University of Wyoming
April 27, 2013

Student Abstracts

Oral Presentations: Classroom Building,
University of Wyoming Campus
9:30 – 4:00 PM

Poster Presentations: Family Room, Wyoming Student Union
3:30 – 5:30 PM
WHEREAS, research is a critical part of the University of Wyoming's mission. UW, a land grant institution, was founded on the principle that knowledge is discovered and shared through research; and

WHEREAS, research gives students a chance to learn outside of the classroom, develop analytical skills and work as part of a team; and

WHEREAS, UW faculty brought in $86 million worth of competitive research grants in 2012, increasing the opportunities for undergraduate students to work on research projects; and

WHEREAS, UW has emerged as a leader in undergraduate research through student participation in a variety of activities from faculty projects to independent research; and

WHEREAS, the 14th Annual Undergraduate Research Day gives UW and community college students an opportunity to share their work with the public – this year more than 360 students will participate.

NOW THEREFORE, I, MATTHEW H. MEAD, Governor of the State of Wyoming, do hereby proclaim Saturday, April 27, 2013 as

UNDERGRADUATE RESEARCH DAY 2013

in Wyoming.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Executive Seal of the Governor of Wyoming to be affixed this 27th day of April, 2013.
ACKNOWLEDGEMENTS

The University of Wyoming Undergraduate Research Day would not be possible without the contributions of many people and programs. We are especially grateful to the following:

**Working Group**

| Steven Barrett, College of Engineering and Applied Science | Tina Markos, UW/Casper College/INBRE |
| Susan Stoddard, McNair Scholars Program | Anne Sylvester, Wyoming EPSCoR |
| Zackie Salmon, McNair Scholars Program | Rick Matlock, Wyoming EPSCoR |
| Angela Faxon, Office of Research and Economic Development | Lisa Abeyta, Wyoming EPSCoR |
| R. Scott Seville, UW/Casper College/INBRE | Beth Cable, Wyoming EPSCoR |
| | Ted Haskell, Wyoming EPSCoR |

**Moderators for the Oral Presentations**

| Alex Xu | Edward Koncel |
| Brian Towler | Chicory Bechtel |
| Mark Garnich | Scott Morton |
| Dennis Coon | Scott Seville |
| Glaucia Teixeira | Stanislaw Legowski |
| Joe Holles | Mark Stayton |
| Jun Ren | Allison Meyer |
| JoAnna Poblete | Michael Stoellinger |
| David Bagley | Roger Coupal |
| Carol Frost | Caroline McCracken-Flesher |
| Steve Holbrook | Lynne Ipina |
| Jonathan Prather | Ruben Gamboa |
| Catherine Connolly | Stanislaw Legowski |
| Elizabeth Simpson |  |
Special Staff and Technical Support

Nicholas Gurbhoo, Instructional Technology, Client Support
Austin Foster, Instructional Technology, Client Support

Special Thanks

Ryan Dinneen O’Neil and Robert Perea, Events Office, Wyoming Union
Michael Marsh and the staff of the UW Custodial Department
Michael Kottenstette and the staff of UW Catering
The Staff of the UW Copy Center

Sponsors

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Most important, we thank all of the students and their faculty mentors. Students participating in Wyoming Research Day represent the very best and brightest of UW and the Community Colleges. Without the support and encouragement of dedicated UW and Community College faculty these exceptional students would not have the opportunity to do independent research in such a wide array of exciting areas…we thank you!
Manufacturing of Acetic Acid from Natural Gas via Methanol Process
Ameen Alabdulaal, Abduljawad BuAreash, Hassan Alsaraaf, Abdusalam Alghamdi and Evan Dearth,
Dr. Joseph Holles
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

Department of Chemical and Petroleum Engineering

Acetic acid is a valuable chemical that can be utilized in a variety of applications. The demand for this compound is expected to continue increasing in the next few years. Our objective is to produce acetic acid from natural gas passing through three main units of the plant: syngas plant, methanol plant and acetic acid plant. The method that is utilized to manufacture acetic acid uses methanol and carbon monoxide as feed stocks. There are four main reactions that are taking place within the plant, one of which involves a catalyst that has a large impact on the operating cost. The quantity of acetic acid that is going to be produced is approximately 500MMlb/yr. The material balance requires 131.5 million lb/yr of natural gas; this is one of our major expenses since it is a main feed. The location of the plant has been selected to be in Ohio due to the readily available amount of shale gas. The cost estimation of the entire plant is $950 million. It is anticipated that the revenue will reach $330 million and yields a profit of $230 million. Based on our calculations and simulation, our payback period is about four years.

Production of Cellulosic Ethanol using Ammonia Hydrolysis
Mohammed Al Bader, Brandon Ruckman, Mashhor Aljabrine, Abdullah Alshaik, and Dan Asker Dr. Joseph Holles
Department of Chemical Engineering
University of Wyoming
Oral Presentation

Department of Chemical Engineering

Cellulosic ethanol is a biofuel that is produced from the inedible parts of plants. The demand for fuel sources and fuel additives such as cellulosic ethanol has become much greater due to the need for cleaner, renewable energy sources. Currently, the majority of cellulosic ethanol is made through a process known as acid hydrolysis. This is where the inedible parts of plants, such as corn stover, are treated with acid to release the sugars which can be fermented into ethanol. Although ethanol can be produced in this manner, it is not economically feasible. A more efficient method is to treat the feedstock with liquid anhydrous ammonia, known as ammonia hydrolysis. Our senior design project is to build an ethanol plant that will use this method to not only increase production of ethanol but also allow for the unfermentable parts of the plant, known as lignin, to be captured and sold as a value added by-product. One of the biggest benefits to using ammonia hydrolysis is the ability to recycle the ammonia, with only a small make-up stream, which is not possible with acid hydrolysis. Our plant will have the ability to produce a more economically feasible ethanol.
Air Separation Unit to Create Zero-Emission Oxy-Combustion Energy
Khalid Aldhahri, Thomas White, Daniel Marken, and Omar Alrajeh with Dr. Joseph Holles
Chemical Engineering Department
University of Wyoming
Oral Presentation
Laramie, WY

The University of Wyoming has proposed the construction of a large wind tunnel that will draw 1-2 MW of electricity. This is a significant amount of energy that may affect the University and possibly all of Laramie. To avoid power outage throughout the city, the first part of the process is proposed to use a gas-powered turbine to provide the electricity for the wind tunnel. The turbine will use oxy-fuel combustion, combustion of pure oxygen as opposed to air, so that pure CO₂ and water will be the sole emissions. With CO₂ and water being the sole emissions our hope is we will create a suitable design for zero emission energy. The second part of the process is using an Air Separation Unit. Having an Air separation Unit will allow us to extract pure oxygen from the air. Finding an optimal method of air separation or oxygen concentration will be required to supply the oxygen for the combustion. This project is not cost effective because there are not really any products being sold. However, this project is still useful because the energy created will provide the wind tunnel its needed energy, which enhances academic prosperity.

Manufacturing of Acetic Acid from Natural Gas via Methanol Process
Abduljawad BuAreash, Hassan Alsaraaf, Ameen Alabdulaal, Abdusalam Alghamdi and Evan Dearth, Dr. Joseph Holles
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation
Department of Chemical and Petroleum Engineering

Acetic acid is a valuable chemical that can be utilized in a variety of applications. The demand for this compound is expected to continue increasing in the next few years. Our objective is to produce acetic acid from natural gas passing through three main units of the plant: syngas plant, methanol plant and acetic acid plant. The method that is utilized to manufacture acetic acid uses methanol and carbon monoxide as feed stocks. There are four main reactions that are taking place within the plant, one of which involves a catalyst that has a large impact on the operating cost. The quantity of acetic acid that is going to be produced is approximately 500MMlb/yr. The material balance requires 131.5 million lb/yr of natural gas; this is one of our major expenses since it is a main feed. The location of the plant has been selected to be in Ohio due to the readily available amount of shale gas. The cost estimation of the entire plant is $950 million. It is anticipated that the revenue will reach $330 million and yields a profit of $230 million. Based on our calculations and simulation, our payback period is about four years.
Monitoring crop growth before and under center-pivot irrigation system using multi-temporal Landsat images

Emmalee Allen\textsuperscript{1} with Ramesh Sivanpillai\textsuperscript{2}

\textsuperscript{1} Department of Plant Sciences/Agroecology program and \textsuperscript{2} Department of Botany
University of Wyoming
Oral Presentation

WyomingView  \hspace{2cm}  Eden, WY

The small town of Eden is located in the Eden Valley in southwest Wyoming. This small community, located in a semi-arid high desert region, consists mainly of agriculture. Growers in the area produce primarily Alfalfa for livestock fodder. Due to the semi-arid climate and sandy soil conditions, salt runoff into the Colorado River through irrigation caused problems prior to the 1980’s. The government established a program at this time to encourage Eden Valley farmers to change from flood to center pivot irrigation. Several growers did make the switch to center-pivot irrigation from flood irrigation system in order to minimize salt leaching from runoff waters as well as to conserve water.

The research objective was to analyze the effect of the switch from flood to center pivot irrigation on crop growth through the use of Remote Sensing. Remote sensing has been used as a successful tool to analyze management practices in agricultural operations. Crop growth in a 140 acre of alfalfa grass mixture field in the Eden Valley was analyzed before (1984, 1985 and 1987) and after (1991 – 1993) the center-pivot irrigation system was installed. Landsat images acquired prior to the first harvest in these years were used to identify crop growth based on very high to very low vigor. This information was then used to compare the effect of center-pivot irrigation system on crop growth.

Biogeochemical Interactions at Thermopolis Hot Springs

Tim Allred, Austin Buckingham, Georgianna Holley, Ruth Law, Nadav Oakes, Nathan Yeomans with Suzanne M. Smaglik and Steven J. McAllister

Health & Science Division
Central Wyoming College
Poster Presentation

CCURI, INBRE  \hspace{2cm}  Riverton, WY

Genetic identification of thermophiles found in the hot springs of Thermopolis, WY, and analysis of their environment could provide insight into the ancestry of Earth’s early inhabitants as well as the possible existence of life on other planets. The main spring flows from its source (52°C) down a 150-meter long channel to the first cooling pond (47°C), proceeding 100 meters to cascade over travertine cliffs, at 0°C in the winter. A smaller spring flows out of a vapor cave (at 54°C) lined with sulfur and other crystals. Recent procedures at the park have reduced the colonies of bacteria by raking the microbial mats.

Variations of the mat colors and their locations were noted. Twelve microbial samples where collected and the DNA extracted using a MoBio Soil kit. The DNA was run by gel electrophoresis to confirm the presence of the DNA. The DNA was replicated using PCR and sent for analysis of the 16S rRNA gene. Fresh samples were described microscopically. Underwater video of the bacterial “forests” was produced as well. Water collected at the sites where analyzed in the field for various
geochemical factors (esp. H₂S). Our new data will contribute to a better understanding of this complex ecosystem.

**Fischer-Tropsch Synthesis – Natural Gas to Diesel Fuel**

Faraj Almarri, Bennett Carv, Travis Stevenson, Ali Al Musabeh, Mohammed Alyousif
With Drs. John Myers & David Bell
Chemical Engineering
University of Wyoming
Oral Presentation

Currently, the steady increases in oil prices have heightened the interest in synthetic liquid fuel sources derived from natural gas. Furthermore, there are a lot of positive experiences with natural gas in the last few decades involving abundance and cleaner energy. Natural gas to liquid fuel via Fischer-Tropsch reactors produces diesel and other useful hydrocarbons. This catalytic GTL (gas to liquid) process converts methane gas (C1) to longer liquid hydrocarbon chains between C5 and C22. These longer hydrocarbon chains can then be utilized as liquid fuels after being refined to diesel. This project has four main stages to achieve the estimated production of diesel at 500 MM lb/yr. These include the Auto-Thermal Reformer for creating syngas from methane, Fischer-Tropsch Reactor for converting syngas to long hydrocarbon chains, Hydrocracker to cut down hydrocarbon chains into desired lengths, and product upgrading/refining for further separation of diesel chains. The fixed capital costs of the simulated plant run upwards of $1.2 Billion with an IRR of 8% over a 20 year analysis. The key to success for this project is keeping overhead expenses low to obtain a substantial profit. Fischer-Tropsch technology, if made more economically viable, could be the future of abundant energy.

**Natural Gas to Olefins**

Salman Almutawa, Travis Wells, Scott Chase, and Mohammed Alzain
Mentors: John Myers and David Bell
Chemical and Petroleum Engineering Department
University of Wyoming
Oral Presentation

In the last decade, the United States has seen a significant boost in domestic natural gas and oil production. With this available new feedstock of Natural Gas Liquids (NGLs), the potential to construct a profitable olefins plant is very high. Olefins, mainly ethylene and propylene, are among the highest produced and used petrochemical in the world. The plant researched and designed in this report has the capacity to produce over 1.5 billion pounds of ethylene and propylene utilizing North Dakota NGLs. This plant will be located in the gulf coast region and consists of ten crackers which convert a 75/25 mass percent feed of ethane and propane respectively into the desired olefins. After the crackers are five quench towers which stop the reaction and cool the products. A large fractionation system then follows the quench towers to purify the ethylene and propylene to 99.9% and 99.7% polymer grade purity respectively. The overall projected cost for this plant is $1.26 billion dollars with an initial return rate of 23%. This estimated cost is based on our running simulation, current feed and product costs, priced equipment for the plant, and basic heat integration.
Hydraulic Fracturing Methods
Ali Alsaffar, Blaine Pelton, Tyler Davis, and Tyler Dvorak with Dr. Brian Towler
Petroleum Engineering
University of Wyoming
Oral Presentation

Our presentation is focused on the types of hydraulic fracturing methods being used in unconventional reservoirs in the United States. The methods covered are slickwater fracturing, gel fracturing, foam fracturing, and gas fracturing. We will be covering safety, environmental concerns, and economics behind these four methods. Lastly, we will present a short overview of where these fracturing methods are being employed in the United States.

Water Resistivity Anomalies in the Uinta Basin
Andrea Alvarez, Josh Lancaster, Kelly Seidel, and Weikang Li with Dr. Brian Towler
Department of Petroleum Engineering
University of Wyoming
Oral Presentation

Water resistivity is an important key in the exploration of petroleum because of the direct correlation between material density, saturation, and conductivity. The Uinta Basin is located in northwestern Utah and northeastern Colorado. Anadarko Petroleum has been exploring and producing in this region for many years. Throughout their production they have segregated two regions: the fairway and the off-fairway. The fairway designates the region of successful production. The off-fairway designates a peculiar area, denoting poor production despite the similarities between the well logs from both regions. Given data sets from Anadarko Petroleum, our goal was to manage the formations, to eliminate the excess data, narrow the data so that we may examine the basin and the water saturation levels of each well. For a single well, there were several samples retrieved at different levels of perforation. Using the mapping program Surfer and Microsoft Excel, data was organized and regional saturation was mapped. Then, we were able to examine the patterns in water resistivity and network of fractures. We concluded that the water resistivity varies depending upon location. We were able to provide Anadarko Petroleum with an accurate estimation for water resistivity constants in particular formations and locations in the basin.
Bentonite as Plugging and Abandoning Material in Low Temperature, Low Salinity Wells
Patrick Amole, Brad Brinkerhoff, Frank Micheli, Jeremy Meyers with Dr. Brian Towler
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

This project is focused on the future of plugging and abandonment of oil and gas wells in Wyoming with hydrated bentonite. The project has been split into two parts. The first part of the project is to construct bullet shape bentonite plugs that will be used in the plugging of the wells. These bullets will be used in further lab and field experiments that will provide more data on the effectiveness of bentonite as a replacement for cement in plugging oil and gas wells. The second and main part of this project is to seek a rule change with the Wyoming Oil and Gas Conservation Commission, WOGCC, to allow bentonite to be used in Wyoming as an alternative to cement in the plugging and abandoning process. This is an important rule change for the state of Wyoming to make because it will save both the state and companies a large amount of money, which in turn will make the exploration and production of the state’s natural resources more profitable for everybody involved.

Farmer Co-designed agroforestry initiative provides preferable plant biomass alternative and reduces field residue removal by subsistence farmers in Kenya
Erin Anders1 and Urszula Norton2
1Agroecology Undergraduate Student, 2 Student Advisor and Assistant Professor of Agroecology
Department of Plant Sciences
University of Wyoming

This study will evaluate the magnitude and origins of plant biomass use in everyday small-holder farmer households. Implementation of farmer co-designed agroforestry practices as an offset to current post-harvest field residue collection and transition processes associated will be assessed. We hypothesize that post-harvest crop residue use is critical to current subsistence strategies. It is further hypothesized that co-designed alternative resources will mitigate farmer need to remove post-harvest field residue. Transitional timing has been established through recorded biomass weight and results suggest that household use on average 17 Kg of plant biomass per household member per month. Plant biomass mitigation, as a result of newly planted alternative agroforestry sources, has occurred as early as February 2013 (six months after planting). System cascades associated with changes in plant biomass use will be assessed through December 2013. Conservation agriculture practices (CAP) encourage smallholder farmers to leave post-harvest residue on soil surface to improve soil fertility and overall agroecosystem sustainability. However, pressures associated with post-harvest residue utilization for household food preparation use and animal fodder limit adoption. Therefore it is important to identify alternative farmer adoptive resources for this purpose.
Simulation of Wellbore Plugging with Bentonite
Levi Anderson, Kyle Huseth, Yi Bai, and Matthew Melton with Dr. Brian Towler
Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

Department of Chemical and Petroleum Engineering
Wright, WY
Powell, WY
Shandong, China
Wasilla, AK

The purpose of this study is to obtain relevant data to determine the viability of Bentonite as a well abandonment material. The most commonly used and widely accepted method of plugging and abandoning depleted oil and gas wells is cement plugs. Bentonite has several physical properties that make it a potential replacement material for cement, such as its ability to repair and rehydrate after being damaged such as in the case of underground seismic events. Bentonite plugs are also less permeable than cement plugs. This research study utilizes five different joints of casing to test the effects of multiple variables such as temperature and salinity. Trials were completed with plugs saturated in 10,000 ppm and 20,000 ppm saline water, as well as with freshwater. Effects of temperature were tested starting at 100 degree Fahrenheit and increasing in increments of 20 degree Fahrenheit. Results indicate that Bentonite plugs hydrated in freshwater are significantly stronger than identical plugs hydrated in saline water. Data obtained indicates that strength sensitivity to temperature exists. Our results have shown that in certain applications Bentonite plugs are a feasible to cement in wellbore plug and abandonment.

Turbulence in Action: Toward a Fractal Poetry
Zachary Anderson, Professor Kate Northrop
Department of English
University of Wyoming
Oral Presentation

UW Honors Program
Cheyenne, WY

Mathematics and poetry are often regarded as two contradictory, if not incompatible, fields of study. This is not the case, as poetry is structured through mathematical series and repetitions. Furthermore, mathematics and poetry are both fundamentally systems of relations among distinct terms where meaning is a result of variations in these relations. The purpose of this creative study is to synthesize mathematical and poetical principles into a substantial poem. The basis for this synthesis is fractal geometry. On the critical side of this study, I have assembled a foundation of theory from poets such as Alice Fulton who have attempted to write fractal poetry or otherwise synthesize mathematics and poetry. For the primary, creative aspect of this study, I wrote an epic in miniature that reimagines Sir Lancelot in the modern age, using the main elements of fractal poetry (turbulence, chaos, self-similarity). This study has revealed that it is possible to create fractal-based poetry. However, it seems that in order to do so, one must conceive of the fractal in looser terms than pure mathematics.
Effects of Lanthanum Doping on EuO Thin Films
Stephen Bagley with Dr. Jinke Tang
Department of Physics & Astronomy
University of Wyoming
Oral Presentation

Europium monoxide (EuO) is a semiconductor that is magnetic at sufficiently low temperatures. Thin films of EuO grown on a substrate material exhibit somewhat different magnetic and structural properties than regular EuO, and these properties can be further altered by doping the film with rare earth elements. We have prepared and studied thin films of EuO doped with Lanthanum (La). We prepared the films using pulsed laser deposition to grow the film on a silicon wafer in a vacuum chamber. The structural properties of the resulting film were analyzed using X-ray diffraction. The magnetic properties of the film were measured using a physical properties measurement system; in particular we measured the magnetization of the film as a function of temperature. Thin films that are magnetic at higher temperature have a greater potential for practical use. We compare the properties of our La-doped EuO film to the properties of previously studied EuO thin films, including undoped EuO films and EuO films that have been doped with other rare earth elements.

Mechanical Behavior of Cyclically Loaded Poly(paraphenylene) Porous Scaffolds for Potential Use in Biomedical Devices
Dustin Bales with Dr. Carl Frick
Mechanical Engineering
University of Wyoming
Oral Presentation

The purpose of this research was to investigate fatigue behavior of open cell porous scaffolds constructed of Poly(paraphenylene) (PPP). PPP is reputed to have strength and stiffness properties nearly an order of magnitude higher than conventional biomedical polymers, and is in compliance with biocompatibility standard ISO 10993. It is our belief that the exceptional strength, stiffness, and toughness of PPP will allow for the creation of a porous structure that can match the stiffness of trabecular bone, while maintaining suitable mechanical properties for use as a load-bearing biomaterial. Porous orthopedic biomaterials are advantageous because they offer the possibility of creating a strong interface through osteointegration (i.e. bone ingrowth). However, the fatigue behavior (i.e. mechanical behavior under cyclic or repeated loading) of PPP has not been previously investigated, and would be critical for any such device. PPP samples of 75% porosity, with pore sizes appropriate for osteointegration, were cyclically loaded until failure. Loading results were analyzed using well established foam theory, and were used to develop the relation between stress and the number of cycles to failure (S-N).
Art and Oils: Mediums for Self-Internalization
Whitney Balzan with Diane Panozzo and Wendy Bredehoft
Department of Health Science: Kinesiology and Health Promotion
University of Wyoming
Oral Presentation

 Through previous research into art therapy, and investigations of the art of specific artists, I have discovered ways in which art can help uncover one’s self on a deeper level. Carol Prusa is an artist who combines her scientific background with her artistic ability; a very precise process involving anatomy, mathematics, physics, domes, LED lights and silverpoint techniques. To find this art form she followed a path of self-discovery by exploring various art mediums, techniques, concepts and purposes. She currently describes herself as a “conceptual voyager”, and continues to use discovery processes to develop her artistic abilities.

I will investigate the influences of artists Carol Prusa and Brian Dickerson, continue researching the field of art therapy, and engage in creative art making processes as a means to self-internalization. I will use oils and charcoal as tools in my own discovery processes. My focus continues to be the human body (Prusa) and abstraction (Dickerson). The impact of this study will be to bring awareness of the healing and freeing aspects of artistic creation. The ordinary person may not be an “artist” but by freeing themselves to create, they may gain insight to their personality, memories, past and even future.

Coccidia (Apicomplexa: Eimeriidae) from Dipodomys ordii (Mammalia: Heteromyidae) of North-central Wyoming
Brittany L. Elliott¹, Delina E. Barbosa¹, Dr. R. Scott Seville¹, and Dr. Zachary P. Roehrs²
¹Department of Zoology and Physiology
University of Wyoming / Casper Center
²Department of Biology
Laramie County Community College
Poster Presentation

This study focuses on documenting coccidia (Apicomplexa: Eimeriidae) infecting Ord’s kangaroo rats (Dipodomys ordii) captured near Lysite, Wyoming. Although previous studies have examined D. ordii for coccidia infections, this is the first study in Wyoming. Fecal samples were collected from captured rats during the summers of 2011 and 2012. Samples were saturated with 2% potassium dichromate and held for approximately one week in petri dishes to allow sporulation of oocysts. Oocysts were isolated from feces by flotation in Benbrook’s saturated sugar solution onto coverslips that were then examined at 1250X by light and Nomarski direct interference contrast microscopy. Ten oocysts were isolated from two host samples. This study extends the geographic distribution for coccidia infecting D. ordii and expands our understanding of biodiversity and distribution of this widespread, diverse parasite group.
Examination of Three Wyoming Vertebrates for Infection with Coccidia (Apicomplexa: Eimeriidae)

Ashtyn N. Kilpatrick, James A. Erdmann, Delina E. Barbosa, Dr. R. Scott Seville, Dr. Zachary P. Roehrs

1Department of Biology
Laramie County Community College
2Department of Zoology and Physiology
University of Wyoming / Casper College Center
Poster Presentation

Despite the importance of coccidia in natural environments, few Wyoming vertebrates have been examined for these parasites. This study examined 3 Wyoming species—Lithobates catesbeianus (American bullfrog), Onychomys leucogaster (northern grasshopper mouse), and Perognathus fasciatus (olive-backed pocket mouse)—for coccidia infection. Samples were collected in 2011 and 2012, stored in potassium dichromate, and examined with a DP72 digital camera-equipped Olympus BX40 microscope. Four fecal and 5 intestinal samples from O. leucogaster, 1 fecal sample from P. fasciatus, and 8 fecal samples from adult and 2 from tadpole L. catesbeianus were examined. Of these 3 species, 2 oocyst morphotypes have been identified from P. fasciatus ($n_1 = 49$, $n_2 = 1$) and 1 morphotype from the tadpoles of L. catesbeianus ($n = 1$). Oocysts of the $n_1$ morphotype from P. fasciatus are prolate, $20.86 \times 18.50$ ($18.26–23.29 \times 16.28–20.11$) μm, with uniform round oocyst residua, 1 or 2 polar granules, ovoid sporocysts of $10.39 \times 7.55$ ($8.55–11.54 \times 6.25–8.83$) μm, with mastoidal Stieda bodies, lacking substieda and parastieda bodies, and 3 spherical sporocyst residua. These records constitute the first reports of coccidia infecting these hosts from this region, and may represent undescribed species.

Deaf Education in Africa and America
Hana Beamer with Dr. David L. Jones
Department of Communication Disorders
University of Wyoming
Oral Presentation

Differences in the education of deaf individuals in America and Africa are astounding. I first realized this upon visiting a school for the deaf in Musanze, Rwanda. Seeing the school and speaking with the director made it very clear that education for the deaf in Rwanda is far behind that in America. My senior project is designed to note the causes for the differences between deaf education in America and Africa as a whole, and what more can be done on both continents to advance deaf education. Differences in etiology of deafness in Africa and America were looked at as well as the history of deafness in society and education. America and Africa have many of the same causes of deafness; however Africa has slightly more due to fewer medical advances, lack of education, and general awareness of the impact of illness. Deaf education in America is far more advanced than that in Africa. Although solutions for the improvement of Deaf education are much more apparent in Africa than America there are still ways to improve upon education programs in both places to better serve deaf individuals in the future.
Perspectives on and effects of conservation agriculture on soil fertility in Uganda
Kristi Bear with Dr. Jay Norton
Ecosystem Science and Management
University of Wyoming
Poster Presentation

This study will investigate whether Ugandan farmers’ attitudes towards conservation agriculture and soil fertility differ between farmers who are implementing conservation practices and those who are not. It is hypothesized that farmers who are practicing conservation agriculture will have a more positive attitude towards conservation agriculture and their fields will have enhanced soil fertility. Sixteen farmers of similar economic status will be chosen from two locations in Uganda, half who practice conservation agriculture and half conventional agriculture. Semi directive interviews will be conducted with farmers on field history and opinions of conservation. Interview analysis will use open coding in which themes, trends and/or patterns will be identified. Soil samples will be collected from each plot and analysis will include basic fertility tests. This study will help bridge the gap in knowledge on whether conservation agriculture is improving soil fertility in Ugandan farms as well as add insight into challenges of transitioning from conventional to conservation agriculture.

Avalanche Advisory App
Nils Beasley, Sarah Reichert, and Brett Riotto with Dr. Ruben Gamboa
Department of Computer Science
University of Wyoming
Oral Presentation

Our senior design project is an android application that will provide several features for backcountry skiers. The first and most important of these features is the ability to obtain avalanche advisories for the Jackson Hole area, and store the day’s advisory on the phone each morning. This way, the information can be read later in the day, when the skier is out of cell coverage range. While in coverage area, the skier can access previous date’s advisories. The second feature is the ability to store snow pit data using the gyroscope and GPS hardware of the phone. The third feature is the ability to view webcam photos from existing cameras in and around the ski resort. The fourth feature is the ability to record and view observations and notes for the skier’s personal use, and will be stored only on the skier’s personal device. The last feature is the ability to access elevation specific NOAA forecasts. One use of this app is the forwarding of vital avalanche information to backcountry skiers and other backcountry recreational participants. Another-use is the ability for users to record important personal information easily and be able to retrieve that information when they need it.
I examined past research on limited studies of structural cyclomorphosis in zooplankton populations as well as large scale size selection by predation. I compared the conditions under which cyclomorphosis occurs and the body size favoured under the pressure of different predation styles to predict cyclomorphic response in ecosystems with diverse predator assemblages. The data showed that larger predators selected for smaller body size while smaller predators selected for larger body size in zooplankton populations. Because structural cyclomorphosis is used to alter body size, I predicted that structural cyclomorphosis would be more prevalent in ecosystems with a predator assemblage composed predominantly of smaller predators.

Non-Pneumatic Composite Moonbuggy Wheel
Kevin Beckman, James Roland, Jacob Lloyd, and Ian Henry
with Mr. Scott Morton and Dr. David Walrath
Department of Mechanical Engineering
University of Wyoming
Poster Presentation

The National Aeronautic Space Administration (NASA) holds an annual student design competition in Huntsville, Alabama called the Great Moonbuggy Race. In the past, the University of Wyoming’s moonbuggy has used bicycle wheels. However, this year, the University of Wyoming split the moonbuggy project into two separate teams. One team designed the moonbuggy, and the other team designed wheels for the moonbuggy.

