ORDERED FUZZY ARTMAP FOR PREDICTING HIV-1 PROTEASE INHIBITOR ACTIVITY

Abdul-Wahid, Badi'; Barker, Grant
Faculty Mentor(s): Razvan Andonie, Computer Science; Levente Fabry-Asztalos, Chemistry

Session: 32 (Oral Session 4:30-5:50 in 135)

Computer-aided drug design is useful because it can drastically decrease the time needed to produce new drugs to use against therapeutically important enzymes. We employ an Ordered Fuzzy ARTMAP (OFAM) to predict the biological activity of HIV-1 Protease inhibitors. Ordering the input vectors before presentation to the Fuzzy ARTMAP (FAM) improves the predictive capabilities of the model for IC\textsubscript{50} values. To circumvent the effect of the input order, the algorithm attempts to choose representative molecules from each cluster to present first to the FAM followed by the remaining data points. The algorithm is outlined as following: 1) Choose the most distinct individual based on internal diversity. 2) Choose the next n\textsubscript{clusters} - 1 individuals that maximize the Euclidean distance between them. 3) Choose the remaining individuals by selecting those closest to the cluster centers first. Our results show a 36% MAPE improvement using the optimized OFAM vs the FAM.

PREDICTION OF NOVEL INHIBITORS TARGETING \textit{P. FALCIPARUM} PLASMEPSIN IV

Abdul-Wahid, Badi'
Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry; Razvan Andonie, Computer Science

Session: 35 (Poster Session Morning in Ballroom)

The malarial parasite \textit{Plasmodium falciparum} is endemic to 50% of the world's population, killing three million people a year, most of whom are children under five years of age. Due in part to the development of malarial resistance to current drug therapies, novel drug targets are being sought. The malarial hemolytic aspartic protease Plasmsepsins are such targets of rational drug design. We use an Ordered Fuzzy ARTMAP (OFAM) and a fuzzy neural network with a genetic algorithm optimizing the feature selection process (FNN) to model the biological activities of Plasmsepin IV (PM IV) inhibitors and to predict the activity cluster of novel structures.

ELECTRONIC REALIZATION OF THE LOGISTIC MAP

Abdul-Wahid, Sami
Faculty Mentor(s): Michael Braunstein, Physics

Session: 7 (Oral Session 8:00-9:40 in 271)

An electronic realization of the Logistic Map was designed and built using integrated circuits and arithmetic operations were performed on the voltage values in the circuit using 741 Op-Amp circuits and an AD734 multiplier chip. The iteration mechanism was constructed using a CD4051B analog multiplexer and two LM398 sample-and-hold circuits, with the multiplexer providing the seed for the initial condition. The sample and hold circuits were triggered using a set of four 555 timer circuits and two logic-gate integrated circuits. To check for proper functionality, the circuit was probed with a voltmeter without iterating the circuit. The behavior of a computational model of the Logistic Map will be compared to the behavior of this electronic circuit.
FOCUS ON FORM AND LEARNER UPTAKE IN AN ESL CLASSROOM: WHAT TYPES OF FOCUS ON FORM FACILITATE STUDENTS' LEARNING?

Allen, Yoko
Faculty Mentor(s): Loretta Gray, English
Session: 8 (Oral Session 8:00-9:40 in 301)

Focus on form is a type of interaction found in second language classes devoted to the completion of communicative tasks. Focus on form is considered to be effective in teaching a second language because it occurs in a meaningful context. Second language learners normally do not learn to use the correct forms of a language merely by participating in a conversation, so some attention to form is generally required. I audio-recorded 7 class sessions of an adult ESL class at YVCC in order to study the nature of focus on form. This study is aimed at revealing correlations between the types of focus on form and students' learning. The following questions guided the analysis: Which types of focus on form (preemptive or reactive, explicit or implicit, vocabulary or syntax) occur more frequently? Which types of focus on form result in learners' successful uptake?

WYMER QUADRANGLE: ISSUES AND CONFLICTS IN RESOURCE MANAGEMENT

Anderson, CJ
Faculty Mentor(s): Nancy Hultquist, Geography and Land Studies
Session: 36 (Poster Session Afternoon in Ballroom)

Located between Kittitas and Yakima counties in Washington State, the Wymer topographic quadrangle is a polyconic projection depicting the shape and elevation of Yakima River Canyon infrastructure created by prehistoric volcanism, tectonic deformation, hydrologic incision and other geomorphological processes. Published in 1953, Wymer depicts extremely rural, rugged and arid terrain, which remains relatively unchanged after the half-century since the map's creation through the combined cartographic efforts of no fewer than five United States government agencies. Today, Wymer contains a dynamic microcosm of management entities, including federal, state, county, tribal, public and private jurisdictions, which form the basis for ongoing research into policies, issues and conflicts inherent to natural and cultural resource management.

CAN FUTURE SOPHOMORE WASL TEST SCORES BE PREDICTED?

Andrews, Chelsey; Flowers, Traca
Faculty Mentor(s): Mike Lundin, Mathematics
Session: 35 (Poster Session Morning in Ballroom)

Research Question: Are Sophomore WASL test scores associated with gender, ethnicity, percentage of continuous enrollment and/or the enrollment of special needs, low income, limited English usage or migrant students? If so, which of these factors can be considered a good predictor of how a school will do on the WASL test? By using past years data, we will statistically examine whether or not individual schools will be able to predict future scores based on that school’s student population. Data has been collected from the Office of the Superintendent of Public Instruction website (http://www.k12.wa.us/ Value of the Study). This study will be of interest to school administration and parents. By being able to predict how the school will test based on the information provided, the administration and parents will be able to better prepare students before testing.
SYNTHESIS AND OPTICAL CHARACTERIZATION OF SrY$_2$O$_4$:Eu$^{3+}$

Atkins, Ryan

Faculty Mentor(s): Anthony Diaz, Chemistry – Science Honors

Session: 24 (Oral Session 2:55-4:15 in 135)

I have finished research on the synthesis and VUV optical characterization of SrY$_2$O$_4$ doped with Eu$^{3+}$. SrY$_2$O$_4$:Eu$^{3+}$ was synthesized from Y$_2$O$_3$, Eu$_2$O$_3$, and SrCO$_3$, with 5% excess SrCO$_3$ by weight; the mixture was fired at 1050°C for 12 hrs in air twice; phase pure product was confirmed with powder X-ray diffraction. Results indicate that Eu$^{3+}$ occupies two non-equivalent Y sites within the SrY$_2$O$_4$ framework. Calculation of maximum transfer efficiency for SrY$_2$O$_4$:Eu$^{3+}$ resulted in 60% with 35% lost to non-radiative decay via surface states. Reflectance data on an undoped sample indicates a band gap of about 6.1 eV.

AMPHIBIAN POPULATION STUDIES WITH TEAM HERPS

Ault, Kori; Arlt, John; Wagner, Steve

Faculty Mentor(s): Steve Wagner, Biological Sciences

Session: 35 (Poster Session Morning in Ballroom)

Team HERPS uses amphibian population studies to Help Enhance Research in Public Schools. As part of the Yakima WATERS program, Team HERPS works to increase the relevancy of biological sciences by integrating watershed themes into the curriculum at Ellensburg High School. Under the context of watershed ecology, amphibian research is used to engage students in inquiry based learning activities. Specifically, students participate in a population study of amphibians which requires capture, measuring, and tagging of Pacific Tree Frogs at Englehorn Pond. Gathering information about abundance and distribution allows students to understand the effects of disease and water quality on amphibian population dynamics. Studies of amphibian populations are important because one third of amphibians worldwide are threatened with extinction, which is part of a global trend of biodiversity loss. Through Project HERPS students gain experience in authentic biological research and are able to contribute to a study of an amphibian population which is undergoing declines.

CHANGING CULTURAL LANDSCAPE OF ASAN POINT, GUAM: 1953 AND 1993

Ayers, Marc

Faculty Mentor(s): James Huckabay, Geography and Land Studies

Session: 36 (Poster Session Afternoon in Ballroom)

This project examines the changing cultural landscape of Asan Point, Guam though the use of aerial photography and photo interpretation techniques. The two times selected, 1953 and 1993, depict very different usages of the area. These usages are most apparent when the location and quantities of roads, trails, buildings, and trees are compared. Guam, a territory of the United States, is the largest and southernmost island of the Mariana chain in the Western Pacific, with Asan Point on its northeast shore. Over the past century, Asan Point has seen many changes. Following World War II, Camp Asan was established and housed U.S. Navy Seabees until 1947, and served as a Civil Service Camp from 1948 to 1967 (see the 1953 photo). The buildings were destroyed in 1976 by a typhoon. In 1978 the site became the War in the Pacific National Historical Park (see the 1993 photo). Analysis of changes in roads, trails, buildings,
and trees between these two times, utilizing air photo interpretation techniques, clearly indicates changes in human use of Asan Point. Despite the economic growth and urban sprawl that has affected most of the island, Asan Point has been set aside and preserved for its historical significance. It is important to understand that the 1993 image, while it seems vacant, is depicting a scene just as interesting as the 1953 image. In fact, the use of Asan Point as a park is just another of the many identities the area has held over the years.

CONCESSIONS OF NECESSITY: THE RELATIONSHIP BETWEEN PRIVATE ENTERPRISES AND STATE DURING THE COLONIZATION OF SIBERIA
Baker, Paul
Faculty Mentor(s): Roxanne Easley, History
Session: 29 (Oral Session 2:55-4:15 in 202)

This primary and secondary source research paper describes the process that the Russian state during the reign of Ivan IV (The Terrible) gave land as well as financial and administrative concessions to the Stroganov family. The paper examines the reasons why the state provided these concessions, under what terms and the historical events that framed these concessions. The paper also examines the historiography of these events, describing how the colonization of Siberia was carried out and how these events have been interpreted by historians and why the current scholarship leaves a gap in the study of the history of Siberia.

LEMON BATTERIES: AN EXPLORATION AND APPLICATION OF THE ELECTROCHEMICAL SERIES
Balandova, Zhenya
Faculty Mentor(s): Timothy Sorey, Chemistry
Session: 35 (Poster Session Morning in Ballroom)

The objective of this research project is to create a laboratory that supports student inquiry of redox reactions and processes involved in setting up an electrochemical series. Students will perform this by creating a lemon battery system using different types of metals and connecting them to create a galvanic cell. The goal is to find a problem based approach for college level students to create, test, and use a battery to power an electronic device, such as an LED or a low current electric motor. The experiment will be implemented into the general chemistry lab series in Spring Quarter of 2008. If students are able to develop a battery with enough current and voltage to power a small device then they will better understand redox chemistry and the electrochemical series because they will be physically applying these chemical concepts to solve a real-world problem.

COMPUTER MODELLING AND NEURAL NETWORKS USED IN THE DESIGN OF NOVEL HIV-1 PROTEASE INHIBITORS FOR THE THERAPEUTIC TREATMENT OF HIV/AIDS
Barker, Grant
Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry; Razvan Andonie, Computer Science
Session: 24 (Oral Session 2:55-4:15 in 135)

This computational chemistry approach employs the use of a genetic algorithm to optimize feature selection and a Fuzzy ARTMAP (GA-FS-FAM) to predict the biological activity of HIV-1 protease inhibitors as measured by their IC$_{50}$ value. Predictions were made using seeds
containing 4, 8, and 35 common molecular descriptors in pharmaceutical design (i.e. Lipinski’s descriptors). Trials were performed with and without feature selection. Feature selection is an automated process which chooses the most representative descriptors from the total set of molecular descriptors for the given data set using an evolutionary algorithm. This involves scrutinizing the fitness of different combinations of molecular descriptors based on their statistical correlations to a training set using RMSE, SMAPE, and Pearson’s coefficient. The fittest chromosome is selected and used to seed the FAM to predict the biological activity of novel inhibitors. Once this optimization is complete, the rules used by the GA-FS-FAM can be extracted. Rule extraction provides the medicinal chemist with a more comprehensive understanding of the most relevant molecular descriptors. The goal of this research is to develop a set of adaptive algorithms which can be used to determine the most representative molecular descriptors of any new data set which is presented to the program, predict the biological activity of novel inhibitors within that data set with precision and accuracy, and extract the rules which govern the learning and prediction processes. If successful, this approach will decrease the time required to develop and improve the efficacy of novel pharmaceutical leads.

SEASONAL MOVEMENT AND HABITAT USE OF THE CASCADES FROG (RANA CASCADAE) IN WASHINGTON
Barreca, April; Irwin, Jason T.
Faculty Mentor(s): Jason T. Irwin, Daniel Beck, R. Steven Wagner, Biological Sciences

Session: 18 (Oral Session 1:20-2:40 in 137A)

Cascades frogs (Rana cascadae) are endemic to montane ecosystems in the Pacific Northwest and are declining in the southern part of their range. There are no studies on the overwintering habits of the Cascades frog and little information about their habitat requirements after the breeding season. This study will track a population of Cascades frogs in the foothills of the North Cascades throughout the year using radio-telemetry. Physiological data on energy storage will be gathered before and after hibernation and compared to a lower elevation site. Data will be gathered on population size and health and correlated with temperatures and dissolved oxygen at hibernation sites and throughout the year. Frog movement will be tracked between hibernation, breeding and summer foraging sites. Preliminary data indicate that R. cascadae are not freeze tolerant and require specific micro-habitats during hibernation.

THE CENTRAL LOWLAND MAYA REGION OF THE YUCATAN PENINSULA PRE 1492 CE
Barrett, Carrie
Faculty Mentor(s): Patrick McCutcheon, Anthropology & Museum Studies

Session: 36 (Poster Session Afternoon in Ballroom)

Much is made in both scientific and popular writing of the Mayan Collapse during the Classical Period, 800 to 1000 CE. While a variety of researchers have speculated on this period, there is not a prevalence of interdisciplinary approaches that might give a more holistic understanding of the lower Yucatan through time. This poster project uses such an approach to review what is known about this region, from the ‘Peopling of the Americas’ through 1491 CE. An integration of information from Archaeology, Oral History, and Geography was used to explore the lifeways and environment of the Maya. The tropical forest obscures traces of human activity forcing researchers to focus on the Mayan cultural centers, thus creating biases in data. Oral History is composed of written origin stories of the Maya including descriptive narratives of their Gods. Paleoenvironmental data shows the climate changing from wet to dry, with a series of dry periods and those affects on tropical forest ecology. This research found the common thread of
corn within all of the disciplines. The role of corn is thought to be central, as it is depicted in Mayan architecture, plays a primary role in oral and written stories, and was found in environmental soil studies dating to long before the rise of the Classical Maya. These findings indicate corn's importance to the people of the lowland Yucatan and provide a more integrated and holistic view Mayan worldview.

