject to a system of linear constraints. This method will be used to select food items that minimize backpack weight while satisfying dietary requirements, such as the amount of protein, sodium and calories. Other objective functions will be considered as well, including maximizing protein and minimizing sodium. The solution to these models will be implemented using Excel's Solver command.

Presenter(s): Kylee Simpson

Title: LEARNING WITH DYSLEXIA

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: As a teacher, it is crucial to give each student a fair chance to access a quality education. Everyone has a different way of learning and a different way of thinking. Some students have learning disabilities, including dyslexia, that can affect the learning process. This presentation will focus on work done with a local elementary student with dyslexia who needs extra support in math. There will be research presented on methods to accommodate students with dyslexia in the classroom, also successful teaching tips and research-based strategies will be shared.

Presenter(s): Jessah Skalla

Title: ISOLATION AND PROPAGATION OF PROTEOLYTIC MYXOBACTERIA FOR THERAPEUTIC EVALUATION

Faculty Sponsor: Kimberly White, Department of Physical and Environmental Sciences

Abstract: Myxobacteria are Gram negative bacteria that feed on organic compounds and are found primarily in terrestrial environments. These understudied organisms thrive in the arid regions of Western Colorado and produce many unique secondary metabolites. This project focused on the collection, isolation, and cultivation of myxobacteria strains for further analysis of the therapeutic capabilities of their metabolites. After collection of soil samples, myxobacteria were characterized and isolated using their unique fruiting body formation, proteolytic activity, and swarming behavior as indicators. Pure strains were cultivated in liquid media for large-scale isolation of the biologically significant metabolites. A multi-step liquid-liquid partition scheme was performed on liquid culture extracts to produce four fractions with varying degrees of polarity with the most interesting metabolite properties typically found in the moderately polar fractions. Myxobacteria are known producers of viable drug leads, with the bengamide and epothilone classes of molecules being the most significant discoveries in the field. It is for this potential anti-cancer drug development that myxobacteria were cultivated and processed for this project. Crude extracts from numerous isolates were formatted into 96-well plates for biological evaluation at the Henry Ford Cancer Center and the University of California, Santa Cruz Chemical Screening Center (UCSC CSC).

Presenter(s): Sara Speedlin

Title: A PRELIMINARY STUDY OF TARDIGRADE TAXONOMIC COMPOSITION IN MOSSES COLLECTED ON TWO DIFFERENT SUBSTRATE TYPES IN THE HIGH DESERT: BARE ROCK AND PINYON PINE (PINUS EDULIS) LEAF LITTER

Faculty Sponsor: Aparna Palmer, Department of Biological Sciences

Abstract: As aquatic organisms that can withstand some of the harshest conditions on earth, tardigrades have been known to survive when confronted with extremes in temperature, salinity, and pressure. Tardigrades that live in the mosses of the high deserts of Colorado face some of the most intense environmental pressures with little annual precipitation and extremes in daily and seasonal temperatures. This study examined species composition in mosses occurring on two substrate types in an area located near the Colorado National Monument. Tardigrades were extracted from mosses collected on bare rock as well as in the leaf litter under pinyon pines to test the null hypothesis that there is no difference in tardigrade species composition between the two types of moss substrates. The specimens were visualized using light microscopy and were identified using morphological

characteristics. While the data from the leaf litter mosses are still being analyzed, the results from the mosses collected on bare rocks show the presence of species in two genera: Milnesium and Macrobiotus. The knowledge gained from this study may lead to a better understanding of tardigrade ecology and evolution as well as the mechanisms that enable them to survive under the harsh conditions present in the high desert.

Presenter(s): Natasha Sterry

Title: DENDROCHRONOLOGY OF GIBBLER GULCH, COLORADO

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: The purpose of this research is to use dendrochronology of cottonwood trees in Gibbler Gulch, Mesa County, Colorado to better constrain the age of the Qt1 terrace. Previous work, using the ¹⁴C technique, has resulted in an age range of 0-300 years before present. If the age of Qt1 can be determined more accurately, then it can be compared with similar terraces in the arid climates of the southwestern United States. Widespread synchronous arroyo incision is likely the result of regional processes such as climate (fluctuation of temperature and precipitation), settlement of the west, or over grazing of livestock. Lithological differences could cause asynchronous, local incision. If Qt1 is the same age as other terraces in the southwestern United States, then a regional process may have caused incision. If Qt1 is not the same age, then a local process near Gibbler Gulch must have caused incision.