The wheel design was based on both mathematical modeling and SolidWorks® computer modeling. These wheels are expected to be an improvement over ordinary mountain bike wheels, as they are designed to withstand higher axial forces, have a lower rolling resistance, and provide improved suspension. The wheels are made almost exclusively out of composite material. Kevlar® was used in the design of the wheel spokes and the rim. A strip of rubber material was used for the tread, and the wheel hub is made of 6061-T6 Aluminum. The wheel has 18 spokes that are each 0.18 inches thick with a spoke angle of 80° and a 9.4 inch radius of curvature. The outer diameter of the rim is 25.5 inches. The entire moonbuggy project is funded by NASA and has a total budget of $5,000, and the moonbuggy wheels project was granted up to $2,000 from that budget.
During Dr. Obert’s Postcolonial Literature class in Fall ’12, I became immersed in the work of Seamus Heaney, who is quite well-known not only as a literary translator, but also as an esteemed Northern Irish poet. The question I posed was whether the idea of the feminine in Heaney’s poetic work was treated with too much violence, particularly since Ciaran Carson—Heaney’s colleague—had accused him of just that.

Through close reading and analysis of Heaney’s works to date, extensive searching through secondary criticism, and more closely acquainting myself with Northern Ireland’s Troubles (the theme of Heaney’s poetry), I compiled evidence of gendered violence and literary tropes common to Irish poetry. I was able to come to the conclusion that Heaney does portray an horrific quantity of violence against women in his work, but he also displays a good deal of cognitive dissonance, guilt, and hope, such that it does not appear to be the author’s explicit wish to portray women or Ireland as victims; moreover, Ireland’s struggle for full independence, autocracy, and safety is analogous to that of women’s struggles across the globe in the twentieth and twenty-first century, with an upward projection.

**Awaiting The End: The Eschatology of American-Israeli Relations**  
Jacob H. Benson with Dr. Quincy D. Newell  
Program of Religious Studies  
University of Wyoming  
Oral Presentation  

Beginning in the late 19th century, Zionism – the desire by Jews for a Jewish homeland – began to emerge as a dominating geopolitical movement. By the time Israel gained statehood in 1948, Zionism’s definition expanded to encapsulate competing Jewish and Christian theologies, as well as ethnic and political philosophies. I argue that religious Zionism has permeated the political discourse and created an American Zionism that creates a view of the Middle East that influences the way Americans talk about Israel, Arabs, and Muslims. This paper argues it is important for Americans to understand a movement that dictates how their government spends billions of dollars every year, as well as how the government dictates foreign policy toward the Middle East. Contained is a brief history of Zionism, as well as an overview of the theological views of Christians who wholeheartedly support Israel. I use Interviews with local Christian Zionists, as well as excerpts from online message boards to provide insight to the way the average American Zionist discusses the Middle East in ways that mirror the ways Evangelical Christians discuss the end of the world.
Methods in Immunology for Brucella Abortus
Jacob Berg with Dr. Jeffery Adamovicz
Department of Veterinary Sciences
University of Wyoming
Oral Presentation

NASA Space Grant Undergraduate Research Fellowship Cheyenne, WY

Bovine in the Greater Yellowstone Area (GYA) of the United States are consistently exposed to Brucella abortus. This bacterium has been known to cause abortions in cattle resulting in an economic loss to the owner and operator. The current veterinary vaccine, B. abortus RB51, is inadequate in giving broad host range protection against infection in domestic livestock. A complete understanding of how the vaccine strain, RB51 when given in a single dose, affects the immune response of cattle, Bos taurus. We propose to study the effects of multiple doses of RB51 in cattle. This study focuses on the methods needed to continue this research and move toward quantifying the results of vaccination of cattle against the Brucella abortus. This is a presentation of the methods developed to aid in that study.

Method Optimizing Micropropagation of Cold-hardy Grapevine Cultivars
Daniel Bergey,2 Berva Dawn Brock1, Lacey Lyn Fisher1, Jeremiah Vardiman1, and Sadanand Dhekney1

1University of Wyoming, Sheridan Research and Extension Center, 2Sheridan College
Oral Presentation

Paul Stock Foundation/Bert Bohmont Sheridan, WY

Grapevine bacterial and viral diseases are transmitted through infected propagation material. Micropropagation is utilized for production of disease-free stock vines. The goal of this study was to study proliferation and regeneration rates of cold-hardy grapevine cultivars.

Shoot tips of ‘Bronx Seedless’ ‘Himrod’ and ‘Interlaken’ were obtained from greenhouse-grown grapevines. Explants were surface-sterilized by a brief rinse in 70% alcohol, agitated in a 25% commercial bleach solution for 3 min and then rinsed in distilled water. Explants were dissected to remove outer leaves and transferred onto C2D medium with 4.0 µM BAP. Cultures were maintained at 25°C, 16h/8h photoperiod and sub-cultured by transferring single nodes to fresh medium every 4 weeks. The number of shoots obtained from each explant was recorded after each transfer. After 12 weeks, shoots were transferred to rooting medium containing C2D medium plus 0.5 µM NAA.

A high proliferation rate was observed in the grape cultivars studied. For instance, ‘Himrod’ cultures produced 8 shoots per explant during the first transfer, which increased to 152 following the second transfer. Rooted shoots were hardened in a growth chamber and transferred to a greenhouse. Proliferation rates of additional cultivars are being studied to optimize micropropagation protocols for producing disease-free grapevines.
As climate change and human populations continue to stress water resources, the need for effective water management will only increase. The Intermountain West relies extensively on annual snow pack for water supplies for downstream agricultural and municipal use. To better inform water resource managers and overcome current gaps in understanding how precipitation is transformed into river flow and groundwater recharge, water balance maps of watersheds illustrating precipitation and flow patterns become invaluable tools.

Given the Snowy Mountain Range’s significant contributions to water resources, spatial analyses of watersheds within this mountain environment to build an atlas of spatial information becomes crucial for water management. The creation of this digital repository relies upon emergent field-based hydrologic sensors, isotopic analysis and ArcMap software. More specifically, an array of sensors emplaced in forest watersheds in the Snowy Mountain Range allowed for the analysis of key water balance components including rainfall and runoff patterns, snow depth and water content, timing of snowmelt, proportion of precipitation converted into runoff, and proportion of river discharge due to groundwater or surface water. ArcMap software aided in analyzing watershed boundaries, soil and geological characteristics of the watersheds, terrain characterization, and identifying geological features that control hydrological processes. Ultimately, current and upcoming analyses and data collections will produce a high quality water budget map.

Residents of Wyoming are familiar with ideas regarding the exchanges of culture between native peoples and encroaching powers moving into their lands. Two thousand years ago, native European peoples faced similar situations as their homelands became the frontiers and provinces of the Roman empire. After becoming part of Rome, these provinces allegedly became increasingly acculturated, taking on various aspects of Roman culture and cultural identity – a process known as “Romanization”. This paper will examine the historical accounts of Romanization, as well as secondary literature today critiquing this interpretation of past cultural change, and will argue for a model of creolization rather than the traditional models representing these shifts as instances of cultural replacement.
**Pavillion Water Contamination**  
Kristen Boden, Yafei Liu, Brett McIntosh, and Eli Zent  
Petroleum Engineering  
University of Wyoming  
Oral Presentation

*Chemical and Petroleum Engineering*

We will be presenting issues with the Pavillion, Wyoming water contamination concern. We will discuss the main issues and make recommendations of how to resolve each issue, which include repairing production wells that have poor or no cement in the casing, recompleting EPA monitoring wells, no potable water, and legislature. Along with these, we will also discuss the economical, ethical, environmental, and safety impact related to the topic.

**EPCOT to Epcot: Changes in Educational Approach in Disney’s EPCOT Center Attractions**  
Christina Bogdan with Dr. Susan Aronstein  
Department of English  
University of Wyoming  
Oral Presentation

*UW Honors Program*  
Lake Oswego, OR

In the mid-1960s, Walt Disney introduced plans for EPCOT, a state-of-the-art city dedicated to showcasing American innovation in industry and technology. In 1966 Walt died, as did the idea of EPCOT as a city. The EPCOT name and some of the EPCOT concepts were later reformatted into an educational theme park EPCOT Center.

The purpose of this project is to examine alterations made to EPCOT Center since its opening in 1982 and to determine how these changes impact the park as an educational experience. I explore the narrative of the park and the narrative of its attractions through a combination of field observation, literature review, and video review of extinct attractions. Overall, park attractions shift from being primarily educational to being entertainment based, either through the inclusion of animated characters or the addition of thrill rides. Attractions retaining an educational purpose present their information in a less formal and less academic style than the original attractions. These changes in attractions’ focus and narrative style indicate corporate perceptions of what experiences park guests want and what they are willing to pay for, as well as act as an indicator of larger social trends.
Estimating intra-annual changes in the surface area of Sand Mesa Reservoir #1 using multi-temporal Landsat images
Cody A. Booth¹ with Dr. Ramesh Sivanpillai²
1. Department of Ecosystem Science and Management and 2 Department of Botany
University of Wyoming
Oral Presentation

WyomingView                  Pinedale, WY

Sand Mesa Reservoir #1 is a man-made reservoir constructed to improve habitat for several wildlife species and is located in Fremont County, Wyoming. Wetlands surrounding this reservoir also filter the sediments and other pollutants from the farmlands before the water flows into Boysen Reservoir. However no in- or out-flow records are available for this reservoir that can be used for reconstructing past changes in the water level or surface area.

Changes in the surface area of this reservoir was mapped with Landsat images acquired in 2007 and 2009 growing seasons (June and September). Results indicate that the surface area decreased linearly throughout the growing season in both years. However the surface area in 2009 was higher in comparison to 2007. This methodology can be applied to other cloud-free Landsat images acquired since 1984 for reconstructing seasonal and annual changes in the surface area of Sand Mesa Reservoir #1.

Proton Exchange Membrane Fuel Cell (PEMFC)/ Ultracapacitor (UC) Powered Laptop
Phil Bourgeois, Steven Toedter, Thomas Romshek, and Will Miller with Mr. Scott Morton
Department of Mechanical and Energy Systems Engineering
University of Wyoming
Oral and Poster Presentation

Department of Mechanical and Energy Systems Engineering             Hawk Springs, WY
Centennial, CO
Windsor, CO
Arvada, CO

Microsoft™ and FuelCell Energy Inc. have created a joint venture to build a fuel cell powered data center in Cheyenne, Wyoming. The primary challenge, inherent to the project, is the rapid manner with which a data center’s power demand changes; coupled with the much slower transient behavior of the fuel cell’s power production. The main goal of ProCell Engineering, an Energy Systems Engineering Senior Design team, is to produce a scaled version of the Cheyenne data center project. ProCell utilizes ultracapacitors to provide the supplemental power during abrupt increases in power demand while the fuel cell increases power production. While the fuel cell for Cheyenne’s data center will produce 300 kilowatts of power, ProCell’s project has been sized down to 75 watts. To further model the system in Cheyenne, an IBM™ laptop was implemented to simulate the data center. The system is designed to operate at ambient room conditions with 5 farads of capacitance and a minimum operating voltage of 13 volts. The successfully designed system will operate under peak load for any duration of time.
Student Attitudes Regarding the Impact of the Murder of Mathew Shepard
Alex Brink with Dr. Cathy Connolly and Dr. Andrew Garner
Political Science and Gender & Women’s Studies
University of Wyoming
Oral Presentation

The purpose of this study is to discover and understand the importance of the death of Matthew Shepard on the current students at the University of Wyoming. In end, I hope to answer the following question: Is Matthew Shepard’s death and person a salient issue on the UW campus for students? If so, what is the surrounding discourse? In this discussion of discourse I will look at issues of Wyoming’s “hate state” reputation, what is salient in contemporary student opinion, myth-making, and other themes identified in the research process. This research is two-fold. First students will be surveyed in public campus areas, and then offered an opportunity to participate in an interview to explain their perspectives.

HTML 5 Game Development with Impulse.js
Dustin Brown and Sean Ludtke with Dr. Ruben Gamboa
Department of Computer Science
University of Wyoming
Oral Presentation

Game development for internet browsers such as Microsoft’s Internet Explorer or Mozilla’s Firefox has traditionally required the presence of a client-side plug-in, such as Flash or Java. However, with recent developments in web standards, and HTML 5 specifically, it is becoming increasingly possible to migrate such games into a completely native, standards-based web applications. In order to prove the viability of these applications, and provide a uniform boilerplate for their implementation, we created Impulse.js. Impulse.js is an HTML5 compliant API and library implementation written in JavaScript of common tools and procedures to make native game development easier. Simply, it is a game engine that runs in HTML5 compatible browsers, which includes tools for graphics, audio, networking, physics, asset management, and more. The results show that HTML5 game development is extremely viable, as well as highly performance.
Race and Shopping: Does it still matter?
Kassidee Brown, Kya Cole, Cody Greenwald, Brianne Long, Braden Henderson with Dr. Stephen Miraglia
Behavioral Science Department
Western Wyoming Community College
Oral Presentation

WWCC Honors Program       Rock Springs, WY

Consumer Racial Profiling (CRP) is a well-documented aspect of the American marketplace. However, most of the research is anecdotal or based on opinion surveys; CRP studies suffer from a lack of empirical research. Not many empirical studies exist which scientifically support the existence of CRP.

In effort to empirically test the prevalence of CRP we are conducting a CRP field study at two malls in the Salt Lake Metropolitan area. Our research participants are men and women from the major ethnic groups in the United States. Furthermore, a study on interracial and homosexual couples will be included in particularly intimate stores. Customer service will be measured by greeting time, friendliness, and customer reengagement. A rendezvous right after the experiment with both participant and cross-reference advocate will negotiate on the data points. The data will be quantitatively analyzed using a basic chi-square test while qualitative data will be used to augment the findings.

Sound Levels In the Neonatal Intensive Care Unit
Julia Brown with Elizabeth Goodwin and Kimberly Raska
Nursing
University of Wyoming
Oral Presentation

UW Honors Program       Casper, WY

Sound levels in the Neonatal Intensive Care Unit (NICU) are a source of environmental stress to already vulnerable premature infants. Many physiological changes occur when premature infants are exposed to high levels of auditory stimulation and sound levels greater than 45 decibels. This systematic review encompasses several studies exploring the long term auditory and neurological developmental issues in a neonate exposed to excessive auditory stimulation. The early transition from the mother’s womb is already stressful. This stress combined with excessive auditory stimulation of the NICU can have a profound impact on the neonate’s health.

Behavioral and environmental modifications can be made to decrease sound levels to help limit the amount of stress exposed to a high-risk newborn. Physiological stability can be increased through a variety of modifications to the environment or via the manner health care is delivered. With these modifications an infant’s heart rate, respiratory rate, and oxygen saturation can improve. Decreased noise levels will help the infant grow and thrive at a healthier rate than with damaging sound levels. The impact on decreasing sound levels in the NICU can be extensive on the premature infants morbidity.
Small-scale polymers are increasingly being applied to a variety of fields, making it important to understand the behavior of polymers at small length scales. Indentation size effects (ISE) is the apparent increase in material-specific properties at very low indentation depths. These effects are observed for a wide range of materials, including polymers and metals. Unlike in metals, ISE in polymers is neither well understood nor well documented. The ISE in properties such as universal hardness and elastic modulus were investigated using nanoindentation. For this study, polydimethylsiloxane (PDMS) was chosen as a common polymer. Surface detection criteria were experimentally determined, and a consistent Berkovich indenter tip was used for all tests. The results for a cross-link density of 5% indicate two characteristics: first, there is a clear increase in universal hardness and elastic modulus with decreasing indentation depths, and second, the hardness and elastic modulus reach transient values as indentation depth increase. This illustrates the drastic ISE in PDMS at low indentation depths. The research group members and I will be combining the results for different cross-link densities to examine the effect of cross-link density on ISE. These findings will be incorporated into a manuscript to be submitted for publication.

Since its design, the U.S. Army has reinforced a specific combat vehicle with additional armor, nearly doubling its original weight. With the added load, the vehicle’s differential components can fail, and a particular splined shaft is the weak link. To maintain these vehicles, the Army periodically disassembles and rebuilds them, at which time they inspect this splined shaft. The shaft is rejected for reinstallation if it has any signs of plastic twist deformation. Currently the shafts are visually inspected, but angles of twist less than 1° are undetectable to the naked eye. The U.S. Army Materiel Systems Analysis Activity (AMSAA) has requested that 3AS Engineering, a University of Wyoming Mechanical Engineering Senior Design team, design an inspection tool that can detect angles of twist less than 1°. This tool must have a resolution of 0.01°, an inspection duration of ≤ 5 minutes, and operate with shafts of varying diameters and lengths. The amount of deformation on the shaft surface corresponding to twist of 0.01° is less than the machining tolerances indicating no single measurement on the shaft could decipher between twist and machining effects. This is overcome by taking thousands of measurements and statistically analyzing the data to detect trends indicating twist. The tool will be delivered to AMSAA in May 2013.
Reconstruction of the Holocene water-level history for Little Molas Lake, Southern Colorado
Jacob E. Buettner with Dr. Bryan N. Shuman & Jeremiah P. Marsicek
Department of Geology & Geophysics
University of Wyoming
Oral Presentation

UW Honors Program & McNair Scholars Program Ft. Laramie, WY

Water is a vital resource and its abundance is affected by climate change. Severe drought brought on by climate change affects water availability in the western U.S. Recent studies suggest El Nino-Southern Oscillation (ENSO) as a possible driver for latitudinal shifts in western storm tracks producing a north-south precipitation dipole anomaly in the western U.S. Here, we generate a lake-level record for Little Molas Lake (LML) in Southern Colorado using various lakebed sediment analyses. To evaluate this anti-phased behavior we will examine lakes in a north-south transect, where LML will provide the southern extent of the transect and Lake of the Woods (LOW), WY, will provide the northern extent of the transect. Accelerated Mass Spectroscopy radiocarbon dating, grain size, and loss-on-ignition analyses were conducted on a near-shore core from LML to establish age constraints on sandy intervals and percent organic content, respectively. LML data was compared with the existing LOW lake-level reconstruction to determine moisture availability trends during the Holocene. Evidence for the N-S precipitation dipole anomaly was observed at 5.5 ka. Ocean core data suggests ENSO frequencies began to increase after 6.0 ka, possibly contributing to the initial anti-phased relationship between water-levels 5.5 ka. Analyzing Holocene water-level responses to climate change may provide suggestions for water resource managers.

Structural Systems Design of the Lincoln Fire Department Headquarters
Michelle Burback with Dr. David Mukai
Department of Civil and Architectural Engineering
University of Wyoming
Oral Presentation

UW Honors Program Casper, WY

For the purpose of the Structural Systems Design course in which this project was completed, students were to develop a structural design to withstand all loads and meet code requirements for a certain project. Given were the architectural drawings for a fire department building to be located in Lincoln, Nebraska, geotechnical report for the building site, and design deadlines. The main objectives of the design were to choose materials and systems to carry expected gravity and lateral loading in accordance with local codes and the requirements of the architect and mechanical and plumbing engineers. Constructability and cost were also considered in the design process. The completion of the design resulted in a steel framing system to sustain gravity loading, a lateral system comprised of braced frames and masonry shear walls, and a foundation system with both strip and isolated footings. Calculation of gravity and lateral loads led to sizing of steel members, footings, roof and floor decking, and design of shear walls, braced frames, and connections. Overall, the complexities provided by the architectural floor plan, needs of the project’s other engineers, and loading conditions led to a unique structural system that met all given requirements.
A Comparative-Historical Analysis of the Effect of the *Black 14* in Shaping Student Rights and Privileges on the University of Wyoming Campus
E. Catlynne Calvetti with Jeremy Weaver
Political Science
University of Wyoming
Oral Presentation

*UW Honors Program* Cheyenne, WY

Rights and privileges of students on university campuses are the basis for gaining an understanding of the role a citizen must play in society. By providing the means whereby students may exercise their freedoms of expression and assembly, the university may provide them a foundation for the necessary civic engagement and knowledge of social issues. The presence and practice of student liberties on college campuses incites action and allows for further expansion of ideas and social change. This paper presents a qualitative analysis of current students’ perceptions of their rights and privileges on the University of Wyoming campus and the effect of the *Black 14* on the perception and awareness of students with regard to those freedoms. The results of this paper suggest the current student population does not seem to be aware of their rights and privileges. Based on this understanding, the university must either create awareness or educate students on their rights.

Improved Multi-Draw Compound Bow
Greg Canestrini, Travis Vliem, Kodi Dixon, Matt Hall with Mr. Scott Morton
Department of Mechanical Engineering
University of Wyoming
Oral and Poster Presentation

*Cody Laboratories, Inc.* &
*Gillette, WY*
*Department of Mechanical Engineering*
*Gillette, WY*
*Casper, WY*
*Rock Springs, WY*

An improved multi-draw compound bow (MDB) was developed by DrawVantage Technologies (DVT) as per the requests of Mr. Ric Asherman, CEO of Cody Laboratories, Inc. The MDB design’s intent is to reduce the draw force of a compound bow by distributing the effort of the drawing process across multiple draws. This is primarily developed for the benefit of disabled persons, or those not strong enough to pull the bow string. To achieve the reduction in draw force, the MDB utilizes a dual disk cycloid drive with a reduction of 16:1. The system is drawn via a recoil reel. A tensioning cam is attached to the output of the cycloid drive, and uses tensioning cables affixed to the bow limbs. As the cam rotates, the tensioning cables compress the limbs. A one-way ratchet clutch maintains the tension applied to the bow limbs between pulls. After pre-loading, the bow string is pulled with minimal effort, and a release mechanism on the clutch is utilized to release the pre-load, transferring pre-load energy into the bow string. The system has been designed to be adaptable to multiple bows by changing the mounting apparatus.
2013 SAE Baja National Design Competition Vehicle
Jacob Carpenter, Josh Carpenter, Luke Johnson, Cody McKinney, Chris Jenkins, David Collins, Jordan Rhodine, Anthony Fleak, Sam Rubino, and Eric Dirkes, with Dr. Dennis Coon, Dr. Rob Erikson, Dr. John Strike, Dr. David Walrath
Department of Mechanical Engineering
University of Wyoming
Oral and Poster Presentation

Department of Mechanical Engineering

The Mechanical Engineering department has sponsored the development of a single-rider off-road vehicle to compete at the 2013 SAE Baja National Design Competition in Bellingham, Washington. The vehicle is larger than an average ATV but smaller than a typical side-by-side off-road vehicle. The chassis is constructed of both 1.25” and 1” thin-wall 4130 “chromoly” tubular steel. The competition specifies the use of a stock four-cycle, air-cooled, Briggs and Stratton 10 HP OHV Intek engine. That power will be transmitted to the 23 inch rear wheels through a Comet 780 Series CVT and a SNPT forward-neutral-reverse gearbox to a Polaris Outlaw 525 IRS Rear Driveshaft Assembly. Overall, this powertrain system has a speed reduction ratio of approximately 34:1, which will allow the vehicle to reach speeds close to 30 mph. Dual A-arm assemblies at the front wheels, in combination with tri-link trailing arms in the rear, allow for 12 total inches of suspension travel. The vehicle has been designed to withstand a 5 foot fall onto all four wheels. Fox Podium X coil-over shocks with dual-rate springs soak up small obstacles on the trail and soften the impact of large jumps.

Isotope Tracing in the Libby Creek Watershed
Wil Chapple with Dr. Dave Williams
University of Wyoming
Ecosystem Sciences
Oral Poster Presentation Abstract

Wyoming NSF EPSCoR

New research, using water isotope tracers, has indicated that the plant-water relationships of mountain ecosystems may be more complicated than previous scientific thought believed the relationship to be. Recent research by Brooks et. al. 2010, indicated that plants were not consuming water from below ground stream flow. This knowledge significantly changes the way plant communities were thought to affect watersheds. My EPSCoR research project seeks to determine whether similar phenomena are occurring in the Snowy Range Mountains and specifically within the Libby Creek watershed. I have begun to answer this question by gathering isotope samples of the snowpack to determine the local meteoric water line. Using this information I will then over the summer period collect samples of soil, tree and water flow and measure the isotope levels of water molecules in these samples to find how close they are to the local meteoric water line. Understanding the hydrologic details in the Snowy Range will lead to better management of our water resources.
Near Isogenic Line variation in Circadian Rhythm and Effects on Genotypic Traits in *Arabidopsis thaliana*
Sarah Cheeney with Dr. Cynthia Weinig and Matthew Rubin
Botany Department
University of Wyoming
Oral Presentation

*Circadian rhythms are endogenous rhythms that can be set by environmental inputs such as temperature and light. One feature of circadian rhythms is the period, or duration of one rhythmic cycle; because the diurnal cycle on earth is close to 24 hours, circadian periods close to 24 hours are thought to be adaptive. I tested for the adaptive significance of the internal circadian period match to the external environment using a set of Near Isogenic Lines (NILs) of *Arabidopsis thaliana* that contain genotypes with wild-type periods (close to 24 hours) and short and long period genotypes. The short and long period genotypes, with the mismatch clock, germinated and transitioned to reproduction faster (bolting) and took longer to produce flowers after the bolting compared to the wild-type genotypes. The wild-type genotypes achieved a larger size at reproduction, as estimated by leaf size and number, relative to the short and long period genotypes. Match of the internal clock to the external environment also increased end-of-season biomass. One possible explanation for the increased size and biomass could be differences in underlying physiological processes which are currently being investigated in these NILs.*

How Infographics Will Save the World
Kira Cheshier
with Mark Ritchie
Art Department
University of Wyoming
Oral presentation

As consumers and citizens of modern society, we are inundated with images, information, and data that lead to confusing messages and an overload of content. Much of this information is forgotten or discarded immediately due to the inability to retain the significant amount we receive in our daily activities. However, there are certain elements in design that can aid in understanding, processing, and retaining data while disseminating information due to neurological activities and connections. Some of these elements include size, color, proximity, and movement, amongst other important graphic design elements. Infographics utilize these elements and create an incredible tool to facilitate better communication within the world of design and information.
The Examination of Life History Traits of Small Mammal Populations in Washington State
Taylor Clawson and Bryn Wiley, Dr. Will Clark
Department of Biology
Western Wyoming Community College
Oral Presentation

Human influence has increased as our population has increased, therefore amplifying the need for scientific research that examines the effects of human degradation on life history of small mammals. Roads have the potential to become a linear barrier for small mammals, cutting off species from a major food source and essential habitat refugia. This degradation to suitable habitat can increase parasite load in small mammal populations by forcing organisms into smaller refugia and lower immunocompetence via increased stress. The current research project looks at the differences in small mammal morphology (mass, length, and sex of mammal), physiology (fat content, gonadosomatic index (GSI), hepatosomatic index (HSI), and Fulton’s Condition Factor), parasite load (ectoparasites and endoparasites) and diet in relation to sample site (I-90 Project, Cascade Mountains Washington State). Roads increase the likelihood of human and rodent interaction. If the roads do increase the parasite load on these small mammals, the chance of human infection from these same parasites is increased as well.

Optimization of Non-Enzymatic Microwave Cleavage at Aspartic Acid and Disulfide Bonds
Scott Coffin with Dr. Franco Basile
Department of Chemistry
University of Wyoming
Oral Presentation

Enzymes such as Trypsin are used extensively to study proteins (i.e. proteomics) due to the simplicity of use, and the enzyme’s ability to cleave proteins specifically at Arginine (R) and Lysine (K), which allows the fragments to be easily analyzed using tandem Mass Spectrometry (MS/MS) measurements. However, enzymes have a limited useful shelf life, must be stored at -80 °C, requires many manual procedural steps, and most importantly it requires an incubation time of 7-8 hours (overnight), thus making its implementation time-consuming and unsuitable for automated operation. In contrast to this commonly used technique, a new protocol which utilizes two techniques, including the reagent-less microwave cleavage at aspartic acid (D) and the microwave-assisted cleavage of disulfide bonds using a reducing agent (dithiothreitol, DTT) allows for proteins to be cleaved and analyzed by researchers in as little as five minutes, and in a flow-through manner, allowing automation. The goal of this project was to optimize the microwave radiation heating procedure to cleave disulfide bonds in proteins. Variables like heating temperature and time, DTT concentration and pH were all tested and conditions were found for the rapid and efficient cleavage of disulfide bonds in proteins.
Mapping Burn Severity of the Marking Pen Prescribed Burn in the Seminoe Mountains using pre- and post-fire Landsat Thematic Mapper images

Erik Collier¹ with Dr. Ramesh Sivanpillai²
1. Department of Ecosystem Science and Management and 2 Department of Botany
University of Wyoming
Oral Presentation

Burn severity of a prescribed fire in the Seminoe Mountains, Wyoming was mapped with Landsat 5 Thematic Mapper images. This prescribed fire, named the Marking Pen Rx Burn, was set by US Bureau of Land Management in May 2011 to diversify and manipulate existing vegetation community characteristics within the proposed project area, and to mitigate already existing Wildland Urban Interface (WUI) issues. Pre- and post-fire Landsat images received through WyomingView were processed in ERDAS Imagine. First, Normalized Burn Ratio Index (NBRI) images for both images were computed. Using the pre- and post-fire NBRI images, the delta NBRI image was derived. Using a combination of image interpretation techniques, expert knowledge, and field data received from two UW researchers, pixels in the delta NBRI image were grouped into the following seven thematic classes: severe burn, severe/medium burn, medium burn, medium/low burn, low burn, low/no burn and no burn.

Crosby Reservoir Simulation Study
Erik Cooper, Tewodros Debebe, Timothy Kohler, Aleksandra Nations, and Ziming Zhu
Petroleum Engineering
University of Wyoming
Oral Presentation

Of the many techniques used within the field of reservoir engineering, one of the most powerful and useful is that of the reservoir simulation study. Existing as a virtual model of an oil field, a computer simulation makes use of information gathered through studying geology, petrophysical attributes, and fluid properties. With the help of powerful software, such as Petrel™, the Crosby field was used as an example to learn about the practical application of a reservoir simulation. The use of this sort of analysis for several specific areas of study was also considered. Economic decisions about hydrocarbon reservoirs, whether bid valuations, new field developments, operational plans, production estimates or divestments, can be closely related to the results of a simulation. Besides the economic impacts of such an analysis, the ethical implications of the study’s accuracy cannot be ignored. Lastly, the use of reservoir simulations in environmental impact analysis is considered.
Identification of MaSp1-like gene coding for protein sequences from orb weaving spider

*Araneus gemmoides.*

Mark Coulter, Brian Clark, Isaac Wentz, Dagmara Motriuk-Smith,
Florence Teulé, R. Scott Seville.
Zoology and Physiology
University of Wyoming/Casper College
Oral Presentation

*Wyoming INBRE*                                   Casper, WY

Orb weaving spiders produce up to seven different types of silks. Each of them serves a different purpose like for example dragline, web components, prey wrapping, or egg sac formation. Methods to distinguish different silk types include the analysis of amino acid composition and identification of unique amino acid motifs in their protein sequences. A correlation exists between the mechanical properties and amino acid motifs present within the silk proteins. The goal of this study was to identify genes coding for dragline proteins (major ampullate spidroins, MaSp) in the cat-faced spider (*A. gemmoides*). Polymerase chain reaction was used on *A. gemmoides* genomic template to isolate the MaSp1-like gene. The deducted amino acid sequence from the putative MaSp1 sequence isolated was compared to published sequences of other known MaSp1 proteins from several orb weaver spiders (BLAST searches and Clustal Alignments). These putative *A. gemmoides* MaSp1 protein sequences exhibit the characteristic GGX and (A)$_n$ amino acid motifs as well as similar amino acid compositions compared to other MaSp1 proteins, thus confirming their identity as MaSp1 sequences.