**CONTACT, CONQUEST, AND COLONIZATION OF THE MAYA**

*Barrett, Carrie*

Faculty Mentor(s): Patrick McCutcheon, Anthropology & Museum Studies

Session: 36 (Poster Session Afternoon in Ballroom)

An interdisciplinary approach leads to a more holistic way of understanding the period of European contact (1500 to 1900 CE) in the Yucatan Peninsula. The use of archaeological records, historical American Indian and Euro-American records, and rhetorical analysis is employed in an effort to get an integrated view of the cultural interactions of the colonial period. Archaeological studies highlight the demographic dispersal of indigenous people just before and during colonial times. Colonial records and missionary journals give generous details of daily life and the pacification strategies used in the area during that period. The Sacred Books of the Maya, which were continuously added to by Mayan Priests, conveyed a sense of how the indigenous population felt about and understood the changes that were affecting their traditional way of life during that time. Each of these types of records were analyzed and recognized for carrying biases, using different methods of data collection, and holding various worldviews. This poster project shows the difficulty of getting a holistic understanding of a region when so many factors are at play in the cultural mixture of colonial society.

**ROLE OF VENTRAL CORD NEURONS ON EGG LAYING UPON LONG-TERM EXPOSURE TO SEROTONIN IN THE ROUNDWORM, C. ELEGANS**

*Bates, Terri*

Faculty Mentor(s): Lucinda Carnell, Biological Sciences

Session: 35 (Poster Session Morning in Ballroom)

The roundworm, *C. elegans* is an excellent genetic model for studying genes involved in behavior. In wild type *C. elegans* initial exposure to the neurotransmitter serotonin (5-HT) stimulates egg laying and pharyngeal pumping and decreases locomotion. After four hours of exposure to 5-HT, wild-type worms begin to show behavioral adaptation, which is shown by a decrease in egg laying to levels that occur in the absence of 5-HT. Additionally, wild-type worms after being removed from 5-HT containing agar plates stopped laying eggs completely, a behavior described as withdrawal. The neurons controlling adaptation to 5-HT for egg laying have not been identified. It is known that the ventral cord neurons (VC4 and VC5) play a role in egg laying in general but is not known whether or not they also play a role in adaptation to 5-HT. In order to test whether or not these VC neurons are involved in adaptation, a mutant worm defective ventral cord (VC) neuron function was tested for its response to long-term exposure to 5-HT. Preliminary results indicate the mutant worms, strain CB270, adapts to 5-HT suggesting the VC neurons are not involved in adaptation of egg laying to 5-HT.
TRADITIONAL ECOLOGICAL KNOWLEDGE AND WESTERN SCIENCE ON THE YAKAMA RESERVATION, WASHINGTON

Beavert, Tia
Faculty Mentor(s): Allen Sullivan, Resource Management

Session: 1 (Oral Session 8:00-9:40 in 135)

Around the world, traditional ecological knowledge (TEK) is slowly being lost or neglected. This knowledge is as important as western science in maintaining ecological systems. The integration of both disciplines is important on the Yakama Reservation to help maintain not only the ecological landscape, but also cultural identity of the Yakama people. To understand the importance of both TEK and western science in relation to the Yakama people, Camas Patch Meadow is examined through the lens of each discipline. Past management strategies of the meadow included prescribed burning, fence exclosures, and traditional root gathering. The meadow is currently being affected by forest land practices, such as grazing and timber harvest. While many tribal elders attest to changes in both the size and quality of the meadow system, because these changes have not been measured or documented using a scientific process, they are not accepted as proof of degradation by adherents of the western science discipline. Recently, resource management plans for the meadow have begun to focus on integrating traditional knowledge with western knowledge to both educate and inform tribal members and management decision-makers. This study illustrates the importance of traditional knowledge and how it relates to western science in regards to managing the environment. If these two approaches are integrated, resource managers can provide a management plan that best suits not only scientists, but tribal members as well.

METHOD DEVELOPMENT WITH HIGH PRESSURE LIQUID CHROMATOGRAPH FOR THE DETECTION AND QUANTITATION OF SUBMICROMOLAR CONCENTRATIONS OF METHANESULFINIC ACID

Best, Brittany
Faculty Mentor(s): Anne Johansen, Chemistry

Session: 13 (Oral Session 9:55-11:35 in 201)

Methanesulfonic acid (MSIA) is an oxidation intermediate of phytoplankton derived dimethylsulfide (DMS) emitted when metabolic iron-limitation persists in open oceans. To further prove or disprove laboratory evidence that MSIA is likely to enhance iron (II) photoproduction and thus, iron bioavailability, the detection and quantitation of MSIA at low atmospheric levels is fundamental. This study will focus on developing a method of analysis of MSIA at submicromolar concentrations in aqueous solutions by applying High Pressure Liquid Chromatography (HPLC). This technique is novel and would therefore also constitute a significant contribution to the field of analytical chemistry.

SYNTHESIS TOWARDS NOVEL 1,3-AZABORINE HETEROCYCLES AS POTENTIAL DUAL-MODE HIV-1 PROTEASE INHIBITORS

Blackmore, Amanda
Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry – Science Honors Program

Session: 24 (Oral Session 2:55-4:15 in 135)

Drug discovery has resulted in many life-saving therapies, making a great impact on modern medicine and the human condition. Even though new therapies are available many drugs are
highly susceptible to resistance development, have poor bioavailability, and some of them are
toxic. HIV-1 protease inhibitors presently on the market show high specificity but have low
bioavailability and high toxicity. Furthermore, the available drugs have a very low affinity for
mutant forms of HIV-1 protease. Recent studies have shown that boronated HIV-1 protease
inhibitors, which demonstrate both competitive and associative inhibition, have a higher affinity
for HIV-1 protease at lower concentrations than their corresponding carbon analogs and also
inhibit a mutant form of HIV-1 protease. In this study three novel 1,3-azaborine type of
heterocycles are being synthesized. Their biological characteristics will be analyzed and
compared with other inhibitors to determine their effectiveness as novel anti-HIV drugs.

**FUNCTION OF GENE PRODUCT ISOLATED FROM RETINA OF CHICKEN EMBRYO**

*Blaisdell, Megan; Wessel, Erich*

*Faculty Mentor(s): Dan Selski, Biological Sciences*

*Session: 35 (Poster Session Morning in Ballroom)*

The overall goal of this research is to determine if a certain gene product may have effects on
neuronal connections in a developing visual system. Previous studies identified a unique mRNA
and the encoded protein synthesized in the retina of a developing chicken embryo. Since these
sequences were originally isolated, the chicken genome has been completely sequenced.
Current analyses are focused on what might be known about this chicken gene product. When
the sequence was compared to the chicken genome database it was matched with a gene on
the seventh chromosome with 100% identity. Other characterized genes exist within this region
on the chromosome that have known functions. The gene isolated matches to a computer-
predicted gene on the chromosome, meaning that there are no previous reports regarding a
gene with a known function in this specific region. More research is underway to identify
homologous genes in the human and mouse genomes that might provide more information
about the function of this gene, aside from what is predicted by computer software.
Furthermore, comparison of the protein sequence to the protein databases could reveal
homology to small functional “units” of the encoded protein that may identify a function of the
gene product. Identifying some function of this gene will potentially provide more information
regarding whether the gene product is involved in axonal growth patterns within the visual
system.

**INDIVIDUAL- AND TASK-VARIATION IN HANDEDNESS IN FIVE CROSS-FOSTERED
CHIMPANZES (PAN TROGLODYTES)**

*Blodgett, David; Stadtner, Gina; Metzler, Deborah; Wallin, Jason; Potosky, Robin*

*Faculty Mentor(s): Mary Lee Jensvold, Chimpanzee and Human Communication Institute; Lori Sheeran, Anthropology & Museum Studies*

*Session: 35 (Poster Session Morning in Ballroom)*

Humans show a population-level hand preference for the right hand but such a population-level
handedness in chimpanzees is disputed. Robinson (1979) and Steiner (1990) examined hand
preference in a family of cross-fostered chimpanzees and found that the chimpanzees showed
individual differences in hand preference overall and that hand preference varied within the
same individual across tasks. The current study examined the handedness of these
chimpanzees – Washoe, Moja, Tatu, Dar, and Loulis – over various dates and locations from
the last 22 years. We hypothesized that 1) the chimpanzees would show individual preferences
for one hand or the other and 2) that such preferences would vary within the same individual
during different tasks. Three categories of tasks were examined: object manipulation, gesture
use, and food interaction. We reviewed 40 hours of adventitious videotapes and found 1,796 instances of hand use during such tasks. We found that Washoe was predominantly right handed and Dar was predominantly left handed during each task. Overall, Tatu showed a preference for her right hand, but was more ambidextrous. Loulis also showed a preference for his right hand, except when interacting with food, when he showed a trend for using his left hand. Moja showed significant preference for her left hand in gesture, but for her right in object manipulation. Overall, these data support our hypotheses.

WILD HORSES ACROSS GENERATIONS
Blodgett-Duque, Kristen
Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies
Session: 16 (Oral Session 9:55-11:35 in 301)

The Yakama Nation Reservation is home to a large population of wild horses. These wild horses have been seen as symbolically meaningful, a thrill to catch, and also a nuisance. Wild Horses Across Generations is a ten minute documentary short that interviews three Yakama men of different generations within the Blodgett family each with a slightly different perspective of the horse population. David Blodgett Sr. tells of his personal histories, his relationships with the horses, and what they mean to the Yakama. David Blodgett Jr. describes the horse population today, their steady increase in numbers, and the detrimental effects of such a large population. Dave Blodgett III takes the viewer out to the field for some live shots to demonstrate the thrill of chasing these animals. The film is informative with a hint of impressionism and should allow the viewer to grow an appreciation for the wild horse population on the Yakama Reservation and an understanding of the need for proper management.

MY THANKSGIVING EXPERIENCE
Blodgett-Duque, Kristen
Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies
Session: 16 (Oral Session 9:55-11:35 in 301)

Thanksgiving is a holiday well known in this country for giving thanks and being with family however each one of us has our own unique ways of celebrating. The documentary short My Thanksgiving Experience follows me, Kristen Blodgett-Duque, as I find out what others think about the holiday and how they celebrate it. Later the film observes my Thanksgiving unfold with a reunion of family, what we’re thankful for, and after all is said and done, what I took away from Thanksgiving. The seven minute film ties in brief interviews, modern music, and a “reality TV” edge, to properly showcase how Thanksgiving unfolds for one “typical, everyday” college student.

AN EXPLORATORY STUDY OF THE PROPARYGLATION OF AROMATICS WITH Bi(OTf)$_3$ IN IONIC LIQUID SOLVENT [BMIM][OTf]: NEW LIFE FOR A CLASSIC TRANSFORMATION
Brown, Kelley; Kellar, Casey; Charlton, Paul
Faculty Mentor(s): Viorel D. Sarca, Levente Fabry-Asztalos, Chemistry
Session: 35 (Poster Session Morning in Ballroom)

Green chemistry, also known as sustainable chemistry, refers to the design and use of chemicals and processes that reduce or eliminate substances that are hazardous to humans
and the environment. In this relatively new approach to chemistry emphasis is also placed on maintaining economic viability while minimizing energy use and waste production. Many traditional organic solvents have been implicated as environmental contaminants and are often toxic, volatile and difficult to work with. The search for replacements for these solvents is currently the subject of intense research and is an important agenda for green chemistry. Room temperature ionic liquids have attracted great interest for use as green solvents because they have a low melting point, no vapor pressure and are generally non-volatile, non-toxic, recyclable and environmentally friendly. This study was designed to test bismuth triflate, Bi(OTf)$_3$, and 1-Butyl-3-methylimidazolium trifluoromethanesulfonate, [BMIM][OTf], as a novel catalyst-solvent system for the propargylation of aromatics. The products of these reactions are valuable intermediates used in a wide variety of organic syntheses. All reactions were carried out under nitrogen atmosphere at room temperature or low temperature. The products were then separated from the ionic liquid by extraction with anhydrous diethyl ether. After removing the ether, the products were dried and analyzed using GC, GC-MS and $^1$H NMR and the ionic liquid solvent was recovered and reused.

FUNERAL MARCH FOR TROMBONE QUARTET, OPUS 11
Brown, Sean; Burrough, Erik; Curley, Erik; Cobb, Steve; Morris-Kenfield, Zachary
Faculty Mentor(s): Mark Babbitt, Music
Session:  Performance (Morning Intersession)

This piece of music was commissioned by a member of this trombone quartet that meets regularly during the week. The actual piece was composed shortly after the death of a close family friend, so some aspects of the piece pay homage to him. Otherwise, the request for the composition was to be "dark". The piece is indeed dark, with many changes in volume and even mood. My composition style is similar to the styles of Anton Bruckner and Richard Wagner, and the piece can be thought of as a tribute to them, as well. I have had 10 other successful compositions in the 4 years I've been here at CWU, and all of them have been performed by students of the music department at various music events. This piece has already been premiered once. Three of the members of this quartet have premiered pieces of mine before, and so they are familiar with my writing style. The piece will last about 6 minutes.

CONDITIONING PRACTICES AND INJURY RATES OF COMPETITIVE IRISH DANCERS
Bruhn, Christian
Faculty Mentor(s): Vincent Nethery, Leo D'Acquisto, Harry Papadopoulos, Health, Human Performance & Nutrition
Session: 11 (Oral Session 9:55-11:35 in 137B)

Although Irish dance competitions have existed for over two centuries, little is known about conditioning practices or the types and rates of injuries of competitors. The purpose of this study was to help determine the relationship between skill level, extracurricular activities, cross-training and injuries within the Irish dance population. An anonymous survey was created to provide information on the levels of competition, the conditioning practices and the injury rates of Irish dance competitors. Respondents (n=351) included past and present competitive male (n=23) and female (n=328) Irish dancers from 10 to 52 years of age. The average volume of specific dance training amounted to 8.34±4.91 hours per week with 56% (198/351) also participating in other supplemental training. The ankle/foot had the highest injury rates (63.7%) followed by the knee (16.9%) and the hip (15.2%). Respondents indicated a strong willingness to participate in a specialized Irish dance strength training regimen (>90%). The information
obtained helped develop a clear profile of competitive Irish dance to better identify and refine the training tools and techniques needed to develop stronger and healthier dancers.

**SURFACE METALS CONTRIBUTE TO THE TOXICITY OF AIR POLLUTION**

*Bryner, Stephanie; Johnston, Justin; Thomas, Carin; Johansen, Anne*

*Faculty Mentor(s): Carin Thomas, Chemistry*

*Session: 13 (Oral Session 9:55-11:35 in 201)*

Atmospheric ultrafine particles (UFP, 100nm or less in diameter) have been shown to have adverse health effects in vivo and in vitro. A part of the toxicity of these particles can be due to the redox cycling of the surface chemical groups reacting with biological reductants to cause reactive oxygen species (ROS) formation. Some surface reactive groups that can cause redox cycling are quinones and transition metals. One example of a transition metal is iron, which can be removed from redox cycling with desferrioxamine to form the ferrioxamine complex. Ambient atmospheric ultrafine particles were collected in both Seattle and Ellensburg and tested for their ability to redox cycle. Increased redox cycling was observed in Seattle UFPs compared to Ellensburg UFPs. In general, statistically significant differences were observed in Ellensburg and Seattle samples in the presence and absence of desferrioxamine, linking the transition metal iron with redox cycling.