Presenter(s): Sarah Stevens

Title: GENDER AND SEXUAL ORIENTATION: GAY

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Gay culture has become more widespread, talked about, and valued in today's society. It's important that people, especially teachers, learn how to accept others with different sexual identities. This presentation will share tips on how people can help and support others who are coping with the pressure of coming out as gay and how teachers can prepare for situations that may come up in the classroom involving gay students. This presentation will also include important terms that are used in gay culture and sources that people who are struggling with their sexual identity can go to for help. Interview information about a boy who came out as gay in only the fifth grade, will be shared as well as practical information on critical topics in gay culture.

Presenter(s): Adam Stoeffler

Title: IMPROVING ALPINE BANK'S CREDIT CARD SYSTEM

Faculty Sponsor: Don Carpenter, Department of Business

Abstract: The increasing demand for credit card products following the end of the 2008 financial crisis led Alpine Bank to offer credit card services to its customers. The organization faced multiple issues arising from this new activity, including a lack of customization and integration between the bank's core system and its third-party provider. The goal of this research was to address problems relating to the credit card system at Alpine Bank. First a literature review helped identify technology as one of the main challenges for credit card activities in the financial services industry, followed by legal constraints, and operations management. Best practices emphasized the enhancement of integrated platforms to perform seamless information flows between the different stakeholders thanks to the lean and Six Sigma approaches. Data collected on-site was then used to design swim-lane diagrams and a process simulation model allowing for a dynamic visualization of credit card inquiry management, which was then statistically validated against experts' opinions using a 95% confidence interval. Twenty-two changes were subsequently proposed to address the main issue and quantitative outputs were compared to those of the base model using paired-samples t-tests to determine statistically significant differences. Feasible changes became recommendations to Alpine Bank.

Presenter(s): Victoria Stone

Title: TRIGGER

Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: This project, debuting on May 19th 2017 at Colorado Mesa University's Robinson Theater explores the controversial topic of sexual assault and abuse in the LGBTQA+ community. In this one-night event, there will be several different walk through installations of dance and art depicting the struggles an individual goes through after a life-altering event. In a conservative town like Grand Junction, CO, uncomfortable material and affronting energy like this needs to be said, heard and seen if anything is going to change. The people involved

with this project range from dancers, actors, technicians, university instructors, and the possibility of clubs on campus. I will be presenting one of six stories being told from this one-night event. "Unless someone like you cares a whole awful lot, nothing is going to get better. It's not." -Dr. Seuss

Presenter(s): Jessica Switzler

Title: ARE WE RUNNING ON EMPTY?

Faculty Sponsor: Shawn Robinson, Department of Computer Science, Mathematics and Statistics

Abstract: Have you ever felt the panic of running your gas tank on empty? Now imagine a poor helpless autonomous vehicle, one with no human emotions. The robot can't feel that panic and in turn will be stranded helpless with no fluids. A group of local engineers, mathematicians and computer scientists are creating an autonomous vehicle that will aid in the agricultural world and compete in the AgBot Challenge. As part of the problem, we need an accurate reading of the fluid levels within the autonomous vehicle being built. The tank brought into question is an elliptic cylindrical tank. The vehicle will have a sensor that gives us the spatial orientation of the tank. The tank will also have a fluid measurement reading that is taken from a single end of the tank. Using the angles at which the tank is oriented, and the fluid measurement we will calculate the volume of the fluid using an integral. This integral will give us a solution for a range of scenarios.