*Anthropologizing Breaking Amish: Televisual Authenticity on The Learning Channel*

Elizabeth Crawford with Dr. Ruth Toulson
Department of Anthropology
University of Wyoming
Oral Presentation

*Department of Anthropology*                                   Cody, WY

In 2012 a new television series, Breaking Amish, was the subject of a great deal of controversy. The central accusation was that the program, which followed five young people as they moved to New York and left behind their Amish beliefs, was fake and that the people within it weren’t quite as “Amish” as the producers suggested. In this paper, drawing on critical discourse analysis of program transcripts and images and an analysis of the controversy, I critically engage with the new Amish television phenomenon. Drawing on approaches to the anthropology of media that stem from the work of Faye Ginsburg and Lila Abu-Lughod, I examine how televisual “Amishness” is constructed and imagined, probing how “authenticity” becomes an element of problematic “Othering.”
Electrochemical Device Fabrication for Advanced Energy Conversion
Phillip Cross with Dr. Katie Li
Department of Chemical Engineering
University of Wyoming
Oral and Poster Presentation

Wyoming NSF EPSCoR
Golden, CO

Electrochemical Devices such as Fuel Cells operate by converting hydrogen and other components of natural gas into electricity, have inherent high efficiency (60-80%) and generate very little to zero pollutants, thus providing a very attractive source of electricity. However, the cost and durability are still the primary roadblocks for fuel cells to compete with current power generating equipment in both stationary and transportation markets. To address these challenges, the proposed research focuses on using surface chemistry to increase the durability of one specific fuel cell type, proton exchange membrane fuel cell (PEMFC). The premise is that the chosen chemical compound, dopamine, used in surface modification will not only increase the adhesion between fuel cell assembly components, but also have either no or positive effect on ion conductivity of the modified component. Consequently, the surface modification either will have no effect on power generation or, better yet, increase power density. Preliminary testing data have demonstrated feasibility of increasing longevity of PEMFCs by dopamine coating.

Frequency Dependent Audio Visualizer
Kyle DaRif and Devon Schmidt with Dr. Stanislaw Legowski
Department of Electrical and Computer Engineering
University of Wyoming
Oral and Poster Presentation

Volpi and Cupal Senior Design Fund
Rawlins, WY
Rock Springs, WY

Music is a language that can be shared with everyone. However, it’s a shame that in most cases, music can only be enjoyed through listening. Our project aims to incorporate a visual component to any audio signal. Granted, audio visualizers are nothing new, but most are created digitally within software; our visualizer is created robustly using analog methods. We intend to process a stereo audio signal to be used to illuminate an LED array based on the frequencies within the signal. The signal is first amplified using a class-D amplifier. It is then processed using two groups of eight analog filters, one group for each channel of the audio. After filtering is complete, the signal will then be converted to a DC voltage. This voltage will be inputted into a small pulse width modulation generator. The output of this generator will be used to control a small current driver that is connected to the LED array, allowing for LED brightness to be controlled via the signal voltage. All of our components are to be compactly housed so that the visualizations can be enjoyed anywhere.
How the “Queer” Undermines Imperial Ideology in the Victorian Novel  
Alexis Dadelahi with Dr. Barbara Ellen Logan  
Department of History  
University of Wyoming  
Oral Presentation

Power and the oppression it breeds manifest through the discourse used to describe the world around us. According to Michel Foucault’s, *The History of Sexuality* the very language used to describe the world around us effectively frames our interpretation of reality, and thus, reinforced the structures of power that defined 19TH century Western “civilization” and imperialism. My paper argues narratives of “queerness” as an “uncanny other” undermines heteronormity in the Victorian novel, which thereby undermines Imperial ideology in the Victorian age. Through Foucaultian theory I will demonstrate that the Imperial ideologies at work in the Victorian age are subject to scrutiny through queer themes in Victorian fiction that touch on the growing anxiety regarding the decadence and complacency of the British Empire.

Search for Novel Antimicrobials Produced by Environmental Bacteria  
Colt Dalton, Chelsea Holcomb, Morgan Luther, Ian Muller, Olivia Rogers and Rory Smith  
with Allan Childs, Steve Harbron, Elise Kimble  
Chemistry, Biology  
Northwest College  
Poster Presentation

INBRE  
Colt Dalton  
Cody, WY  
Chelsea Holcomb  
Jackson, WY  
Morgan Luther  
Hardin, MT  
Ian Muller  
Laramie, WY  
Olivia Rogers  
Powell, WY  
Rory Smith  
Lovell, WY  

The ability of bacteria to evolve antibiotic-resistant traits, demonstrated by strains of methicillin-resistant *Staphylococcus aureus* and carbepenem-resistant Enterobacteriaceae, is of great concern. We have focused on samples of rotting wood as a source of antibiotic-producing bacteria. Rotting wood was collected aseptically at numerous sites, bacteria were isolated from the wood and then tested for ability to inhibit growth of *Escherichia coli, Pseudomonas aeruginosa* and *Staphylococcus aureus*. DNA was extracted from bacteria that showed such antibiotic activity and the 16S ribosomal RNA gene was amplified by pcr. A BLAST search was done of the sequences of the pcr products to provide a tentative identification of the bacterial isolates. The most frequently identified genera have been *Bacillus* and *Pseudomonas*. If no evidence for the activity seen in our lab is found in the literature for a species, efforts are directed to characterize the active inhibitory metabolite.
The Dry Creek Waste Water Treatment Plant (WWTP) is a facility that processes raw sewage from Cheyenne, Wyoming. This facility uses anaerobic digestion as the method for stabilizing the sludge, prior to drying and disposal. Heating of the sludge is necessary for the anaerobic digestion process and is achieved by the use of a hot water bath heat exchanger. A portion of the digester gas produced by the facility, along with purchased natural gas, is currently combusted to heat water in the heat exchanger. The unused portion of the produced digester gas is flared to the environment.

The digester gas produced by anaerobic digestion is a valuable resource, as it has a considerable amount of chemical energy stored within it that could be utilized. EnTec’s goal was to demonstrate that the digester gas being produced could provide value to the WWTP. Electricity is approximately six times more valuable than natural gas per unit energy. Electricity produced by using energy within the digester gas would thus provide the most amount of value to the WWTP and would be utilized directly by the WWTP to offset their electricity consumption. EnTec has determined through thermodynamic and economic modeling that use of a gas turbine and generator is the most feasible means for producing electricity from the digester gas. Waste heat from the gas turbine engine will be utilized to preheat the sludge, creating a combined heat and power (CHP) system.

With this application, it was determined through thermodynamic modeling that electricity could be produced between 400-500 kW from the gas turbine system. Additionally, the amount of energy contained within the exhaust of the system will be able to entirely supplement the sludge heating demands for the WWTP. The future value gained for the WWTP from this project was estimated to be about 2.1 million dollars.

**Autonomous Rugged Maze Navigating Robot**

Andy Darter and Luke Kaufman with Dr. Stanislaw Legowski
Department of Electrical and Computer Engineering
University of Wyoming
Oral and Poster Presentation

Navigational Robots are becoming tools for setting educational foundations in engineering. As technology advances, the demand for robots in the classroom is necessary to fit the needs of real world applications. The next generation of robots will be controlled by processors similar to the BeagleBone. With the support of robotic supply companies: DFRobot, EpicTinker, and Makeblock, our senior design project proposes the use of the BeagleBone processor in instructional environments by developing a Four Wheel Drive Autonomous Robot that will venture through a maze with rugged terrain. Necessary attributes include: independent control of each wheel, a traction control system, an ability to detect walls, tilt measuring accelerometer, and system status reports on an LCD display. Additionally, the robot has flexibility to include more objectives such as making a map of the maze that can later be viewed by a person after navigation. In result, our device inspires others to explore electronics and controls systems engineering and provide hands-on experience for instructional purpose.
Enhanced Oil Recovery in the Big Horn Basin
Caleb Davidson, John Gorrell, Landon Dawson, and Leilei Zhang, with Dr. Brian Towler
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

Enhanced oil recovery is an emerging field with high importance for increasing the overall oil recovery and raising reservoir production to a whole new level. The Black Mountain Field within the Big Horn Basin is an area with increased interest and use of EOR techniques. With all the oil left behind in normal reservoir production we can use sophisticated methods of introducing new or existing components back into the reservoir to aid in the production of oil. We are researching cores from a well within the Black Mountain Field. The research includes measuring the properties of porosity and permeability for the dirty cores, and then performing the same tests on the cores after they were cleaned. Some other tests we shall be performing include capillary pressure, chemical sensitivity, spontaneous imbibition, core flooding, and mineralogy. By obtaining this data from our cores we can apply what we learn to determine and then present what EOR techniques will work best for this field.

Cathepsin K Inhibition Alleviates Antimycin-Induced Cardiomyocyte Apoptosis
Dawn Anne Davison with Dr. Sreejayan Nair
Department: Pharmacy
University of Wyoming
Oral and Poster Presentation

Background: Heart Failure is the leading cause of death in the US and other developed countries. Programmed cell death of the heart cells (or cardiomyocyte apoptosis) plays a critical role in the development of heart failure. Cathepsins are lysosomal proteases, which have been reported to regulate apoptosis. However, the role of cathepsin K, the most potent lysosomal enzyme in cardiac apoptosis is still under investigation.

Methods and Results: Cultured rat cardiomyoblasts (H9c2 cells) were challenged with the pro-oxidant antimycin A in the presence or absence of cathepsin K inhibitor. Active cathepsin K and lysosome were immunolocalized using specific dyes. Cardiomyocyte apoptosis was evaluated by terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL staining) and apoptosis-related protein levels were detected by Western blot analysis. Treatment of cardiomyocytes with antimycin A (5 μM) elicited the release cathepsin K from lysosome into the cytoplasm and induced as evidenced by an increase in the number of TUNEL-positive cells and alterations in the levels of apoptosis-related proteins (elevated BAX and decreased Bcl-2 levels), all of which were reconciled by cathepsin K inhibitor.

Conclusions and discussion: Cathepsin K has a permissive role in oxidative stress-induced cardiomyocyte apoptosis. Inhibition of cathepsin K alleviates oxidative stress-induced cardiomyocyte apoptosis, which might represent a strategy for the treatment of a variety of cardiovascular diseases.
Growth release of subcanopy trees following mountain pine beetle-induced overstory mortality in Rocky Mountain National Park
Christopher B. Deaderick with Dr. Daniel B. Tinker
Department of Botany
University of Wyoming
Poster Presentation

McNair Scholars Program
Laramie, WY

For the past decade, mountain pine beetles (MPB) have invaded millions of hectares of forest in Colorado and Wyoming, causing extensive conifer mortality. Tree ring data can provide insights into the chronological occurrence of past climate and disturbance events, the severity and frequency of these events, and the ecological response of forest vegetation. This study will examine the magnitude of tree growth release of subcanopy trees following MPB-induced overstory mortality, and will estimate the differences in growth release among cohorts (vertical canopy layers) and among tree species. I hypothesize that there will be an increase in subcanopy growth as a result of decreased overstory cover and reduced competition for water and nutrients created by MPB. Tree core samples and tree diameter (DBH) will be collected for 5 trees of each cohort and species type present in each plot. Tree core preparation and analysis will follow standard dendrochronological methods (Stokes and Smiley 1996). By elucidating the growth response of subcanopy trees, this study will enhance understanding of important alterations in stand structure and composition following severe MPB forest mortality.

Modeling the SARS Outbreak in Toronto, Canada
Regene DePiero with Dr. Rongsong Liu
Department of Mathematics
University of Wyoming
Oral Presentation

Department of Mathematics
Jackson, WY

In the last century rapid spread of disease has become a critical threat due to increasing interaction on a global scale. Quick development of simple and effective models with limited data can be a crucial part of determining exactly how and for how long to handle the outbreak of a disease. The outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003 in Toronto, Canada differed from other outbreaks of the disease. Two outbreaks were observed, most likely linked to a relaxation in preventative strategies. Better predictors of how long an outbreak can last and how to best counteract new infections is key to preventing cases like this in the future. By examining a data set consisting only of counts of new infections each day and their likely method of infection (i.e. family contact, healthcare setting, travel, etc.) a multi-group compartmental model was developed to estimate the rate of infection as well as the basic reproduction number. The model was used to determine new infections, deaths, and recoveries for each day and also to determine the best methods for preventing new infections, such as quarantine, healthcare procedures, and isolation.
Clostridial Diseases in Cattle

1Courtney Dixon 2Rick Landeis
1. Animal Science 2.Agriculture
Sheridan College
Oral/Poster Presentation

EPSCoR                Newcastle, WY

Clostridial diseases in cattle have plagued ranchers across the country for many years. These are some of the most deadly diseases to cattle; with little to no cure and a quick onset to death timeframe. The top six affecting cattle today are: *Clostridial perfringens types C&D, Clostridium chauvoet, Clostridium septicum novyi, Clostridium sordellii novyi,* and *Clostridium haemolyticum.* This project gives an overview of each of the above strains as well as symptoms and possibilities for helping the animal overcome the disease for certain strains only. Common names for each are also discussed as many of these diseases are well known for their deadly effects on calves and cattle.

Reflections upon India
April Dockter with Mark Ritchie
Department of Art
University of Wyoming
Oral Presentation

UW Honors Program                     Rock Springs, WY

Travel is a life altering experience that can affect entire life outlooks. My journey to India in 2011 was an eye opening experience that has since allowed me to reflect upon my life and gain some perspective. I have grown a lot over these past three years at UW and this installation show can attest to that. I am using patterning that reflects on many cultural uses to create a commentary on craft and crafting, printmaking, society, emotion, and abstraction within art.

Judy Pfaff is an artist that has influenced the contemporary art world over the past 50 years. She has traveled worldwide to teach and learn. She has taught all across America. This semester she is teaching here at UW and helping us to learn and create art in a different way. I am learning to incorporate my experiences from India with the other opportunities and learning experiences that have helped form me into the person I am now. I am using this awareness of who I am to create a full immersion experience that fills entire spaces.
Dietary Analysis of Fatty Acid Intake In Reference to Polycystic Ovarian Syndrome
Matt Dooper with Dr. K. Shane Broughton
Department of Family and Consumer Sciences
University of Wyoming
Oral Presentation

INBRE Lusk, WY

Polycystic Ovarian Syndrome (PCOS) is an inflammatory endocrine disorder which afflicts women, and is characterized most notably by inducing infertility into women, along with increasing testosterone levels, which lead to a variety of superficial issues including persisting acne and hair loss. In addition, recent finding have shown PCOS to have a high correlation with the onset of type 2 diabetes; a correlation as high as over 50%. In regards to inflammation, omega-6 (n-6) polyunsaturated fatty acids (PUFA) have recently been shown to induce inflammatory responses in lipid membranes of cells, along with saturated fats which have always been known to do so. On the contrary, omega-3 (n-3) PUFA are known to be anti-inflammatory, and are in fact used to treat inflammatory disorders, including rheumatoid arthritis. The purpose of this study is to observe the diets of both females with and without PCOS in regards to their saturated fat, n-6 PUFA and n-3 PUFA in order to determine if a correlation of elevated consumption of the saturated fats and n-6 PUFA are found in the women diagnosed with PCOS. The study showed a greater consumption of n-6 PUFA and saturated fats in the non-PCOS group, a greater amount of n-3 PUFA consumed in the PCOS group, and a higher consumption ratio of n-6:n-3 PUFA in the non-PCOS group versus the PCOS group.

Consumer Identity: Pride of Texas
Chelsea Downey with Stacey Baker
Marketing
University of Wyoming
Oral Presentation

UW Honors Program Bryan, TX

Texas is well known as a larger than life state with a diverse and often wildly stereotyped history and culture. The pride of Texans is often mentioned as a defining characteristic of the state, and it is not an unfounded descriptor. In order to discover whether this state pride can motivate consumers toward buying local over outside goods, research and personal interviews of Texans were conducted.

Both the research and subsequent interviews concluded that Texans’ identities are deeply tied to their state, an identity that they maintain through a cycle of consumption and attachment to both promote and affirm that connection. In order to facilitate in-state consumption of Texas-made goods, companies should heavily promote their goods’ production point. While Texans routinely seek out American-made products, they feel a deeper attachment to products made within their hometown and state.
Examining the Role of Cortactin and Dynamin Association on Actin Remodeling Events in Pituitary Gonadotropes
Melissa Dozier with Dr. Amy Navratil
Department of Zoology and Physiology
University of Wyoming
Poster Presentation

The binding of hypothalamic gonadotropin-releasing hormone (GnRH) to the anterior pituitary GnRH receptor (GnRHR) is essential for reproductive function by stimulating the synthesis and secretion of gonadotropic hormones, luteinizing hormone (LH) and follicle stimulating hormone (FSH) from gonadotrope cells. Engagement of the GnRHR by GnRH initiates a complex series of signaling events that include the activation of the actin cytoskeleton in gonadotropes; however, the physiological consequences and cellular mechanisms of actin reorganization have yet to be fully explained. To elucidate a more complete mechanistic understanding of the role of cortactin in actin engagement, we propose to identify potential cortactin binding partners that help aid in its function. One particular protein of interest is dynamin. Dynamin and cortactin association is thought to be critical in the modulation of actin rearrangements. To assess any potential interaction, we used both imaging and protein colocalization experiments. The images generated support the notion that cortactin and dynamin associate and play a role in mediating actin remodeling events for appropriate hormone vesicle trafficking.

Activity and Stability of Ceria-supported Bimetallic Ni-Au in the Reforming of Ethanol
Sakun Duwal
Department of Chemistry
University of Wyoming
Oral Presentation

Ceria supported metal catalysts have potential to be suitable catalysts for the Steam Reforming of Ethanol (SRE) reaction. SRE is a popular method of producing hydrogen. For this research, ceria supported Ni-Au were studied as the potential SRE catalyst. Well-ordered ceria thin films [CeO$_x$(111) (1.5<x<2)] were used as support. The films were prepared by depositing Ce onto a single Ru (0001) crystal in an oxygen environment. Ni and Au were evaporated on the ceria thin film at room temperature. Ni-Au bimetallic particles were prepared by deposition of Ni followed by the deposition of Au. After the growth, their morphology and surface composition were studied using X-ray Photoelectron Spectroscopy (XPS) and Scanning Tunneling Microscopy (STM). Our preliminary studies show that adsorption of ethanol over ceria-supported pure Ni nanoparticles can produce H$_2$. Furthermore ceria-supported Ni can exhibit interesting reactivity compared to that of pure ceria and Ni. The reactivity of ethanol over Ni will be further studied to that over Ni-Au bimetallic particles.
A diet rich in omega-3 fatty acids have been shown to influence ovulation in rodents; different types have been shown to either positively or negatively influence ovulation. While an increase in ovulation by 1.4 fold has been seen, it is uncertain if the increase in ovulation leads to an increase in viable offspring. Recent research has determined that women have oocytes of varying maturity; primary oocytes being the mature, fertilized type that will result in a fetus; and secondary being immature and often containing genetic abnormalities. It is unknown whether secondary oocytes can be matured into primary oocytes and therefore give rise to a fetus upon fertilization. This study will help determine whether or not the increase in ovulation in rats with omega-3 rich diets consists of; primary oocytes only, or a combination of primary and secondary oocytes. The implications this may have to women with poly cystic ovarian syndrome (PCOS) are huge. If in fact, secondary oocytes mature into primary oocytes, women with PCOS whose fertility is compromised may have better odds at having children. This may also have agricultural implications in animals with multi-offspring potential, particularly swine.

Finding the faculty member for a higher education facility institute can be a messy and difficult process. The purpose of this research project was to find a solution to making it easier for higher education facilities and prospective faculty members to search for each other, and to manage all the paperwork in a paperless environment. The goal of the project was to develop a web based application that created a one stop, convenient environment for Universities to post searches, and prospective employees to search and apply to those positions. The solution presented uses Adobe Flex paired with a Java server and Amazon SimpleDB for a database to create the previously mentioned web based application.
Remembering To Do Things For Others: Social Prospective Memory and Goal Activation
Anna Fahlsing, Dr. Suzanna Penningroth, Dr. Stephen Bieber
Psychology Department, Statistics Department
University of Wyoming
Oral Presentation

UW Honors Program, Wyoming INBRE
Rock Springs, WY

Prospective memory (PM), or memory for intentions, is an integral part of everyday life. Social prospective memory (social PM) is the subset of PM that affects other people, such as remembering to call your grandparents or meet a friend for lunch. While research suggests that social PM tasks are seen as more important and more likely to be completed, little research exists on mechanisms underlying these effects. The Goal-Based Motivational-Cognitive Model of Prospective Memory proposes that the relevance of a PM task to a particular goal will enhance PM performance by increasing several processes, including: increasing use of strategies, increasing accessibility of intentions, and increasing allocation of attention. The current study examined the effects of primed goals and chronic individual social goals on social PM performance (on a computerized task) and accessibility (by listing real-life tasks). Results support the Goal-Based Motivational-Cognitive Model of Prospective Memory, as social PM performance increased in males with an achievement goal primed and in females with a social goal primed, while accessibility of social PM tasks was higher for individuals with high chronic individual social goals.

Taxidermic Regret:
the Troubling Histories of Anthropology Teaching Museums
Samantha Fawcett with Dr. Ruth Toulson
UW College of Arts and Sciences, Anthropology Department
Oral Presentation

Anthropology Department
Worland, WY

Ethnographic collections provide significant challenges for curators as they must work to alter public perception that museum spaces are stuffy and unengaging, while also finding ways to address troubling histories of appropriation and violence. In this paper I focus on how much regret museum space should convey to viewers as well as what form regret should take. Utilizing a case study of an anthropology teaching museum, I bring together anthropological considerations of both taxidermy and nostalgia in my analysis. Of critical importance is the dilemma that taxidermic regret fails to address the ways in which anthropologists have sought to redress the historical burden of colonialism. Centrally, I examine how native peoples have been imagined, absorbed, and reconstructed as specimens of taxidermic regret. The core argument is that taxidermy seeks to make that which is dead appear to be living, and thus depends on, and is a response to, death. The subjects of museum space are constructed as being ultimately both authentic and deceased. Essentially, taxidermic regret is the equivalent of the “ethnographic present” positioning exhibits as being reverent, while lacking artifice.
2012 NASA Great Moonbuggy Race
Davis Fay with Dr. Dennis Coon
Department of Mechanical Engineering
University of Wyoming
Oral Presentation

Wyoming NASA Space Grant Consortium                Jackson, WY

The Great Moonbuggy Race is an annual student design competition at the U.S. Space and Rocket Center in Huntsville, Alabama that is sponsored by the National Aeronautic Space Administration (NASA). Teams of students design, build and race human-powered vehicles over an obstacle course which mimics the engineering challenges faced by the original lunar rover design team. SpacePokes Design, consisting of Davis Fay, Alisa Frohbieter, Ryan Williams and Leslie Young, was the student design team that represented the University of Wyoming at the 19th Annual NASA Great Moonbuggy Race in April of 2012. This presentation will demonstrate the design considerations and novel features that went into the 2012 University of Wyoming moonbuggy. Results from the race will be reported, improvements to future designs will be recommended and the implications of the SpacePokes moonbuggy design on human powered vehicles in general will be discussed.

Food Security in Ethiopia:
The Role of Foreign Aid in Poverty Alleviation
Angela Fiedler with David Finnoff and Thorsten Janus
Economics and Finance Department
University of Wyoming
Oral Presentation

UW Honors Program                Laramie, WY

As one of the world’s “Least Developed Countries,” Ethiopia has long been a large recipient of Official Development Assistance (ODA), also known as foreign aid. ODA is financial assistance given by foreign governments to support economic development and poverty alleviation in developing countries. This paper analyzes how large amounts of ODA correspond to improvements in Ethiopia’s food security and overall economy. Examining the relationship between foreign aid to Ethiopia and the country’s GDP per capita in a linear regression reveals a moderately strong correlation between the two variables. The author concludes that continued increases in foreign aid to Ethiopia could potentially help the African country move beyond subsistence, out of its current food trade deficit, to eventually become a large agricultural producer within the region.
Myxobacteria as Biocontrol Agents of Agricultural Plant Pathogens
Cameron Finley with Dr. Daniel Wall
Department of Molecular Biology
University of Wyoming, Laramie
Oral Presentation

Wyoming NSF EPSCoR, UW Honors Program Green River, WY

Myxobacteria are soil microbes that display swarming motility and predate on other microbes. Predation by myxobacteria involves utilization of antibiotics and hydrolytic enzymes against prey species. The purpose of this research is to investigate whether predatory myxobacteria can be exploited to manage plant pathogens of agriculturally important crops such as sugar beets, and dry beans. We hypothesize that plant seeds or soils treated with myxobacteria might display reduced susceptibility to disease caused by microbial pathogens. In the laboratory various assays have been employed to look at antagonistic interactions between a panel of myxobacterial species against targeted fungal and bacterial plant pathogens. In preliminary studies we find that microbial pathogens can be inhibited to different degrees. Inhibition appears to involve both diffusible factors as well as cell contact-dependent mechanisms. Sugar beets have been used as plant disease models to test whether select myxobacteria can suppress diseases caused by microbial pathogens. Initial testing has been conducted with seedlings on agar petri dishes. Considering that between 7 to 20 percent of crop yields can be lost per year due to microbial pathogens, this research may have important implications for agricultural industry.

Fabrication of photodegradable capture surfaces for the capture of circulating tumor cells.
Paige Fischer with Dr. John Oakey
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

Wyoming INBRE Arvada, CO

The blood of cancer patients often contains rare circulating tumor cells (CTCs) that can provide information about the extent and nature of the cancer. In order to develop tests based upon CTCs, one must first solve the problem of capturing CTCs from whole blood. A successful CTC capture method must capture and release viable CTCs and provide both a high yield and purity of captured CTCs. These characteristics allow for the re-culturing of CTCs for more accurate diagnostics and prognostics of CTCs. Several capture methods have been previously developed using microfluidic devices, and while these methods represent a improvement over traditional bead-based methods they still lack certain important characteristics. This research introduces a photodegradable hydrogel within microfluidic devices for the capture and release of CTCs. Two different geometries, flat and patterned, are used to demonstrate and quantify CTC capture efficiency upon hydrogel surfaces. We show that patterned capture surfaces captures a higher number of cells with improved purity over pervious methods. The main advantage of this hydrogel-based system is the ability to selectively release CTCs to improve the released purity, which could improve diagnostics and prognostics of cancer while providing a route to individualized therapies.
A point of care (POC) system refers to the ability of a device to take a test and acquire quick accurate results in any environment. The POC industry has become more and more successful over the past few years with an estimated profit increase of eight to nine percent annually until 2016. Our device would have the ability to test for five different diseases using rapid lateral flow (RLF) technology. Component (conjugate pad, reagents, colloidal particles, etc.) selection is the most instrumental part of creating accurate assays because they affect the sensitivity, specificity, and reproducibility of the RLF device. An optimal device design has been developed using published research. Further, a basic cash flow analysis was done to see how profitable a device like this could be. It was determined that if each device was sold for $13.00 that profit could be made in three years if six million devices were made annually. A RLF device with the ability to test for more than one disease is currently not on the market, and could lead to better world healthcare through better diagnostics if introduced into developing countries, as well as, the developed world.

Optimizing Embryogenic Culture Induction of Cold-hardy Grapevine Cultivars
Lacey Lyn Fisher¹, Berva Dawn Brock¹, Jeremiah Vardiman¹, Daniel Bergey² and Sadanand Dhekney¹
¹University of Wyoming, Sheridan Research and Extension Center, ²Sheridan College
Oral Presentation

Plant regeneration through somatic embryogenesis is an essential prerequisite for inserting desired traits in elite grapevine cultivars via genetic engineering. A wide variation in the production of embryogenic cultures is observed among grape species and cultivars. The goal of this study was to study the feasibility of embryogenic culture production from cold hardy grape cultivars.

Shoot tips of ‘Bronx Seedless’ ‘Himrod’, ‘Interlaken’ and ‘Thompson Seedless’ were used to establish micropropagation cultures. Unopened leaves obtained from micropropagation cultures were placed on NB2 medium and incubated in the dark for 5-7 weeks. Resulting callus cultures were transferred to light with a 16h light /8h dark cycle at 25°C. The number of explant producing an embryogenic response was recorded in various cultivars. Embryogenic callus was then transferred to X6 medium to induce somatic embryo development and proliferation.