**ELECTRONIC THEATRICAL PROMPT SCRIPT**

*Carroll, Justin*

*Faculty Mentor(s): Chris Sousa-Wynn, Theater Arts*

*Session: 23 (Oral Session 1:20-2:40 in 271)*

I am a Stage Manager in the Central Theatre Arts Department. This past Fall quarter I had the opportunity of stage managing an adaptation by Ken Jones of Charles Dicken's *A Christmas Carol* in the McConnell Auditorium. In order to expand my knowledge base and try new things, I put the prompt script onto a computer rather than using the traditional pencil and paper to record the cues. The prompt script is a copy of the show script that contains all the cues (indicators of all scenic shifts, and all light, sound and special effect changes and executions through-out the show) and is used by the stage manager to ensure a flawless reproduction of the director's vision. I found the process extremely efficient, time-saving and simple. It is an experiment that I will bring with me back into the professional world. There is a generational gap in the field of Theatrical Stage Management between the "old-school" Stage Managers and those who are familiar with technology in this field. I am trying to introduce a more technological base for my fellow students here at Central and for my peers in the career field. It is a small step, but one that can begin a bigger push for other technological innovations. I will be presenting my electronic book along side my 3-ring bound blocking script.

**THREE PERFORMANCE PIECES**

*Cartwright, Madeleine; Deimer, Adrein*

*Faculty Mentor(s): Keith Edie, Theater Arts*

*Session: 31 (Performance 2:55-4:15 in Theatre)*

These performance pieces were presented last quarter in Laramie, WY at the regional Kennedy Center American College Theatre Festival. The performers were moved on to the preliminary
round. The pieces are as follows: One scene from Alexandra Gersten's *My Thing of Love*, the song "Single Man Drought" from the musical *I Love You, You're Perfect, Now Change!*, and a monologue.

**WHAT BUFFON’S ANIMALS TELL US ABOUT HUMANS: EIGHTEENTH-CENTURY CONCEPTIONS IN BUFFON’S NATURAL HISTORY: GENERAL AND PARTICULAR**

*Caulkins, Tamara*

*Faculty Mentor(s): Jason Knirck, Thomas Wellock, History*

*Session: 29 (Oral Session 2:55-4:15 in 202)*

The work of the once famous eighteenth-century French naturalist known as Buffon has been largely overlooked due to the rapid increase and revisions in scientific understanding that took place in the nineteenth-century as well as the wholesale adoption of the Linnaean classification by most of the scientific community of the time. Nevertheless, an examination of Buffon’s methods, insights and findings sheds light on the roots of modern understandings of the nature of human beings and the relationship between humans and the natural world. This paper will focus on Buffon’s epistomologies and observations pertinent to his definition of humans as part of or separate from nature.

**SCIENCE, ART, AND THE PERCEPTION OF NATURE: MARIA SYBILLA MERIAN AND ALEXANDER VON HUMBOLDT IN THE NEW WORLD**

*Caulkins, Tamara*

*Faculty Mentor(s): Thomas Wellock, History*

*Session: 35 (Poster Session Morning in Ballroom)*

Many of our attitudes toward nature, methods of study, and approaches to environmental problems can be traced to the eighteenth century. Entomologist-botanical artist Maria Sybilla Merian and explorer-philosopher Alexander von Humboldt voyaged to the New World a hundred years apart: Merian to the Dutch colony of Surinam in 1699 and Humboldt to New Spain in 1799. They both relied heavily on the knowledge and expertise of native, slave, and creole Americans. They also shared a passion for direct empirical observation of the natural world. However, they appealed to vastly different audiences and employed very different media to communicate their findings. This poster outlines the changes that took place in the hundred year period between these two exemplary explorer/naturalists. It also compares the ways they studied and perceived nature and how their work reflected the way they each approached their studies of the natural world.

**THE LIFE AND TIMES OF HAIRY ELEFANTE: GEOGRAPHY, GEOCHEMISTRY AND PALEONTOLOGY OF THE PRATUM SITE, WESTERN OREGON**

*Cearley, Stacie; Barton, Bax; Hackenberger, Steve*

*Faculty Mentor(s): Lisa Ely, Geological Sciences – Science Honors Program*

*Session: 1 (Oral Session 8:00-9:40 in 135)*

In August of 1967 remains of a mammoth were discovered in a peat bog in Pratum, a small farming community near Salem, Oregon. Two molars were found in conjunction with a tusk, femur, and partial pelvis. While mammoth finds are fairly common in the area, detailed palaeontological analysis has rarely been attempted on such finds. The goals of this project are
to analyze the Pratum mammoth in terms of the geographic and geologic context of the find, conduct stable isotope geochemical analyses of the bones and tusk, and morphometric analysis of the remains. To date, morphometric analysis of the find has determined that the animal was a Columbian mammoth (*Mammuthus columbi*). Approximately 22±3 years of age at death. AMS radiocarbon dating has revealed that the animal died 12,023±77 years ago. The project is currently awaiting stable isotope analysis results (δ¹⁸O, δ¹⁵N, δ¹³C) to be correlated with regional paleoclimate datasets. Microsampling of the Pratum tusk material has been used to compose an 3.5 yr annual variation sequence for δ¹⁸O and δ¹³C that can be used as a proxy palaeodata for temperature and vegetation at the time when the mammoth lived. Mathematical climate models have also been used to construct a contemporary palaeoclimate record for comparison with the recovered stable isotope information from this mammoth.

**EFFECTS OF A CALCIUM CHANNEL, UNC-2, ON LONG-TERM EXPOSURE TO SEROTONIN ON EGG LAYING IN THE NEMATODE, CAENORHABDITIS ELEGANS**

*Chamberlin, David*

Faculty Mentor(s): Lucinda Carnell, Biological Sciences

Session: 35 (Poster Session Morning in Ballroom)

The nematode, *Caenorhabditis elegans* (*C. elegans*) is a great model organism for studying the behavioral responses and neural pathways controlled by serotonin. Research on the wild-type, N2 strain has identified specific serotonin pathways that control behavior. One behavior that is controlled by serotonin is egg laying. Serotonin will have different effects depending on the amount of time the animal is exposed to serotonin. Upon short-term exposure (one hour) to serotonin the nematode will increase egg-laying rate. When exposed for four hours or longer, egg-laying rate decreases to levels observed when serotonin is absent, a process we call adaptation. My particular project is to address whether or not the calcium channel protein, UNC-2 controls the long-term response to serotonin for egg laying as had been previously reported. To test this question, I examined the response of a mutant strain, missing the UNC-2 protein. I have observed in this mutant that the calcium channel protein may not effect adaptation to serotonin on egg laying because the mutant showed a decrease in egg laying to serotonin over time.

**GPS ESTIMATES OF CASCADIA SLIP DEFICIT BENEATH THE OLYMPIC PENINSULA**

*Chapman, Jim; Melbourne, Tim*

Faculty Mentor(s): Tim Melbourne, Geological Sciences

Session: 36 (Poster Session Afternoon in Ballroom)

Previous studies documenting multiple slow slip events (SSEs) along the northern Cascadia megathrust suggests that these events might be of use in quantifying the seismogenic potential along the deeper locked reaches closest to major metropolitan regions. While previous modeling of interseismic deformation vectors have focused on fitting long-term interseismic vectors, the increasing spatial resolution of GPS-based slip inversions allows a more detailed look at strain accumulation beneath regions of the megathrust that have had long-term monitoring. The downdip extent of the locked subduction thrust fault is accumulating elastic strain. Some models suggest a slip deficit coupling effect which diminishes closer to the deformation front. Our analysis suggests that ~50% of the plate coupling effect is maintained into the Puget Lowlands. Slip inverted from 12 large SSEs, integrated from April 1997 to September 2005, show a pronounced updip limit beneath the Puget Basin. We modeled the interseismic deformation from 1997 though 2006. To obtain a first-order approximation model
we applied a simple algorithm that best fit the coupling strength. This method culminated in a coupling strength profile downdip through the locked zone which is maintaining nearly half of its strength as far east as below the Puget Lowlands. The predicted interseismic deformation yielded by a coupling profile corroborates that ~50% of the total strain accumulation beneath the Olympics will be available to drive megathrust rupture. Considering the increased hazard potential these results may prompt a reassessment of the strong ground motion induced by megathrust rupture within Cascadia’s large metropolitan regions.

TO SPRAWL OR NOT TO SPRAWL: THE GROWTH AND DEVELOPMENT OF KITTITAS COUNTY
Charlton, Nea
Faculty Mentor(s): Hong Xiao, Sociology
Session:  10 (Oral Session 9:55-11:35 in 137A)

Growth and development has impacted many major cities and their immediate surrounding areas. This paper examines the growth and development of a smaller more rural area, the Kittitas County. It focuses on environmental impacts resulting from expansion in Ellensburg and the surrounding areas. This paper examines impacts to natural resources that are affected by the consistent development in the Kittitas County resulting from the influx of population residing in the area. Much of the data gathered came from the U.S. Census Bureau, various environmental agencies as well as the City of Ellensburg website. As a result of information obtained, the growth and development in the Kittitas County have resulted in loss of farmland, an increase in resources for building purposes, effects to wildlife and wetland habitats, water and electrical usage issues, and increased use and need for natural resources.

SYNTHESIS OF NOVEL 1,3-AZABORINES AS POTENTIAL DUAL-MODE HIV-1 PROTEASE INHIBITORS FOR THE TREATMENT OF HIV/AIDS
Chen, Pei-Mien; Ream, Lee
Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry
Session:  35 (Poster Session Morning in Ballroom)

HIV-1 protease is the enzyme responsible for the maturation of the HIV virus. Most of the currently available enzyme inhibitors can be rendered useless due to resistance. Other problems associated with currently used drugs include low bioavailability and toxicity. Therefore, it is essential to develop new chemical structures which can become more efficient drugs. These novel inhibitors must have such characteristics as high affinity, good bioavailability, and low toxicity. Furthermore, new compounds that are dual-mode inhibitors (competitive and associative) should be more efficient than the currently available drugs, which are strictly competitive inhibitors. We are currently synthesizing novel 1,3-azaborine dual-mode inhibitory compounds. Once obtained, their biological characteristics will be determined and compared with known inhibitors to determine their effectiveness as novel anti-HIV drugs.

ELECTRORECEPTION IN THE NEMATODE, CAENORHABDITIS ELEGANS
Chrisman, Steven
Faculty Mentor(s): Lucinda Carnell, Biological Sciences; Michael Jackson, Physics
Session:  14 (Oral Session 9:55-11:35 in 202)
Certain organisms such as migratory birds use the Earth’s magnetic fields as a compass to direct their migration. How this magnetic information is sensed by organisms and converted into a response remains elusive. *C. elegans* provides an excellent model to study similar effects using electric fields. *C. elegans* is a small roundworm that is used as a model organism to study the neurons (nerve cells) and genes involved in behavior, largely due to its rather simple and well-characterized nervous system. In addition, many mutants are available or can be generated allowing one to study effects of known genes or to isolate genes that might be involved in electroreception. This research has centered on developing a method to measure electroreception in *C. elegans* to study the neurons and genes involved in this process. The experimental method that has been developed will be discussed. In addition, the testing of the hypothesis that *C. elegans* may use its chemosensory neurons to detect electrical fields will also be discussed.

**USING COMPUTER TECHNOLOGY TO REPLACE OBSOLETE (PAPER PROCESS) ATTENDANCE TRACKING OF MUSIC STUDENTS AT REQUIRED EVENTS**

*Churchill, Stephen; Curtis, Steven; Barla, Sumanth; Dybvig, Abraham*

*Faculty Mentor(s): Grant Eastman, James Schwing, Computer Science*

*Session: 32 (Oral Session 4:30-5:50 in 135)*

Music majors attending required music events had their presence recorded on punch cards. The punch cards were thin cardboard and as such, were subject to abuse such as bending or tearing, or allowing students to add their own punches. At the end of each quarter, the cards were hand-processed, taxing a faculty member with hours of recording and writing results. Students’ instructors had to wait until quarter’s end to learn of and, if necessary, correct student progress. Our computer system replaces this archaic technology with a device that scans barcodes on students’ Central Connection cards; the data thus gathered uploads to a computer database; student attendance is then accessible immediately in online or printed reports. Faculty no longer toils in manual labor to make the system work. Instructors can be proactive, able to work with students to make up missed events as they occur.

**SOMETHING MORE: TWO DIMENSIONS OF THREE DIMENSIONAL ART PRESENTATION**

*Churchman, Joe*

*Faculty Mentor(s): William Folkstad, Art*

*Session: 26 (Oral Session 2:55-4:15 in 137B)*

Historically, two-dimensional art has been at the forefront of institutional presentations of the arts at the expense of three-dimensional media. This paper will present my inquiry into institutional approaches to three-dimensional display and media hierarchy conducted winter quarter 2008 at the LA County Museum of Art and the Getty Center. Each of these institutions approaches the display of their collections with practices embracing traditional visual biases. Specifically, the practice of three-dimensional work being displayed as a complement to two-dimensional art will be addressed as well as three-dimensional artwork being displayed as two-dimensional work. This paper will also discuss cases of three-dimensional display in which the work serves as an element subordinate to the surrounding architecture. My paper demonstrates that even with separate approaches to presentation, each institution’s collection suggests that three-dimensional art is subordinate to two-dimensional work.
THE IMPORTANCE OF BEING EARNEST
Conner, Ashlee
Faculty Mentor(s): Chris Sousa-Wynn, Theater Arts

Session: 35 (Poster Session Morning in Ballroom)

“Stand by lights, sound, and actors for the start of the show” Then every one on headset, respond that they are all ready, but this is not where the process started it was many months before. You are invested in the project from the beginning. Stage Management is a skill that one possesses and can develop through practice and development of different techniques. The rhythm of each show changes but the steps one takes to get there should be made as simple as possible and document all the work so if in case of an emergency some one else could call the show for you. While working on The Importance of Being Earnest I worked on many of those skills and have developed a successful way of calling a show, running a crew, and keeping every thing on a professional level. Working with crews with different skill levels test a Stage Managers ability to explain and be a strong leader. During the show I had to incorporate crewmembers changing the sets in costumes, as well as make sure that, The Importance of Being Earnest, which had its own challenges and successes. Working with an acting company composed of fellow students as well as performance faculty, who have worked at a professional level, tests the ability to communicate. During this show I implemented the skills that I feel it takes to be a successful stage manager such as being organized, have open communication and being timely.