Presenter(s): Ally Tapp

Title: AD/HD IN THE CLASSROOM

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: Teaching students who learn differently than others can be a challenge. Whether a student has been diagnosed with a disability or exceptionality, it is important to work with the student to create an atmosphere where a student can get a quality education and thrive. This presentation is focused on students with attention-deficit/hyperactivity disorder (AD/HD). Based on published written sources and field research with students diagnosed with AD/HD, the presenter gives information on the disorder as well as positive ways to work with and enhance a child's education when this disorder is present.

Presenter(s): Samantha Tate

Title: USING CREATIVITY TO LEARN

Faculty Sponsor: Nicole Grider, Department of Theatre Arts

Abstract: If a picture paints a thousand words, why insist on using mostly words to take notes to retain information? Art gives life to my fingerprint and can breathe new life into learning and lectures, according to the classical works of Alberti, Newton, and Goethe, to name a few. Thus, this persuasive presentation examines the impacts of early education through art, and the learning costs students face as they progress through school, where the use of art in lectures drops drastically. Multiple action steps will be provided for non-art college educators to bring art into class concepts, thereby creating visually stunning lectures that help learners of all ages understand and retain information through picture cues or lecture memories. Regardless if one is a scholar or teacher-scholar, free expressionism in a notebook creates the color this world thrives on.

Presenter(s): Genevieve Thomas

Title: EXCERPT FROM "PLAYING THE ROLE" A CABARET BY KAI THOMAS

Faculty Sponsor: Jeremy Franklin, Department of Theatre Arts

Abstract: "Playing the Role" is an autobiographical cabaret written and performed by Kai Thomas with piano accompaniment by Douglas Morrow. The presenter will perform "Some Other Me" by Tom Kitt and Brian Yorkey, presented with junior musical theater major Joseph DeMers, and "How Far I'll Go" by Lin-Manuel Miranda. This section of the cabaret explores the question of "what if life were different?" The subject is approached from the apology of one friend to another, and a desire to be something more.

Presenter(s): **Roxanne Truter**
Title: NON-PROFIT TRIO PROGRAM
Faculty Sponsor: Nicole Grider, Department of Theatre Arts

Abstract: H.R. 795, introduced by the 102nd United States Congress, amended the Higher Education Act of 1965 to "provide for certain evaluation and demonstration grants under special programs for students from disadvantaged backgrounds" (Title III, Innovation in Postsecondary Education, Part A), thereby creating TRiO. Yet, TRiO funding stipulations are restrictive, limiting support for students who have not yet been identified as in-need. This persuasive presentation suggests action steps that, if taken, could decrease advertising stipulations to increase the student base and success rates of disadvantaged students in college. Additional steps, such as augmenting current advertising to reflect the rich diversity of TRiO scholars, and creating space for TRiO clubs, could allow TRiO to expand without increasing funding needs. By allowing TRiO to open up its population, its population will create a learning community of scholars supporting each other in academic and life goals.

Presenter(s): **Tia Valles**
Title: PROSTHETIC DISCOVERY
Faculty Sponsor: Scott Bevill, Department of Engineering

Abstract: The prosthetic leg, meant for scientific exploration, is a theoretical design project specifically for the through-knee amputee. Design emphasis includes age-adaptability in height, instantaneous custom socket support and multiaxial knee motion. The overall goal is to safely maximize knee motion and comfort. Fabrication methods include 3D modeling, printing and milling. This project is a continuation of a design project that was begun as a high school student. With the resources available at CMU, such as the Maverick Innovation Center, a first-generation prototype has been developed to begin testing the novel design features of this prosthesis.

Presenter(s): **Megan Vorse**
Title: POST CRITICISM: DISSOLVING ACADEMIC BOUNDARIES
Faculty Sponsor: Barry Laga, Department of Languages, Literature and Mass Communication

Abstract: There exists in the creative institution a sharp divide between scholarly and academic modes of writing. English majors do both kinds of writing, but almost never within the same piece. Post Criticism offers a way to dissolve the boundaries between scholarly and creative writing, enabling a writer to utilize both to innovative and useful ends as they create works comprised of both modes of writing. This presentation explores the use of Post Criticism by established authors and uses these examples to demonstrate its ability to achieve various goals by enabling scholarly and creative modes of writing to work together.