Embryogenic cultures were initiated from leaves of all cultivars. The highest response was observed in ‘Thompson Seedless’ (34%) followed by ‘Bronx Seedless’ (20%) and ‘Himrod’ (16%). Somatic embryo development and proliferation was observed from all cultivars studied. Cotyledonary stage somatic embryos were germinated to obtain plants. Embryogenic cultures are currently being established from additional cultivars and will be used as target tissues in genetic engineering studies.
Production of Biodiesel from Algae Using Supercritical Methods
Matthew Fleury, Caitlin Lefevbre, Trevor LeValley, and Anthony Richard
Department of Chemical Engineering
University of Wyoming
Oral Presentation

Department of Chemical Engineering
Elizbeth, CO
Fort Collins, CO
Lakestevens, WA
Eunice, LA

Algae have gained attention recently as biodiesel producers due to the safe, environmentally friendly production process which in the future could alleviate the need for fossil fuels. Cultivation, harvesting, extraction, and refining are the steps required in biodiesel production. Cultivation uses photobioreactors utilizing sunlight and circulating a nutrient rich culture medium which produce microalgae at high concentrations. During harvesting the algae are dewatered, which is followed by extraction in which lipids are extracted and separated from the harvested biomass. Lipids are fed to a transesterification reactor where biodiesel is produced with high purity. While biodiesel is the main product from this process, some high value side products are also produced such as glycerol and defatted biomass. Production plant design involves the utilization of many novel techniques optimized for speed, efficiency, and cost. Very little waste is produced during the process making it extremely environmentally friendly. While equipment costs are high, the high value side products make this process economically feasible. This work assembles various nascent, as well as established, technologies to create an algae to biodiesel process that is able to be applied at production scale.

Direct Conversion of Benzyl Alcohol to N-phenylbenzylamine Via a Lewis Acid Mediated Approach
Jacob Flores and Jaco Fornengo with Dr. Rocky Barney
Department of Chemistry, Division of Math and Science
Western Wyoming Community College
Oral Presentation

Wyoming INBRE
Rock Springs, WY

Amines are an important class of chemical compound that serve in a variety of roles including as agrochemicals, surfactants, biomolecules, corrosion inhibitors, and pharmaceuticals. Given the prevalence of amines in a variety of industries, convenient and efficient methods of amine synthesis are critical to further development in a range of applications and fields. Currently, the most common methods for the synthesis of amines from alcohol precursors are limited in scope and require multiple steps, harsh conditions, or expensive air- and moisture-sensitive catalysts.

In an effort to develop a direct, cost effective, and mild synthesis of amines from alcohol precursors we have surveyed a range of conditions including variations in solvent, temperature, molar equivalents, and Lewis acids employed. Using benzyl alcohol/aniline/aluminum isopropoxide as our model system we have successfully synthesized N-phenylbenzylamine from the requisite benzyl alcohol precursor under mild conditions and in moderate yield. Work continues to expand the scope of the reaction to include both electron-rich and electron-deficient benzyl alcohols, allylic alcohols, and both aromatic and aliphatic amines.
The Effects of Laramie River Effluent on the Neurological Development of Xenopus laevis
Sean Foley with Dr. Kara Pratt
Department of Zoology and Physiology
University of Wyoming
Oral Presentation

EPSCoR Laramie, WY

There are a number of water treatment plants that introduce treated waste water into the Laramie River known as effluent. The effluent these treatment plants put into the river contains many neuroactive agents that could have devastating consequences on neural processes in wildlife in the Laramie River habitat. It has been observed by toxicologist Harold Bergman that the chemicals in the effluent feminize male fish that live in the river. My proposed research project will be studying the effects this effluent has on the development and function of neural circuits in the Xenopus laevis tadpole. To conduct this study, I will rear tadpoles in undiluted effluent and control tadpoles in an effluent-free environment. Then I will compare neurophysiology between these two groups. This study is very relevant because of the effects that the neuroactive agents in the effluent could have on the environment.

Social Effects of Precocious Puberty
Kayci Fuller with Jeremy Weaver
Honors
University of Wyoming
Oral Presentation

UW Honors Program Gillette, WY

Precocious puberty, puberty occurring before the age of 8 in girls and age of 9 in boys, is continuing to increase in frequency, especially for girls. Precocious puberty can be caused by genetic abnormalities, diseases, obesity, and/or endocrine disruptors. This informative research paper emphasizes the current conditions of the topic through a literature review and examination of reported cases of precocious puberty. The results of this research found that precocious puberty caused two major types of effects: micro effects and macro effects. The micro effects include health, social, and psychological effects. The macro effects include changing the current sex educations programs used in schools, an increase in government costs, and the need to modify parenting styles.
Shaping the Mitotic Spindle: Investigating the Interactions between Dynein and Augmin

KC Gandy with Jay Gatlin
Department of Molecular Biology
University of Wyoming
Poster Presentation

McNair Scholars Program                                                                                                   Laramie, WY

A normal mitotic spindle consists of microtubules extending from exactly two poles. This bipolar structure ensures the proper distribution of chromosomes to daughter cells that result from cellular division. Achievement of this proper, bipolar shape is aided by the motor protein dynein, which is thought to interact with a number of other proteins, many of which are unknown. This study aims to determine if augmin, a protein complex that affects spindle shape, is among these. To begin to address this question, we have performed initial characterization of a newly developed antibody that recognizes dynein’s motor domain (DHC). Ultimately, we plan to use this antibody in co-immunoprecipitation assays to test for augmin-dynein interaction.

Effects of late gestation energy source on mRNA expression of jejunal mucosa angiogenic factors in ewes.

Jillian Garrison with Dr. Allison Meyer
Department of Animal Science
University of Wyoming
Poster Presentation

College of Agriculture and Natural Resources                                                                  Lafayette, CO

Small intestinal angiogenic factor expression has previously been affected in ewe models of developmental programming resulting in altered ewe metabolism and fetal growth. We hypothesized that ewe jejunal mucosal mRNA expression of vascular endothelial growth factor (VEGF) and nitric oxide (NO) systems respond to late gestational energy source. Mature ewes (n = 14; single or twin fetuses) received 1 of 3 diets (3.52 Mcal ME/d) with different primary energy sources at day 67 ± 3 of gestation: ad libitum alfalfa haylage (HL), limit-fed whole shelled corn (CN), or limit-fed corn dried distillers grains (DG). On day 130 of gestation, non-survival surgery took place, followed by necropsy. The small intestine was dissected and jejunal mucosa samples were collected for real-time RT-PCR of selected angiogenic factors (VEGF, VEGF receptor-1 [FTL1] and receptor-2 [KDR], endothelial NO synthase 3 [NOS3], and soluble guanylate cyclase [NO receptor; GUCY1B3]). There was no effect of gestational energy source on ewe jejunal mRNA expression, VEGF (P = 0.97), FTL1 (P = 0.44), KDR (P = 0.36), NOS3 (P = 0.53), or GUCY1B3 (P = 0.73), suggesting that vascularity of the small intestinal may not have played a role in observed dam and offspring responses in this model.
Local and Organic Food in Laramie: Analyzing Consumer Opinions
Louisa Gietz with Dr. Pamela Innes
Department of Anthropology
University of Wyoming
Oral Presentation

In the food industry there are a variety of terms used to market food to the consumer. This study seeks to discover what messages consumers are actually receiving and internalizing about these terms. This study will examine Laramie consumers’ definitions of the terms “local” and “organic” in regards to grocery shopping. Fifty interviews were conducted at two grocery stores in town and through snowball sampling. Thirteen scripted questions were asked about shopping habits, motivation for shopping, and definitions of key terms to obtain a broad view of how Laramie consumers think. Interviews were coded to collect quantitative information on consumer shopping habits and opinions. A majority of consumers identify as shopping local or organic. Further analysis reveals motivations, foods frequently bought, and preference. The study will be a good resource for businesses trying to reach the Laramie consumer.

Invasive Species: An Inside Look at Management and Funding Protocols
Kaitlynn Glover with Dr. Don McLeod
Department of Agricultural Communications
University of Wyoming
Oral Presentation

Effective prevention and management of invasive species plagues agriculturalists, policy makers and academics worldwide. The United States addresses invasive species through various programs at the federal, regional and state levels, with little success due to the multiplicity of challenges invasive species pose. Though multifaceted, these challenges can be addressed in this manner: first determining the identity of an invasive species (plant, animal, virus) and the inherent challenges posed by the specific life form, examining the potential role/harm the species would play in the non-native ecosystem, and identifying an appropriate control method (including viable agency of duties). More than 1,000 plant invasive species alone exist in the United States, which limits the ability of the federal government to have a specific plan with which to deal with invasive species. Because the diversity of control methods with which to deal with invasive species is spread among a variety of agencies, this diffusion of responsibility coupled with the inability of the agencies to communicate about potentially cooperative management plans poses the greatest challenge to control of any type of invasive species. Ultimately, for invasive species to be managed effectively, the appropriations process must be amended to address the rapidly evolving ecological realities.
Greenhouse Controller
Demetrio Gonzales and Michael Henry with Dr. Stanislaw Legowski
Department of Electrical and Computer Engineering
University of Wyoming
Oral and Poster Presentation

As our population and cultures grow and develop, people are becoming more conscience about the foods they eat and how they’re grown. As a result, many people are now looking to grow their own organics.

The use of greenhouses is a huge culture that is not only being used by the novice growers, but finding its roots in industry. However, having a greenhouse alone is only an enclosed environment. Having climate control in a greenhouse is necessary if you want to extend the growing season or grow environmentally sensitive organics.

Some of the technologies necessary to offer climate control in a greenhouse will be demonstrated through our senior design project. We hope to demonstrate how powerful an automated control system can be in controlling a greenhouse’s climate. These types of systems not only have the power to change what we grow, but also how we grow.

Assessing the Performance of Reverse Osmosis Processes for Treating Hydraulic Fracturing Flowback Waters
Sean Gossner | Jonathon Brant (advisor)
Civil and Architectural Engineering
University of Wyoming
Oral Presentation

Background - The overall goal of the proposed research project is to establish the viability of using reverse osmosis processes for treating hydraulic fracturing flowback waters. Meeting the objective of the proposed research is expected to facilitate the beneficial reuse of the water, which is currently viewed as a waste. Therefore, the long-term outcome from the proposed work is a reduced water footprint for the energy industry.

Methods - This research will be conducted using two different types of bench-scale membrane test apparatus. The first test unit is classified as a dead-end filtration or stirred cell system; the second test unit is described as a crossflow system. The project will completed using frack flowback waters from well sites in Texas.

Results - At this point in, results have not yet been obtained. Extensive preliminary and baseline testing has been performed with pure water, as well calculations for membrane performance parameters. Additionally, a new computer interface and automated data collection package are currently being installed, and tests will resume upon completion. Concrete results should be available before Research Day on April 27.

Conclusion - At the date of this writing, conclusions have not yet been made, but should be available before April 27.
A Proposal to Trap and Test West Nile Virus-Infected *Culex tarsalis* Mosquitoes in Fremont County, Wyoming

Tyler Graham, Drew Leach, with Dr. Steven McAllister
Department of Science
Central Wyoming College
Poster Presentation

**INBRE**
Riverton, WY

West Nile Virus (WNV) is an RNA arbovirus in the family Flaviviridae. Birds are the primary reservoir for the virus, but horses and humans are terminal hosts. Fremont County is a hotspot for WNV. In Wyoming, the primary vector for WNV is the *Culex tarsalis* mosquito. The goal of this research is to determine the frequency and the distribution of the WNV-infected *Culex tarsalis* mosquitoes in Fremont County. In previous year studies conducted by our research group, 20% (95% CI: 17%-23%) of the population of mosquitoes trapped were *Culex tarsalis*. In this study, mosquitoes will be trapped during a three month period from June 1 to September 1, 2013 in six different locations throughout Fremont County. Each site varies in environmental condition. In a change from previous years, collections will be made with the benefit of carbon dioxide. Trapping procedure will be carried out using a CDC light trap, atmospheric pressure and temperature sensors, and the imposition of a more consistent collection protocol. Future research will include the testing of corvids (a family of birds that usually carry the virus).

**Anticoagulant and antibacterial activity of an enzyme from *Agkistrodon piscivorus piscivorus* (Eastern Cottonmouth)**

Joseph Graves, Duane McMurtry, and Deo Lachman with Dr. Rob Milne
Natural Science Division
Sheridan College
Poster Presentation

**INBRE**
Sheridan, WY

Snake venoms are rich sources of biologically active components. While life-threatening on envenomation, these components are of interest because of their potential applications. The purpose of this investigation is isolating anticoagulant and antibacterial components.

One issue that arises from materials interacting with human blood is blood clots forming on the material and interfering with its purpose. The anticoagulant component isolated from *Agkistrodon piscivorus piscivorus* (Eastern Cottonmouth) venom enzyme has the potential to prevent these clots from forming.

The ability to kill harmful bacteria is important. It has been discovered the anti-coagulant component of this snake venom also exhibits phospholipase activity which in turn has the potential to have antibacterial properties. This protein was placed in auger with several different strands of bacteria and tested for its ability to inhibit bacterial growth.

A goal of this research was to embed the purified venom component within medical-grade urethane or epoxy to investigate the feasibility of whether treating the interior of an IV line could reduce the likelihood of blood clots. Details of venom purification, as well as observed anticoagulant and antibacterial activity will be reported.
Evaluation of the Effects of Oxygen Concentration on the Infectivity of T-Even Bacteriophages
Hannah M. Green with Dr. John D. Willford
Departments of Microbiology & Molecular Biology
University of Wyoming
Oral Presentation

INBRE Undergraduate Research Fellowship
Casper, WY

This project developed out of EMS policy to administer oxygen to all patients. While this may prevent ischemia, it could also increase infectivity of a pathogenic virus like HIV. To test the effects of oxygen on viral infectivity, we grew cultures of bacteria and bacteriophages normally, without oxygen, and with additional oxygen. The anaerobic environment was achieved by sealing cultures in an air-tight chamber with an anaerobic AnaeroPak. A measurable hyper-oxygenated environment was engineered by drilling a hole in a chamber through which we fed a polyurethane tube and sealed with caulk. We fed both the oxygen and a meter that records the dissolved oxygen into the chamber. Measurements of cell and phage concentrations were taken at 1, 2, 4, 8, and 24 hours from each of the 3 environments. By comparing growth and morphology over time, we observed any variability that occurred due to the oxygen composition of the atmosphere. Initial data show little evidence that the absence of oxygen limits phage proliferation and indicated a slight increase in the concentration of phages that occurred in the presence of supplemental oxygen. Follow-up studies will attempt to better characterize these phenomena.

Ritual Permanence and Malleability: An Examination of Mortuary Practice in Diaspora Communities
Chelsea Hacker with Dr. Ruth Toulson
Anthropology
University of Wyoming
Oral Presentation

UW Honors Program
Cheyenne, WY

Many prominent anthropologists have suggested that when a society undergoes significant social transformation ritual is the last element to change. Consequently, many rituals have been analyzed as the last remaining vestiges of a vanishing culture. In this project, I consider whether this idea of the resilience of rituals can be extended to rituals surrounding death. Using case studies of Croatian and Chinese burial I intend to examine the burial grounds of those who have immigrated to the United States and compare burial practices and rituals found there to the literature on mortuary practice in the homeland. I will explore how the graves do or do not represent the traditional burial forms of their previous homeland or if they have adopted new ritual practices. Additionally, I will examine if there is a relationship between the significance of death rituals to the culture and the amount of malleability that occurs in mortuary practices within diaspora communities. This project engages with the significant literature on the nature of change, the immigrant experience, and the connection between material culture and beliefs.
From Kitchen to Combat: The Changing Role of African American Servicemen in WWI
Charity Haley with Dr. Tracey Owens Patton
African American & Diaspora Studies
University of Wyoming
Poster Presentation

McNair Scholars Program Laramie, WY

The contributions to war efforts by African Americans have been historically downplayed by the United States government. While African Americans have fought in each of this country’s wars, their sacrifices have not been valued by the government in the same way as White Americans’ sacrifices. This disparity is evidenced by a list of injustices following service including the denial of pensions to widows of Black servicemen. In spite of this treatment, African American men continued to sign up to fight in each of America’s wars. This research will address the treatment of African American servicemen during WWI when they were subjected to segregation and Black regiments were assigned to service rather than combat units. The United States government would eventually allow Black men into combat during this war, but only reluctantly. This research intends to document the societal pressures that forced the government to allow African American men into combat roles. This transition has been assessed through the examination of articles from African American newspapers of the time and the use of quantitative data from government records. Taken together, the findings demonstrate a correlation between societal pressures at home and the changing role of African American servicemen abroad.

The Legitimacy of the Office of the Presidency
Jeremiah J. Hall with Dr. Ruth Olga Bjorkenwall
Psychology
University of Wyoming
Oral Presentation

UW Honors Program Rawlins, WY

The American public’s thinking about the office of the presidency has become detrimental to the office. Accusations about current President Obama’s birthplace to comments regarding former President Bush’s intelligence point to a lack of respect for the office of the presidency. Americans now increasingly view the president as a figure to be mocked instead of revered. This trend could be correlated with the expansion of presidential powers, but little research has been done on the correlation between the decline in the popular view of the presidency and the overuse of presidential powers. In my research, I looked for a correlation between trends brought about by the extension of presidential powers and whether these trends have effected popular perception of the president. I have not found a direct correlation between the expansion of power and the decline in the public’s view of the president, but I did find some loose correlation showing that expansion of powers and the decline in the popular view of the president are linked. Further research is needed to determine what effects the expansion of presidential powers has had and will have on the future of the United States political system.
Glaciation Soils and Stress Sensitivity of Spruce Trees in the Snowy Range
Margo Hamann with Dr. Brent Ewers
Botany
University of Wyoming
Oral Presentation

*UW Honors Program*  
*Laramie, WY*

Scientists have documented three major glaciations in the Snow Range Mountains and called these Pinedale, Bull Lake, and Pre Bull Run. All three have characteristic soil make up but support the same species of evergreens. It was predicted that the different soil make up from each site would determine how sensitive to stress the trees are. Using spruce from all three sites in a xylem conductivity experiment we found that there was a significant difference in stress tolerance between sites.

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Wireless Sound Level System
Ian Harrison with Dr. Stanislaw Legowski
Department of Electrical and Computer Engineering
University of Wyoming
Oral and Poster Presentation

*Cody Christian and Missionary Alliance,*  
*Volpi and Cupal Senior Design Fund*  
*Cody, WY*

The Wireless Sound Level System (WSLS) is being designed for the Cody Christian and Missionary Alliance Church in Cody, Wyoming. The church has a very powerful sound system but unfortunately, the sanctuary was not designed with sound projection in mind. This creates for several abnormally loud, or hotspots, in the room. My senior design project is being designed so that they, the church’s sound technicians, will be able to monitor those areas and adjust the sound levels accordingly. This will be done by using three sound pressure level meters (SPL) to monitor the three major hotspots. Each of these meters will have a wireless transceiver that will communicate with a central hub. This hub will be located in the sound booth, and will have an LED display for each meter, so that the sound technicians can easily monitor the sound levels. The sound level is measured linearly, but is converted into decibels inside the meter so that the values displayed will correlate directly with the gains set on amplifiers and other sound monitoring devices. The WSLS will help create a more balanced atmosphere to worship in.
The Great Moonbuggy Race
Shelby Hayes, Ethan Smith, Keithl Schneider, Justin Wood with Dr. Dennis Coon
Mechanical Engineering
University of Wyoming
Poster Presentation

The National Aeronautic Space Administration (NASA) holds an annual student design competition in Huntsville, Alabama called the Great Moonbuggy Race. Students are required to design and build a vehicle that addresses several engineering problems similar to those faced by the original NASA lunar rover engineers. The vehicles are raced by two students, one male and one female, around a course including simulated moon terrain. This senior design project includes the complete design of a two passenger, human powered moonbuggy which will compete in the 2013 NASA Great Moonbuggy Race on April 25-27. This design includes a frame which folds in half at a hinge in the center in order to fit in specified dimensioned requirements. Steering is accomplished by articulation about a center hinge. Riders sit facing forward and power the moonbuggy using bicycle components. The project is funded by NASA, which provides a budget of $5000 to help cover design and fabrication costs as well as travel expenses for the competition.

Patterns and Perceptions of Risk and Help-Seeking
Amongst Sex Workers in Denver
Misty Heil with Dr. Susan Dewey
Social Work/Women’s Studies
The University of Wyoming
Poster Presentation

This study, based upon research with a cohort of over 100 women engaged in sex work in the Denver area, employs a mixed methods approach to understand sex workers’ perceptions of risk and motivations (and methods) for help-seeking. With the broader goal of improving services for women engaged in sex work, the objective of this study will assess how sex workers conceptualize risk, strategies for risk avoidance, and their descriptions of needed, but currently unavailable, services. Qualitative methods comprise of transcription, coding, and analysis of fifty completed semi-structured interviews with sex workers. Quantitative analysis will consist of two methods. Over 100 women’s key life events and other demographic factors will be analyzed using the statistical analysis software program SPSS. Data will be collected and analyzed through digitally archived pieces on sex work/prostitution from the Denver Post and the New Orleans Times-Picayune. This harm reduction-driven project situates sex worker women as authorities of their own experiences, and will employ their voices and descriptions of their life situations as a means to offer recommendations for legal, social services, and policy change. Findings will be presented at the annual meeting of the Society for Applied Anthropology in Albuquerque, New Mexico in spring 2014.
Nitrogen Cycling in an Open Canopy Mountain Stream
Paige Hellbaum with Erin Hotchkiss
Program in Earth Systems Science
University of Wyoming
Oral Presentation

Wyoming NSF EPSCOR
Wheatland, WY

Streams receive, transform, sequester, and transport nitrogen (N). Stream N fluxes and transformations are of particular interest due to the large anthropogenic influence on N movement through the biosphere. Though regional estimates quantifying N fluxes have been proposed, these represent averages that may vary drastically given different local geomorphology and species composition. These fluxes are also highly variable at different time scales. In order to characterize short-term N cycling in a (relatively) pristine sub-alpine stream, we added $^{15}NO_3$ to North Fork Little French Creek in Medicine Bow National Forest. We measured travel time and ecosystem metabolism in three reaches downstream of the isotope tracer addition. We collected plant, organic matter, invertebrate and water column samples over a period of 45 days before and after the $^{15}N$ addition. The relative isotopic enrichment in these samples will allow us to calculate uptake length and the degree of biological N assimilation over time. Preliminary indicators for in-stream biological activity and turnover rates can be deduced from comparisons of travel time (salt tracer additions) and ecosystem metabolism (diel $O_2$ measurement). Area-specific reconstructions of the fate of N in freshwater ecosystems will increase our understanding of the impact of human-induced changes on Wyoming’s watersheds.

Israel’s First Fight for Survival
Ryan Helling with Dr. Marianne Kamp
History Department
University of Wyoming
Oral Presentation

History Department
Laramie, WY

In 1948, Israel pronounced itself to be a new, independent country in the Middle East. Egypt, Jordan, Iraq, Syria, and Lebanon subsequently declared war on Israel. Israel defeated its attackers, but what helped Israel win? This historical essay examines and compares the factors that enabled Israel’s victory, drawing on scholarship about the War of Independence. Israel’s effort was partly driven by desperation, because Israel was up against multiple enemies, but this was also one of the primary weaknesses of its enemies. There was no cohesion among these forces and they underestimated Israel’s ability and determination to combat their enemies. Israel was fighting for its survival and had established unity through strong leadership. They prepared to fight for each other and their country from their inception, with a well-trained, well-armed and well-coordinated military. My research will explain that although these factors enabled it to win, their unity and pure determination was the deciding influence.
Tracking sugarbeet/corn growth in a Wyoming farm using Landsat images
Carson Hessenthaler with Dr. Ramesh Sivanpillai
1. Department of Agricultural & Applied Economics and 2 Department of Botany
University of Wyoming
Oral Presentation

Remotely sensed data are an effective and cost-effective source of information for monitoring and mapping crop growth. Data collected once in every 16 days by Landsat satellite since 1984 can be used for monitoring crop growth and identify areas of poor growth. In this study, Landsat data collected in 2011 were used to track sugar beet and corn growth patterns in a field located in Lovell, Wyoming. The farmer was aware of the patches within this field that had poor soil fertility and was interested in seeing how this variation affected sugar beet growth. This analysis revealed that approximately two thirds of the field good growth while problem spots existed in the eastern portion. This information will help the farmer to select appropriate management strategy to improve crop growth in the low growth areas.

Shakespeare in a Trunk
Sean Higgins; John O’Hagan
Department of Theatre and Dance
University of Wyoming
Oral Presentation

Arguably the most influential writer ever to lay pen to paper, the works of William Shakespeare continues to shape and sculpt the literary world on the page. Although his text is powerful on the page, it is even more so when brought to life on the stage. The art of storytelling, through acting, helps to dispel the fear associated with the feelings that Shakespeare is convoluted or complex, and instead makes it accessible to audiences of all ages. “Shakespeare in a Trunk” is designed to infuse the young peoples of Wyoming with Shakespeare by opening their ears to the language. Our tour brings Shakespeare’s words to life in communities which have had little exposure to this important text using just a handful of actors and a trunk of props. Through educational workshops and performances, we will break down barriers, so that the youth can start to pick up, understand, dissect, and hopefully enjoy the works of this great author.
Investigating Web Applications using ASP.NET
Kaither Holiway, Kira Lawrence and Lee Sargent
Department of Computer Science
University of Wyoming
Oral Presentation

Model-view-controller (MVC) is a software design pattern in which data and views of data are manipulated by a controller in order to clearly accommodate many user interactions. We hypothesized that we could implement a database in MVC to store homeowner information and associated attributes allowing users to add, edit, and delete houses from a central profile. By aggregating both text and image data, we created a model that represented a single house in its entirety. This allows the user to alter the underlying data model of their home by adding additional features, entering form data, and uploading photos. MVC’s reliance on views also allows us to create collections of users, such that references to others in the database could be created. These references allow users to view the homes, photos, and house features of other users. This could serve several purposes, including the ability to exchange information about homes, gain new décor ideas or even market their home to potential buyers. We investigated how MVC would allow us to easily provide these user to user interactions and provide a detailed model representation of a house. During implementation, we were presented with several obstacles in understanding and utilizing the MVC framework.

Parental Influences on Childhood Obesity
Jenna Hotovec with Dr. Virginia Vincenti
Department of Family and Consumer Sciences
University of Wyoming
Oral and Poster Presentation

Obesity is an epidemic that has dramatically risen in children across the United States. Obese children are at risk for numerous immediate and long-term health problems. Parents have a great influence over children’s daily activities and meal times. Parents set rules for the amount of screen time allowed each day, how often healthy, home-cooked meals are eaten, how often the family eats together without media, and how often a child engages in physical activity. Through a literature review, I adapted a published survey of parental influences on childhood obesity to assess the educational needs of parents at the UW Early Care and Education Center (ECEC). Twenty-two out of seventy parents, ages 18-55, completed the online survey, a 31% return. Results indicate things such as parents need education about avoiding using sweet treats as rewards for good behavior and about healthy amounts of physical activity for themselves and their children. I plan to survey parents with different backgrounds too compare results with this academically-oriented parental group.
Dispensing Device for Two-part Household Epoxy
Joe Hoyt, Brent Roth, Lizzi Snyder, and Jeremy Banks with Dr. Robert Erikson
Department of Mechanical Engineering
University of Wyoming
Oral and Poster Presentation

Two-part epoxy can be a very useful and helpful adhesive for home use, but it does not come without some common problems: It can be messy, inconsistent, and wasteful to use. The industry solution to this problem is the use of mixing nozzles, which are sold with most sizes of epoxy, except the 25 ml variety. The objective of this research was to design an epoxy dispensing device that readily accepts a variety of 25 ml epoxy cartridges and adapts them to a single type of mixing nozzle. It was discovered that there are two general types of epoxy cartridges available on the market that are dramatically different. Thus, the approach chosen for this project included the development of two limited-use cartridge-to-mixing nozzle adapters. To simplify the solution to this problem, a guiding case was also designed that would adapt the entire epoxy fluid system to a standard caulking gun, which most people have in their home toolbox. The epoxy dispensing device is easy to assemble and convenient to use. Most importantly, it solves the problems associated with epoxy use that was the motivation for its development.

Autoethnography as a Research Method: the Benefits of Using an Intimate Account to Study the Attainment of Cultural Competence.
Haylee Hunsaker with Dr. Diane Kempson
Department of Social Work
The University of Wyoming
Oral Presentation

The attainment of cultural competence for social work professionals is a major need as a result of the growing connectedness of different cultures worldwide. But how does one obtain such competence? The goal of this research is to show the effectiveness of the research method autoethnography in facilitating the attainment of cultural competence. This has been done through an autoethnography of my personal experience as a volunteer in Addis Ababa, Ethiopia: a nation that contains a culture and people that were completely unknown to me before my traveling there. This research illustrates the effectiveness of autoethnography in inviting the writer into a process of self-reflection about personal biases and learning about “the other”: primary components of cultural competence. The research method of autoethnography proved to be an effective tool for this social worker in developing competence in working with those of different cultures.
Short Sale Constraints
Kristina Huston with Hilla Skiba
Department of Economics and Finance
University of Wyoming
Oral Presentation

This paper examines the effects of short sale constraints on stock price valuation, and discusses whether or not short sale restriction policies alleviate the severity of negative returns, specifically those realized during the financial crisis of 2008. A brief overview of short sales is provided. A history of short sale constraints is discussed, as well as the overall effects of short sales in the stock market, market efficiency and asset pricing. The Lintner model is examined and derivations are taken to evidence the interaction of investors’ risk-aversion preferences, beliefs regarding asset returns, expected value of the assets, the risk-free rate and prices of the stocks, to determine investors demand for the stock. The impacts of naked-short sale constraints on financial firms during the financial crisis are examined, and the results suggest that the restrictions lead to an improper valuation of asset prices. Policy recommendations are provided based on the results.