MEASURED EFFECTS OF COMMUNITY-BASED INQUIRY ON CRITICAL THINKING IN NON-MAJORS CHEMISTRY
Cornell, Caitlyn; Quitadamo, Ian
Faculty Mentor(s): Martha Kurtz, Chemistry

Session: 4 (Oral Session 8:00-9:40 in 140)

Higher education faculty, business employers, and government agencies have become increasingly concerned over the inability of college graduates to think critically using analysis, inference, and evaluation skills. Prior research shows that these students are entering the workforce at a comparative disadvantage in our globalized society. Recent trends in science education at all levels emphasize a shift from traditional, teacher-centered lecture instruction to student-centered and inquiry-based learning. The basis of this change lies in developing students’ critical thinking skills while maintaining the focus on course content. As educators and researchers have begun to analyze existing literature in order to develop the most beneficial teaching style for chemistry, they have discovered that there is a large void in evidence for methods that quantifiably improve critical thinking skills. The research conducted at Central Washington University in the fall quarters of 2006 and 2007 involved determining the effect of modifying the Chemistry 101 Laboratory from traditional, “cookbook” laboratory lessons to a community-based inquiry laboratory.

WATERS IN LINCOLN ELEMENTARY FIFTH GRADE
Cornell, Caitlyn; Affholter, Tara
Faculty Mentor(s): Martha Kurtz, Chemistry

Session: 35 (Poster Session Morning in Ballroom)

The Yakima Watershed Activities To Enhance Research in Schools (WATERS) grant is funded
by the National Science Foundation. Its goal is to enhance authentic interdisciplinary watershed research in the public schools along the Yakima River. While many units in the science lessons can be tied directly to the Yakima watershed, other units have an indirect connection. One classroom of fifth grade students at Lincoln Elementary demonstrates their work with the science of boat motion and design using the additional resources of the WATERS grant. They investigate the design qualities which ensure a boat will float and carry a load. The students learned water displacement and force dispersion as well as critical thinking skills necessary to modify and evaluate designs.

KITTITAS COUNTY LAW AND JUSTICE COUNCIL: A HISTORY
Cox, Candee
Faculty Mentor(s): Charles Reasons, Law & Justice
Session: 35 (Poster Session Morning in Ballroom)

In 1994 the Washington State Legislature mandated the establishment of Law and Justice Councils for all counties in Washington State. The Board of County Commissioners created the council, and is responsible for the appointment of members, pursuant to RCW 72.09.300. The Law and Justice Council has had various missions over the years. This poster will display the missions and accomplishments of the Law and Justice Council from 1994 to 2007.

TAKE A LOOK
Crowley, Hannah
Faculty Mentor(s): Therese Young, Health, Human Performance & Nutrition
Session: 31 (Performance 2:55-4:15 in Theatre)

I choreographed an original dance for Central Washington University’s local television station for the promotion of the performance arts. I created a piece titled Take a Look in my own time, independent from school projects and assignment. My goal was to explore unique and unconventional movement as an expression of my own personality. My dance instructor, Therese Young, submitted my original work to be reviewed for presentation at the American Alliance for Health, Physical Education, Recreation and Dance Conference hosted in Fort Worth, Texas. My choreography was accepted and will be presented as part of the Gala Dance Performance at the conference. Going to this convention is a rare and excellent opportunity to expose myself to the professional world of dance, a world I plan to enter after I graduate this spring. I will be able to mingle with professional dancers and educators and make possible connections that will assist in my future endeavors. I am excited to have an opportunity to represent Central Washington’s Dance Program at the conference. This is the first time a dancer has participated in a national dance conference gala. I look forward to meeting and working with dancers from across the country.

VIETNAM 101: STAGE MANAGING THE GRAND EXPERIMENT
Curran, Terry
Faculty Mentor(s): Jerry Dougherty, Chris Sousa-Wynn, Theater Arts
Session: 23 (Oral Session 1:20-2:40 in 271)

In fall of 2007, I served as Production Stage Manager for Vietnam 101: The War on Campus, a production put on by CWU’s Theatre Department. As the Production Stage Manager for this
show, it was my job to ensure the smooth running of rehearsals and performance by using skills which I have honed during my time here. This was done through a combination of communication among team members (including both faculty and students), delegation of tasks based on the individual strengths of personnel, and swift and careful problem solving to alleviate problems which arose during the process. From a production standpoint, this was done in a uniquely organic manner. The director for this production entered the process with no set ideas on how the show would look, but rather relied on feel when it came to how this production would come to life. This made my job difficult, as it was my duty to provide some form of foundation for the entire company. One challenge which was presented based on the episodic nature of the piece and added technical element was the actual calling of cues during the run. This production called for over 530 cues over a two-hour and fifteen minute span. By dividing the workload based upon the strengths of the stage management team, the show was able to go off without any serious issues. The ability of the Stage Manager and Assistant Stage Manager to handle issues arising during performances allowed me to effectively maintain the show.

**ISOLATION OF BACTERIAL VIRUSES FROM AN ALKALINE ENVIRONMENT**

*Cusack, Alicia*

*Faculty Mentor(s): Holly Pinkart, Biological Sciences*

*Session: 35 (Poster Session Morning in Ballroom)*

Virus-cell interactions are a very integral part of nature and play an important role in evolution of microbial communities. Due to their importance and versatility in replication strategies, understanding how they interact in various conditions is important. Lysogenic phage (bacterial viruses which integrate their DNA into bacterial genomes), have been postulated to drive evolution of microbial communities during periods of environmental stress. Soap Lake is an environment subject to a variety of environmental stresses, including large shifts in temperature, salinity, and pH. To date, only 2 viruses from alkaliphilic bacteria have been characterized. The goal of this study was to isolate phage from Soap Lake, and characterize them in terms of replication strategy and host range. To isolate bacterial viruses, previously isolated bacterial cultures from Soap Lake were subjected to filtered water from the lake. The filter utilized a pore size that allowed for passage of virus but not bacteria. The filtered water was mixed with the culture and growth medium then allowed to incubate for several days. After incubation, circular spaces of clearing were observed amid the confluent bacterial growth. This indicated that there were in fact viruses present that were able to utilize bacteria for replication. Characterization of these phages will include molecular analysis and determination of host range. These phages will be used in subsequent studies that address the role of phage infection during periods of environmental stress.

**MARVEL VS. DC (A REAL WORLD BATTLE FOR COMIC SALES)**

*Davis, Kelsey; Warnock, Allie*

*Faculty Mentor(s): Mike Lundin, Mathematics*

*Session: 35 (Poster Session Morning in Ballroom)*

Which publishing company (Marvel or DC) is more profitable? Investigating which company nationally profits more off their top selling titles; which company nationally sells more of its best titles; and which company locally sells more titles. Using these findings we will make a conclusion as to which company is a better choice for a comic book store to stock. This will provide helpful information for small comic stores.
A 5-YEAR POST-CASINO ECONOMIC STATUS OF NATIVE AMERICAN TRIBES

de los Angeles, Gabriel
Faculty Mentor(s): Allen Sullivan, Geography and Land Studies

Session: 1 (Oral Session 8:00-9:40 in 135)

Since the Indian Gaming Regulatory Act of 1988, studies have been done on Native American tribes and their economic status following the institution of Las Vegas-style casino venues. Most have identified the positive returns of casino gaming in economic growth and establishment of necessary programs in a few years that followed use of casino gaming compacts. This literature review examines the historical documentation of tribal casino study patterns to identify whether or not the casinos improve the quality of life of tribal members as well as economic growth of the tribe overall and whether these improvements persisted at least five years past the casino’s launch. Synthesis of past literature demonstrates that many tribes flourish in ways never conceivable previously and that these improvements are maintainable past the five year mark. However, more individual tribal studies as well as a boilerplate standard for running said studies are necessary for the most thorough understanding of the effects of casino gaming on tribes.

OF NOBODIES AND WHOS: WHAT SHOULD WE CALL PEOPLE WITH MENTAL RETARDATION?
Dee Bellah, Trisha
Faculty Mentor(s): Daniel Fennerty, Education

Session: 4 (Oral Session 8:00-9:40 in 140)

The change of terminology recently adopted by the American Association on Mental Retardation to the new title American Association on Intellectual and Developmental Disabilities is one of many in its’ history that reflects the need to change with time. The adaptation of professional terminology to cultural usage is examined here with its implications for the groups that it labels. Possible considerations in language choice are examined, historical context explored, and repercussions discussed. Limitations of language, possible political implications, and lack of vocal representation by the labeled group are distinct problems. Stigmatization through categorization may be avoided through the use of functional labels that encourage needs-based supports and individuality of people versus mass grouping.

VENTALITORY THRESHOLD AND LACTATE THRESHOLD COINCIDE USING THE Dmax METHOD

del Pozzi, Andrew; Papadopoulos, Harry
Faculty Mentor(s): Harry Papadopoulos, Health, Human Performance & Nutrition

Session: 36 (Poster Session Afternoon in Ballroom)

The ventilatory threshold (VT) has been used as a non-invasive technique to monitor training. The VT and the lactate threshold (LT) have been shown to coincide. Purpose: The purpose of this study was to determine if the VT correlates with the LT using the Dmax method. Methods: 22 trained male subjects 8 cyclists and 14 runners completed a single continuous incremental maximal exercise test to determine individual lactate profiles. During the maximal exercise test, oxygen consumption (VO2), minute ventilation, and blood lactate were measured. Blood samples were collected at rest, post-warm-up, at the end of each exercise stage and at maximal exercise. Pearson’s Correlation Coefficient was used to determine the relationship between the
LT and VT. A Paired t test was used to determine differences between the two measures. Results: The VT and LT were significantly correlated (r=0.91; p<0.05). The paired t test indicated a non-significant (p=0.42) difference in VO\textsubscript{2} determination between the VT and LT. When the initial lactate concentration was removed from the determination of the LT, there was a significant difference (p<0.05) in VO\textsubscript{2}. The LT and VT were not significantly different (p=0.11) even with the elimination of the initial lactate concentration. Conclusion: These results, using both runners and cyclists, indicate that the VT determined by the Dmax method can be used as a non-invasive technique to determine the LT.

**DISCUSSION IN THE AGE OF APATHY: THE CONCERNS OF AN ACTIVE MIND**  
*Derheimer, Michael*  
Faculty Mentor(s): Matthew Altman, Philosophy

Session: 28 (Oral Session 2:55-4:15 in 201)

In the modern era we avoid discussing many controversial topics such as religion, politics, and ethical issues out of concern of being “politically incorrect.” As a result we have raised a generation of minds who avoid living an examined life. By discouraging a generation from examining these controversial issues we have brought neo-Hegelians like Francis Fukuyama’s prediction of the end of history nearly into reality. Fukuyama’s prediction comes not at an age of transcendent understanding, as predicted by Hegel, but instead at a time of smothering mediocrity. We have a moral imperative to find a form of understanding conducive to an atmosphere of enlightened discussion in order to prevent the death of new ideas. If we do not change and herald in an atmosphere of enlightened discussion then we will prove the neo-Hegelians like Francis Fukuyama correct in the somber prediction of the death of the ideological evolution. We will end not at Hegel’s zenith but at a false plateau created by this generation’s apathy.

**THE SNAKE RIVER PLATEAU: 1805 AD - 1900 AD**  
*Dice, Laura*  
Faculty Mentor(s): Patrick McCutcheon, Anthropology & Museum Studies

Session: 36 (Poster Session Afternoon in Ballroom)

In 1805, the native peoples (Shoshone) of the Snake River Plateau hardly thought that when they discovered a half starved and desperate group of strange white men who had wandered into their valley, they would administer any aid to the desperate group. Fortunately for the travelers, known as the Corpse of Discovery led by the famed Lewis and Clark, their hired native guide (Sacagawea) happened to be the sister of the then Shoshone Chief. Thankful for the reunion of the Chiefs sister, the Shoshones consented to saving the company from starvation and continued to aid them in their endeavors. This pivotal day in history marked the beginning of the contact period between the Shoshone people of the Snake River Plateau and the encroaching waves of European settlers who were heralded by the Corpse of Discovery. This poster is a presentation of the contact period (1805 AD-1900 AD) between the people of the Snake River Plateau (Shoshone and later Shoshone-Bannock) and expanding European culture and peoples. The contact period, as presented, entails a brief description of initial contact, assimilation, conquest, and post-conquest of the Shoshone and Shoshone-Bannock with European culture.
MOZI'S PHILOSOPHY OF UNIVERSAL LOVE PROVIDES A MEANS FOR ELIMINATING POVERTY AND ACHIEVING WORLD PEACE IN CONTEMPORARY SOCIETY

Dickinson, Kathy Mae
Faculty Mentor(s): Chenyang Li, Matthew Altman, Philosophy

Session: 28 (Oral Session 2:55-4:15 in 201)

In Contemporary American society, Mozi's Universal Love is a more practical means for eliminating poverty and achieving world peace than is Confucian Love with Distinction. Chinese Philosopher, Mozi, lived about 2,500 years ago during the Warring States Period in China. Small kingdoms were continually fighting with each other, and poverty was endemic. Mozi devoted his life to rectifying these two problems. Mozi believed that if we love everyone equally, then we don't show favoritism. Discrimination, racism, exploitation, war, and inequality of all kinds are immediately eliminated. The Confucian model, in which one loves one's own family first and gradually extends love to others, actually serves to increase the problems of war and poverty. Mozi's idea of Universal Love solves those problems. When we love everyone equally, we act only in ways which benefit others. We will look at how this can be practically applied in our every day lives to increase the peace and well-being of all citizens of the earth.

BUDDY UP!

Dix, Jessica; Dee Bellah, Trisha
Faculty Mentor(s): Chris Curran, Education

Session: 35 (Poster Session Morning in Ballroom)

Buddy Up: A Program Description of the Pilot of the After School Buddies Program. The After School Buddy program was initiated by a local health program professional and university professor to answer community need and parent request for social and recreational opportunities for children with disabilities. The inaugural program was Winter Quarter, 2008. Students from the Central Washington Department of Education planned and executed programming for eight weeks. Students with disabilities ranging in age from six to fifteen participated in social, craft, recreational and educational activities. Non-disabled peer buddies also attended the sessions. This poster will examine the progress of the initial program sessions, describe the outcomes for participants, and reflect on the benefits for the larger community.

WIND INTERMITTENCY AND POLICY: IMPLICATIONS FOR EFFICIENT ELECTRICITY PROVISION

Dombert, Casey
Faculty Mentor(s): Morris Uebelacker, James Huckabay, Charles Wassell, Resource Management

Session: 10 (Oral Session 9:55-11:35 in 137A)

Wind is an intermittent source of electricity, meaning that generation output fluctuates in accordance with natural wind levels. Intermittency poses a unique set of implications for grid integration, with associated economic costs. Inaccurate—or lack of—consideration and representation of these costs in markets and policy results in economic distortions, with corresponding investment signals. Comparative case studies are performed in New York and Washington States which consider the ways these costs are: (1) mechanically integrated into, and (2) considered in the formulation of market and policy (mainly state Renewable Portfolio Standards) design, in terms of qualitative implications for economic distortions. The central
issues are (1) assessment of intermittency costs for a region, and the importance of differential analysis of wind development scenarios in terms of geographic scale as well as scale of production, and (2) promotion of efficient electricity provision through market and policy design that effectively incorporates intermittency costs.