Presenter(s): **Jennifer Wadleigh**
Title: CHOREOGRAPHY AND ARCHETYPES
Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: Part of the presenter's research as a dance major has recently delved into understanding separate styles and codified techniques of not only well-known choreographers, but also understanding her own style. Within that reflection, she draws inspiration from contemporary choreographers so to better understand dance styles from the source material, in addition to following choreographers using improvisation and somatic work. As a double major in theatre, Jenna is also interested in archetype roles in literature and historic theatre, and how these characters may be represented in dance. In this demonstration, the combination of these two fields of research into one; a choreography piece of Jenna's own design in collaboration with six others, emphasizes the combination of select styles in accordance with the theme of the archetype. This study is focused on weaving human characteristics and personalities into performance qualities. She will present the rehearsal process through a series of videos exemplifying the styles currently being explored, and will provide context for the archetypes used.

Presenter(s): **Chris Walker**
Title: SYMPHYSES IN THE SOUTHWEST
Faculty Sponsor: John Nizalowski, Department of Languages, Literature and Mass Communication

Abstract: The American Southwest has fostered a unique writing tradition that has grown into a distinctive literary movement. This literary tradition emerged from a background of ancient societies and religious traditions –

including Pueblo Indian, Diné, and Renaissance Spanish cultures – to flower in a modern landscape of rapid change and urban growth. This juxtaposition of stasis and fluidity offers a unique setting for literary works that explore the interactions between populations, individuals, and the environment. In “Symphyses in the Southwest,” I will examine the American Southwestern literary tradition’s portrayal of the process through which the sociocultural stresses between populations of various ethnicities give way to their collective experience of surviving in a challenging high-desert environment, resulting in an interconnection that parallels the biological concept of symphyses. These thematic concerns have resulted in an exceptional literary movement with a strong sense of regional identity and place, producing works from writers as varied as Mary Austin, John Steinbeck, and N. Scott Momaday that both sharply analyze and compassionately celebrate the region’s varying peoples and landscapes.

Presenter(s): Brooklyn Waterhouse

Title: BASELINE CAMERA-TRAP STUDY IN THE AMAZONIAN YASUNI BIOSPHERE RESERVE

Faculty Sponsor: Johanna Varner, Department of Biological Sciences

Abstract: Thirty percent of mammalian diversity is found in the Amazon Rainforest. However, these mammals are hard to study due to elusive behaviors and camouflage. By using camera traps at the Shiripuno Lodge Yasuni Biosphere Reserve, we non-invasively captured natural behaviors of mammals. The purpose of this study was to document mammalian diversity in the Reserve. Motion-activated cameras were placed along trails for 2-6 weeks between 2013 and 2015. In total, we captured 2,593 photos and videos, 299 of which were mammals (29 species). The most common species were peccaries and agoutis. Rarely-seen mammals included Brazilian Tapirs and Jaguars. Without camera traps, these elusive creatures would be difficult to observe. The images serve as a baseline of mammal diversity in the area, but more research will be necessary to document changes in populations and behaviors. Because poaching is common, there may be differences in mammalian populations and behaviors in different areas of the Amazon. Recent studies suggest that if large mammals are lost from a forest, the large trees will also be lost because their seeds will not be dispersed. Documenting the presence and populations of large mammals in the Amazon is therefore essential for the preservation of the entire ecosystem.

Presenter(s): Kyle Watling

Title: FIBONACCI IN ART AND ARCHITECTURE

Faculty Sponsor: Nicole Grider, Department of Theatre Arts

Abstract: Fibonacci’s inherent fundamental pattern exemplifies the simplicity and beauty sought after in life. Evident within the designs of artists and cultures who may or may not have been aware they were replicating it; the Fibonacci Sequence has been the basis for the works of numerous cultures. Thus, this informative presentation examines the golden ratio in famous works and structures, such as the Acropolis, Bernini, or the Vitruvian Man. Leonardo Da Vinci even went so far as to illustrate a book called “The Divine Proportion”, written by Luca Pacioli. This was one of the first literature works to examine the applications of the Golden Ratio in art and architecture on a deeper level. As Oscar Wilde argued, “life imitates art”, and Fibonacci’s Golden Ratio serves as a backbone of that argument. Results of this study indicated that intrinsic, seemingly random numerical patterns connect all of us through the Golden Ratio.