Contribution of the Intestinal Microbiome to the Development of Hirschsprung’s-Associated Enterocolitis
Tetiana Hutchison¹, Rachel Lamb¹, Steven McAllister¹ and Naomi Ward²
Department of Science, CWC
Department of Molecular Biology/Department of Botany, UW
¹Central Wyoming College and the ²University of Wyoming
Oral and Poster Presentation

Hirschsprung’s disease (HD) is a congenital malformation of the gastrointestinal tract characterized by the absence of the distal enteric nervous system. Hirschsprung’s-associated enterocolitis (HAEC) is one of the most serious complications of HD. It is hypothesized that the intestinal microbiome contributes to the development of HAEC in human subjects. Our experimental design is to enroll five HD patients after they were diagnosed with HAEC. Fecal samples will be collected prior to antibiotic treatment, after completion of antibiotic treatment, three months after treatment and six months after treatment. The samples will be frozen and pulverized. Extraction of genomic DNA will be performed by bead-beating technique which will be followed by phenol-chloroform extraction. Pyrosequencing will be outsourced. Then we will taxonomically classify and compare community structure between samples. We predict our results to show that the structure and function of the microbiome of each patient before antibiotic treatment is different from those after treatment. This finding will support the hypothesis that disruption of normal intestinal microbiome contributes to the development of HAEC. These data will help to form strategies to positively impact the morbidity and mortality of HAEC.
Descriptive versus Injunctive Norms in Reducing Rape Myths: A survey study  
Lauren Jaeger with Dr. Matt Gray  
Psychology  
University of Wyoming  
Oral Presentation

Sexual assault is an unfortunately prevalent devastating crime, leaving victims with a range of physical and emotional injuries. In an effort to decrease the occurrence of sexual assault, researchers and university personnel have developed prevention and risk reduction programs on college campuses. Though important efforts, the results of these programs have been mixed. Some evidence suggests that individuals who endorse rape myths (i.e., endorse rape supportive beliefs and victim blaming attitudes) overestimate the degree to which their opinions are shared by others. Because most individuals disavow such notions, it is believed that providing individuals with corrective information about normative behavior and beliefs will be helpful in challenging such opinions. This investigation directly compared two types of norms (descriptive and injunctive) to evaluate the comparative efficacy of each approach. Participants endorsing rape myths in a previously administered survey study were randomly assigned to normative information conditions and impact on rape myth acceptance immediately and one week later was assessed. Preliminary analyses suggest that attitude changes were sustained at a higher rate in individuals who were exposed to both descriptive and injunctive norms.

Engineering a Light Activated Caspase-3 for Cell Biology Research and Cancer Treatment  
Tricia Jensen with Dr. Mark Gomelsky  
Molecular Biology  
University of Wyoming  
Oral Presentation

Optogenetics is the study of how light can be used to control specific processes in living cells by hinging microbial proteins, which respond to visible light, to model animals. My project was to create a red-light activated caspase-3. Caspase-3 is the final protease that initiates apoptosis (cell death). To engineer this light activated caspase-3, a red-light sensing photoreceptor was fused to a caspase-3 mutant. This gene was inserted into a plasmid and transformed into Escherichia coli. E. coli proved not to be a viable organism for testing because caspase-3 is toxic to the bacteria. A new system was designed with Saccharomyces cerevisiae. Caspase-3 and reporter plasmids were transformed into yeast. Once the caspase-3 is active, it cleaves the reporter gene, activating the Lac Z reporter system promoting β-galactosidase degradation of X Gal media, resulting in a blue colony. The goal was to have the caspase-3 be active in red-light (blue colony) and inactive in the dark (white colony). Testing is currently in progress. A red-light activated caspase-3 could have great significance. The ability to control the death of a single cell would create new opportunities to study the impact a cell has on an organism and possibly treat diseases.
Bound By Grief: The Role of *The Coquette* and *Charlotte Temple* in Early America

Briana Johnson with Dr. Jeanne Holland
Department of English
University of Wyoming
Oral Presentation

*UW Honors Program*  
*Powell, WY*

The novels *Charlotte Temple* by Susanna Rowson and *The Coquette* by Hannah Webster Foster were popular when first printed in America in the 1790s. A time of suspense for many Americans in the early Republic, the 1790s were characterized by deep-seated political uncertainty. I became interested in these two seduction novels, which prominently feature wildly different protagonists because graves were erected to the main characters of both novels, which became popular tourist destinations. Using post colonialist and affect theory methods, I discover that the appeal of these novels was specific to underrepresented or unrepresented groups in the foundling nation, regardless of gender and class boundaries. I find that these novels united the fledgling American readership under one bond of mutual sympathy for the sacrificed women, allowing them to experience the loss of the innocent and accept the terms of their own betrayal at the hands of democratic rhetoric. Grief transformed the readers of these seduction novels into a community with mutual feeling. These seduction novels, while popular from the 1790s through the 1860s, became obsolete and gave way to new stories in the mid-nineteenth century, as America gained an established voice and identity.

The Photocatalytic Reactions of Desert Varnish

Lacie Johnson with Dr. Carrick Eggleston
Department of Geology and Geophysics
University of Wyoming
Oral Presentation

*Wyoming NSF EPSCoR*  
*Evanston, WY*

Numerous studies have been conducted on desert varnish over the years, yet there have been few advances in the field during the past decade. Currently the prevailing idea is biological processes create desert varnish, but there is little evidence to give this idea a solid foundation. This research will show that while desert varnish may or may not be created biologically, it plays a biological role far beyond creating desert varnish via the photocatalytic properties of semiconducting minerals that occur in the varnish. Light absorption by the varnish, leads to solar energy generation in a form that can be used by the non-phototrophic microorganisms associated with varnish. The experiments with desert varnish lead to the idea that desert varnish is photo-active. When desert varnish is illuminated by sunlight, reactions occur creating measurable changes in the composition of aqueous solution in contact with the varnish. The energy from the light creates electron hole pairs on the desert varnish. The electrons then reduce ferro- and manganese- oxides, while the holes oxidize other molecules (e.g., water, chloride). This research can support new areas of inquiry involving the chemical evolution of early Earth, the history of Mars, and even advances in solar cell technologies.
Design of a Baja Style Vehicle
Students: Luke Johnson
Faculty Advisors: Dr. Dennis Coon, Dr. Rob Erikson, Dr. John Strike, Dr. David Walrath
Department of Mechanical Engineering
University of Wyoming
Oral Presentation

The Mechanical Engineering department has sponsored the development of a single-rider off-road vehicle to compete at the 2013 SAE Baja National Design Competition in Bellingham, Washington. The vehicle is larger than an average ATV but smaller than a typical side-by-side off-road vehicle. The chassis is constructed of both 1.25” and 1” thin-wall 4130 “chromoly” tubular steel. The competition specifies the use of a stock four-cycle, air-cooled, Briggs and Stratton 10 HP OHV Intek engine. That power will be transmitted to the 23 inch rear wheels through a Comet 780 Series CVT and a SNPT forward-neutral-reverse gearbox to a Polaris Outlaw 525 IRS Rear Driveshaft Assembly. Overall, this powertrain system has a speed reduction ratio of approximately 34:1, which will allow the vehicle to reach speeds close to 30 mph. Dual A-arm assemblies at the front wheels, in combination with tri-link trailing arms in the rear, allow for 12 total inches of suspension travel. The vehicle has been designed to withstand a 5 foot fall onto all four wheels. Fox Podium X coil-over shocks with dual-rate springs soak up small obstacles on the trail and soften the impact of large jumps.

Automotive Fuel Tank Tumbler Drive and Ventilation Systems Design
Mark Johnson, Spencer Miller, and Justin Popp with Mr. Scott Morton and Dr. Dennis Coon
Department of Mechanical Engineering
University of Wyoming
Oral Presentation

A local business owner is in the unique market of revitalizing used automotive fuel tanks. Metal fuel tanks corrode over time to the point that they may become unusable. If corroded tanks are still structurally intact, this business owner applies a special liquid sealant to the inside surface of the tank to seal pin sized holes and trap loose particulates, thus making the tanks reusable. Currently, the sealing process is done entirely by hand. In 2011 this business owner approached UDR Engineering, a University of Wyoming Mechanical Engineering Senior Design group, to design a machine that would automate this process. The UDR-designed machine rotated tanks about two axes to achieve even sealant coverage. However, it did not have complete drive or ventilation systems. Therefore, Integrated Drive Solutions (IDS) was tasked with designing these two systems to fit UDR’s frame. The ventilation system will shorten the sealant drying time and the drive system will allow tanks to be coated without constant supervision. This machine will decrease the cost and time required to evenly coat each tank. It will also limit the operator’s exposure to the chemical sealant. Further, the machine will allow more tanks to be reused, thus reducing waste.
Efficacious drug testing for fungal infections using Fountain Flow Cytometry  
Andrew Jones with Dr. Paul Johnson  
Department of Physics and Astronomy  
University of Wyoming  
Oral Presentation  

UW Honors Program, INBRE Fort Collins, CO

Every year, billions of people around the world contract fungal diseases, and millions of these infections end in death. The most common fungal infection is from *Candida albicans*, and causes high mortality rates in immunocompromised patients. There are multiple commonly accepted methods for detecting fungal drug resistance, and all of these have been used for Candida spp, but they fall short at rapidly determining the choice of antifungal for septic patients. Dr. Paul Johnson at the University of Wyoming has developed an instrument, the Fountain Flow Cytometer (FFC), which is used for rapid detection and counting of microorganisms in an aqueous environment. I have developed a nutrient broth to grow large concentrations (>10,000) of yeast over an 4 hour time period. This has proven that we can get a measurable increase in yeast to prove as a control group. The final goal of this project is to develop a procedure for antibiotic resistance testing of blood samples.

Art Marketing as New Marketing Domain  
Nicolette Kaliebe with David Hunt  
Business Marketing  
University of Wyoming  
Oral Presentation  

UW Honors Program Jackson, WY

Artistic goals are customarily concerned with the aesthetic growth of the artist and their followers, while in comparison, the objectives sought by businesses are perceived as economically driven, materialistic, and growth driven. Yet, the evolution of marketing and media has provided a business-related avenue upon which a relationship between art and business can harmoniously collaborate and achieve a shared purpose. This study explores the social phenomenon of the continuously progressing forms of media, from traditional marketing tools towards advanced digital vehicles, and how this succession of technology has changed the approach of marketing from a controlled and commercialized business process into an opportunity for entrepreneurial artists to market their artwork according to the demand they create, rather than their response to the demand already created. The democratization of media, and the power and control of marketing being placed in the hands of the individual, has further stimulated the need for the exploration of art marketing as a separate domain of marketing theory. The creation of a visual art marketing concept applied by individual artists will provide an innovative and fresh philosophy upon which established marketing structures should consider implementing.
Pitchfork Field Study
Rochak Karki, Dhruba Panta, Tayyab Parvez, Rebecca Podio and Omair Sadiq with Dr. Brian Towler
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

Department of Chemical and Petroleum Engineering
Kathmandu, Nepal
Bharatpur-4, Chitwan, Nepal
Calgary, Alberta, Canada
Newcastle, Wyoming
Calgary, Alberta, Canada

The Pitchfork Field is an oil field that primarily produces for the Tensleep Formation. The field is physically located in Northwestern Wyoming in the Big Horn Basin. The characteristics of this field that have been examined include; porosity, permeability, original oil-in-place, and production decline curve analysis. The properties of the Pitchfork Field were investigated using the production data, well logs, perforation depths and other information of the field available on the Wyoming Oil and Gas Commission website. Structure, oil-water contact and original oil-in-place maps and Hingle, Pickett and decline curve plots were created and analyzed. In addition, to the reservoir properties and production of the field other topics investigated about the field include; economics, environmental considerations and safety concerns. A complete field study of the Pitchfork Field, from reservoir properties to field operations has been completed.

Detection of Antimicrobial Resistant Bacteria Isolated from Chicken Breast
Sukhjeet Kaur and Elizabeth Pieper, Bernardino Madsen, M.S.
Casper College
Poster Presentation

INBRE
Casper, WY

Over utilizing antibiotics has become a widespread problem in humans and animals throughout the world. This overuse has provided microorganisms with the opportunity to adapt and develop into different strains of antibiotic resistant microorganisms. This overindulgence has caused resistant genes to be found in animals after they are processed and put on local grocery store shelves, resulting in an outbreak of “super infections.” Treating the variety of diagnoses is difficult because common antibiotics like vancomycin, erythromycin, and tetracycline no longer effective in the treatment of illnesses due to antimicrobial resistance.

The scope of this research project is a series of modern techniques to isolate, identify, and sequence the resistant microorganism’s DNA found in chicken purchased at a local supermarket.
**Theory of a Punchline**  
Jonathan Kawulok with Dr. Caroline McCracken-Flesher  
English Department  
University of Wyoming  
Oral Presentation

According to the French philosopher Henri Bergson, laughter is a corrective; comedy renders moral judgment to its audience. The punch-line, as the climactic part of a joke or sketch resulting in immediate laughter, can be considered the venue by which moral judgment may be delivered. However, Terry Gilliam of the Monty Python comedy troupe states that their first rule was “no punch-lines.” Can comedy render moral judgment without the use of a punchline? This presentation investigates how the television series Monty Python’s Flying Circus uses deconstructionist, absurdist metacomedy to deliver its correctives to its audience as opposed to the use of a punch-line. By using other comedic methods to deliberately avoid the punch-line, Monty Python critiques the ineffectiveness of traditional comedy, and thus its ability to issue a corrective. This style of humor addresses the purpose and evolution of performance comedy, indicating that if a corrective is even issued, audiences must be competent enough to ascertain it on their own.


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**Advanced Oxidation of Produced Water**  
Heather Kenyon with Dr. Rob Milne  
Natural Science Division  
Sheridan College  
Poster Presentation

Water produced during oil and natural gas extraction is often considered a waste due to a high level of dissolved contaminants including hydrocarbon compounds. One method of reducing the amount of dissolved hydrocarbon compounds is oxidation, this includes exposure to ultraviolet (UV) light, to ozone, to peroxide activated by UV light, and to the combination of ozone and peroxide activated by UV light. All of these create highly-oxidizing hydroxyl radicals. Oxidation of produced water from the Piceance Basin of Colorado was specifically investigated, utilizing each of these oxidation modes. A test apparatus was assembled for steady-state presentation of the produced water to each of the oxidation modes, with controlled reaction time. Hydrogen peroxide and ozone dosage and residual were measured by colorimetric and titration methods. The UV light, 254nm, was to maximize absorbance by the dissolved hydrocarbons, peroxide and ozone. Total Organic Carbon (TOC) was analyzed before and after each exposure, as an indicator of overall hydrocarbon content.
The role of the Neurokinin 3 Receptor (NK3R) in neurite outgrowth
Eli Kinney Lang with Dr. Lynne Ipiña and Dr. Bill Flynn
Math Department, Neuroscience Program
University of Wyoming
Oral Presentation

UW Honors Program Laramie, WY

At the beginning of life, mammals have relatively few neurons. These neurons are guided by molecular and chemical cues to reach their correct targets in the brain, allowing the brain to wire itself correctly. Knowing chemicals which guide neurites early in development is therefore important in understanding how the brain becomes wired. The Neurokinin 3 Receptor (NK3R) appears early in development and is widely expressed throughout the brain. The early presence and wide distribution of NK3R raises the question whether it plays a role in early brain development. To test this, rat embryonic hypothalamic (REH) cells were transiently transfected with NK3R attached to green fluorescent protein and were imaged using the Zeiss 710 LSM confocal microscope. Cells were given a 10 minute baseline of no treatment, followed by addition of an agonist, senktide, to activate the NK3R. Images were then quantified using ImageJ analysis software. Additionally, analytical mathematical techniques were developed to understand how the shape of a neuron affects the growth of neurite processes. Furthermore, mathematical modeling techniques allowed neurite outgrowth to be described through a novel model. Results demonstrate that activation of NK3R by receptor agonist causes an increase in both the number and length of neurite processes.

Tone Versus Pitch in the Violin Middle b Using Fourier Series
Jenna Krieschel with Dr. Jeff Selden
Department of Mathematics
University of Wyoming
Poster Presentation

McNair Scholars Program Arvada, CO

This study will examine the differences between the tone and pitch of the middle b as played on both the D and A strings of the violin. In terms of this study pitch will be regarded as the ‘note’ on the treble cleft, and tone will be regarded as the clarity of the sound. It is hypothesized that there will be a distinct observable difference between the tone and the pitch of the middle b when played on different strings. The sound waves of the middle b will be established from both the D and A strings either from past mathematical data, if available, or will be estimated using a violin and a computer program, outlining physical differences. These models will be analyzed for the parameters that account for the physical differences using Fourier Series. Parameters that are similar will be classified as pitch, and the differences as tone. This research will help define the cause of differences in tone of the violin and provide a mathematical insight into the sound of the violin.
Coccidia Presence in Wild Avian Communities of the Big Horn Basin
Margarita Kurnaeva, David Rach, and Ainsley Oates with Eric C. Atkinson, Elise Kimble, Steve Harbron, John Campbell, and Allan Childs.
Biology Department and Chemistry Department
Northwest College
Poster Presentation

Coccidia are intracellular parasites infecting a variety of animals including birds. *Eimeria* and *Isospora* contribute to the disease commonly known as coccidiosis, one of the most prevalent vertebrate diseases in North America. The purpose of this study is to assess the presence, diversity, and ecology of coccidia in wild avian communities of the Big Horn Basin. Presence of coccidia was ascertained through collection of fecal materials beneath feeding stations, sampling twice daily: 11:30hrs MDT and 16:30hrs MDT (n=219). Samples were placed in 2.5% solution of potassium dichromate and then transferred to Petri dishes. After 10 days, samples were floated in 30ml centrifuge tubes, with wet mounts prepared of the least dense supernatant. We scanned each slide at 100x-400x for the presence of coccidia. Low coccidian prevalence was encountered in our samples leading us to investigate alternate protocols for the identification of coccidia from small (~ 0.15g) passerine fecal samples. Coccidiosis is an opportunistic disease. Failure to observe coccidia in the slides does not prove the absolute absence of coccidia in these birds because, like many other parasites, they could bury in intestinal epithelium until the appropriate conditions for shedding would appear; conditions potentially related to gut microbial communities.

Characterization of Bacterial Isolates from Mice affected with Hirschsprung’s Disease
Patrick Tracy LaBreck with Dr. Naomi L. Ward
Department of Molecular Biology
University of Wyoming
Oral Presentation

Hirschsprung's disease (HD) is a congenital disease featuring blockage of the large intestine, leading to enterocolitis, a serious and sometimes fatal complication. The microbiome in a mouse model of HD differs from that found in healthy mice, supporting a role for the microbiome in enterocolitis. In particular, young HD mice show proliferation of coagulase-negative staphylococci such as *Staphylococcus xylosus*, in place of lactobacilli. The goal of my study was to isolate and characterize *S. xylosus* from a HD mouse and *Lactobacillus johnsonii* from a wild-type mouse. The two bacterial species were successfully isolated using selective media,(and their identity confirmed by 16S rRNA gene sequencing) allowing me to further study biofilm formation and possible interspecies interactions. Biofilm formation was tested on several surfaces and viewed via light microscopy; *S. xylosus* was able to form a biofilm on a hydrophilic support. The interactions between the two species were examined by reciprocal growth inhibition assays using the culture supernatants of both species. No growth inhibition was observed. Our characterization of the biofilm formed by *S. xylosus*, as well as our examination of possible interactions between the two species, provides a foundation for an improved understanding of enterocolitis in the HD mouse.
A Two-Year Serosurvey of a Rural Population for West Nile Virus IgG and IgM Antibodies
Rachel Lamb\(^1\), Cassie Paulsen\(^1\), Shelby Shearer\(^1\), Rod Printz\(^2\), Tetiana Hutchison\(^1\), Tyler Graham\(^1\),
Drew Leach\(^1\), Scott Seville\(^2\) and Steven McAllister\(^1\)
Department of Science, CWC
Department of Zoology and Physiology, UW
\(^1\)Central Wyoming College and the \(^2\)University of Wyoming/Casper Center
Oral and Poster Presentations

West Nile virus (WNV) is an RNA arbovirus in the family \textit{Flaviviridae}. Birds are the primary reservoir of the virus; mosquitoes are the primary vector. Humans are a terminal host and most infections are asymptomatic. Less than one percent of patients exhibit severe symptoms including paralysis, encephalitis, and death. Since Fremont County is a hot spot for WNV, serosurveys were conducted for two years to determine the percentage of residents previously exposed to WNV. Serum samples were drawn and tested for the presence of WNV for IgG and IgM antibodies using Enzyme Linked Immunosorbant Assays (ELISA) tests. The presence of high titers of IgG antibodies are indicative of past exposures; IgM indicates more recent exposure. In 2011, 87 subjects were tested. 12.6\% (95\% CI: 5.7\% -19.6\%) were positive for IgG and 9.2\% (95\% CI: 3.1\% to 15.3 \%) were positive for IgM. In 2012, 96 subjects were tested. 10.4\% (95\% CI: 4\% to 16.8\%) were positive for IgG and 6.3\% (95\% CI: 1.4\% to 11.1\%) for IgM. These surveys indicate that most of the population of Fremont County remains at risk for exposure to West Nile virus infection and that new exposures are still occurring.

Land Wind Racer
Daniel Larsen, Trevor Ross, Josh Meeks, and Kevin Toly with Dr. Robert Erikson
Mechanical Engineering Department
University of Wyoming
Oral and Poster Presentation

Zephyr Racing, in collaboration with Z4 Energy Systems and the Wyoming NASA Space Grant Consortium, has designed a 100\% wind powered vehicle to compete in the Carbon County Higher Education Celebration of Wind race May 4, 2013 in Rawlins, WY. The design specifications and approach were developed through mathematical modeling of race conditions, constraints imposed by race rules, and sail mechanics. These parameters led Zephyr Racing to implement a 3-wheel dual sail design with a single steered wheel in the front. Steering and rear braking is controlled by the driver’s feet. The vehicle is composed of a 1018 CD steel frame, aluminum mast supported by guy-wires, and an aluminum floor plate. The assembled vehicle is 10.5 feet long, 10 feet wide, and 13.5 feet tall. Propulsion is accomplished using a crosswind sail and a symmetric spinnaker sail when appropriate. With this design, Zephyr Racing will have a wind racer capable of winning the Celebration of Wind race on May 4.
Analysis of Soils With Historic Arsenical Pesticide Applications for Arsenic and Lead Content
Philip Lavallee Jr.¹, Brandon Reynolds², Scott Schell³, K.J. Reddy⁴
¹Major in Rangeland Ecology/ Watershed Management with a Minor in Soil Sciences
²Assistant Research Scientist, Ecosystem Science and Management, University of Wyoming
³Associate Research Scientist, Ecosystem Science and Management, University of Wyoming
⁴Professor, Ecosystem Science and Management, University of Wyoming
Ecosystem Science and Management
University of Wyoming
Oral Presentation

EPSCoR

Arsenic is a worldwide contaminant of soils and water sources that humanity use for multiple purposes including agriculture. High concentrations of Arsenic in food and water sources have been known to cause cancer and illness in populations. Historically, lead arsenate was applied to fruit orchards as a pesticide before banning by EPA in early 1900s. An orchard in central WY is known to have a history of such pesticide applications. Soil samples were collected from a historic private orchard in Wyoming and analyzed for remaining constituents of arsenical compounds that were formerly applied as pesticides in the form of lead arsenate. The hypothesis is that the arsenical compounds, if still present would be bound within the first 30 cm of soil with little potential to move further. Samples were processed in a lab at University of Wyoming and analyzed for arsenical and lead compounds. Results led to the conclusion that only background Arsenical compounds are held in the soil profile and any remnants of the pesticides have been leached or bound within the soil so as to be biologically unavailable and of no consequence to the ongoing operations of the orchard.

Sustaining Sustainability: a Management Plan for ACRES Student Farm
Sarah Legg with Dr. Urszula Norton
Department of Plant Sciences
University of Wyoming
Oral Presentation

UW Honors Program

Agricultural Community Resources for Everyday Sustainability (ACRES) Student Farm is a student organization at the University of Wyoming whose mission is to provide the University of Wyoming and local Laramie communities with local, sustainably-grown produce while promoting agricultural awareness and involvement. As a well-established organization that provides community supported agriculture (CSA) shares, conducts a city-wide composting program, sells produce at two Laramie farmers’ markets, and provides countless educational and research opportunities, ACRES has experienced exponential growth in the six years since its conception. However, the transient nature of the student management and work force also causes the farm to continually suffer losses in efficiency and acquired knowledge, as the lack of consistent management leads to unsustainable internal functioning. This project seeks to develop alternatives for a management plan for ACRES that build on information regarding management structure from other student farms across the country and that also incorporate previous knowledge acquired by ACRES members. The research culminates in the creation of a management handbook for the on-site use of current and future ACRES members. The handbook will serve as a tool to help the farm run as efficiently as possible, thus sustaining ACRES for years to come.
The Sagittal Preparation for Use in *Xenopus laevis* Tadpole Electrophysiology
Allison Lewis with Dr. Kara Pratt
Department of Zoology and Physiology
University of Wyoming
Poster Presentation

**EPSCoR/INBRE**

Colorado Springs, CO

The retinotectal circuit is the main part of the visual system in the *Xenopus laevis* tadpole. This circuit involves the retinal ganglion cells in the eye, which project their axons to the brain where they synapse onto tectal neurons located in the optic tectum. Our lab studies the functional development of these tectal neurons using electrophysiology to quantify synaptic currents and action potentials. Typically, these sorts of experiments have been carried out using a tadpole whole brain preparation. However, this preparation only allows access to the inner-most tectal neurons. Recently, our lab has developed a new preparation – the sagittal slice preparation – that allows us to visualize and record from all layers of the optic tectum. One unique cell type that we have found using this preparation has fast spontaneous events, exhibits more action potentials, and has sodium currents at least double that of normal tectal cells. We suspect that these cells are GABA-ergic cells. We hope that this new preparation will allow us to classify more cell types and explore more circuitry in the developing *Xenopus laevis* tadpole brain.

Capillary Electrophoresis on Unconventional Fluids
Yafei Liu with Dr. Lamia Goual
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral presentation

Wyoming NFS EPSCoR

China

As the supply of conventional oil is fading, the world is increasingly dependent upon petroleum fluids from unconventional fluids such as asphaltenes. Thus, a better understanding of their properties is essential, and it can be achieved by using a microfluidic device to separate the samples according to their electric charges and then analyze them. The fundamental theory is that there are two cross channels in a microfluidic device, and due to electrophoresis flow and electroosmotic flow, samples carrying different charges will move at different speeds in the channels. Asphaltenes have multiple compositions; therefore, the separation of differently charged compositions will be achieved once the asphaltenes sample is injected into the channels and moves. However, the injection of the sample can be very difficult. Because there are positively charged components in asphaltenes, they can neutralize the negative charges on the surface of the channels and the electroosmotic flow stops. But this did not happen at all times. Sometimes the injection was possible, but it was not controllable. Thus, the separation of asphaltenes was not actually achieved. Another way of injection is suggested which is through a microfluidic continuous electrophoretic device.
In J.R.R. Tolkien’s “On Fairy Stories” he writes that these stories are “wide and deep and filled with many things.” According to Tolkien, these stories have four elements: fantasy, recovery, escape, and consolation. The purpose of this paper is to examine how these elements function in C.S. Lewis’ children’s novels, The Chronicles of Narnia. Lewis’ novels have a loyal group of followers in the religious community. The elements of the fairy story function as a framework for revealing why these novels are so influential in this religious community as well as outside that community. For example, Tolkien explains that an element of the fantasy novel is that it contains an internally consistent secondary world. This is important psychologically in order to gain the readers’ trust of the story. The “recovery” takes place when the reader is able to see something in the real world in a different light after experiencing the fantasy world. In the “escape” elements of the real world are suspended and the “consolation” is the ending of the novel when good overcomes evil. Identifying elements of the fairy story in Lewis’ novels helps explain the method in which the stories function in a reader’s imagination.

Preface to Set Apart Stories
Sarah Maddy and Nell Hanley
Department of English
University of Wyoming
Oral Presentation

William Wordsworth wrote Preface to Lyrical Ballads as an introduction to a compilation of poems that he and Samuel Taylor Coleridge had written. In this Preface, Wordsworth creates the purpose of the poet, i.e. his purpose in writing poetry. He establishes himself as a writer with a purpose, a confident writer who can stand by a certain set of ideals and convictions. I wish to do the same. In my Honors Thesis, I am creating my own compilation of short stories that I have written while in college, along with a critical analysis of my work. Through complete original works, including a few imitations of famous authors, and an analysis of my personal writer’s statement, emulating Wordsworth’s Preface, I will display my purpose in writing. My results are the stories I will submit, and my conclusion in my analysis is that I want Christ to be at the center of everything I write. I want to be a Christian writer, not just a Christian who writes, as my role model Francine Rivers has said.
**Reversible Electrochemical Behavior of Transition Metal Compounds**  
Kenneth M. Markley with Dr. Rob Milne  
Natural Science Division  
Sheridan College  
Poster Presentation

Metallocenes and coordination complexes are transition metal compounds that contain a transition metal atom bonded to organic ligands. Many of these materials have been shown to be electrochemically active undergoing redox reactions that are often reversible. Reversible redox reaction ability of metallocenes and related coordination complexes give these novel substances the potential to be useful in storing energy.

Electrodes modified with transition metal compounds were tested for electrochemical behavior using tetrabutylammonium hexafluorophosphate in acetonitrile as the electrolyte. The electrodes used were graphite clay, and the compounds tested were ferrocene, nickelocene, cobaltocene, and ruthenium tris bipyridine.

**Species of Eimeria from the Artic Ground Squirrel (Urocitellus parryii) in Canadian Yukon Territory**  
Tina Markos, Dagmara-Motriuk Smith, R. Scott Seville, Florence Teulé  
Department of Zoology and Physiology  
University of Wyoming/Casper Center  
Poster Presentation

Fecal samples were collected from Urocitellus parryii in the Ruby Range, south-west Yukon Territory, Canada. U. parryii from this Canadian territory have not been previously examined for Eimeria spp. Seventeen fecal samples were processed to isolate eimerian oocysts via sugar flotation and the obtained oocysts were examined at 800x magnification. Pictures and measurements of Eimeria were taken using an Olympus BX microscope. Three species of Eimeria were recovered including: Eimeria lateralis L x W 31.6 x 25.1µm, range 28.7-34.1 x 20.6-27.1µm; Eimeria cynomysis L x W 34.6 x 27.2µm, range 34.3-34.9 x 26.4-28.6µm; and Eimeria moroainensis L x W 23.5 x 20.1µm, range 20.4-27.8 x 16.6-25.3µm. However, damaged oocysts have made measuring oocyst dimensions difficult and thus accuracy of identification for oocysts from different species that are similar in size problematic. Based on morphology and oocyst abundance three samples were selected for DNA extraction, PCR and target DNA sequencing. In the next phase of the project we will sequence the Open Reading Frame 470 (ORF470) plasmid and 18S rDNA regions. These sequences will be compared to existing sequences in GenBank and our database for confirmation of the Eimeria species isolated.
Swing Dance: Perseverance of Culture
Morgan L Marks with Dr. Kent Drummond
Department of Management & Marketing
University of Wyoming
Oral Presentation

Throughout history, people have danced. Different dances come into and then go out of style, but one particular dance style has remained popular for nearly a century: Swing dance. Unlike the dances whose popularity fades after a short time, Swing’s popularity continues to grow both nationally and internationally. A Swing aficionado will find like-minded individuals in most developed countries. Swing is also popular the local level: the University of Wyoming has a Swing club, which offers free lessons and social dancing each week and has a competitive dance team. My involvement in this club includes: teaching, which perpetuates the style; dancing socially, which allows me to experience the dance; and competing and performing, which has an entirely different mentality than social dance.