DOES VISUAL IMAGERY ACTIVITY AID NARRATIVE WRITING USING THE 6+1 TRAIT WRITING SYSTEM RUBRICS?

Donahoe, Susan
Faculty Mentor(s): Susan Donahoe, Education
Session:  4 (Oral Session 8:00-9:40 in 140)

After working with the Office of the Superintendent of Public Instruction (OSPI) Writing Standards (GLE-EALR’s) and noting how drawing and writing are highly integrated in the early years, the question arose: is there a difference when pre-service teachers write in-class narratives using visual imagery before or after the writing. Two matched classes of students in a Language Arts class for Elementary teacher candidates were given a two-hour in-class assignment to either draw their ideas and then write a story or write a story and then create a drawing about it. Three independent individuals graded the papers: the class instructor, a university administrator with interests in quality writing, and a graduate assistant interested in literacy issues. The findings showed higher scores on the rubrics of those who did the drawings, first. The students who wrote narratives after putting their ideas in a drawing had more action, character description, scoring higher in all of the sections of the rubrics. Students who did the drawing after the writing used more stereotypical and general descriptions, fewer details of adjectives and adverbs, fewer lively action verbs, and their drawings were not detailed. Also, college aged students are often very sensitive about their drawing abilities. However, comments made later show deeper insights than scores alone.

THE MORAL DEFINITION OF ART: WHY ANDY WARHOL’S CAMPBELL SOUP CANS ARE NOT ART

Downes, Phillip
Faculty Mentor(s): Matthew Altman, Philosophy – Douglas Honors College
Session:  28 (Oral Session 2:55-4:15 in 201)

To ask the question of whether Andy Warhol’s Campbell’s Soup I is art requires that we define art or the function of art. Currently many people try to define art by using different theories like formalism or expressivism. These theories propose corrupting art to be art, even though it diminishes of virtues. This is extremely dangerous because art has a large influence on society and diminishing of virtue is destructive to society. A reasoning society’s existence is more morally important than the existence of certain “art” pieces. By drawing on Plato’s political philosophy, this paper demonstrates that art must be re-defined in order to maintain a moral society. The definition of art is a moral question, not a question of what an artist can produce. As a result, Andy Warhol’s Campbell’s Soup I is not art because his piece corrupts a virtuous society by discouraging knowledge and favoring imitations.
PROPAGANDA AND PLATO’S INVITATION: A CORRUPTIVE INFLUENCE IN THE STATE’S MISUSE OF ART
Dunleavy, Casie
Faculty Mentor(s): Matthew Altman, Philosophy

Session: 15 (Oral Session 9:55-11:35 in 271)

Plato stressed that art should be highly regulated by the state. However, this philosophy is dangerous because the level of authority given to the state leaves no room for the individual in a given society to keep the state in check—especially in its regulation of art. Through the examples of Nazi and American propaganda, institutionalized sexism, as well as others, I will explain how corrupt states have abused authority in the regulation of art, and how this idea of authority was instilled into the states from Plato’s philosophy of art. I will also explain how authority should be given to the people of the state rather than exclusively the authorities of the state. This paper will demonstrate that there is something wrong with Plato’s idea that the state should hold all responsibility in the regulation of art.

CRIES FROM THE "SIDE CHAPEL": CREATIVE NONFICTION AS GENRE, DISCOURSE & PERSPECTIVE
Dunning, Sonya
Faculty Mentor(s): Laila Abdalla, English

Session: 5 (Oral Session 8:00-9:40 in 201)

This paper explores the current status of Creative Nonfiction as both a genre in literature and a discourse in academe. Applying relevant elements of contemporary genre theory and the Bakhtinian notion of dialogic discourse, this exploration provides an understanding of Creative Nonfiction not only as a genre or a discourse, but as a valuable perspective, in and of itself. This perspective is valuable in that it offers writers and readers avenues of expression and understanding beyond the ideological boundaries of genre and discourse that might otherwise define their literary or academic realities.

INVESTIGATING MOLECULAR EVOLUTION IN THE CHLOROPLAST GENOMES OF CYCADS
Dutton, Ashley
Faculty Mentor(s): Linda Raubeson, Rhiannon Peery, Biological Sciences

Session: 33 (Oral Session 4:30-5:50 137A)

Sequence comparisons performed between genomes of closely related species allow for the best conclusions to be drawn concerning DNA evolution. The plant's chloroplast genome is a circular molecule with four parts: the large and small single copies (LSC, SSC) and the two inverted repeats (IR). In comparison to the nuclear or mitochondrial genomes, the chloroplast genome evolves more slowly, making mutations easier to characterize in evolutionary analyses. An investigation of mutation rates for the four parts in closely related legumes by Perry and Wolfe (2002) showed an increase in the mutation rate in former IR genes when one IR copy is lost, suggesting that the lower rate commonly found in the IR is reliant on the presence of two copies, not simply on particular genes found in the IR. Now, adding to the legume example, we have the opportunity to further investigate the effect of the IR on DNA evolution, as four completely sequenced cycad chloroplast genomes are available, including Dioon edule that has lost over 20,000 base pairs of its IR and consequently shows an increase in mutation rates for
former IR genes. The cycads, being long-lived gymnosperms, provide an interesting contrast to the short-lived, angiosperm legumes that exhibit the increase in mutation rate. In addition to investigating rates of mutation in the presence and absence of the IR, mutation biases within compartments, identification of genes undergoing selection and possible applications to functional biology are being addressed using close sequence comparisons within the cycads.

APPLICATION OF GIS MAPPING AT EL MARCIANO, MICHOACÁN, MEXICO

Ellering, Anthony; Hackenberger, Steve; Guerrero, Tricia; Fairbanks, Marc; Palmquist, Bruce
Faculty Mentor(s): Steve Hackenberger, Anthropology & Museum Studies

Session: 36 (Poster Session Afternoon in Ballroom)

In partnership with the Purépecha comunidad (Parangaricuatro - San Juan Nuevo, Michoacán), we have mapped a series of mound structures. These stone-faced earth mounds, called Yacata, are thought to be associated with Late Classic or Postclassic settlement (AD 700 to 1450). Some mounds are roughly circular and range between 5 and 15 meters in diameter. Other mounds are oval and can be as much as 15 meters in width and over 25 meters in length. Most mounds stand between 2 and 5 meters above the present surface. Our mapping of the Yacata at the site, covering almost a full square kilometer, shows distinct groupings of mounds as well as possible alignments of mounds. These alignments have been investigated in order to test possible astronomical positioning. Test excavations reveal a sequence of volcanic ash falls and sparse occupation debris spanning 6000 years. We will share some working hypotheses about the form, function and age of the mound features.

CAMERA VIRTUA

Ellis, Stephen John
Faculty Mentor(s): Brian Goeltzenleuchter, Art

Session: 19 (Oral Session 1:20-2:40 in 137B)

Camera Virtua is a performance-based documentary project that argues for identity as a socio-aesthetic hybrid in an attempt to explain representations of self through the visual language of virtual realities. Through my work in the virtual reality known as Second Life, I have explored, and captured on visual record, this socially constructed universe. According to its website, Second Life is “a 3-D virtual world entirely built and owned by its residents.” The topography of Second Life, therefore, is entirely socially constructed, and references the plurality of values characteristic of its over one million residents. To accomplish this, I created a virtual alter ego, or avatar, and built a photography studio in Second Life (Elysium Photographic Studios). My avatar is a social documentarian that dismantles the seemingly endless categorization of photographic practices (i.e. landscape, portrait, commercial, fine art, etc.), while simultaneously privileging the dynamic manifestations of their subjective qualifiers. The aim of which is to exaggerate and emphasize the dilemma of this false dualism through the creation of photographic prints captured from within the realm of virtual realities. As part of this ongoing, performance-based project, I was fortunate to have collaborated with CWU professor Brian Goeltzenleuchter as a participant in the 2007 Pingyao International Photography Festival that occurred last summer in Pingyao, China.
Today, only about 30% of eastern Washington’s historic shrub-steppe still remains. A large majority of this remaining shrub-steppe is located in Kittitas and Yakima counties. The Westberg Trail and the Boy Scout Trail are two popular recreation trails for tourists and locals in Kittitas County and are located right in the middle of prime shrub-steppe habitat. Everyday, the trails are heavily used for by hikers, horseback riders, and mountain bikers. The purpose of this study was to estimate the resiliency of the physical landscape on and surrounding the Westberg and Boy Scout hiking trails to aid in future management decisions of the area. A weighted overlay analysis using ArcGIS was conducted to identify the strongest and weakest resiliency areas in the hiking landscape. The following variables: slope, aspect, soil erosion potential, and vegetation were masked/clipped to the study area and re-classified before running the weighted overlay. Areas with a south facing aspect exhibited the lowest erosion potentials, more vegetation, and a higher resiliency towards landscape impact. In the future, with a more adequate time-frame, a much more detailed analysis for the Westberg and Boy Scout trails can be conducted.

T. S. Eliot’s poetic masterpiece, *The Waste Land*, is a complex, enigmatic work. Eliot lends to the poem’s nuances by speaking not simply from a narrative perspective, but by subtly weaving multiple dialogues into the verse itself. The most prominent voices of *The Waste Land*'s polyphony are that of Marie, Viv, and Tiresias. Through these characters the reader is made to feel more personally connected to the emotion in the poem, and the work’s predominate [dominant] themes of loss, despair, and emptiness can be clearly understood. Marie speaks of lost happiness in her past, and an inescapable, barren future. Viv represents confusion at the hopelessness of life, Eliot’s own failing marriage, and correspondingly, his failing hope for the future. Tiresias unifies the anguish of all the poem’s voices by relating a vision that makes clear humankind’s apathy and the lack of meaning in life itself. The voices of *The Waste Land* unify the poem, and express to the reader Eliot’s own pain and his concern for a war-ravaged generation. Much like the chorus of Greek drama, the voices in Eliot’s work guide the reader through the action and the emotion entangled in the verses.

Literature has often portrayed women as selfish, power hungry characters. The examples are abundant and the motive is the same. They aim to increase their power by taking advantage of people close to them. Aurora in *The Moor’s Last Sigh* uses Abraham and Moraes to further herself, which in turn causes them pain. Beatrice in *The Divine Comedy* tricks Virgil and Dante
into trusting her so she can let out her anger and increase her presence. And the Wife of Bath in *The Canterbury Tales* uses her sexuality to manipulate men into giving her their worldly possessions. All actions are calculated and they use their growing power to obtain greater status. Their success lies in their approachable exterior, which they use to further their goal and lull people into a false sense of security.

**INVESTIGATING THE GREEN PLAGUE: AN EXAMINATION OF THE PHYSIOLOGICAL CONSEQUENCES OF CHYTRID INFECTION IN NORTHWEST AMPHIBIANS**

*Gaulke, Christopher; Irwin, Jason; Johnson, Jim; Wagner, Steven*

*Faculty Mentor(s): Steven Wagner, Biological Sciences – Science Honors Program*

*Session: 18 (Oral Session 1:20-2:40 in 137A)*

The fungus *Batrachochytrium dendrobatidis (Bd)* has been linked to the decline of amphibians worldwide. Research has been devoted to examining the range and prevalence of *Bd*; however, little is known about how it causes mortality. In addition, the sensitivity of Northwest amphibians has not been investigated. Therefore, we investigated the physiological changes that occur during infection in two Northwest amphibians: Northern Leopard Frogs (*Rana pipiens*) and Pacific Treefrogs (*Hyla regilla*). We examined the pathogens effect on metabolic rate and osmotic balance. Fourteen individuals of each species were screened for *Bd* using light microscopy and each individual was housed separately to avoid cross-contamination. Over the course of the 109-day experiment individuals were monitored for symptoms, and weighed. In addition, metabolic rates were monitored throughout the experiment using flow-through respirometry. There were not any significant physiological changes attributable to infection with the fungus. Mail ordered *Rana pipiens* may be a source of the spread of *Bd* and we urge containment of potentially infected individuals. Also, individuals survived an average of over 100 days with infection suggesting that these species may not be susceptible to the pathogen.

**ITRACONAZOL FAILS TO CLEAR CHYTRID INFECTION IN NORTHERN LEOPARD FROGS (RANA PIPIENS)**

*Gaulke, Christopher; Irwin, Jason; Johnson, Jim; Wagner, Steven*

*Faculty Mentor(s): Steven Wagner, Biological Sciences – Science Honors Program*

*Session: 18 (Oral Session 1:20-2:40 in 137A)*

Northern Leopard frogs (*Rana pipiens*) are critically threatened with extinction in Washington. During 2007, only two adult individuals were detected in Washington. The fungus *Batrachochytrium dendrobatidis (Bd)* has been detected in *R. pipiens* and may be contributing to the decline of the species. Recent studies suggest that the fungicide itraconazol can clear chytrid infection in dendrobatid frogs. However, the effectiveness of this fungicide in other species is unknown. In addition, the physiological consequences of treatment with the fungicide are also unknown. Therefore, we investigated the effectiveness of this drug and the metabolic consequences associated with its use. Twenty-one *R. pipiens* were divided into three groups: a five-minute treatment group, a thirty-minute treatment group and an infected control. The animals were housed separately and their metabolic rates were monitored using flow-through respirometry three times during the three-week study. Measurements of mass were taken at weekly intervals. The results of the experiment suggest treatment with itraconazol was not effective in treating infection. In both treatment groups the fungicide failed to clear infection. Also, there were no significant metabolic consequences of the treatment with this drug. Therefore, treatment of chytrid infection in *Rana pipiens* with itraconazol is not recommended.
AVIATION, CONSTRUCTION, ENGINEERING AND SAFETY (ACES) CAREER ACADEMY FOR YOUNG WOMEN

Geckle, Kristine; Hoover, Amy  
Faculty Mentor(s): Kristine Geckle, Industrial & Engineering Technology

Session: 6 (Oral Session 8:00-9:40 in 202)

I created an opportunity for young women between the ages of 13 to 17 to explore their potential as future professionals in these fields. Between 28 and 36 girls participated each year from 2004 to 2007. CWU faculty and students, as well as industry sponsors and volunteers also participated in the camps. Student and faculty participation integrated academic service learning/civic engagement into the camp. This academy provided hands on learning experiences and activities to spark career interest in these fields. Participants stay in residence halls and had a chance to take a flight lesson, engineer a device, operate a backhoe, clean up a mock-hazardous waste spill, design and test launch water rockets, use Global Positioning System (GPS) for a treasure hunt, and build an original project. In 2006 the ACES camp was presented with the Excellence in Construction Education Award presented by the Washington State Construction Workforce Conference. Currently, CWU GEAR UP program sponsors ethnic minority girls, girls from low income families, and potential first-generation college students. Our goal is to increase the number of young women who choose to pursue education and enter the workforce in these technical fields. Women are under represented in these programs at Washington State universities, and the camp serves to create an appreciation for these fields as well as a recruiting venue for these CWU programs. This is an inter-disciplinary project co-sponsored by the Industrial and Engineering Technology and Aviation Departments.