Presenter(s): Amy Weitzel

Title: IMPROVING THE THROUGHPUT OF COMMUNITY HOSPITAL’S EMERGENCY DEPARTMENT

Faculty Sponsor: Don Carpenter, Department of Business

Abstract: Throughput issues are relevant in every business and helps the bottom line of the company. Dealing with throughput issues at Community Hospital’s Emergency Department also can help save lives. Innovations in system design and engineering have largely not taken hold in the health care delivery sector partially due to the dynamic conditions and complex issues of the work environment coupled with the cultural aspects within health care itself. This study examines handoff throughput issues encountered in the ED at Community Hospital. For the purposes of this study, a handoff is defined as process which occurs between the ED doctor’s decision to admit a patient and when the patient is transferred to the inpatient unit within the hospital with the overarching goal of improving health care objectives for patients entering the hospital through the ED. Through building and running a simulation model in Arena™ simulation software from Rockwell Automation™ and by validating it against the observed processes and data collected from the client, the study makes 22 changes (both bivariate and multi-variable) to the model with each variation generating data which was analyzed using SPSS™ to examine whether changes make a statistically significant difference.

Presenter(s): **Alaine West**

Title: PUBLIC EDUCATION OUTCOMES IN RELATION TO SCHOOL TYPE

Faculty Sponsor: Christine Hein, Department of Languages, Literature and Mass Communication

Abstract: The purpose of this paper is to argue the validity of employing alternatives to traditional public education in order to improve national education outcomes. Poor outcomes in public education have been causing debates in America for many years, with the central dispute being the proper way to improve results. The essay will accomplish this by comparing results such as test scores, literacy, and graduation rates across traditional, charter, year-round, and online public schools. Research will support the claim that by employing alternative education opportunities, America will experience an increase in its citizens' knowledge base and critical thinking capabilities.

Presenter(s): **Alexandra Williams**

Title: DENDROCHRONOLOGY AND LATE HOLOCENE ARROYO INCISION, UPPER GIBBLER GULCH, MESA COUNTY, COLORADO

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: Upper Gibbler Gulch in western Colorado has had two episodes of late Holocene valley fill and incision resulting in an upper and older Qt2 terrace and a lower and younger Qt1 terrace. The timing of deposition and incision of the Qt1 terrace is uncertain. Dendrochronology based on cottonwood trees on the Qt1 terrace will help bracket the timing of Qt1 deposition and incision and allow for better comparison with other areas. If downcutting of Qt1 correlates with regional incision from 1880 to 1940, then it is likely that wide-spread climate fluctuations or settlement of the west were key trigger events. If timing of incision does not correlate, then Qt1 formation in upper Gibbler Gulch may be due to local factors such as lithology or bedrock controls on headward erosion.

Presenter(s): **Mot Xayabath**

Title: BEFORE ANYTHING ELSE, WE ARE ALL HUMANS

Faculty Sponsor: Megan Zollinger, Department of Theatre Arts

Abstract: Most of us are too focused on the negativity and adversity of our nation. We sometime forget about the positive and valuable lessons that we can learn from those that surround us. Inspired by the "Love Has No Labels" campaign, choreographed and performed by Mot Xayabath, this dance performance is created to remind audiences that we are surrounded by diversity; a positive force. Diversity is everywhere. If we as citizens are willing to listen, learn, and embrace our diversity, we as a whole can grow.