I argue that Swing Dance continues to thrive due to a combination of its unique history and development; the development and popularization of Swing and Jazz music; the adaptability inherent in the dance; and the rebellious, society-changing nature of Swing. With an ethnography of my experience with Swing dance, I will discuss how these aspects relate to the Swing culture today and how this will allow Swing to maintain its popularity in the future.

Elucidating tolerance: selenium’s effect on lipid peroxidation and glutathione peroxidase in rhizospheric fungi
Domonique D. Martinez, William L. Trebelcock, Dr. Zachary P. Roehrs, and Dr. Ami L. Wangeline
Department of Biology
Laramie County Community College
Poster Presentation

Wyoming INBRE

Selenium (Se) is a trace element that occurs both naturally and anthropogenically and is essential for many organisms, including animals and bacteria, but not for plants or fungi. Se is typically antifungal, but some fungi isolated from plants that accumulate Se (up to 20,000 ppm) seem to thrive in their Se rich environments. These Se tolerant fungi were isolated from the roots of Se accumulator plants and examined to begin elucidation of possible Se tolerance mechanisms. First, cellular stress as a measure of lipid peroxidation (LPO) was examined to determine if Se tolerance was due to stress response, or was the result of other physiological mechanisms. Further, due to differences in the composition of the enzyme glutathione peroxidase (GPx) between animals (uses Se) and fungi (uses S), GPx activity was evaluated in relationship to differing levels of Se in fungal isolates. Impacts on GPx activity and LPO levels varied between isolates and Se treatments, but most indicated a physiological response, either positive or negative. For example, in the presence of selenite, isolates of Aspergillus leporis exhibited a trend of reduced LPO, while selenate resulted in increasing cellular stress ultimately triggering a stress response.
Shaft Twist Inspection Tool
Thomas McAtee and Bryce Rickard with Dr. Stan Legowski
Department of Electrical Engineering
University of Wyoming
Oral and Poster Presentation

AMSAA and Volpi and Cupal Senior Design Fund
Casper, WY
Cody, WY

The United States Army regularly uses armored vehicles for a variety of demanding tasks. Some of these vehicles have been outfitted with additional armor and weapons, dramatically increasing the overall weight of the vehicle. This additional weight can overload the vehicle and cause tub shafts in the axles to become over torqued. These over torqued shafts deform and, if not replaced, break. So, during routine maintenance, these shafts are removed and visually inspected for signs of twist, which indicates a deformed shaft needing to be replaced. Unfortunately, visual inspections are unreliable and can lead either to vehicle malfunctions in the field or to good shafts being replaced and wasting money.

Our senior design project will result in a tool to measure the amount of twist in a shaft and determine whether or not it has undergone deformation. This tool will be able to accurately measure amounts of twist as little as one tenth of a degree. In addition, the tool will also be used by technicians in a harsh industrial setting. So, it will be very durable, resistant to dirt and moisture, and able to withstand a very wide range of temperatures.

Noninvasive Insulin Therapy using Microneedle Perforation and Iontophoresis
Josh McConnell and Kaitlyn McKim with Dr. Joseph Holles and Dr. John Myers
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

Department of Chemical and Petroleum Engineering
Laramie, WY
Erie, CO

In the past decades, diabetes has become widespread among the U.S. population. As of 2011, nearly 26 million individuals had the disease, and this number will continue to grow. Currently, insulin-dependent diabetics have few treatment options. Essentially all individuals rely on subcutaneous insulin delivery (administration beneath the skin via hypodermic needle or catheter), which can be unpleasant to use, leading to reduced patient compliance. Our proposed transdermal system uses a minimally-invasive method to deliver insulin: skin is treated with an array of microneedles and subsequent insulin transport through the skin is actively facilitated via iontophoresis. The device consists of a disposable patch containing a microneedle array, a reusable control module, and software for wireless control of the insulin delivery via mobile electronic device. Together, these components create a device that will be an attractive alternative to pumps and hypodermic needles not only because operation of the device is painless, but also because of its convenience and cost effectiveness.
**Coming to Terms: A creative exploration of the collaboration between photography and literary works**

Kali S. McCrackin with Dr. Conrad Smith and Val Pexton  
Communication & Journalism Department and the English Department  
University of Wyoming  
Oral Presentation  

**UW Honors Program**  
**Laramie, WY**

Literature is one of the oldest artistic influences on culture. Today, however, visual images play a growing role in shaping culture, especially in the western world. Images, particularly photography, fill the environments in which we live. They communicate everything from the latest fashion to the most recent development in the war to artistic shots of small town America. These visuals are a part of daily life, but the commonality of photography is a relatively new development when compared to literature. The gradual acceptance of photograph by the literary world allowed it to rise to its status today. Such acceptance enriched the literary and visual worlds through collaborations between authors and photographers. Synergies between literature and photography, such as those between Henry James and A.L. Coburn, John Steinbeck and Dorothea Lange, Susan Sontag and Annie Liebovitz, and James Agee and Walker Evans pushed the boundaries of each medium and allowed for an atmosphere of collaboration between each art.

In this project, I argue that neither medium is more influential than the other and show how the two mediums can be used in creative collaboration. The two work together in order to reach their potential for shaping culture in the western world.

**Plant Responses to Light Independent of Photosynthesis: Qualification and Quantification of Photoreceptors and Light Dependent Morphological Traits Throughout Development Stages in a Nonphotosynthetic Plant**

Sean McCrackin, Dr. Steven Miller  
Department of Botany  
University of Wyoming  
Oral and Poster Presentation  

**Wyoming NFS EPSCoR, NASA Space Grant Consortium**  
**Laramie, WY**

Photosynthesis, the ability of green plants to synthesize chemical energy directly from carbon dioxide and water using solar energy, is the foundation for survival of all living organisms on Earth. Photosynthesis depends on a number of pigments that detect and capture light energy. These pigments are responsible for the production of energy in plants, as such they play crucial roles in plant development, yet little is known about their role independent of photosynthesis. This study focused on how pigment production responds to differing light environments independent of photosynthesis in a natural occurring non-photosynthetic plant, *Pterospora andromedea*. Plants were grown in the field under conditions of light where one entire wavelength of light was eliminated (blue, green, red). Tissue samples were taken from these plants over developmental stages of growth and pigmentation analyzed using acetone extraction and a spectrophotometer. Both chlorophyll *a* and *b* were detected in varying amounts between individuals but with a consistent 1:2 ratio (*a:b*) among all individuals in the test and control groups. This indicates that light wavelength composition is not the only factor in pigment production. Effects of luminous flux need to be analyzed to eliminate it as a factor on plant pigmentation to establish overarching patterns.
An Evaluation of the Effectiveness of Binge Drinking-based Harm Reduction Programs at the University of Wyoming  
Ty McNamee-Jeremy Weaver  
Honors  
University of Wyoming  
Oral Presentation  

UW Honors Program  

Currently, 44% of college students in the United States binge drink. This number has remained steady for the past 25 years. Because of the social issue of binge drinking, colleges have created and implemented countless drinking prevention, harm reduction, and abstention programs for students across the country. The University of Wyoming (UW) has specifically created harm reduction programs to combat binge drinking problems, as the University’s student population currently holds the same binge drinking rate as the national average. These programs include the campus coalition the A-Team, the free taxi service SafeRide, free legal service through the Students’ Attorney Program, a required educational test about alcohol behaviors AlcoholEdu, and the counseling and intervention program AWARE. Qualitative research was conducted on the effectiveness of these programs’ attempt at lowering binge drinking rates and the negative behaviors associated with binge drinking through surveying UW students and interviewing UW staff members in charge of the harm reduction programs. Results showed a broad variation of effectiveness in UW’s programs. Staff member interviews also detailed a variety of opinions on the effectiveness of programs, as well as the work still needed to be done on the UW campus, in regards to lowering drinking rates.  

UW Classroom Finder for Android  
Justin Meidinger, Erin Sanders, and Jed Storie with Dr. Ruben Gamboa  
Department of Computer Science  
University of Wyoming  
Oral and Poster Presentation  

It is rare today that we do not use some type of mobile application enabled by a Smartphone to navigate us to an unfamiliar location. The goal of our project is to extend this capability to the main campus of the University of Wyoming. In our project, this is done using an algorithm to determine the shortest path between starting and ending locations of both buildings and classrooms. The application is designed to display a map of the locations the user wishes to move between and draw a path to guide the user to their end location. This application is targeted to help those who are not familiar with the campus navigate their way around.
This project was completed in conjunction with the 2013 American Society of Mechanical Engineers (ASME) Remote Inspection Vehicle Design Challenge. ASME proposed the contest after the nuclear disaster at the Daiichi nuclear facility in Japan and requested that interested groups design a vehicle able to accomplish simple tasks in such an environment. This challenge requires that a completely remote controlled vehicle reads a gauge, pushes a button, drops off and picks up radiation sensors, and returns to the starting point fully operational and ready for another run. Because the required tasks can be considered to have low mechanical demands, the critical functions of such a vehicle are the ability to quickly navigate the course and quickly and reliably pick up and drop off the mock radiation sensors (wooden dowels.) These two critical functions were the focus of the design strategy. The final remote controlled vehicle design incorporates two adjustable claws for rapid drop-off and retrieval of the mock sensors, a 4WD platform capable of a top speed of 3 ft/s and a maximum torque of 3.3 lbf-ft, a camera capable of wirelessly transmitting a video feed and rotating 360 degrees, and an average battery life of 1 hr.

**Integration of Accelerated Precipitation Softening - Microfiltration (APS-MF) Assembly to Maximize Water Recovery from the Treatment of Brackish Water**

Kyle Meyers with Dr. Dongmei (Katie) Li
Department of Chemical and Petroleum Engineering
University of Wyoming
Oral Presentation

The development of hydrocarbon resources such as crude oil, coalbed methane, conventional gas, and tight-shale gas unvaryingly results in the generation of brackish wastewaters. Brackish wastewater is characterized by salt content, often expressed as total dissolved solids (TDS). In the United States alone, over 21 billion barrels of produced water are generated every year. The disposal of this produced water has major economic and environmental implications. Current reverse osmosis (RO) treatment methods yield clean water recovery rates ranging from 50-75%. The recovery is largely limited by the presence of mineral scalants.

The objective of this project is to integrate an Accelerated Precipitate Softening (APS) - Microfiltration (MF) device prior to a secondary RO treatment in order to increase water recovery to ratios approaching or exceeding 90%. APS is used to remove scale-forming ions from the RO concentrate in the form of precipitate, and MF serves as a polishing step following the precipitation softening to remove any solids. The integrated APS-MF device for RO concentrate treatment will vastly enhance the feed water quality to the secondary RO system, which allows for the substantial increase in water recovery.
When freshmen enter college there is an expectation of how one conforms to the college lifestyle. For some men, that is by joining a collegiate fraternity or a brotherhood of men who have common hobbies and interests. Media, such as Totalfratmove.com, Animal House, and Revenge of the Nerds have contributed to stereotyping of privilege and entitlement among fraternity men. My research will examine how these influences in fraternity culture create and validate the construction and performance of masculinity for "Greek" men. The interviews address three main areas: 1. How being a fraternity man validates their masculinity. 2. The performance of one’s masculinity through the lens of fraternities. 3. How stereotypes and archetypes such as: frat star, frat daddy, and frat boy affects the fraternity man’s relationships with others.

Development Rate of Golden Trout (Oncorhynchus aguabonita) Eggs under Fluctuating Temperature Regimes: The Implications of Climate Change
Mike Mischke with Dr. Frank Rahel
Department of Zoology and Physiology
University of Wyoming
Poster Presentation

The golden trout (Oncorhynchus aguabonita) is a sub-species of rainbow trout (Oncorhynchus mykiss) native to California. They are a coldwater fish species that require temperatures of around 36°F to thrive and reproduce. Climate change is altering stream and lake temperatures, which may effect fish spawning and eggs develop. To examine the effect of water temperature increases on golden trout spawning and egg development, I analyzed four years of water and incubation temperature records that were collected by Story Fish Hatchery in Story, Wyoming, where golden trout are spawned annually. My results show that as water temperature increases, golden trout spawn earlier. My findings also reveal that temperature determines the development rate of golden trout eggs, and that as temperature increases, eggs develop faster. If spawning occurs earlier and eggs hatch faster in the wild, adequate food may be unavailable to support the young fish. Information on the influences of temperature on golden trout spawning and egg development will be valuable to future conservation efforts and management strategies.
Series Hybrid Off-Road Vehicle Design
Department of Mechanical Engineering
University of Wyoming
Oral and Poster Presentation

Department of Mechanical Engineering  
Z4 Energy Systems, LLC.

HORV-Tech is converting a 1982 Honda Odyssey ATV from its original two-stroke internal combustion engine powertrain to a series-hybrid powertrain. In order to establish design objectives, testing was performed on the original vehicle to determine the performance capabilities which must be met or exceeded by the hybrid-powertrain-equipped vehicle. Using these design objectives, determined through collaboration between HORV-Tech and the sponsor, Z4 Energy Systems, LLC, a design morphology was developed and key components were selected. Mathematical models were used to analyze the performance of each component and its integration into the total product to meet the objectives. Emphasis was placed on selection and configuration of the components within the powertrain. The design includes the electric motor, electric storage units, charging units, the generator, and all controls and connections associated with the components. The project is funded by the Wyoming NASA Space Grant Consortium and Z4 Energy Systems, LLC.

The Synthesis and Purification of Porphyrin
Kendra Moore with Dr. Milan Balaz
Department of Chemistry
University of Wyoming
Oral Presentation

Wyoming NSF EPSCoR

Porphyrs play a significant role in many biological processes that are necessary for life. Both chlorophyll (a green pigment) and heme (a component of hemoglobin) contain metalloporphyrins. Chlorophyll is found in plants and is the most important pigment for absorbing light energy for photosynthesis. The purpose of this project is to synthesize porphyrins using organic chemistry synthesis methods and purify the porphyrins using column chromatography. Once purified the structure of the porphyrins and success of the synthesis will be determined using NMR spectroscopy. The purified products have functional groups that can be altered to allow for further reaction of the porphyrin products.
Duration of a Single Subcutaneous Dose of Curcumin in Mice
Jennifer Morkemo, Dr. William Murdoch and Ed Van Kirk
Department of Animal Science
University of Wyoming
Oral Presentation

UW Honors ProgramGillette, WY

Turmeric root has been used for thousands of years in traditional Chinese medicine to treat inflammatory diseases. The active ingredient in turmeric is curcumin which gives it a characteristic yellow color. Research has proven that curcumin modifies several different molecular targets including enzymes, transcription factors, cytokines, cell cycle proteins, and receptors. Curcumin is being used to treat several different diseases like cancer, diabetes, arthritis, and Crohn’s disease. My research is focused on the effects of curcumin and bone density in mice. Previous studies have shown that female mice with their ovaries removed have a decrease in bone density that is similar to postmenopausal women. Curcumin may have a potential to help decrease this loss of bone density. Mice were injected with a single dose of curcumin in a carrier that is similar to the common contraception Depo-subQ provera 104. Blood samples are taken once a week for eight weeks and High-performance Liquid Chromatography is used to determine the serum levels of curcumin to prove the single injection has continuous release of curcumin. Bones from the mice are assessed histologically and a postmortem Dual X-ray Absorptiometry is used to look at bone density.

Understanding Bystanders’ Behaviors in Response to Bullying
Cheyenne Morrison with Dr. Cynthia Hartung
Department of Psychology
University of Wyoming
Oral Presentation

UW Honors Program Cody, WY

Research has examined bystander intervention in bullying situations in school-aged children. When a bystander intervenes in a bullying situation, they often succeeded in terminating the bullying behavior. However, research has shown actual defending behavior is rare. Although most kids think bullying is unacceptable, they believe they are more disapproving of bullying and more empathic toward victims than their peers. Creating awareness of one’s misperceptions concerning others’ attitudes has proven influential in decreasing negative behaviors. The purpose of this study is to examine whether making children aware of the fact that other children are actually also against bullying and would like to intervene will increase the likelihood that a child will intervene in a bullying altercation. 60 child participants ages 12-14, and their parents, were recruited from the Laramie community to participate in the study. Participants overheard a recorded altercation between two children, after reading a series of paragraphs explaining how other kids are also against bullying. Bullying intervention was indicated if the child instant messaged the researcher to tell them the bullying was happening. Data is still currently being collected.
Effects of Tree Mortality on Soil pH and Microbial Physiology in a Bark Beetle Infested Lodgepole Pine Forest
Laura Morse with Dr. Elise Pendall
Botany Department
University of Wyoming
Oral Presentation

Forests in the Western United States are experiencing widespread mortality from bark beetles, which infest living trees with pathogenic fungi. Since 1996, 3.65 million acres have been affected in Wyoming alone (United States Forest Service, 2012). Ongoing research near the Chimney Park Boy Scout camp in the Medicine Bow Mountains is investigating the impacts of bark beetle infestation on forest ecosystem structure and functions. This project focused specifically on the effects of tree mortality on soil pH and microbial physiology. Samples for this study were taken from forest stands with different levels of infestation-related tree mortality. In the laboratory, MicroResp™ technology was used as a proxy for microbial community physiology by detecting CO₂ respiration, and pH measurements were taken using an electronic pH meter. The results indicated that tree mortality did not contribute significantly to variation in soil pH, but it did affect microbial respiration. The findings of this research suggest that the microbial communities are changing in response to tree mortality resulting from the bark beetle epidemic. Specifically, soil microbes from a young, uninfected stand had contrasting physiological responses than older stands with greater tree mortality. Additional research is needed to explain the mechanisms of this changing microbial ecosystem.

Structural-Functional Studies of TSPO
James Moulton and Joshua Sharpe with Dr. Krisztina Varga
Department of Chemistry
University of Wyoming
Poster Presentation

Translocator Protein (TSPO) is an 18-kDa mitochondrial outer membrane protein involved in transport within eukaryotic cells. TSPO has been implicated in a wide variety of human diseases, including diabetic neuropathy and heart disease. While the potential of TSPO as a pharmacological target for a number of human diseases has been commonly accepted, the lack of a high-resolution structure of this membrane protein has stalled new drug development. The long-term goal of this project is to elucidate the structure and ligand binding sites of a mammalian mitochondrial translocator membrane protein. In order to establish the feasibility of these studies, we initially cloned a well-studied homolog, the *Rhodobacter sphaeroides tspO* gene into a pET23a expression vector, and expressed the TSPO protein in *E. coli*. TSPO was solubilized in detergent micelles and purified with affinity chromatography. Nuclear Magnetic Resonance (NMR) studies indicated that TSPO was well folded and active. Our data provides initial evidence for the viability of high-resolution NMR structural studies of TSPO.
Examining Self-Injury and Coping Based on Sexual Orientation
Austin Mullings with Dr. Carolyn Pepper
Department of Psychology
University of Wyoming
Oral and Poster Presentations

Undergraduate Research Assistant
Stress and Mood Lab  Laramie, WY

Approximately 27 to 35% adults engage in Non-Suicidal Self-Injury (NSSI), or the deliberate destruction of body tissue without suicidal intent (Brown et al., 2007; Favazza, 1998; Gratz 2001). Past research indicates that LGBT individuals are significantly more likely to report engaging in NSSI (Deliberto, 2008; House & Horn, 2011), however differences in coping strategies have remained unexamined. I hypothesized that individuals who were a sexual minority would report greater forms of dysfunctional coping.

Participants were recruited online from international mental health forums, and completed an internet survey. Self-report measures included an assessment of coping strategies using the COPE (Carver, Sheier, & Weintraub, 1989), and NSSI using the Deliberate Self-Harm Inventory (DSHI; Gratz, 2001).

A total of 399 individuals participated in the study (90.7% female), with an average age of 27.17. Heterosexual orientation was endorsed by 65.1% of participants. LGBT individuals reported engaging in more forms of NSSI, t(397) = -3.68, p < .001. LGBT individuals engaged in greater mental disengagement, more humor, and less religious coping.

Results suggest that in samples with evidence of high psychological distress (e.g., NSSI), few differences in coping are apparent. Clinical implications highlight the need to focus on effective coping strategies in treatment.

Gender, Race, and Sexual Orientation and Coalition Building at UW
Cassandra Murphy with Dr. Bonnie Zare
English Department
University of Wyoming
Oral Presentation

UW Honors Program  Hershey, NE

Campus diversity has been at the center of debate and reforming efforts across the United States for several decades. At the University of Wyoming, programs and resources exist to support those who are affected by gender, race, and sexual orientation; and the macro level of campus culture looks to incorporate acceptance and tolerance of diversity. However, race, gender, and sexual orientation can be restricting elements that discourage interaction. Many students come into contact with gender, race, and sexual orientation during college, but struggle to overcome obstacles in understanding one another. My research focuses on the specifics of these boundaries and the extent they affect our personal interactions with one another. Through discussion of the current diversity we may come to know how best to overcome the related problems.

How do we resolve these tensions? Can students learn to identify with others across gender, race, and sexual orientation? Should more be done to celebrate diversity at the University of Wyoming? What is the administration’s, faculty’s, and student government’s role in shaping the discussion of these topics? These are just a few of the topics explored in surveys, interviews, and focus groups and my talk will summarize the conclusions reached by those who engaged with this topic.
Mosquitoes as Pests and Vectors of Disease:  
A Collaborative Effort between Natrona County Health Department and University of Wyoming/Casper College  
Skye Napolitano with Dr. A.S., Kelsey Deus  
Environmental and Natural Sciences  
University of Wyoming/Casper College  
Oral Presentation

This project explored mosquito populations in Natrona County and focused on answering questions about local, adult female species composition and the present threat of West Nile Virus (WNV), Western Equine Encephalitis (WEE), and St. Louis Encephalitis (SLE). The project’s main goal was to work in close cooperation with Natrona County Health Department—Division of Mosquito Control to expand the knowledge base about local mosquito control and improve quality of life for county residents. Adult female mosquitoes were captured in New Jersey light traps as well as Centers for Disease Control (CDC) carbon dioxide traps. Specimens were identified and number and species was recorded. Select specimens from CDC traps were pinned for a reference collection while others were tested for the presence of WNV, WEE, and SLE. Testing using the VecTest Antigen Assay strips returned negative results for WNV, WEE, and SLE. Seven sites and 49 separate random samples were tested. Species composition of adult female mosquitoes consists of primarily *Culex tarsalis*, *Culex pipiens*, *Aedes doralis*, *Aedes vexans*, *Aedes nigromaculis*, and *Culiseta inornata*. It is important to note, however, that, in part due to an unusually active fire season this summer, regular mosquito counts were much lower than in previous seasons.

Is Therapeutic Empathy Teachable? Evaluating the Impact of an Empathy Training Seminar on Empathic Performance for Clinical Ph.D Graduate Students  
Avery A. Nelson with Dr. Walter D. Scott  
Psychology Department  
University of Wyoming  
Oral Presentation

Most cognitive behavioral therapies emphasize the importance of empathy as a basic therapeutic relationship variable (O'Donohue & Fisher, 2009). However, training in empathic responding for clinical doctoral programs is often neglected. In the current study, we evaluated the impact of a graduate empathy training seminar on the ability of clinical graduate students to be empathic with undergraduates across two 20-minute sessions. We expected that clinical students who received the empathy training would provide higher levels of empathy to their clients as rated using an objective empathic responding scale. Fifteen clinical psychology Ph.D graduate students who had either participated in an empathy training seminar (n=8) or who had not participated in the empathy training seminar (n=7), met with an undergraduate student for a 20-minute session at the beginning and at the end of a semester. The graduate students were instructed to do nothing but provide empathic responding to the undergraduate student. Further, two independent raters used an objective empathic responding rating scale (Burton & Scott, 2009) with written transcriptions of audiotaped sessions to rate the empathic attempts of the graduate student listeners. These findings will indicate the value of adding a specialized empathy seminar for clinical psychology doctoral training programs.
Fecal samples collected from 69 chipmunks (Tamias spp.) were screened for the presence or absence of *Eimeria*. Of these 31 (45%) were positive for *Eimeria* and 9 (15%) were positive for *Eimeria vilasi* and/or *Eimeria callospermophili*. *E. vilasi* was recovered from *Tamias senex and Tamias siskiyou* (collected from Lane and Jackson counties, Oregon) and both represent new host records. Oocysts of *E. vilasi* were 17.6 x 14.3µm, oocyst wall thickness was 0.7 - 1.3µm, the oocyst shape was subspheroid to ellipsoid, and the oocyst lacked on oocyst residuum. The sporocyst was 10.1 x 5.6µm, ellipsoid, and possessed a Steida body and sporocyst residuum. *E. callospermophili* was recovered from *T. siskiyou and Tamias townsendii* (collected from Jackson, King, Clallam counties, Oregon). *E. callospermophili* has not been previously documented in any *Tamias* hosts. Oocysts of *E. callospermophili* were 19.2 x 16.0µm, oocyst wall thickness was 1.0 – 1.5µm, the oocyst shape was subspheroid, and there was a polar granule and oocyst residuum present. The sporocyst was 10.2 x 8.2µm, subspheroid, and possessed a Stieda body and sporocyst residuum. Clallam County, Oregon is a new geographic record for *E. vilasi* in *T. townsendii*. *E. vilasi* has been previously reported form *Tamias dorsalis* (collected in Cibola County, New Mexico).

**VERONA: a Short Film Inspired by Cinematic Adaptations of William Shakespeare’s *Romeo and Juliet***
Connor Novotny with Andrew Fitch
English Department, Department of Modern and Classical Languages (French)
University of Wyoming
Oral and Visual Presentation

The majority of my research for this creative film came through the Shakespearean Tragedy and Romance course offered through the English Department. Of the films using Shakespeare’s text as their base, Baz Lurhmann’s 1996 film *William Shakespeare’s Romeo + Juliet* particularly drew my attention. In this film I noticed that the its disjunctive editing technique potentially opens the text up to new interpretations. When the city of Verona is at war with itself, the film reflects that in how it is edited. The “star cross’ d” love of Romeo and Juliet brings peace to both Verona and remarkably also to the fabric of the film itself. Thus with my short film “VERONA” I wanted to work with the idea that the film would possibly come apart throughout the course of the story. My characters (Romeo and Juliet of course) want to make their own version of *Romeo and Juliet*, but for them the main source of dramatic tension lies in the choice of either killing themselves for the sake of retaining the traditional myth or to experience something new in sacrificing the film instead of themselves. Using stylistic references from the several cinematic iterations of the story, I went forth dramatically representing this both old and new conflict for the screen.
Geckos, spiders, and insects have demonstrated the ability to climb across walls, even ceilings as though they were walking on flat ground. This phenomenon is made possible through secondary forces acting on the millions of microscopic fibrils that cover their toes. Reusable adhesive tape, or “gecko tape Methamphetamine”, which mimics this phenomenon, is currently a large area of research. These adhesives are fabricated by creating a structured surface, commonly consisting of pillars, on one side of the sample. Previous research has shown that pillar tips with a “mushroom” shape have the highest adhesion, although these tip shapes have not been studied under peel loadings. This research focused on mushroom shape pillar samples with optical sized pillars in order to analyze the peel behavior based on both peel off force and in situ optical analysis. The effect of the peel angle on the adhesion strength and detachment behavior of the pillars was analyzed. Results indicated that there was a strong correlation between the peel angle and both the adhesion strength and detachment behavior, with three main modes of detachment dominating the behavior. These conclusions are important in the continuing development and optimization of mushroom shaped dry adhesives for peeling applications.

Strategies in the Game F-Saturator
Roy Oursler with Dr. Jason Williford
Mathematics
University of Wyoming
Oral Presentation

In mathematics, a graph is a set of vertices and a set of edges which connect pairs of vertices. A subgraph is a graph that is a subset of vertices of a graph and a subset of the edges connecting those vertices. Some example graphs can be made drawing dots (vertices) on a piece of paper and drawing lines (edges) between those dots. Let F be a graph. The game F-Saturator is played by two players who take turns adding edges to a graph G. A player loses if after their move, F is a subgraph of G. For example, a triangle could be F, and if a player adds an edge which completes a triangle, that player loses. This game is a tool to increase understanding of F-saturated graphs. An F-saturated graph is a graph which does not contain some subgraph F, but the addition of any edge to that graph creates the subgraph F. In this presentation, I analyze some versions of F-Saturator to determine which player wins and discuss the challenges of determining the winner through brute force computation.
Feed costs account for a substantial portion of overall production costs for livestock producers. Increased demands for limited feed resources make it unlikely that future feed costs will decrease. Research indicates improved feed efficiency reduces methane production in ruminant livestock. Genetic selection for improved feed efficiency would potentially increase productivity while reducing methane production. Residual feed intake (RFI) is a measure of efficiency defined as the difference between expected feed intake and actual intake. Growing ewes (n = 80; initial BW = 113 ± 23.8 lb) received a forage-based pellet diet for 70 days. Individual feed intake was measured using the GrowSafe system. Initial, mid, and final BW were obtained and rumen samples were collected (d 33 and 34). Data were collected and are being analyzed. Initial and final BW were used to obtain ADG (0.54 ± 0.22 lb) and RFI will be calculated. Residual feed intakes will be used to rank the 5% most efficient (low RFI) and least efficient (high RFI) ewes. DNA will be extracted from rumen samples and metagenomically sequenced and compared to RFI ranking. Associations of feed efficiency with rumen microbial populations may ultimately provide producers with a novel way of identifying efficient livestock.