SEXUAL SIZE DIMORPHISM OF THE NORTHERN PACIFIC RATTLESNAKE IN CENTRAL WASHINGTON

Gilbertsen, Aaron  
Faculty Mentor(s): Dan Beck, Biological Sciences

Session: 25 (Oral Session 2:55-4:15 in 137A)

Sexual size dimorphism (SSD) is common in many vertebrates, ranging from reptiles to humans. In some species males tend to be larger than females, and in others, the opposite case is true. While in many snake families, such as boas and pythons, females tend to be larger than males, in most rattlesnakes, males tend to be larger than females. We investigated the extent to which the Northern Pacific Rattlesnake (Crotalus viridus oreganus) shows this trend. In an ongoing mark-recapture study, we used data collected from several hibernacula in Central Washington to test the hypothesis that males tend to grow larger than females, as well as determining at what point males and females might diverge. To test our hypotheses, we compared snout-vent length (SVL), tail length (TL), body mass (M), and rattle width (RW). Previous studies have shown that there is a strong correlation between rattle width, and SVL. Since rattlesnakes gain a rattle segment each time they shed their skin, a history of growth over the last 3-8 years is preserved in the rattle of individuals with intact rattles. We observed and compared growth rates in both sexes, and determined the approximate divergence point where SSD begins. It appears that there is no SSD in neonates and juveniles, but that SSD begins to develop as individuals reach maturity.
LEIBNIZ’S VIEW OF FREEDOM: POSSIBLE WITH A GOD?

Goo, Ashley
Faculty Mentor(s): Matt Altman, Philosophy

Session: 15 (Oral Session 9:55-11:35 in 271)

In this paper I am examining Leibniz’s view on freedom and free will as he expresses it in the *Discourse on Metaphysics*. Leibniz would like to be able to say that God has instilled in us everything about who we are and what our actions are to be, but also that we have a free will. In this presentation, I will demonstrate how Leibniz’s argument for freedom falls into a Theological Fatalist trap and also that our very own concept of freedom manages to complicate his position even further. Leibniz’s theory of freedom is flawed because it assumes that having the capacity for freedom is the same as experiencing freedom. While Leibniz likes to say we have the capacity for freedom, the fact is if we deviate from God’s design as it was intended we are not the person we were meant to be. Therefore, we can never choose to do otherwise than what is predetermined. Again, Leibniz’s argument for a God that knows a person’s entire future leaves him in the Theological fatalist trap, which has at its core the concept that with infallible prior knowledge (such as God’s knowledge) of a human act makes those acts necessary and therefore not a free choice or an act of free will. Leibniz offers no arguments to satisfactorily combat this position. As I will show, if we follow Leibniz’s argument, the only freedom that we will have is the choice to exist or not exist. If we allow for an all-knowing God as Leibniz would like, we are only left to exist as how he intended or not at all. This paper is meant to demonstrate the contradiction that arises with the use of the term freedom in association with the belief in an all-knowing God.

AND FLORIDA LIVES TO SEE ANOTHER DECADE

Goodrich, Amber; Zimmer, Alisha
Faculty Mentor(s): James Bisgard, Mathematics

Session: 30 (Oral Session 2:55-4:15 in 271)

Global warming is an impending issue knocking on the door of the world today. To many scientists, the battle continues between understanding the consequences of rising global temperatures and modeling the possible effects in order to address the issue at hand. In this presentation we will address a more specific part of global warming: The melting of the north polar ice cap and the possible effects it has on the coastal region of Florida in the next 50 years. In particular, we focus on Palm Beach County, Florida, a large metropolitan area on the east peninsula. Through research and experimentation, we were able to model these effects.

GOD’S PEOPLE AT WAR: THE FAMILY IN PROTESTANT FUNDAMENTALISM

Greene Sconce, Karlynn
Faculty Mentor(s): Heidi Szpek, Religious Studies

Session: 6 (Oral Session 8:00-9:40 in 202)

This research presents a descriptive analysis of Protestant fundamentalism’s model of the family by examining its characteristics and historical roots. The methods of sociology of religion and history of religion are both used in this paper. *God’s People at War* begins by establishing a series of six characteristics that define fundamentalism. A Venn diagram displays the interconnectedness of each of the characteristics and stresses that only in the intersection of all six can Protestant fundamentalism be defined. It then traces the history of fundamentalism’s
concept of the family from the Reformation when Protestantism emerged until the late twentieth century. The historical roots of Protestant fundamentalism focus on four distinct eras beginning with the Reformation, continuing on through the Colonial era, examining the nineteenth century and finally the twentieth century. It is only in the twentieth century that the characteristics of fundamentalism apply to a newly solidified movement.

LITERARY BIGOTRY
Griffin, Pearl
Faculty Mentor(s): Matt Altman, Philosophy; Laila Abdalla, English – Douglas Honors College
Session: 20 (Oral Session 1:20-2:40 in 140)

Literature has participated in maintaining the social disparity between men and women by portraying them as irrational, incapable, and shallow beings. Women who prove to be stronger than their stereotypes are highly criticized for irrelevant imperfections and are discredited by their male counterparts through literary works. The female characters in Dante's Divine Comedy, Chaucer's Canterbury Tales, and Rushdie's Moor's Last Sigh are judged based on their shortcomings rather than their abilities. Literature's portrayal of strong female characters with deep personal flaws illustrates the paternalistic fear that women are, in fact, equal to men in reason, ability, and love. Through these artistic depictions of women, men are able to maintain the control to which they have become accustomed over time.

GREEN SYNTHESIS AND CHARACTERIZATION OF QUANTUM DOTS
Gyselinck, Craig
Faculty Mentor(s): Dion Rivera, Chemistry
Session: 35 (Poster Session Morning in Ballroom)

Quantum dots (QDs) are a type of luminescent nanomaterial which is becoming increasingly popular in the emerging field of nanotechnology, particularly in biomedical research as luminescent sensors, due to their unique fluorescence properties. The most widely used QDs are made from cadmium and selenium, both which are known to have toxic environmental effects. This research has developed an environmentally safe synthesis technique of zinc QD nanoparticles that emit in the green region of the visible spectrum. These QDs show luminescence that is up to 10 fold greater than more traditional zinc sulfide based quantum QDs. It was found that annealing times critically affect the luminescent intensity of the QDs. In an attempt to further optimize fluorescence properties, preliminary data has shown the rate at which the precipitating agent, sulfide, is added during synthesis, effects the luminescence intensity of the QDs.

THE BIRDS
Hahn, Laura
Faculty Mentor(s): Chris Sousa-Wynn, Theater Arts
Session: 35 (Poster Session Morning in Ballroom)

Creativity and imagination are important to have when creating a world for the stage. Inspiration can be found in many places, but it is best to start by reading the show itself. While reading, write down what stands out to you. Decide what you feel the main focus of the show is about and base your design off of this central theme. For this presentation I will be showing the
process used in my Scenic Design class to create a set design. This involves a concept statement (a summary of what I feel the play is about), a research collage – (a collage of inspirational images), a ground plan and a model. The play I have chosen to represent with this process is, *The Birds*, by Aristophanes.

**THE CABINET OF DR. CALIGARI**

Hahn, Laura  
Faculty Mentor(s): Chris Sousa-Wynn, Theater Arts  
Session: 35 (Poster Session Morning in Ballroom)

Creativity and imagination are important to have when creating a world for the stage. Inspiration can be found in many places, but it is best to start by reading the show itself. While reading, write down what stands out to you. Decide what you feel the main focus of the show is, and base your design off of that central theme. For this presentation I will be showing the process used in my Scenic Design class to create a set design. This involves a concept statement (a summary of what I feel the play is about), a research collage (a collage of inspirational images), a ground plan and a model. The show I have chosen to represent with this process is the 1920's German Expressionist silent film, *The Cabinet of Dr. Caligari*, written by Hans Janowitz and Carl Mayer.

**A STABLE ISOTOPE STUDY OF THE SOIL WATER BUDGET ON A CLIMATE IN A SNOWMELT DOMINATED SYSTEM**

Hammond, Travis  
Faculty Mentor(s): Carey Gazis, Geological Sciences  
Session: 36 (Poster Session Afternoon in Ballroom)

Climate is complexly linked to the soil water budget in that it controls water and heat fluxes to the soil as well as influencing soil formation and soil properties. In this study, $^{18}$O isotopes, climate data, and soil physics monitoring are being used to determine partitioning of evaporation and transpiration and style of soil water flow along an arid to humid climate transect in a snowmelt dominated system on the eastern slope of the Washington Cascade Mountains. For evapotranspiration (ET) partitioning it is hypothesized that during spring snowmelt potential ET will be equal to actual ET at all sites with sufficient snow accumulation and in late spring to early summer potential ET will dominate over actual ET. For style of percolation it is hypothesized that deep soil water is recharged throughout the year at sites with higher precipitation due to percolation by greater preferential flow than at drier sites. Climate gradient soil water budgets have been performed in tropical rain dominated systems but not until now has such research been done in a snowmelt dominated system.

**USING INQUIRY-BASED LEARNING TO DEVELOP CRITICAL THINKING SKILLS AND INTEREST IN SCIENCE IN MIDDLE SCHOOL STUDENTS THROUGH GUIDED RESEARCH IN FLOODING ASSESSMENT OF A LOCAL WATERSHED**

Hammond, Travis  
Faculty Mentor(s): Steve Wagner, Biological Sciences  
Session: 35 (Poster Session Morning in Ballroom)

Inquiry-based learning requires involvement which then leads to the possession of skills and
attitudes that permit students to seek resolutions to problems while constructing new knowledge. Sixth graders at Morgan Middle School assessed the flooding potential of the Umptanum Creek watershed in central Washington State. By drawing upon skills learned in an in-class stream table inquiry, students estimated the minimum stream stage, flow velocity, and discharge that defined the onset of flooding. The intent of WATERS is to bring aspects of graduate level research into the K-12 science class in order to promote greater interest in science and to advance critical thinking in students. As a result of WATERS, it is hoped that improved standardized test scores and greater enrollment in university science and technology fields will become a trend for students once involved in WATERS.

**ANTHROPOLOGY FIELD NOTES: A TELEVISION PROGRAM EXPLORING EXCITING ENDEAVORS IN ANTHROPOLOGY AND ARCHAEOLOGY**

Haney, Faith  
Faculty Mentor(s): Lene Pedersen, Resource Management

**Session: 16 (Oral Session 9:55-11:35 in 301)**

*Anthropology Field Notes* is an educational television program exploring exciting endeavors in Anthropology. The program focuses on current field research in Cultural Anthropology, Archaeology, Visual Anthropology, and Primatology in the Pacific Northwest and beyond! The program highlights science-based, real world field projects. No fedoras or whips here! This monthly program’s benefits are far-reaching, from educating the local public about the importance of cultural resources, to giving Central Washington University students and professors a venue to discuss their research, to offering “outside” researchers a chance to talk about their projects. The mission of *Anthropology Field Notes* is to educate the public about what anthropologists really do (no, archaeologists don’t dig up dinosaurs), let folks in on what studies are currently happening, introduce people to new technology for scientific research, and promote an understanding of world diversity. Guests include: Karl Heider, famed visual and cultural anthropologist; Trent de Boer, Dept. of Transportation Archaeologist and creator of *Shovel Bum* comic ‘zine; Jean-Michel Cousteau, ocean explorer and filmmaker; Ellen Gerth, curator for shipwreck investigation, and salvage company Odyssey Marine Exploration; Biruté Galdikas, the world’s foremost expert on orangutans; and many more. Many episodes will also present current graduate research, lots of “fun facts” to ponder, and clips from the field. Episodes air on KCWU-TV, Ellensburg (cable channel 15) and on archaeologychannel.org.

**CIGARETTES AND ACCORDIONS: FRENCH MUSIC THROUGH THE NAZI OCCUPATION**

Harder, Erika  
Faculty Mentor(s): Matt Altman, Philosophy – Douglas Honors College

**Session: 23 (Oral Session 1:20-2:40 in 271)**

Paris has long been recognized as one of the cultural and intellectual centers of Europe. Paris has been home to some of the world’s most renowned artists and philosophers, people who benefited greatly from the lively environment of the city’s bustling streets and unique cafe scene. Each major intellectual revolution in France has been accompanied by a musical revolution, and the associated movements have greatly influenced one another. By exploring the relationship between French music and Enlightenment thought, Revolutionary chaos, and World War II, this presentation will examine the historical standard of French music in politics and its culmination as a significant cultural entity during the Nazi occupation. Through examples such as Edith Piaf’s controversial performance history and the subtle criticism present in Charles Trenet’s music, this presentation will analyze the value of music as a revolutionary tool, a tool of civil
disobedience, and a tool for the unification and spiritual sustenance of a people.

**MODELING THE ADSORPTION BEHAVIOR OF POLYELECTROLYTES/SURFACANT SYSTEMS AT THE TiO$_2$/WATER INTERFACE USING IN SITU ATTENUATED TOTAL INTERNAL REFLECTION FOURIER TRANSFORM INFRARED (ATR-FTIR) SPECTROSCOPY**

*Hase, Michael; Rivera, Dion*

*Faculty Mentor(s): Dion Rivera, Chemistry – Science Honors*

*Session: 13 (Oral Session 9:55-11:35 in 201)*

Interfacial chemistry, specifically the interaction of molecules at the aqueous/solid interface is particularly important to understanding the chemistry of both environmental and industrial processes. Two classes of compounds that play an important role in both environmental and industrial processes are polyelectrolytes and surfactants. Polyelectrolytes are charged polymers that provide a means to stabilize complex mixtures and hence, are commonly used to facilitate reactions and emulsions that are important to the paint, ink, and coating industries. Surfactants are used as additives to enhance certain characteristics of polyelectrolytes. ATR-FTIR provides the ability to study interfacial interactions in situ. ATR-FTIR was used to obtain infrared spectroscopic information about the interactions between the titanium dioxide surface, the polyelectrolyte sodium styrene sulfonate (PSS), and the surfactant cetylpyridinium bromide monohydrate (CBMD). The IR data was then modeled with a frumkin isotherm and analyzed using a multidimensional least squares technique. For the PSS / TiO$_2$ system, $\Delta G_{ads}$ was $-4.59 \times 10^4$ Joules/(mole PSS) with an interaction parameter (k) value of 1.75. The PSS / TiO$_2$ system with a low fixed CBMD concentration of $3.6 \times 10^{-7}$M yielded a $\Delta G_{ads}$ of $-4.35 \times 10^4$ Joules/(mole PSS) with a k value of 4.00. The PSS / TiO$_2$ system with a high fixed CBMD concentration of $1.036 \times 10^{-5}$M yielded a $\Delta G_{ads}$ of $-4.38 \times 10^4$ Joules/(mole PSS) with a k value of 3.65. The PSS / TiO$_2$ system with a CBMD concentration of $1.08 \times 10^{-4}$M, near saturation, yielded a $\Delta G_{ads}$ of $-4.10 \times 10^4$ Joules/(mole PSS) with a k value of 5.30.