Presenter(s): **Mia Zanoni**

Title: THE MIXING OF GUNNISON AND COLORADO RIVER GRAVELS ALONG THE COLORADO RIVER

Faculty Sponsor: Larry Jones, Department of Physical and Environmental Sciences

Abstract: This study proposes to determine where the Colorado and Gunnison river gravels are fully mixed on both sides of the Colorado River below their confluence in west-central Colorado. Five hundred random gravel samples will be taken on both sides of the Colorado River using grid sampling techniques. Chi squared tests will be used to compare gravel lithologies. Sampling will start at Pollock Canyon. If gravels are mixed there, then sampling will continue upstream to determine the place at which the gravels first become well mixed. If the gravels are not well mixed at Pollock Canyon, then more data will be collected downstream. This information can be used to help determine where the confluence was in the past. Locally, paleo-rivers are located by age and gravel composition of river terraces. This study will help better define paleo-river confluences and aid in the production of more accurate paleogeographic maps.

SPECIAL EXHIBITS

Presenter(s): John Beezley, Shane Christensen, Brendan Clark, Scott Culbertson, Justin-shay Ellsworth, Daniel Hegge, Michael Hendricks, Robert Howard, Dillon Knuepfer, Steven Lawson, Connor Lumley, Thorsen Milton, Bradley Morgan, Dylan Payne, Alix Peltier, Dalton Rauer, Cesar Reyes, Chandler Roberston, Adam Shine, Lauren Thorpe, Marcus Vincent

Title: CNC MACHINING II CLASS PROJECT: DESIGNING UNIQUE DESKTOP CLOCKS

Faculty Sponsor: Bill McCracken, Western Colorado Community College

Abstract: Engineering and Manufacturing students enrolled in the Computer-numeric Control (CNC) Machining II class are presenting their uniquely designed desktop clocks manufactured from solid billet aluminum and industry specifications in the CNC machining laboratory. Student use CAD/CAM design software to their projects, then select the proper CNC machining processes to complete their work.

Presenter(s): Caleb Brown, Marcus Fingerlin, Hannah Martin

Title: ART THROUGH CRAFT

Faculty Sponsor: KyoungHwa Oh, Department of Art and Design

Abstract: Caleb Brown, Hannah Martin, and Marcus Fingerlin 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.

Presenter(s): Samuel Byrne, Alan Carrasco, Corbin Cooper, Erin Cooper, Mitchell Dilley, Cody Dozoretz, Nathan Glennon, Garrett Koehler, Westlyn Johnston, Connor Lumley, Josh McGarity, Justin MarkerSeth Mewhinney, Dalton Rauer, Garrett Rodstrom, Morgan Ryan, Dirk Smuin, Naomi Yamada, Ryan Zinke

Title: MESA MOTORSPORTS FORMULA SAE 2017

Faculty Sponsor: Scott Kessler, Department of Engineering

Abstract: The Colorado Mesa University Engineering Club has designed and built another car for the yearly Formula SAE design competition series. Mesa Motorsports is competing for the third time at Michigan International Speedway in May. The competition involves designing a small formula-style car, gathering funds, fabricating it from scratch, marketing it to potential investors, and racing it against hundreds of other universities. The team is comprised of six groups tasked with designing sub-systems including chassis, powertrain, electronics, suspension, driver ergonomics, and aerodynamics. The team is excited to unveil their vehicle for this year's international competition.

Presenter(s): Cullen Easter, Nick Clemmer

Title: THE GERM GENIE

Faculty Sponsor: Tom Benton, Maverick Innovation Center

Abstract: This project combines a senior in the CMU nursing program with a junior in Mechanical Engineering. Cullen developed the idea to reduce hospital born and transmitted diseases by using a tactile reminder for hospital providers to wear while performing his clinical rotations at the local hospitals. The device has been augmented by Nick Clemmer to provide smart data using wireless technology and capturing the hospital providers use of preferred hygiene techniques. This eliminates a number of serious threats to patients and provides data for hospitals to use with insurance companies, Medicare and Medicaid re-imbursements.