Medical and surgical procedures that previously only existed in the realm of human medicine have been making the move into the world of veterinary medicine. While these advancements can provide lifesaving treatments for beloved companion animals, there exists a grey area in which the application of these technologies may be inappropriate. New cancer therapies have helped to extend the lives of companion animals afflicted with cancer, organ transplants have been undergoing new developments, and there are new ways to treat congenital problems and injuries in pets. The dog cloning industry is one wrought with ethical dilemmas as well. Are these procedures ethical? Should pet owners be allowed to pay huge fees, sometimes upwards of one hundred thousand dollars, in order to save the lives of their animals? The moral theory of utilitarianism can help to shed light on the reasons why people should or should not subject their pets to these new veterinary procedures. The purpose of this study is to explore current procedures available to improve the lives of companion animals and to outline the ethics behind the decisions of pet owners and veterinary professionals to apply these technologies.
Lesson Planning in the Elementary Classroom
Sara Peck, Amy Spiker
College of Education
University of Wyoming
Oral Presentation

Lesson planning is a critical part of teaching in the elementary classroom. Effective lesson planning can lead to increased student learning and decreased behavior problems. Lesson planning can come in many different models and forms because there is no ideal format to follow. Teachers need to ensure that their lesson planning format meets their personal teaching style and the suggestions of their school or district. While there is no ideal format, there are several steps and strategies to aid in lesson planning. Teachers begin by first deciding what to teach by looking at curriculum guides and frameworks. They then begin to create goals and objectives to guide their planning and give it direction. After the goals and objectives have been created teachers turn their attention to the activities and lessons that will be taught in order to achieve these objectives. Novice teachers often document each of these goals, objectives, lessons and activities in detailed daily lesson plans. These detailed lesson plans allow novice teachers to be more successful, but as teachers gain experience their plans often become less detailed.

Views of the Effects of Methamphetamine on Health, Treatment Efficacy and Criminality
Laurie J. Petric with Cary Heck Ph. D
Criminal Justice
University of Wyoming
Oral Presentation

This study explored the views of three Laramie professionals and forty citizens regarding methamphetamine’s impact on health, treatment efficacy and criminality. Expert participants included a nurse practitioner, law enforcement officer and drug counselor. Citizen participants were recruited via a randomized mailing list. All participants were given a drug severity survey (DSS), in which they rated their agreement or disagreement with four statements. Each individual statement asserted that either cocaine, alcohol, prescription drugs, or methamphetamine cause more adverse effects than any other drug. Expert participants were interviewed and asked twelve open-ended questions related to the aforementioned drugs. Averaged responses of individual DSS statements revealed two things. Expert participants believed that alcohol causes more adverse effects than any other drug. Citizen participants believed that methamphetamine causes more adverse effects than any other drug. An independent samples t-test with Welch approximation compared opinions between the two groups. Results of this t-test indicated that expert participants felt that alcohol and prescription drug abuse were more severe than the citizen participants. The results of this study may help future researchers determine whether methamphetamine use does have a significantly greater effect on health, treatment efficacy and criminality when compared to other drugs.
Discovering Classroom Management
Emily Phillips with Linda Hutchison
Department of Education
University of Wyoming
Oral Presentation

UW Honors Program Cheyenne, WY

My student teaching experience this semester has taught me about the most difficult and most important aspects of teaching. The two pinnacle components that require the most amount of time and experience are content and classroom management. The difference in content between classes is obvious and can be prepared for before entering the classroom. Classroom management, however, is the ultimate unknown. Student behavior is like an unbalanced substance that shifts with any change in its environment. Not only does the behavior of students change from each year, but it also changes between each class, each day and can even change with the weather. While our education program does its best to prepare us for student teaching and our first year of teaching, there is a distinct difference when moving from reading to application. This presentation is intended to address the change from reading classroom management to implementing classroom management, the process of discovering classroom management techniques, and the experience of observing differences in behavior among a variety of classes and students.

Fifty Shades of Conversation:
An Examination of Popular Novels as a Tool for Conversation
Christine Pond with Dr. Mona Schatz
Department of Social Work
University of Wyoming
Oral Presentation

UW Honors Program Casper, WY

Popular novels are important to our cultural perspective as a mechanism of modeling and learning about appropriate behavior. Within society today, there is a high rate of intimate partner violence. Popular media can be used as a way to create discussion about intimate partner violence and healthy relationship models. In an examination of our popular media, particularly the Twilight series and Fifty Shades series, the messages that girls and women are receiving as culturally acceptable may not be healthy. An ethnographic content analysis was conducted on both series’ of books using a chart with prescribed themes. Throughout the analysis, the number of occurrences was recorded for each theme and for each individual novel. The results were remarkable in that the Twilight series is geared toward teens and featured more male aggressiveness (male territorial, anger, and in defense of a woman) compared to the Fifty Shades series, targeted to adult women, which featured more controlling behaviors (physical, verbal orders, and emotional). As a result, these books could be used to create discussion amongst girls and women to identify healthy relationships and recognize the occurrence of intimate partner violence.
Shakespeare in Latin American Cinema
Mariah Price with Dr. Peter Parolin
English
University of Wyoming
Poster and Oral Presentation

McNair Scholars Program

This project will examine William Shakespeare’s influence on Latin American Cinema, with a focus on the 1943 parody of Romeo and Juliet: Romeo y Julieta starring the Mexican comedian Cantinflas. This film not only parodies William Shakespeare’s Romeo and Juliet, but also the 1936 Hollywood production of George Cukor’s Romeo and Juliet as well. Moreover, this film comments on American culture while it stays pertinent to Mexican audiences through its use of language and setting. The objective of this study is to show how Shakespeare can be adapted in a way that comments on the Anglo culture in film in a way that is relevant for Latin American culture. Furthermore, my study will be conducted by using the actual film of Romeo y Julieta, as well as, the 1936 version of Romeo and Juliet as a comparison of the two adaptations. I will also be using William Shakespeare’s Romeo and Juliet, along with secondary resources in order to take a more historical approach. The importance of this research is to show how smoothly Shakespeare’s plays, with an emphasis on Romeo and Juliet, can be adapted to cinema, cross-culturally, to make a statement about the dominant culture.

Post-Conflict Health Care: Women's Lives After Conflict
Audrey Quest with David Messenger
Global and Area Studies
University of Wyoming
Oral Presentation

UW Honors Program

In post-conflict societies many essential resources have been destroyed. Opposing forces, to weaken their opponents, often target health facilities. Along with the scarcity of hospitals, many specialists are displaced. This causes instability for civilians, affecting women disproportionately. Women are vulnerable post-conflict due to increased sexual violence during and after conflict, an increase of women living in poverty or as refugees, and a need for maternal health assistance. Studies focus on the issues of healthcare for women during conflict, but the lack of accessibility continues post-conflict, which is the subject of this work. This research will focus on previous academic work, along with personal accounts and interviews from experts to explore the post-conflict issues of healthcare for women. Post-conflict situations in Rwanda, Sri Lanka and Somalia are emphasized. In these countries, a lack of healthcare followed conflict, affecting the maternal, reproductive and psychological health of women. Sexual violence and maternal health increases the need for health facilities, while education can influence women to seek healthcare. Each country and its own post-conflict circumstances have diverse complications. The purpose of this project is to raise awareness about post-conflict healthcare access and examine case studies to understand the challenges that are unique to each setting.
Morphological characteristics follow the mtDNA sequence of evolutionary descent within the family Calcariidae.
David Rach with Eric C. Atkinson
Biology Department
Northwest College
Oral and Poster Presentations

Biology Department                                                                                                       Comitan, Mexico

The family Calcariidae is a group of sparrow-like birds inhabiting grass-steppe habitats of North America. Mitochondrial DNA analysis has recently revealed that the Calcariidae is composed of two sub clades, with the McCown’s Longspur (Rhynchophanes mccownii, formerly Calcarius mccownii) more closely aligned to the Plectrophenax buntings in evolutionary descent than to the Calcariidae longspurs as previously believed (Klicka et al. 2003). I took morphometric measurements from museum specimens (Northwest College, University of Alaska – Fairbanks, Montana State University) of all the species in the family, ran a principal component analysis (PCA), analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA). I found that hallux length and bill depth are inversely related, and therefore along with primary feather emargination, are the best indicators predicting the two sub clades, supporting the mitochondrial DNA findings, overriding proximal effects of habitat selection.

Corporationalism
Ryan Ragaglia
Political Science
University of Wyoming
Oral Presentation

UW Honors Program                                                                                                       Cheyenne, WY

Multinational corporations have been increasingly important facets of the global economy since they began to be formed in the 16th and 17th centuries. Since that time, the nature of corporations has changed from a strictly national-based existence to a true international focus. However, corporations have been limited from truly embracing the international economy by regulations and restrictions that are placed upon them from nation-state governments. Drawing from the economic theories proposed by Kenichi Ohmae in his work The End of the Nation-State and those of Ayn Rand in her work Atlas Shrugged, this research will explore the possibility of a nationless global economy. An economy without borders will allow corporations to fully engage the capitalist market in which supply and demand work without government intervention of any sort. In fact, governments of any kind will be dissolved, as the main unit of analysis for this society is the corporation. This research will outline the structure by which society could operate, with the proposition of a new form of democracy, marketocracy. This form of ‘government’ will not be rule by the people, but rule by the people’s demands and corporate supplies.
Economic Implications of Increased Fishing Access in Wyoming
Brian Ramaeker with David Finnoff
Economics and Finance
University of Wyoming
Oral Presentation

Growing up, fishing was huge in my family. Every spare weekend was spent on with fishing pole in hand, and the family rivalry between my father, my brother, and I still rages on. Yet, for a trio of avid Wyoming fishermen, we spent a disproportional amount of time on Montana waters, even though the costs of doing so were much higher. I now realize that the benefits available to us in Montana were much greater than in Wyoming because of the stream access laws. The goal of this project is to examine the demand and supply functions for fishing, and a possible solution to increase fishing access in Wyoming as well as net benefits to society.

Fracture Characterization Using Ground Penetrating Radar
James Ramsay with Dr. Steve Holbrook
Department of Geology and Geophysics
University of Wyoming
Oral and Poster Presentation

Ground Penetrating Radar (GPR) is a near surface geophysical technique that is used to image the subsurface. The GPR sends a pulse of electromagnetic radiation into the ground that reflects off of a dielectric contrast within the materials of the subsurface, and then back to the GPR unit. Our area of study was the weathered Sherman Granite Batholith near the Happy Jack Recreation area. The significant material contrast between the cohesive granite and the air or fluid within the fracture space provides an ideal dielectric contrast that can be easily imaged by the GPR. The objective of this study is to determine if the fractures seen in the GPR images have a topographic control. If a topographic control is found to be influencing the fracture density and orientation of the cohesive unweathered granite, then this study will provide evidence that surface weathering processes play an active yet indirect role in degrading the subsurface granite. The ramifications of this study can be used for future subsurface modeling of stream catchments.
Warming significantly impacts Soil Organic Matter decomposition in semi-arid grassland
Swastika Raut\textsuperscript{1}, Elise Pendall\textsuperscript{2}, Jenni Rocca\textsuperscript{3}
1. Department of Molecular Biology, University of Wyoming, Laramie, WY
2. Department of Botany and Program in Ecology, University of Wyoming, Laramie, WY
3. Graduate Degree Program in Ecology, Colorado State University, Fort Collins, CO
Oral Presentation

Department of Botany and Program in Ecology Laramie, WY

Soil organic matter (SOM) constitutes large proportion of stored carbon in the soil. Warming can stimulate SOM decomposition rates, potentially putting more CO\textsubscript{2} into the atmosphere, causing further warming. However, there is great deal of uncertainty on how warming and elevated CO\textsubscript{2} interact to influence SOM dynamics. We conducted laboratory incubation experiment to assess the effects of elevated CO\textsubscript{2} and warming on SOM decomposition rate and soil carbon pool size. We sampled the soils from the semi-arid PHACE (Prairie Heating and CO\textsubscript{2} Enrichment) site with four different treatments –ambient CO\textsubscript{2}/ambient temperature, ambient CO\textsubscript{2}/elevated temperature, elevated CO\textsubscript{2}/ambient temperature and elevated CO\textsubscript{2}/elevated temperature. We measured CO\textsubscript{2} production rates over three months at optimum temperature and moisture conditions. We fit the data with a three-parameter exponential decay model to derive the kinetic parameters of soil C dynamics. We observed that the labile carbon pool size and the intrinsic decomposition rate of resistant carbon pools significantly increased in soils from the field warming treatment. However, the pool size or decomposition rate did not change with elevated CO\textsubscript{2} treatment. Based on our results, we conclude that warming may have induced soil drying, increasing the soil carbon storage, in contrast to expectations from other ecosystems.

Aesthetic Electromechanical Chessboard
Brandon Reavis with Dr. Stanislaw Legowski
Department of Electrical and Computer Engineering
University of Wyoming
Oral and Poster Presentations

Volpi and Cupal Senior Design Fund, NASA Space Grant Consortium Cody, WY

In the late 1700’s a Hungarian inventor toured Europe with an elaborate chess-playing machine defeating opponents as high up as Napoleon. Fifty years later the public finally discovered that a human chess master was hiding in the machine known as the mechanical Turk. Today however, with the advent of microcontrollers, a machine capable of playing a human opponent is completely possible.

The central goal of this project is to make a device that uses modern technology to play a game of chess, while maintaining the aesthetic quality of pre-20th century craft. To do this the interface is unique, hand-crafted, and it does not use the standard buttons or LEDs that virtually all modern electronics use. All of the stone chessboard tiles are capable of moving up and down by means of a servo pushing them from underneath. This vertical movement allows the chessboard to show which moves are a valid when the player picks up a piece. It also indicates the move that the on-board computer opponent chooses to make. The result blends artistry and engineering to create a device that excels both in form and function.
**Dendritic Spines**

Collin D. Redinger with Dr. Qian-Quan Sun  
Department of Zoology and Physiology  
The Laboratory of Learning and Neural Development

Fragile X syndrome is a mental condition caused by the mutation in a single gene called the fragile X mental retardation 1 (FMR1) gene, which is found on the X chromosome. Fragile X syndrome is the most common inherited condition causing mental retardation. Fragile X syndrome can cause learning disabilities, severe mental incapacitation and even autism. Behavioral features exhibited include problems with speech, poor eye contact and attention deficit disorders. At this time, there is no cure for fragile X syndrome. Evidence suggests that fragile X syndrome might involve abnormal development of neuronal structure in the brain. The reason for this study is to determine whether there are density and length differences in the dendritic spines of normal wild-type mice and affected homozygous mice.

**Particle Dynamics and Scaling in Inertial Microfluidic Flows**

Amy Reece with Dr. John Oakey  
Department of Chemical and Petroleum Engineering  
University of Wyoming  
Oral Presentation

*Wyoming NSF EPSCoR, NASA*  
*Gillette, WY*

Microfluidic inertial focusing has enabled the development of miniaturized flow cytometers, size-selective sorting devices and other high-throughput particle screening tools by reliably positioning particles to well-defined lateral and longitudinal locations. The equilibrium positions of inertially focused particles have been extensively studied and the constitutive phenomena empirically characterized in straight channels of square and rectangular cross section. In order to design higher throughput devices with a broader range of applications, a better understanding of particle dynamics during focusing is required. This talk will focus on the elucidation of scaling relationships that determine relative equilibrium positions of various sized particles with different concentrations in channels of varying cross-sectional geometry, including non-traditional cross-sections. We have investigated the competing inertial forces that contribute to lateral focusing and determine the threshold at which Stokes’ flow begins to influence lateral focusing. Experiments to quantify the dynamics of lateral particle migration have been used to quantify the shear and wall-induced inertial lift forces, which is used to verify our scaling and also inform alternate designs for optimal focusing. Finally, we demonstrate new high-throughput particle analysis applications that are enabled by an improved understanding of particle dynamics during inertial focusing.
Observing Laramie Basin Vegetation Phenology using MODIS
Josh Reynolds with Dr. Steve Prager & Dr. Ramesh Sivanpillai
Geography & Botany
University of Wyoming
Poster Presentation

This proposed research will investigate the use of the Moderate Resolution Imaging Spectroradiometer (MODIS) in detecting changes in grassland vegetation phenology in the Laramie Basin. It is hypothesized that analysis of MODIS imagery is an effective tool in modeling vegetation response to local climate variability. Eight-day composite images (collected from the year 2000 to present) will be used to measure the amount of spectral reflectance in different portions of the electromagnetic spectrum for several sampling plots distributed along latitudinal and longitudinal gradients. Using these measurements, we will quantify green-up, maturity, senescence, and dormancy periods of growth for each land cover type. By comparing the values to known phenological trends, it will be possible to discover whether MODIS imagery is a useful tool for monitoring seasonality and the effect of varying environmental characteristics on vegetation over an inter-annual time period. The information this study yields may benefit ranchers and firefighters among others. Understanding plant response to environmental conditions is useful for purposes ranging from grazing decisions to predicting fire susceptibility, and represents an important tool for land management operations.

Limitations in Delineating Lake Shoreline in Cloud Contaminated Landsat Images
Kate E. Richardson1 with Dr. Ramesh Sivanpillai2
1. Department of Ecosystem Science and Management and 2 Department of Botany
University of Wyoming
Oral Presentation

Bull Lake Reservoir is the primary irrigation water source for the ceded portion of the Wind River Reservation. The Saratoga National Fish Hatchery also keeps the lake stocked with trout; enabling the Wind River Indian Reservation to sell fishing licenses as part of its income. As it is such an important water resource, Bull Lake must be monitored so that the resource can be properly managed.

Remotely sensed images, such as those collected by Landsat, can be used to delineate Bull Lake’s shorelines and map its changing surface area. However, presence of clouds and their shadows disrupts the delineation of shorelines. The objective of this project was to quantify the amount of error introduced by different types of clouds and shadows while delineating the shoreline of Bull Lake. Results from this study will provide valuable insight for selecting suitable Landsat images for reconstructing past changes in a lake’s surface area.
Quick Camp
Dakota Roberson and Kendall Williamson with Dr. Stanislaw Legowski
Electrical Engineering
University of Wyoming
Oral and Poster Presentation

Electrofab, Inc. Rock Springs, WY

**Background** – *Quick Camp* is a project that was envisioned by Electrofab, Inc. which essentially enables a land owner and potential entrepreneur to maintain an RV campground without the need for a traditional camp host. Electrofab, Inc. provided the idea as well as monetary support for the design of the system, and intends to use the final product in industry.

**Methods** - The system design incorporates various controls schemes in order to provide the customer with easy access to their campsites while providing a safe, reliable campground with access limited only to paying customers. The design is in part hardware (in order to monitor various aspects of the system) and part software (in order to interact with the paying customers).

**Results** - In order to maintain the campground, monitoring of potable water, electricity, billing, and security gating systems is necessary and is entirely controlled via the combination of hardware and software components. The end product is a deployable, user friendly system that will make campground maintenance cheaper, easier, and 24-hour accessible.

**Conclusion** - In conclusion, the product envisioned by Electrofab, Inc. has come to fruition, and with little manipulation, it can be deployed and used in industry in short order.

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**Non-Pneumatic Composite Moonbuggy Wheel**
James Roland with Mr. Scott Morton, Dr. David Walrath
Department of Mechanical Engineering
University of Wyoming
Oral Presentation

UW Honors Program Scottsbluff, NE

The National Aeronautic Space Administration (NASA) holds an annual student design competition in Huntsville, Alabama called the Great Moonbuggy Race. In the past, the University of Wyoming’s moonbuggy has used bicycle wheels. However, this year, the University of Wyoming split the moonbuggy project into two separate teams. One team designed the moonbuggy, and the other team designed wheels for the moonbuggy.

The wheel design was based on both mathematical modeling and SolidWorks® computer modeling. These wheels are expected to be an improvement over ordinary mountain bike wheels, as they are designed to withstand higher axial forces, have a lower rolling resistance, and provide improved suspension. The wheels are made almost exclusively out of composite material. Kevlar® was used in the design of the wheel spokes and the rim. A strip of rubber material was used for the tread, and the wheel hub is made of 6061-T6 Aluminum. The wheel has 18 spokes that are each 0.18 inches thick with a spoke angle of 80° and a 9.4 inch radius of curvature. The outer diameter of the rim is 25.5 inches. The entire moonbuggy project is funded by NASA and has a total budget of $5,000, and the moonbuggy wheels project was granted up to $2,000 from that budget.
The Art of Communication: A Windows 8 Social Game
Jordan Roselle with Dr. Ruben Gamboa
Computer Science
University of Wyoming
Oral Presentation

COSC Laramie, WY

With the launch of Windows 8 in October of 2012 Microsoft also launched the Windows Store. The Windows Store is an attempt by Microsoft to gain a foothold in the growing app market. The apps on the new Windows Store use a new runtime known as WinRT which allows the same application to run on both traditional processors and those based on the ARM architecture. This allows apps created for the Windows Store to run on regular computers, tablets, and phones with the same code. The Windows Store represents a significant opportunity for independent developers to get applications published and available to millions of users in a market that is not yet flooded by competition.

My senior design project is a Windows Store application built using the new WinRT libraries and using Windows Azure mobile services. My application is a multiplayer social game based on the idea that information is distorted as it is passed between individuals. My application allows players to be a part of a digital grapevine and share the results with the world.

The Division of Labor among Dukha Pastoralists, Khövsgöl Province, Mongolia
Kimberly Sanchez with Dr. Todd Surovell
Anthropology Department
University of Wyoming
Poster Presentation

McNair Scholars Program Cheyenne, WY

The division of labor by gender and age is a virtually universal trait among nomadic pastoral societies. This division of work fulfills significant societal functions including the procurement and/or maintenance of political and social power, the transmission of cultural ideals and practical knowledge, and the economic advancement of the group. This study will use statistical analysis in examining how labor is distributed by gender and age among Dukha reindeer herders of Mongolia. Data acquired from time lapse images taken of household areas in a Dukha summer camp during July and August of 2012 from an ongoing ethnoarchaeological study will be used. Non-parametric tests will be performed to determine how labor activities are apportioned to individuals of varying gender and/or age. This study differs from prior research on the division of labor in pastoral societies, which only provide highly generalized classifications of task differentiation, in that it will provide precise quantification of how and to what extent work and specific tasks are performed equally or unequally by members of Dukha households.
Synthetic Optogenetic System to Study Bacterial Pathology
Rachel Schaefer with Dr. Mark Gomelsky
Molecular Biology Department
University of Wyoming
Oral presentation

A near infrared light activated system based on light-activated cGMP synthesis will provide a tool to study bacterial pathology within a mammalian host. Activation or inactivation of proteins with light will allow scientists to have precise spatiotemporal control of cellular processes and will yield great insights into the mechanisms of cyclic nucleotide dependent pathways. This NIR light activated system will be comprised of two pieces, a transcriptional activator and a cyclase.

We have attempted to create a transcription activator which is activated by cGMP binding by altering the substrate specificity of E. coli transcription activator from cAMP to cGMP. Using Fusion PCR we created a chimeric protein of a cGMP specific transcription activator N terminal domain from R. centenum fused to the C terminal domain of the E. coli transcription activator. We further performed Random PCR Mutagenesis on this fusion to obtain a functional fusion protein.

Despite our best efforts we were unable to find a functioning chimeric transcription activator. Recent studies have shown that the R. centenum cGMP specific transcription activator will activate transcription in E. coli, therefore a cGMP specific transcription activator is no longer needed. Future studies will focus on creating a NIR light-activated guanylyl cyclase.

Alterations to Common Foods in Attempts to Increase Iron Intake
Catherine Schmidt, Rhoda Schantz
Department of Family and Consumer Science: Dietetics
University of Wyoming
Oral Presentation

Iron deficiency anemia is a common, worldwide problem, most severely affecting infants, children and women of childbearing age. Iron deficiency anemia has been shown to cause significant health care costs which can be decreased by adequate intake of the RDA of 18 mg/day. Molasses is an inexpensive, common sweetener that contains a large majority of nutrients that are processed out of refined sugar. Because brownies are a strongly flavored, frequently consumed treat within the age groups most frequently at risk, I chose to fortify this dessert with varying amounts of molasses to increase iron content. The experiment tested the substitution of 1/3 and 2/3 of the traditional sweetener (granulated sugar) for equal mass of molasses. Along with subjective assessments from a four person panel on the appearance, aroma, texture, flavor and sweetness; the objective views of viscosity, volume, tenderness and baking time was evaluated. It was concluded that due to the taste confliction with expectations, molasses is not an appropriate substitution for granulated sugar in brownies. Further studies of alterations to brownie recipes are recommended.
Analysis of Solutions of 2nd Order Stochastic Parabolic Equations.
Erik Schmidt with Dr. Peter Polyakov
Department of Mathematics
University of Wyoming
Oral Presentation

Wyoming NASA Space Grant Consortium

Using a computational method to solve parabolic differential equations is a feat that can be done with relative simplicity. However, when the stochasticity, i.e. the randomness of coefficients, is introduced into the equation, things become more complicated. The goal in solving a stochastic differential equation is different from the goal in solving a deterministic equation. In solving a stochastic equation we try to determine the expectation or the variance of the set of “possible” solutions of the considered equation. A method already exists which yields reasonably good results that can be used as a benchmark for checking the accuracy of new computational methods: Monte Carlo trials. In the Monte Carlo trials, the same problem is solved a sufficiently large number of times using randomly chosen coefficients employing some sort of a random number generator to simulate randomness. Then the expectation is computed as the average of all obtained solutions, and the variance is computed as the average of the square of difference between the average solution and the set of all solutions. The higher the number of trials, the higher is the accuracy. The algorithm suggested by Zhang and Lu (Zhang & Lu 2004) and implemented in the project uses the Karhunen-Loève decomposition of the random coefficient and the series expansions of this coefficient and of the solution itself to divide the original problem into a sequence of much simpler deterministic problems. Then the numerical scheme called the Crank-Nicolson method is used to solve those deterministic parabolic differential equations.

All Terrain Self Leveling Wheelchair
Andrew Schofield with Dr. Steven Barrett
Electrical Engineering
University of Wyoming
Oral and Poster Presentations

Limited mobility is something that affects approximately 6.8 million Americans. Out of these 1.7 million are using wheelchairs or scooters of some kind. Everyday obstacles become a struggle or even decomposition to those in a wheelchair. Outdoor environments such as campsites, lakes, or even grass fields are a challenge for those with limited mobility. My senior design is a solution to some of the limitations faced by those in wheelchairs. The wheels and tires of the wheelchair will be such that it can navigate through most terrain such as grass, gravel, and sand. As a wheelchair climbs or descends a hill it becomes unstable and the user risks tipping the wheelchair causing injury or even death. The self-leveling wheelchair will use an accelerometer to determine the angle it is at and depending on user interface choices will display the angle or raise the seat with actuators to keep the seat level. This will keep the center of gravity towards the front when going up the hill and towards the back when going down the hill. This stability will give the user the confidence and ability to go places most wheelchairs can't.
Nesting Placement of Two Threatened Sagebrush-Endemic Songbirds
Chris Scholtz with Dr. Anna Chalfoun
Department of Zoology & Physiology
University of Wyoming
Poster Presentation

Our objective was to describe nest placement for two songbirds endemic to sagebrush habitats and designated as Species of Greatest Conservation Need in Wyoming: Brewer’s Sparrow (*Spizella breweri*), an inconspicuous yet abundant sagebrush-associated sparrow, and Sage Thrasher (*Oreoscoptes montanus*), a less abundant and larger sagebrush-associated bird. Basic ecological information such as nest placement and its effect on bird fitness will be critical in conserving these at-risk species into the future. We located and monitored 171 nests for these species in sagebrush habitats in central Wyoming. At each nest, we measured the height of the chosen nest shrub and height of nest above ground to determine nest placement attributes for each species. Brewer’s Sparrows mean nest height was 27 cm and the mean nest shrub height was 56 cm, whereas Sage Thrashers averaged 18 cm and 73 cm, respectively. Using two-sample statistical comparisons and linear regression, we determined that Brewer’s Sparrows nest higher up within shorter shrubs, Sage Thrashers tend to nest lower within taller shrubs. This trend is worth considering when managing and conserving sagebrush habitats in Wyoming. Future research will explore the selection pressures and resulting fitness consequences that may be shaping nest placement.

Autonomous Wheelchair Development
Carter Schultz with Dr. Steven Barrett
Department of Electrical and Computer Engineering
University of Wyoming
Oral Presentation

The most severely disabled of individual lack the capability to operate a conventional powered wheelchair. Autonomous wheelchairs are able to self-navigate and thereby allow severely disabled individuals independent transportation. All existing autonomous wheelchair solutions are extremely expensive. The University of Wyoming is working to develop a low cost autonomous wheelchair to provide a viable transportation option to those most in need. This presentation covers the development progress of the autonomous wheelchair project during the 2012-2013 academic year. During this time frame, work on the wheelchair focused on the development a new, more powerful control system for the wheelchair. This presentation will cover the justification of the need for control system redesign, the design of the new electrical system, and a plan for future development of the project.
Alia Scott and Jeremy Weaver
Honors
University of Wyoming
Oral Presentation

LAS Honors Program
Jackson Hole, WY

Latino immigrants face a necessary process of assimilation in order to become a functioning member of society. This assimilation process induces and deduces criminal and deviant behaviors depending upon the maturity of the community and the social inhibitors that are present within that immigrant community. This paper is an analytical policy paper that focuses on the first, 1.5 and second generation Latino immigrants, the social inhibitors they face and the crimes they commit in the United States. Ethnic identity, cultural maintenance, linguistic isolation and economic deprivation are the social inhibitors that are the byproducts of the assimilation process and cause Latino immigrant populations to become involved in drug and violent crime. The impact of this research provides information about Latino criminal and deviant behavior and focuses on the fact that crime has the ability to decrease as positive social inhibitors increase within a community, which work to create an informal social code and support network.