**PSEUDO-RATE REACTION: REACTION OF EDTA WITH Ni/PADA**

*Helland, Terry; Mullen, Kellie*

*Faculty Mentor(s): Tim Sorey, Anthony Diaz, Chemistry*

*Session: 35 (Poster Session Morning in Ballroom)*

The Purpose of this research is to identify and design a repeatable lab based process for analyzing/understanding kinetics. This lab will focus on the reaction of Ni/PADA complex reaching equilibrium with NH$_3$ to form Ni(NH$_3$)$_2$. Other reactions of Nickel (II), PADA, and EDTA will also be considered. Through analysis of these various reactions, the intent is to discover a combination that will yield reasonable reaction time scales for appropriate student inquiry with the MicroLAB 10-Color Colorimeter. The target population for this laboratory experiment is CHEM 383: Physical Inorganic Chemistry Laboratory for Spring Quarter of 2008.
TECHNOLOGIC: A DIALECTIC OF METAPHYSICS AND TRANSHUMANISM

Hively, Rocky
Faculty Mentor(s): Matthew Altman, Philosophy
Session: 15 (Oral Session 9:55-11:35 in 271)

Using the Enlightenment as a cultural starting point and Immanuel Kant’s question of how metaphysics is possible, I will attempt to show how the movement called transhumanism (a global cultural movement that advocates for the advancement of humanity through technology) is, essentially, the logical conclusion and eventual outcome to the question of metaphysics as a science and cultural end. I will explore the cultural, biological, and technological process in which I form my thesis. The Enlightenment effectively produced two conflicting cultural concepts: individualism and collectivism. We can observe these two opposing concepts propagating in radical ways—even at times suggesting evolutionary charge. In social phenomena known as “memes,” we see the spread of standardized concepts and ideas on a global scale. Almost in response, individual oriented conditions, such as autism, are hitting historical highs. Autism alone affects approximately every 1 in 150 children in the United States today. Transhumanism can be shown as the effective heir to both the Enlightenment and the Kantian question of metaphysics through its synthetic stance on technological science and metaphysical spirituality as its primary missions. The movement seeks to transcend physical reality and achieve alternate and controllable forms of consciousness, erasing the need for physical boundaries. The movement’s hope lies in the advancement and creation of technologies that could, theoretically, house ones very consciousness in an artificial construct, allowing one to thus exist in a state of ethereal data, effectively becoming a metaphysical entity in a fully integrated cognitive system of existence.

PLAY
Hollick, James
Faculty Mentor(s): Donna Stack, Art
Session: 26 (Oral Session 2:55-4:15 in 137B)

Play is a C. Farrell Scholarship project that uses drawing and sculpture to explore the idea of playing. The concept of this project is based on the idea of zero-sum games played with the end result of having a clearly defined winner and loser with its relation to American society. My intention is to create an intergenerational outlook of play in American culture that we would not normally see on a traditional playground. The idea becomes one of playing as a competitive activity with the direct outcome of a winner and loser, accentuating this notion of winning as everything. These ideas will be presented to an audience by large architectural blueprints and scale models of the playground itself as well as various items found within. Play will be presented in Sarah Spurgeon Gallery June third through the eighth.

TRANSITION FROM CORRECTIONAL FACILITIES TO THE MAINSTREAM COMMUNITY FOR YOUTH WITH EMOTIONAL OR BEHAVIORAL DISORDERS
Hollod, Katie
Faculty Mentor(s): Robyn Conley-Downs, Education
Session: 4 (Oral Session 8:00-9:40 in 140)

In 2004, there were 1.66 million youth delinquency cases (violations of the law) in the United States. Of the total population serving time in correctional facilities, 70 percent were identified as
having a disability. Of this total, nearly half had some form of emotional or behavioral disorder (EBD). The Individuals with Disabilities Education Act (IDEA) requires that these youth receive transition services, but research indicates that these services are lacking thereby negatively affecting this population’s ability to integrate back into their communities. A synopsis of the factors contributing to poor transition will be discussed. Effective components of the Student Transition Model will be outlined and application of these components proposed.

EFFECT OF CONCURRENT TASK MANAGEMENT TRAINING ON SINGLE PILOT TASK PRIORITIZATION PERFORMANCE

Hoover, Amy
Faculty Mentor(s): Amy Hoover, Aviation

Session: 8 (Oral Session 8:00-9:40 in 301)

This study tested whether single-pilot multi-tasking skills can be trained. Task prioritization performance was evaluated for pilots who participated in a concurrent task management (CTM) training course and pilots who did not. CTM is the process by which pilots selectively attend to high priority tasks and shed non-priority tasks. Twenty seven pilots enrolled in a university flight program were randomly assigned to an experimental group and a control group. Pilots flew pretest and posttest simulated flights on an FAA approved flight training device. Twenty potential task prioritization errors were embedded at 14 locations within the flight scenarios. Pretest CTM performance of the two groups was comparable. During a two week period between pretest and posttest simulated flights pilots in the experimental group participated in a CTM training course designed and taught by an FAA certified flight instructor and pilots in the control group did not. A Mann-Whitney U test rejected the null hypothesis that there was no difference in posttest CTM errors between the groups, indicating a positive short-term training effect for experimental group pilots. Long-term training effects were not evaluated. These results support training multi-tasking skills in single-pilot operations.

GENETIC DIVERSITY AND KINSHIP IN A CENTRAL WASHINGTON COUGAR POPULATION

Houghtaling, Paul; Ernest, Kristina; Wagner, Steven; Koehler, Gary
Faculty Mentor(s): Kristina Ernest, Biological Sciences

Session: 25 (Oral Session 2:55-4:15 in 137A)

Large carnivores are under increased threat from habitat destruction and fragmentation that limit gene flow among populations. These factors can reduce effective (Ne) population size and increase the rate of inbreeding influencing the long-term persistence of a population. In order to understand the population structure of cougars (Puma concolor) near Cle Elum, Washington, we investigated the genetic relationships among individuals (n=39) using 18 microsatellite loci. Pedigree analyses were conducted using several methods (i.e., paternity exclusion, maximum likelihood, genetic distance) to estimate kinship relationships and the contribution of non-residents to demographic structure.
A STUDY OF SOIL MOISTURE VARIATIONS AT TWO LOCATIONS IN ELLENSBURG, WA

Howarth, Kathren
Faculty Mentor(s): Carey Gazis, Geological Sciences – Science Honors

Session: 9 (Oral Session 9:55-11:35 in 135)

Soil moisture monitoring combined with stable isotope geochemistry was used to investigate how the soil water budget and styles of soil water movement vary at locations with different soil types but similar climates. Soil moisture content and oxygen isotope data for precipitation, snow melt, and soil water, was gathered at two locations near Ellensburg, Washington: Manastash Road and Durr Road. The objectives of this research is to explain seasonal variation in the style in which water percolates through the soil (e.g. piston flow vs. preferential flow), the rates of evaporation, and the timing of deep soil water/groundwater recharge by soil type. In general, the soil hydrology is dominated by snow in the winter, snowmelt in the spring and high evaporation and transpiration rate in the summer and early fall. As a result, moisture content values at both sites were greatest during the winter and early spring months, while the moisture content values were lowest in the summer and early fall months. Moisture content was greater for 60 cm depths compared to 10 cm depths, except for a few individual precipitation events. Overall moisture content values were slightly greater at the Manastash Road site; however, a previous study at the Durr Road site revealed significantly higher soil moisture content values than either site in this study. These within-site variations could be due to differences in soil texture, plant type or density, the intensity of rain events, or differences in elevation.

PHENOMENOLOGY & AUTHENTIC EXPERIENCE

Hudgens, Jordan
Faculty Mentor(s): Matthew Altman, Philosophy – Douglas Honors College

Session: 34 (Oral Session 4:30-5:50 in 140)

Can there be such a thing as ‘authentic experience,’ and can we appeal to things in themselves? To support my claim that the answer is no, I will employ several philosophic viewpoints. The first, conscious relativity, attempts to understand the fundamental differences between human experiences, and whether an individual consciousness can be a ‘thing in itself.’ Then, building off the theory that human existence cannot be codified, I will examine the Kantian sense of objective judgment and whether any such judgment can be either universal or even meaningful. Further, I will address the Heideggerian argument for ‘Being of being,’ and whether such a theory - that is, the theory of things in themselves - can exist under a non-unified framework. The main point in each of these arguments will be that there cannot be authentic experience since an authentic experience would require similar or identical thought, consciousness, and experience. Because of the relativity of consciousness and existence, appeals to things in themselves are inevitably unsuccessful; additionally, the judgments we make about things cannot be legitimate due to this relativity.

SUSTAINABILITY AND CAMPUS LIFE: IMPROVING CENTRAL’S ECOLOGICAL FOOTPRINT THROUGH EFFECTIVE RECYCLING, PURCHASING, AND PRODUCT USE

Hull, Laura; Bonsell, Kristina; Bradford, Lura; Kang, Yeon Sil
Faculty Mentor(s): Jennifer Lipton, Geography and Land Studies

Session: 2 (Oral Session 8:00-9:40 in 137A)

The research that will be presented will be a calculation of CWU’s ecological/carbon footprint.
We will demonstrate through research on campus how this can be reduced through recycling, purchasing, and product use. While there are multiple recycling receptacles on campus, many students find them to be inconveniently located or simply don’t know where they are. We will be presenting methods to decrease the amount of waste produced by the school by both increasing awareness and developing more convenient ways for students to recycle their waste, as well as an effective composting system to help reduce the food waste generated by students in the Student Union Recreation Center.

CIVIC ENGAGEMENT AND ACADEMIC SERVICE LEARNING THROUGH INTERNSHIPS
Hultquist, Nancy B.
Faculty Mentor(s): Nancy B. Hultquist, Geography and Land Studies
Session: 35 (Poster Session Morning in Ballroom)

This poster describes summer internships completed by CWU students signed up for GEOG 490 credit and working for agencies at the local, regional, and national levels. It is designed to display the broad coverage of Civic Engagement opportunities possible through using service and training at governmental entities to promote on-the-job learning experiences for CWU students, while also serving the local community. A few examples may include work at Mt. Rainier National Park, Yakima County GIS, Sinlahekin Wildlife Area, Pacific Northwest National Laboratory, WA State Department of Transportation, WA State Department of Ecology, WA State Department of Fish and Wildlife, and Kittitas Community Development Services.

CHALLENGES TO INCLUSION OF ACADEMIC SERVICE LEARNING IN COURSE CURRICULA
Hultquist, Nancy B.
Faculty Mentor(s): Nancy B. Hultquist, Geography and Land Studies
Session: 6 (Oral Session 8:00-9:40 in 202)

Some courses do not lend themselves well to planning Academic Service Learning (ASL) or Civic Engagement (CE) projects into course syllabi. The Geography courses I have taught through the years, where such projects might be injected, did not allow enough time to do the project or the course content justice. Most of the geospatial techniques I teach, including Geographic Information Systems (introductory through applied project skills) and Map Reading and Map Interpretation (including the use of air photos and remotely sensed imagery data) do not allow time to teach the concepts, basic techniques and skills, while also producing projects for the community. Further, other human geography courses, such as Urban and Economic Geography, also do not provide an appropriate arena. Therefore, over the years I have utilized internships to bridge the gap and put ASL and CE to work for the benefit of employers and students. Having an internship on a student’s transcript or resume is most often equal to getting a foot in the door for a future job. This presentation explores examples of utilizing internships at the undergraduate level to put students into the field to gain on-the-job experience, while also teaching them workplace issues in a real-life employment setting. CWU has a fine Career Services opportunity for all students, and I plan to elaborate on the skills and content my students have experienced and delivered to the various agencies.
STATISTICAL ANALYSIS OF “ATTITUDES TOWARD ANIMAL RESEARCH” SURVEY

James, Jesse
Faculty Mentor(s): Kara Gabriel, Psychology

Session: 35 (Poster Session Morning in Ballroom)

Attitudes toward the genetic modification of animals and psychological research conducted on animals vary widely. The purpose of this study is to investigate different statistical techniques in the analysis of the results of two surveys, administered together to 404 subjects, about the use of animals in research and genetically modified animals, respectively. Step-by-step analysis began by reverse-coding responses to some questions for analytical purposes. A factor analysis with rotation was performed to identify questions that were responded to in an overall like-fashion, and these sets were evaluated for similar conceptual themes or components. A Cronbach’s alpha was used to determine correspondent validity within each factor. Data results from ANOVAs and multiple regressions will be presented along with the strengths and limitations of each technique. These statistical analyses focus on determining which of the nine demographics collected from participants best predict answers to questions in each factor. In particular, previous research has found a gender difference in attitudes toward animal research. Additionally, attitudes of beginning psychology students tend to be more opposed to animal research than those who are nearer graduation. Various applications of such previous findings as well as findings of the current study will be discussed.

THE PERCEPTION OF RISK WHICH MALES HAVE REGARDING ACQUAINANCE RAPE

Jarczak, Ronald
Faculty Mentor(s): Laura Appleton, Sociology

Session: 3 (Oral Session 8:00-9:40 in 137B)

This study will investigate the extent to which college males perceive the risk and if they are even aware that having consensual sex with a woman who is inebriated can lead to charges of acquaintance rape against them. Past research has shown that the likelihood of acquaintance rape increases with the presence of alcohol. In Warshaw’s study, 75% of men and 55% of women involved in acquaintance rape had been drinking or taking drugs. According to Stormo, acquaintance rapes involving alcohol tend to not only have more victim blaming but also position less responsibility upon the perpetrator. Rape law does acknowledge that an individual may be limited in their ability to consent to sex; meaning that a woman in Washington State can not give her consent to sex if she is legally intoxicated. There have been numerous past studies involving the perceived risk of acquaintance rape and what impact alcohol may have on risk assessment, but only very few of these studies have involved or focused upon men. This research will focus on how men perceive risk and whether they are even aware of the ramifications that can take place when they agree to consensual sex with an inebriated individual. Through the use of a questionnaire, subjects will be asked to examine a scenario and answer questions directed towards the use of alcohol prior to consensual sex. Potential findings may show that what is needed are educational programs geared towards educating men about the legal risks governing consent.
STREAM NUTRIENT CYCLING: A STABLE ISOTOPE STUDY ON UMTANUM CREEK

Johnson, Allison; Hennessey, Kelly
Faculty Mentor(s): Paul James, Biological Sciences

Session: 35 (Poster Session Morning in Ballroom)

Central Washington University has partnered with A.C. Davis H.S., located in Yakima, WA., to integrate salmon ecology and other watershed themes to enhance the relevancy of biological sciences in the 9th, 10th, and 11th grade biology classes. This integrative theme provides real world context for inquiry based learning in the high school. Our team’s research focus is to investigate the relative importance of aquatic invertebrates and terrestrial invertebrates in salmonid diets using stable isotopes. We are using carbon and nitrogen isotopes to describe the dynamics of food webs, and the importance of trophic pathways that shift seasonally between microhabitats and river reaches in the upper Yakima River. Gut analysis, which only provides “snapshots” of an organism’s diet, does not capture spatial and temporal differences in dietary shifts. The high school students are investigating the diets of juvenile chinook salmon and resident rainbow trout by collecting potential prey items, and using carbon and nitrogen stable isotopes to determine the relative importance of riparian production and aquatic production to the salmonid populations of the Yakima River.