Presenter(s): Jessica Hedlun, Timothy Johnson, Seirra Key, Brynne Plett, Samuel Speir, Zachary Tabb, Alexandra Wiuff
Title: LIVE-PRINTING SHIRTS
Faculty Sponsor: Joshua Butler, Department of Art and Design

Abstract: Printmaking Guild will be exhibiting a live-printing demonstration of original wood block designs for the general public. Our goal is to prove that the techniques students are learning in art courses can be applied to a business model as well as Fine Art while still remaining cost effective to both the artist and the consumer. The Guild does this through our live-printing fundraisers where our audience can engage in the process by picking the art and color of shirt then watching it be printed and in their hands in a matter of minutes. The sales exhibit our various artists' skill sets as well as encouraging the public to buy hand-made art. These sales have allowed for us to collaborate with other programs, both on and off of campus, to do larger projects such as club shirts. These projects have expanded our team-building experiences to allow non-artists to work with artist to create a product in a way that is cost effective for both parties. The long-term significance of this project is that students learn valuable skills in teambuilding, networking, running a business, and creativity that they can apply to future opportunities in the art and business world.

Presenter(s): Aden Cesmat
Title: PEAK AUTOMOTIVE SYSTEMS
Faculty Sponsor: Tom Benton, Maverick Innovation Center

Abstract: The device eliminates the ability for a consumer to drive away from a filling station or convenience store with the fuel nozzle still connected to their automobile. This seems to happen about one time per month on average for all of the fuel stations around the US.

Presenter(s): Tia Valles
Title: BIOMETRIC PROSTHETIC APPENDAGE
Faculty Sponsor: Tom Benton, Maverick Innovation Center

Abstract: This is a concept design for a young person who is still growing and allows the prosthetic device to grow with the child so that they no longer need to buy replacements. The device is wired biometrically to the other leg or arm so that the two remain common sized.

Presenter(s): Hayden Murphy
Title: INFINITY INK
Faculty Sponsor: Tom Benton, Maverick Innovation Center

Abstract: Rechargeable Dry erase marker for schools, universities, home and business applications. This system provides the user the ability to dock multiple colored markers in a platform next to their white board and have the ink refill into the marker for longer life and less clutter in community landfills. The rechargeable markers will last for months, perhaps even years of repeat use. This exhibit reflects the various iterations in design since the concept was introduced in April of 2016.

ABSTRACTS



Presenter(s): Ashley Cross, Elizabeth Franzen, Abigail Gonzales, Samantha Gould, Tara Honnen, Nicole Hutchison, Keri Metcalf, Natalie Pipe, Cindy Rascon, Kylee Simpson, Alexandra Suppes, Ally Tapp

Title: STRUCTURED TASKS AND ADAPTED BOOKS: ACTIVE ENGAGEMENT AND LEARNING FOR ALL STUDENTS

Faculty Sponsor: Jennifer LaBombard-Daniels, Center for Teacher Education

Abstract: All elementary classrooms in today's schools are full of a beautiful mix of diverse children. Teachers must be prepared to work with students who are culturally diverse, students with disabilities, students who are English Language Learners, and students who are gifted and talented. Research shows that educational materials that are highly structured and highly visual are motivating for students, they capture students' attention, and allow all students access to the content, all leading to more active student engagement and deeper levels of learning. Preservice teachers in the class "Exceptional and English Language Learners in the Inclusive Classroom" have created a collection of structured tasks and adapted books for use in their future classrooms with all of their diverse students and have showcased their work in this Special Exhibit.

Presenter(s): Alison Bukacek, Jennifer Dunn, Colleen Edwards, Stephanie Patterson

Title: NSTA STUDENT CHAPTER COMMUNITY STEAM WORK

Faculty Sponsor: Ann Gillies, Center for Teacher Education

Abstract: The CMU National Science Teacher's Association (NSTA) Student Chapter has hosted multiple family science nights and week long STEM-athon camps throughout the CMU community for K-12 students and families. This group was also responsible for hosting the Spacetacular Day with NASA, the ISS and Commander Scott Kelly. Each of the projects hosted focus on STEAM challenges that participants collaboratively engage in. Some of these challenges include survival operations, Lego challenges, hydrolic claw engineering, and technology based programmed robots. This Special Exhibit will showcase many of these hands-on, engaging challenges.



ACADEMIC AFFAIRS

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