Age of Humans? Examining the Cosmic Perspective and the Individual
Seth Sivinski and Joseph Ulatowski
Philosophy
University of Wyoming
Oral Presentation

LAS Honors Program
Seattle, WA

This paper looks at environmental ethics and specifically the Cosmic Perspective Argument. This argument puts forward that with new developments in cosmology it is unlikely that Earth is unique in terms of life and ecosystems. Furthermore it claims that with this information we should not be concerned with environmental degradation. The ethical framework and conclusions laid out by the Cosmic Perspective is applied to the individual level to determine if this is a complete ethical argument. Once the Cosmic Perspective is applied to an individual the logic becomes problematic. After examining the Cosmic Perspective at an individual level the problems that arise intensify and not only break the argument at an individual level but on a much larger scale as well. With these problems it is clear that the Cosmic Perspective is not a sufficient environmental ethics framework. These problems show the need for an environmental ethics framework that takes into full account the complex and interconnected nature of the environment.
On the Time-dependence of Size Effect in Polydimethysiloxane using Nanoindentation Testing
Elizabeth J. Smith with Dr. Chung-Souk Han
Department of Mechanical Engineering
University of Wyoming
Poster Presentation

Wyoming NSF EPSCoR
Seattle, WA

Improvements in nanoindentation technology have made it possible to analyze the properties of materials at the nano-level. The mechanical properties such as hardness have been found to vary with size at extremely small depths in certain materials. This phenomenon is called size effect. Furthermore, the mechanical properties of some materials appear to vary with loading time. Previous tests have shown the size-effect in polymer polydimethlsiloxane (PDMS) is also dependent on time. A “twist” in the data represents a change in the deformation mechanism. In order to examine the change in the deformation mechanism of PDMS, a series of tests with varying loading, holding, and unloading times were conducted. Experimental results show that holding time of 200 seconds removes the “twist” from the data. Furthermore, a constant unloading time removes twist while a constant loading time has no effect. This supports theories involving adhesion rather than damage.

Quantum Cutting Film and Solar Applications
Ryan D. Smith with Dr. Jinke Tang
Physics and Astronomy
University of Wyoming
Oral Presentation

UW Honors Program
Boulder, CO

In our day and age, energy is one of our most important issues. Finding new, better and more efficient ways to utilize the resources of our world is paramount to human success and prosperity. The goal of the Quantum Cutting Film Project is to make one of these resources, solar power, competitive with current forms of useful energy production, namely fossil fuels. The Quantum Cutting Film Project relies on a very simple idea; modifying the incoming solar spectrum prior to interaction with the photocell, rather than modifying the photocell itself. The project hinges on the experimental phosphor Sr2CaMoO6: Yb3+. This focus of this research was to create a film coating of the phosphor Sr2CaMoO6: Yb3+. The two methods used were Pulse Laser Deposition, and Spin Coating. This chemical has been found to be a quantum cutter, and happens to emit photons of 1.2 eV. This chemical is used in combination with silicon based photovoltaic solar cells, and can increase the efficiency of these cells by 30%. This is accomplished by reducing the effects of thermalization, which robs the photocell of its ability to effectively move charge, and therefore produce electricity.
On the Shoulders of Giants  
Stuart Smith with Dr. Rudiger Michalak  
Physics  
University of Wyoming  
Oral Presentation

UW Honors Program  
Half Moon Bay, CA

The hard sciences are dwindling in this country. The physics program here at the University of Wyoming, though filled with extraordinary professors, remains small. This is due, in part, to students in middle school and high school having trouble relating to the field. People tend to be more interested in stories than in equations. What I have done here is to take physics and make it a story. I combed through any and all discoveries concerning the nature of light, the aether, motion, and space from Isaac Newton to Albert Einstein, choosing my favorite fifteen or twenty scientists, and wrote their stories. However, I wrote the stories to be interactive; they are written as a choose-your-own-path plotline where the reader can try multiple different ideas to see what happens. Also, the entire work is written from the second-person perspective so that the reader, “you”, is doing the experiments and discovering everything for himself or herself. The story itself is broken into four distinct parts: Isaac Newton, Light and Aether, Space and Motion, and Special Relativity.

Heartbeat Stars  
Rachel Smullen, with Dr. Henry Kobulnicky  
Department of Physics and Astronomy  
University of Wyoming  
Oral Presentation

Wyoming NASA Space Grant Consortium  
Rogue River, OR

NASA’s Kepler Satellite has discovered a new class of binary star systems: eccentric binaries with dynamic tidal distortions, deformations due to interactions with the secondary star, and tidally-induced pulsations. Because of the unique light curves of these systems, they have gained the nickname of “heartbeat stars”. We are collaborating with the Kepler science team to better characterize these systems using velocity variations in the primary star's spectrum. We use the Wyoming Infrared Observatory to obtain multiple spectra of the heartbeat stars. From our data, we can extract parameters such as the period and eccentricity of the binary star system, the mass ratios of the stars, and perhaps understand better the effect of the tides that distort the spherical shape of the star and stimulate pulsations in the primary star. We present the results of our pilot survey of four of these heartbeat stars. Our findings can eventually lead us to a formation scenario for this type of binary system, which, in turn, will allow us to more fully understand stellar evolution as a whole.
Bimetallic Carbide Nanomaterials as Fuel Cell Catalysts

Jack Stacy with Dr. Brian Leonard
Chemistry
University of Wyoming
Poster and Oral Presentations

We are developing a synthetic technique which will produce bimetallic carbides for use as catalysts in Proton Exchange Membrane (PEM) fuel cells. PEM fuel cells have the potential to replace environmentally damaging, fossil fuel based internal combustion engines. However, Platinum, the current catalyst for fuel cells, is too expensive for mass production of fuel cell cars to be economically viable. Our goal at the Leonard Research Group is to create a cheaper metal carbide catalyst that possesses equal or superior catalytic efficiency to that of Platinum. My research focuses on the solid state synthesis of Iron Molybdenum Carbide, Nickel Molybdenum Carbide, and Cobalt Molybdenum Carbide. My raw materials consist of Iron powder, Nickel powder, Molybdenum powder, multi-walled Carbon nanotubes, Lithium Chloride, Potassium Chloride, and Potassium Fluoride. The salts; LiCl, KCl and KF, form a eutectic near 350 C and act as a solution above that temperature. This eutectic salt solution allows us to synthesize our carbides at a relatively low temperatures compared to traditional techniques. Using this synthesis, I have successfully synthesized the targeted bimetallic carbides; Fe$_3$Mo$_3$C, Ni$_6$Mo$_6$C and Co$_3$Mo$_3$C. I employ x-ray diffraction (XRD) to confirm the presence and purity of these compounds. Based on images obtained via scanning electron microscopy (SEM) and transmission electron microscopy (TEM), it is evident that our carbides maintain the nanowire morphology of our Carbon source. This gives rise to an ideal, high surface area catalyst nanomaterial. With the successful synthesis of pure bimetallic carbides, we are testing these materials via electro-chemical catalytic cycling and acid resistance testing.

Mapping Changes in Reservoir Surface Area Using Landsat Thematic Mapper Images

Christopher Steinhoff$^1$ and Dr. Ramesh Sivanpillai$^2$
1. Department of Ecosystem Science and Management and 2 Department of Botany
University of Wyoming
Oral Presentation

Majority of Wyoming is characterized as semi-arid environment where availability of water impacts agricultural operations, animal husbandry, and recreational purposes. Ranchers and farmers depend on reservoirs to sustain agricultural operations, and if the water level were to get too low it could adversely impact activities throughout the state. Unfortunately numerous reservoirs in the state are not gaged i.e., no data exists on how much water flows in and out of them. The objective of this study was to evaluate the potential of remotely sensed data to reconstruct surface area of Sixty Seven Reservoir located in Sublette County, Wyoming. Landsat Thematic Mapper data acquired in August of every year from 1985 through 2011 were classified and digital maps of the reservoir’s surface area were generated. Surface area of this reservoir fluctuated between 58 hectares (1992) and 116 hectares (2011). Landsat images can be used to reconstruct surface areas of reservoirs that are not gauged, and can be less expensive than the traditional field survey methods.
Veterinarian Recommendations- Vaccinating for Clostridial Diseases
Ashley Stimpson with Dr. Rick Landeis
Animal Science
Sheridan College
Poster and Oral Presentation

When talking to veterinarians to determine when it is best to vaccinate cattle for clostridial, there was never a very specific answer. I wanted to know when the best time to vaccinate cattle and why that time was better than other ways recommended. I started the project just by calling veterinarians and asking what they recommended to their clients and why. Each veterinarian had varying methods of vaccinating, when it is most helpful to vaccinate and what to use. I collected all the information I gathered from veterinarians and made a power point. There can really be no right or wrong answer for when to vaccinate, because vaccinating is better than not vaccinating. Therefore the conclusion is that of the several recommendations that veterinarians gave me, I chose one that would work best with my program and the information is available to others to decide what works with their program.

A Study of Chronostratigraphic Markers for Dating Plant Macrofossils
Beau Stricker with Dr. Steve Jackson
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Poster Presentation

On the south shore of lake Michigan a series of linear wetland complexes were formed as the shoreline retreated during the past 4000 years. Ongoing studies by Jackson and others have looked at plant macrofossils (seeds, fruit, and vegetative material) produced by aquatic plant species from more than 100 sediment cores obtained from 20 ponds. These studies have yielded detailed records of local plant community changes from the late 19th century to the present. I am investigating small industrial particles obtained from the sediments as a potential chronostratigraphic marker for the cores. These markers can establish the age of plant community samples from different areas or ponds. I found three or more distinct types of particles, which I categorized by shape: spheres, chunks, and flakes. Analysis of these particles revealed a definite cut off point of the presence of all industrial particles, corresponding to historic absence of industry in this region. Each type of particle appears at distinctive depths in various abundances corresponding to the development and operation of steel mills starting in the early 20th century. Industrial particles as stratigraphic markers may provide a viable and cost effective means to date macrofossil samples compared to lead-210 or radiocarbon dating.
**Strength Testing of Reinforced Autoclaved Aerated Concrete Lintels**
Nathan P. Stroud with Dr. Jennifer Tanner
Civil/Architectural Engineering Department
University of Wyoming
Oral Presentation

*Wyoming NSF EPSCoR*  
*Coupeville, WA*

Autoclaved Aerated Concrete (AAC) is a lightweight, cellular, precast building material capable of providing structural, thermal and fire resistance. Design provisions for AAC masonry were introduced in the 2005 masonry design code (MSJC), but these design provisions do not reference experimental testing of grouted reinforced AAC lintels.

The hypothesis is that lightly reinforced and grouted AAC lintels, designed according to current masonry design provisions (MSJC), will be conservative. A suite of 12 lintels were tested to confirm this hypothesis. There were ten beams (lintels) to validate flexural behavior and two to validate shear behavior. Companion material tests were conducted on the AAC, grout, thin-bed mortar, and reinforcing bars to provide accurate values for evaluating the theoretical strength. Results of observed-to-calculated capacity showed that the average beam strength was 30% better than that predicted using MSJC design provisions. All data verified that AAC lintels can indeed behave in a ductile manner.

**Soil microbial community physiology is altered by snow depth**
Shanker Tamang¹, Colin Tucker², Elise Pendall²
Department of Microbiology
University of Wyoming, Laramie, WY
Oral presentation

*Department of Botany and Program in Ecology*  
*Laramie, WY*

Land in temperate ecosystems, such as sagebrush steppe in Wyoming, is covered by snow during winter. Soil biogeochemical processes that lead to emissions of greenhouse gases are partly dependent on the depth and duration of snow cover. Hence, we conducted an experiment evaluating the role of snow depth on soil microbial emissions of carbon dioxide. We used highway snow fences located at three sites in sagebrush steppe in Southeast Wyoming to create areas of deeper and shallower snow within the same ecosystem. We collected soils in winter, spring and summer from 4 distances from the snowfences (5,10,20,40 m) corresponding to different levels of snow depth and brought them to the laboratory to measure community level physiological profile (CLPP) by using MicroRespTM analysis, which indicates the respiration rate soil microbes utilizing different substrates. We observed that in winter and spring, the soils experiencing deeper snow depth had different CLPP than the soil experiencing shallower snow depth. However, the effect of snow depth experienced during winter and spring was not seen clearly in summer soils. Our results indicate that the physiological activity of soil microbial communities changes with season and responds strongly to the amount of snow cover in winter and spring.
Characterizing analyst bias in unsupervised classification of Landsat images  
Bailey Terry¹ & Benjamin Beaman² with Dr. Ramesh Sivanpillai³  
¹. Department of Ecosystem Science and Management; ². Zoology & Physiology Department; and ³. Department of Botany  
University of Wyoming  
Oral Presentation  

WyomingView  
Newcastle, WY

Unsupervised classification is a classification technique used to process remotely sensed images. Products generated from this technique are used for monitoring changes in earth’s vegetation, urban settlements, and water bodies. One of the drawbacks of this classification technique is operator bias, which can influence the area of map classes.

This study examined the operator bias in calculating the surface area of Keyhole Reservoir through unsupervised classification of Landsat images. Using a set of Landsat data, two analysts generated maps with water and non-water classes. Each map pair was compared to quantify the operator bias in terms of percent agreement and disagreement. Between analysts we found that the differences in distinguishing water were minimal. However, most of the bias was found along the shorelines in classifying the boundary of where the water ended and land started. Results from this study will provide insights for minimizing operator bias in future projects.

Assessing Transferability of Landsat-derived NDWI Values across Space and Time  
Matthew J. Thoman¹ and Kaitlyn McCollum¹ with Dr. Ramesh Sivanpillai²  
¹. Department of Ecosystem Science and Management and ² Department of Botany  
University of Wyoming  
Oral Presentation  

WyomingView  
Riverton, WY  
Fort Collins, CO

Normalized Difference Water Index (NDWI) derived from the reflectance values of green and infrared bands is a widely used index for the delineation of water bodies in remotely sensed images. While attempting to identify water bodies in a remotely sensed image the analyst has to determine the threshold for NDWI values that correspond to lakes, reservoirs and ponds. However the reflectance values of water bodies in a region will vary widely because of factors such as water depth, presence of biological materials, and turbidity among others.

First we tested the transferability of the range of NDWI values derived for a water body in one Landsat image to other water bodies in the same image. Next we tested the transferability of those NDWI values to the same water body in Landsat images acquired in different years. Results from this study will provide insights for automatic extraction of water bodies in Landsat images.
Informally, the goal of a digital watermark is to “mark” a piece of digital media, such as images or videos, in a way that makes it possible to identify the respectful owner of the media and make it difficult for an opponent to remove the mark without destroying the object. A “perfect” digital watermark is a watermark that has become impossible to remove without destroying the media, but this type of digital watermarking does not exist and remains an unsolved problem. In this project, I partially survey the current state of the perfect digital watermark problem and the theories being applied to the problem. Further, this work closely examines current state-of-the-art methods for watermarking digital media and what benefits and flaws these methods have as watermarking schemes. I also investigate and speculate on the implications of the existence of a perfect digital watermark; focusing on the copyright issues, the cost, and general availability to a broader consumer.

Physiology of Cardiac Hypertrophy in Severely Iron Deficient Rats Using Pressure-Volume Loops

Emily Thompson, Ashley Weigel, and Jacquie Zadra with Dr. Bud Chew
Biology Department
Western Wyoming Community College
Oral Presentation

Cardiac hypertrophy, enlargement of the heart, can be adaptive or pathological. Athletes increase cardiac output and ventricular chamber size; congestive heart failure decreases cardiac output without chamber enlargement. Iron deficiency causes cardiac hypertrophy through sympathetic stimulation, but its physiology is unknown. We believe iron deficient hypertrophy begins as adaptive, but transitions to pathological. We hypothesized that four weeks of iron deficiency would result in failing cardiac function and decreased sympathetic neurotransmitter stores. We placed rats on a four-week iron deficient diet, then determined cardiac function in vivo using pressure-volume loops. We implanted catheters in both femoral veins (for drug infusion), a jugular vein (for saline calibration), and inserted a pressure-volume micro-catheter into the left ventricle via the right carotid artery. We occluded the inferior vena cava for load-independent measurement of contractility, and infused hypertonic saline via jugular vein for parallel conductance calibration. We used dopamine (beta-agonist) and atenolol (beta-antagonist) to assess activation and deactivation of the sympathetic nervous system, respectively. We heparinized and decapitated rats; collected blood for cuvette calibration (for conductance-volume calibration), hematocrits, and plasma catecholamine analysis by HPLC. We dissected hearts for morphometric and HPLC analysis. At abstract submission, data collection is complete, and analysis is underway.
Within Mormon culture the existence of feminism has roots back to the suffragist movement. As with secular feminism, this movement has evolved over time and has gone through its own separate waves of causes and degree of radicalism. Today’s Mormon feminists tackle contemporary issues such as homosexuality in the church. This Mormon feminist movement is readily seen in social media via the use of blogs, twitter, and facebook. The research will consider key themes such as third wave feminism and backlash in the context of feminism within the Mormon feminist movement. The purpose of the research is to examine the existence or lack thereof of a culture of Mormon feminism in one community. This community consists of three separate wards- two family and one student ward- in the Laramie, Wyoming Stake. Research will be conducted through participant observation of church services and functions of these three wards for ten consecutive weeks, followed by interviews with two to four women in each ward. Data will be collected using qualitative methods including identification of themes, trends, and patterns.

Improved Multi-Draw Compound Bow
Travis Vliem with Mr. Scott Morton
Department of Mechanical Engineering
University of Wyoming
Oral and Poster Presentation

An improved multi-draw compound bow (MDB) was developed by DrawVantage Technologies (DVT) as per the requests of Mr. Ric Asherman, CEO of Cody Laboratories, Inc. The MDB design’s intent is to reduce the draw force of a compound bow by distributing the effort of the drawing process across multiple draws. This is primarily developed for the benefit of disabled persons, or those not strong enough to pull the bow string. To achieve the reduction in draw force, the MDB utilizes a dual disk cycloid drive with a reduction of 16:1. The system is drawn via a recoil reel. A tensioning cam is attached to the output of the cycloid drive, and uses tensioning cables affixed to the bow limbs. As the cam rotates, the tensioning cables compress the limbs. A one-way ratchet clutch maintains the tension applied to the bow limbs between pulls. After pre-loading, the bow string is pulled with minimal effort, and a release mechanism on the clutch is utilized to release the pre-load, transferring pre-load energy into the bow string. The system has been designed to be adaptable to multiple bows by changing the mounting apparatus.
A Comprehensive Look at the Synthesis of Metal Carbide Nanomaterials
Greg Waetzig with Dr. Brian Leonard
Department of Chemistry
University of Wyoming
Oral Presentation

In the last 20 years, transition metal carbides have been investigated as replacement materials for noble metal catalysts. Because the starting materials for the synthesis of metal carbide compounds are inexpensive and abundant, and the reactivity and stability of the catalysts are both suitable, it is possible that these carbide materials can replace noble metal catalysts in fuel cell applications. Moreover, the carbide catalysts are expected to constrain carbon deposition and poisoning, therefore increasing the stability and reactivity of the catalyst. Carbides have very high melting points which makes them difficult to synthesize as high surface area nanomaterials. To circumvent this problem, we use salt flux reactions to transport the metal from the bulk powders to the carbon source. This technique allows for composition control and manipulation of electronic and geometric properties of the catalyst. We have investigated a variety of mono and bimetallic carbide catalyst materials with Molybdenum Carbide and Titanium Vanadium Carbide showing the most promising results. We have also found that varying the cations and anions of the salt flux results in more pure products. Using the information found in the single metal and salt flux studies, we have a clear path for synthesizing bimetallic carbide nanomaterials.

Paleopathology of Remains Excavated at Benick Ranch
Lauren Westling
Department of Anthropology
University of Wyoming
Poster Presentation

In this study, adult and juvenile remains collected from the Benick Ranch Excavation Site and stored in the University of Wyoming’s Human Remains Repository were reviewed for osteological indicators of abnormalities in growth and development and antemortem diseases. This was performed using a standardized documentation format, designed by the researcher, to create a partial biological profile and analyze each set of remains for pathological indicators. It was found that the adult remains had pathologies related to bone degradation which could have occurred as early as 44 years of age. Also, extensive tooth wear and areas of advanced bone wear provide insight into the diet and daily activities of these individuals. The juveniles were reviewed for growth and developmental pathologies. Future researchers will be able to use this methodology and the results to further our current understanding of the pathological ailments of early inhabitants of Wyoming.
Effects of Elevated CO$_2$ on Circadian Rhythms in *Arabidopsis thaliana*
Jonathon Whipps with Matthew J. Rubin and Cynthia Weinig
Department of Botany
University of Wyoming
Oral Presentation

*Wyoming NSF EPSCoR*  
*Casper, WY*

It is predicted that by the year 2050, atmospheric CO$_2$ will rise from 368 Parts Per Million (PPM) to 560PPM accompanied by an increase in temperature of approximately 3°C. As a result, the composition of plant populations may change, genotypes that can tolerate these novel elevated CO$_2$ conditions will become more prevalent, and other genotypes that have reduced fitness will decrease. One trait that may enable adaptation to global climate change is the circadian clock. Circadian rhythms are repeating rhythms that can be set by environmental inputs such as temperature and photoperiod. I used 14 ecotypes derived from natural populations of *Arabidopsis thaliana*, which span a latitudinal gradient, to examine the expression of circadian rhythms under ambient and elevated CO$_2$ conditions. I estimated two circadian components: period, defined as the duration of one rhythmic cycle, and phase, the timing of peak expression. The 14 ecotypes showed significant genetic variation for both period and phase but the expression of these traits did not significantly differ across CO$_2$ regimes. Previous studies have shown that circadian clocks are temperature sensitive and I am currently examining the combined effect of elevated CO$_2$ and temperature on the expression circadian period and phase.

Fictional Language Use and Cultural Assumptions
Gloria Wickman with Dr. Pamela Innes
Anthropology
University of Wyoming
Oral Presentation

*UW Honors Program*  
*Casper, WY*

In various forms of media, fictional languages have been created to give invented cultures more depth. Film franchises such as *Star Trek* and *The Lord of the Rings* have worked with professional linguists to insure that the fictional languages that the actors speak are portrayed accurately. Given that so much time is spent in the development of these languages, it is likely that the creators hope the audience will gain something from hearing them. The purpose of this study is to determine whether or not people assign cultural traits to the languages they hear and if so, from what basis do they build those assumptions. To answer this question, a number of participants took a survey of fictional and dead languages. The participants listened to samples of three different languages and were asked to draw conclusions about the culture the language represented. The results showed that there was a great deal of agreement about cultural characteristics for the various languages which is likely due to participants drawing on common methods of categorization and stereotyping. This study shows that people are willing and able to draw a startling number of conclusions about an unknown group of people based solely on a small audio sample of their language.
Did Lake Trout Cause a Trophic Cascade in the Benthos of Yellowstone Lake?
Oliver Wilmot, Lusha Tronstad, Robert Hall, Jr., Todd Koel
Wyoming Natural Diversity Database
University of Wyoming
Oral Presentation

Wyoming Natural Diversity Database Laramie, WY

Invasive predators can cause trophic cascades in pelagic zones of lakes; however, much less is known about their effect on lake benthos. Lake trout (*Salvelinus namaycush*), were introduced to Yellowstone Lake, Wyoming reducing the Yellowstone cutthroat trout (*Oncorhynchus clakrii bouvieri*) population. We predicted the presence of lake trout caused cutthroat trout to prey more on benthic invertebrates as opposed to zooplankton, altering the food web of Yellowstone Lake. Benthic invertebrates samples have never been collected in Yellowstone Lake when cutthroat trout were abundant; therefore, we compared the invertebrate assemblages of two regions of Yellowstone Lake where cutthroat and lake trout vary in abundances. We collected benthic invertebrates using a petit Ponar sampler. We collected 4 samples per site on 6 dates during the open water season of 2004 in the littoral zone. We found invertebrates from at least 20 taxa in the benthos of Yellowstone Lake. Invertebrates were found in abundances of >12,000 ind./m². Chironomidae (7700 ind./m²) were the most abundant invertebrates found in Yellowstone Lake. Data analysis is in progress to determine the degree to which a trophic cascade occurred in the benthos of Yellowstone Lake. Results from this study will help biologists manage the Yellowstone Lake ecosystem.

Connecting Neuroanatomy to the Performance of Learned Behaviors: An Investigation of the Neural Basis of Disordered Vocal Performance
David A. Wilson with Dr. Jonathan F. Prather
Department of Zoology and Physiology
University of Wyoming
Oral Presentation

Wyoming INBRE Fellowship Cheyenne, WY

Experience-driven changes in brain structure are the essence of the learning, and learning is the basis of nearly every form of human behavior. For example, through the experience of hearing and rehearsing music to learn an instrument, sensory and motor pathways are built, refined and preserved as a novice becomes an expert. Those processes also underlie how we learn the sounds we use to communicate using speech: we gradually become expert in imitating the sounds we hear performed by others around us, those vocal patterns are preserved throughout adulthood in the structure of sensory and motor brain sites dedicated to speech. If the structure of those sites is disturbed, then speech rapidly deteriorates, as occurs in cases of adult-onset stuttering following stroke. To investigate this structural change, I have used use an animal model of acquired changes in the sequencing of sounds used in vocal communication, and have tested whether induced changes in vocal sequence are associated with changes in the size and/or number of neurons in a sensorimotor brain site dedicated to performance and perception of the sounds used in vocal communication. This research has potentially increased our understanding of the anatomical basis of specific pathologies of vocal performance. Structures in the songbird brain are analogous or homologous to corresponding structures in the human brain, and as a result these insights may guide clinical development of mechanistically-targeted therapies for disordered speech.
Holistic Methods to Overcome Dental Anxiety
Sarah Wimpenny with Dr. Rachel Watson
Molecular Biology
University of Wyoming
Oral Presentation

UW Honors Program Saratoga, WY

The goal of this research project is to examine the effectiveness of holistic methods used by dentists in order to lessen anxiety in patients. This research project investigates the origin of dental fears and anxiety and different ways to treat it. In order to evaluate the effectiveness of these methods, six dentists were interviewed about the methods that they use regularly in their practice and the importance of using those methods. As demonstrated by the research in this paper, competence in utilizing these holistic techniques in dentistry is imperative for optimal patient care as well as a successful dental practice. Therefore, training for treating dental anxiety should be a part of general curriculum in dental schools.

Effects of Aerobic Training on Gene Expression in the Heart after a Myocardial Infarction
Alexander Wolff with Dr. Paul Thomas, & Dr. Mark Stayton
Departments of Kinesiology & Molecular Biology
University of Wyoming
Oral & Poster Presentation

Wyoming INBRE Gillette, WY

Heart disease is the leading cause of death in the world, and one of the simplest measures that can be taken against it is aerobic exercise. Both exercise and a myocardial infarction (MI) can lead to hypertrophy of the heart. An MI leads to pathological growth, in contrast to the physiological growth caused by exercise. By examining the effects of training upon gene expression in the heart, we endeavor to understand how, and if, exercise may attenuate this response. To create a model system, C57BL/6J mice were obtained, and MIs were induced by surgically tying off the Left Anterior Descending (LAD) Coronary Artery. Once the mice recovered, they were trained on a treadmill for 8 weeks. Tissues were harvested, and RNA was isolated and checked for quality via capillary electrophoresis. Currently, RNA has been isolated from all of our samples, and is of ample quality for downstream applications. Our next step will be to run qPCR reactions to analyze the gene expression of markers for hypertrophy. This assay will provide insight into the interactions of exercise and an MI, and how they influence cardiac hypertrophy. Future investigation will allow us to probe the changes within these signaling pathways more thoroughly.
Wyoming NSF EPSCoR  
Cheyenne, WY  
Laramie, WY

High mineralization and low porosity prevent ion exchanges with bioapatite, conditions found in the whale tympanic bulla. Cetacean bullae may be ideal specimens for isotopic research. Extending stable isotope analysis to later mysticetes, with the use of bullae in place of enamel, would provide a more complete picture of whale evolution. Whale tympanic bullae would allow us to study the ecology of this order for the past 50 million years. To understand preservation potential of the tympanic bullae, experiments of differing temperature and pressure conditions will be carried out with a variety of bioapatites such as bone, enamel, and cetacean bullae. This design will simulate natural burial conditions and allow me to determine the extent of isotopic and elemental exchange during diagenesis.

Virtualizing Grief: Commemorating Life and Death through Online Memorials  
JoAnna Wurst with Dr. Ruth Toulson  
Department of Anthropology  
University of Wyoming  
Oral Presentation

Memorialization—the ways that the dead are remembered and remain part of the society of the living—has long been a subject of anthropological inquiry. More recently, anthropologists have focused on spontaneous shrines, for example the roadside temporary shrines that commemorate traumatic deaths and yellow ribbons as commentary on death in war. However, what characterizes this existing research is a focus on materiality and place. As yet, little research has been conducted on memorials that emerge on social networking sites after traumatic death. In my study, with focuses on the Facebook profiles of the deceased, I argue that these virtual memorials contain the same characteristics as material memorials: they serve as the focus for grieving and thus accumulate memories, making visible the nature of the relationship between the living and the dead. Drawing on theoretical commentaries on the prominence of technology in the American Life, I suggest that critics of social networking sites have under-estimated the importance of these forms of sociality.
Obsessive-compulsive disorder with primary religious themes, also known as scrupulosity, is an understudied problem that poses unique clinical challenges owing to the potential conflicts between the requirements of exposure therapy (the standard treatment) and adherence to religious law. Although previous discussions have highlighted the potential role of clergy members in the maintenance and treatment of this problem, empirical research has not examined religious authorities’ attitudes and behaviors toward scrupulous parishioners. The study to be presented was a nationwide, online survey of 70 clergy members affiliated with liberal or conservative denominations of the Lutheran church. Pastors affiliated with the more conservative denomination evidenced higher endorsement of the position that a bad thought is equal to a bad action, belief in a micromanaging God, and responses to a scrupulous parishioner that risk reinforcing compulsive rituals and the fear of sin (e.g., admonitions of God’s expectations for purity in thought and deed, advising regular confession of sinful thoughts). Moral thought-action fusion fully mediated denominational differences in potentially problematic responses to a scrupulous parishioner. Implications for collaborative efforts between mental health professionals and clergy members to improve the prevention and management of scrupulosity will be discussed.