A STUDY OF ATMOSPHERIC DEPOSITION AND ITS EFFECTS ON THE CHEMISTRY OF THE YAKIMA RIVER WATERSHED

Johnson, Jacob; Kopczynski, Meghan; Eddings, Gabrial; Sturgill-Simon, Kyle; Seaman, Stephanie; Johansen, Anne
Faculty Mentor(s): Anne Johansen, Chemistry

Session: 35 (Poster Session Morning in Ballroom)

As part of the NSF-WATERS Project which main objective is to infuse hands-on research in the K-12 schools, the chemistry of the Yakima River watershed was studied. Water quality in the river is affected by many factors including the deposition of atmospheric components of both natural and anthropogenic sources. Two topics were chosen as areas of focus for current and future work to further our knowledge in issues pertaining to water quality in Kittitas valley: (i) chemistry of precipitation and aerosols, and (ii) the chemistry of the Yakima River. Conductivity, pH, and nitrates were analyzed this year, while future analyses will also include trace metals and ions. In this context, method development is underway to improve analytical capabilities to determine iron spectrophotometrically at low levels. Sampling, analysis, and method development were the components of Ellensburg High School Chemistry Students’ senior projects, and a compilation of these studies is presented here.

PETROGENETIC PROCESSES CHARACTERIZING THE MOUNT BACHELOR, OREGON MAGMATIC SYSTEM: OPEN VERSUS CLOSED SYSTEM PROCESSES

Johnson, Sara
Faculty Mentor(s): Wendy Bohrson, Geological Sciences

Session: 36 (Poster Session Afternoon in Ballroom)

Mount Bachelor Volcanic Chain (MBVC), located in central Oregon, is significant among Cascade volcanoes because of the abundance of magnesium rich (basaltic) volcanic rocks. Preliminary studies have defined how eruptions have changed composition with time, but a detailed assessment of magma chamber processes has not been conducted. To gain a more thorough understanding of the processes that contribute to the observed compositional
evolution, this study focuses on one of four eruptive episodes, specifically the younger and more voluminous episode III. The geochemistry and textural diversity of twenty representative lavas were assessed to determine the associated magmatic processes. Magmatic systems can be impacted by external influences, such as the incorporation of surrounding rock into the magma (assimilation), or the replenishment of magma from below (recharge). These processes result in open-system magma chambers and modify the original chemistry of magma. Closed-system processes such as crystal formation and separation can also significantly alter the magma chemistry. The focus of this study was to determine which of these processes was most significant in the formation of the lavas erupted during episode III, utilizing whole rock and single crystal geochemical and isotopic analyses. It was determined that crystal formation in a closed magmatic system resulted in the majority of the geochemical diversity observed. However heat released during crystallization resulted in melting of surrounding country rock; incorporation of that melt changed the magma composition, thus highlighting the importance of open-system processes.

HUMAN-MACAQUE (MACACA THIBETANA) AGONISTIC ENCOUNTERS IN MT. HUANGSHAN, CHINA

Jones, Amber; Matheson, Megan; Sheeran, Lori; Li, Jin-Hua; Wagner, R. Steven
Faculty Mentor(s): Megan Matheson, Psychology
Session: 21 (Oral Session 1:20-2:40 in 201)

Ecotourism is increasingly used to promote conservation of primates. However, long-term impacts of human-nonhuman interactions at tourist sites are unknown. We investigated human-directed threats in free-living macaques (Macaca thibetana) at Mt. Huangshan, China. We hypothesized monkeys differentiate between categories of humans (tourists, Chinese researchers, American researchers, and keepers) due to habituation toward keepers and researchers. Human-monkey interactions were identified via scan sampling for human-directed threats. Following initial threat, focal sampling and continuous recording were used to document interactions. During August 2007, 3002 minutes of observations were conducted on two groups, YA1 and YA2, which recorded 2156 human-directed threats. For each group (YA1 and YA2), total number of observed threats towards targets was significantly different (df=3, $\chi^2=30.09$, p<0.0001 and df=3, $\chi^2=1497.28$, p<0.0001, respectively). The greatest difference in threats occurred at YA2, where keepers and Chinese researchers received a higher number of threats (57% and 10%, respectively) and American researchers and tourists a lower number of threats (29% and 39%) than expected. Results suggest habituation and human density do not account for aggressive interactions while individual human behaviors may elicit threats. Positive correlations of monkey threats with human antagonistic behaviors for all target categories support this inference (r=0.85, df=32, p<0.01). Overall aggressive interactions appear to mediate individual variability in human and monkey antagonisms.

BIOCIDAL EFFECTS OF WATER FROM SOAP LAKE ON SKIN PATHOGENS

Justus, David
Faculty Mentor(s): Holly Pinkart, Biological Sciences
Session: 14 (Oral Session 9:55-11:35 in 202)

Soap Lake (Grant Co., WA) is a saline alkaline lake with a high mineral content. It has long been touted as a “healing lake”, curing everything from Buerger’s Syndrome to arthritis. However, only one study has been conducted to support the claims of “healing waters”. This
study examined the effect of exposure of Soap Lake water on bacterial biofilms, layered microbial communities associated with disease processes. This project is unique in that most studies of this type evaluate microbes grown on slides or in standard liquid media, while this project examined colonization of actual skin samples, thus more closely resembling the colonization that would take place during an infection. Biofilms of 3 common skin pathogens (Staphylococcus aureus, Pseudomonas aeruginosa, and Candida albicans) were developed on skin samples obtained from mice. Once the skin was colonized, the skin biofilms were then exposed to Soap Lake water or appropriate controls for time intervals of 20 minutes. Pre-exposure and post-exposure biofilm populations were determined using standard microbiological techniques. T-tests were then used to determine whether exposure to Soap Lake water caused a significant drop in pathogen population. Initial studies demonstrated that Soap Lake water has a significant biocidal effect against Staphylococcus aureus biofilms. This test system could provide a model for future studies of the effect of other compounds on skin biofilms.

DIFFERENTIAL PHOTOMETRY ON SV CAMELOPARDALIS
Kangas, Eric
Faculty Mentor(s): Michael Braunstein, Physics

Session: 7 (Oral Session 8:00-9:40 in 271)

SV Camelopardalis (HD 44982) is an eclipsing binary star in a tertiary system with a period of 0.59 days orbiting the third body with a period of 41.32 years. This study is measuring the light curve of SV Camelopardalis using a CCD camera attached to the 0.3 m telescope at Central Washington University. Each eclipse is about three hours long, and the camera will be set to take a sequence of exposures during those three hours. This data will be analyzed using the technique of differential photometry in which a comparison star, in the field of view of SV Camelopardalis, will be observed. The light from the comparison star will be compared to the light observed from SV Camelopardalis. This light curve is an important parameter in measuring properties of the stellar system for instance, their masses, orbital properties, and stellar classification. We will present the light curve for SV Camelopardalis that we have obtained.

Kaviani, Khodi
Faculty Mentor(s): Khodi Kaviani, Education

Session: 4 (Oral Session 8:00-9:40 in 140)

A Turning Point in the US-Iran Relations, the Hostage Crisis of 1979, was a turning point in the U.S.-Iran relations that defined the way these two former allies treated each other. This study examined the American national narrative about that episode in history as depicted in the widely used history textbooks. The conceptual framework that was deployed include: socialization, explicit, implicit, and null curriculum. Six history textbooks published by Pearson/Prentice Hall are selected because they are among the most widely used history textbooks in schools. Forty three main variables are identified and compared across the sample and the results show that all six textbooks depict Khomeini (1) as a Muslim cleric; (2) as a fundamentalist who was anti-Western; (3) along with the Iranian people was angry with the Shah who was a dictator and an ally of the United States. These textbooks disagreed to various degrees on the remaining thirty six variables.
CHARACTERIZING THE ~1000 AD ERUPTION OF BAITOUSHAN VOLCANO USING ISOTOPES AND TRACE ELEMENTS

**Kinch, Adam; Shurtleff, Brett**

**Faculty Mentor(s): Frank Ramos, Geological Sciences**

**Session: 36 (Poster Session Afternoon in Ballroom)**

Baitoushan Volcano, located along the China/N. Korea border, is responsible for one of the largest caldera-forming eruptions in the past 2000 years, producing ~100 km$^3$ of pyroclastic flows and airfall deposits. Activity at ~1000 AD, ~0 AD, and ~2000 BC produced comenditic, pantelleritic, and trachytic deposits (K-Na enriched rhyolites and dacites), in addition to a single comendite lava flow. We are evaluating isotopic variations (Sr, Nd, and Pb) in this highly alkaline volcanic system in order to determine the sources and magmatic history of these volcanic rocks. The ~1000 AD eruption, which is composed of airfall deposits and pyroclastic flows with mixed pumices that have strikingly different compositions, was followed by the late stage eruption of pure trachyte, without comendite. Major and trace element whole rock data suggest that both trachyte and comendite result from fractional crystallization, growth and removal of crystals in a magma, of alkali basalts similar to those seen proximal to Baitoushan caldera. Furthermore, $^{87}\text{Sr}/^{86}\text{Sr}$ ratios obtained from comenditic pumices reflect the composition of the melt at the time of eruption and are higher than the $^{87}\text{Sr}/^{86}\text{Sr}$ ratios found in quartz-hosted melt inclusions indicating an influx of additional material, either from a second magma or from crustal sources, that changed the isotopic composition of the melt produced at eruption as reflected by the pumice. Isotope analyses of single minerals, including potassium feldspar, clinopyroxene, and fayalite, will be presented to identify and constrain the processes involved in the generation of the ~1000 AD comendite.

PARADISE LOST, 1 ENOCH, AND THE LIFE OF ADAM AND EVE: MILTON AND EXTRA-BIBLICAL LITERATURE

**Klepach, Jr., Scott**

**Faculty Mentor(s): Heidi Szpek, Religious Studies**

**Session: 6 (Oral Session 8:00-9:40 in 202)**

In this paper, I analyze Milton’s texts, particularly *Paradise Lost*, and examine how he was influenced by many texts and synthesized these ideas in his epic. In Paradise Lost, Milton focused on the first three chapters of Genesis, though he greatly expands on these events, demonstrating knowledge not only of the biblical account but also of the historical presentation of angels, demons, and the issue of freedom. Since it is well established that Milton drew from Greek mythology, I will instead focus on two other possible sources of influence: the pseudepigraphal texts of *1 Enoch* and *The Life of Adam and Eve*. Though some critics, like Grant McColley, have tied Milton’s epic with *1 Enoch* in the past, others have doubted this claim. I contend this claim is still plausible. Starting with McColley’s argument, I will explore how Milton combined *1 Enoch* and *The Life of Adam and Eve* with the biblical text and Greek mythology and put them to work in a fresh light in his opus.
GEOSCRAPEBOOK: SEE THE WORLD ALL OVER AGAIN
Kolowinski, Casey; Long, Nate
Faculty Mentor(s): Robert Hickey, Geography and Land Studies; Jim Schwing, Computer Science
Session: 9 (Oral Session 9:55-11:35 in 135)

With the exponential growth of technology, more people than ever are able to collect a photographic record of not only what they are doing, but also where. It is this ‘where’ that is the driving force behind GeoScrapbook—a photo-scrapbook built on top of Google Earth. In this world of diminishing attention spans, the goal of GeoScrapbook is to slow the viewer down and allow them to become immersed in a virtual tour around the planet. With GeoScrapbook, your favorite locations come back to life and allow the viewer to relive their most memorable moments. Undeniably unique, GeoScrapbook brings a fresh take to picture management and easily allows each and every user to customize their own experience. Whether you simply want to show where you’ve been on vacation or you want to professionally display significant information about an area, GeoScrapbook is for you. Enjoy the experience as you make your way around the world in an enriching and fulfilling virtual environment.

GEOGRAPHIES OF FRESHWATER SPORT FISHING IN THE UNITED STATES
Kuhlken, Robert
Faculty Mentor(s): Robert Kuhlken, Geography and Land Studies
Session: 36 (Poster Session Afternoon in Ballroom)

Angling is a recreational activity that involves definitive spatial characteristics and configurations. This research begins a geographic investigation into freshwater sport fishing in the United States by looking at some of the economic, cultural, and ecological aspects of an engaging pastime enjoyed by more than thirty million participants. Tabular data from the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation are here presented cartographically, allowing distinct spatial patterns to emerge. Various types of fishing, by mode and target species, generate additional geographic diversification. Fly-fishing for trout, for example, has transformed landscapes in many locations, and gradations of quality result in designations such as blue-ribbon streams and rivers. Officially sanctioned bass tournaments at select sites have assumed all the trappings of NASCAR events, in which formerly amateur sports enthusiasts become competitive professional athletes, complete with corporate sponsorships and highly specialized watercraft. Freshwater sport fishing expenditures amount to a staggering 25 billion dollars annually, divided equally between trip-related costs and equipment purchases. Sales of licenses and other expenses for interstate excursions function as an indicator of tourism potential that many states now seek to exploit. Place-specific identities that rely on angling have produced numerous capitals, meccas, or resort destinations proclaimed by local officials and business entrepreneurs. Additional geographic considerations of the sport include private property versus public access issues, fisheries conservation measures such as creel limits or catch-and-release regulations, reliance on hatcheries and the stocking of non-native species, and the detrimental effects of acidification and climate change on habitat.
USING GENOMIC MUTATIONS TO INVESTIGATE EVOLUTIONARY RELATIONSHIPS WITHIN CONIFERS

Lackey, Kelli
Faculty Mentor(s): Linda Raubeson, Biological Sciences

Session: 33 (Oral Session 4:30-5:50 137A)

The evolutionary history of the conifers has been debated, with conifers either being monophyletic, i.e., originating from the same ancestor, or conifers being paraphyletic, i.e., containing the most recent ancestor but not all of its descendants. All plants possess chloroplasts, organelles housing their own genetic material, the plastome. Plastomes are circular and usually composed of 120-150,000 base pairs (bp) with a 20-25,000 bp region that is duplicated, referred to as the inverted repeat (IR). Unusually, all conifer plastomes have been found to have lost one copy of the IR, a mutation supporting monophyly. However, looking at the current gene arrangements of our complete plastome sequences of Cryptomeria japonica and Podocarpus macrophyllus and the published plastome of Pinus thunbergii two separate IR losses seem at least superficially possible, which is the only way conifers could be paraphyletic. However, because each of the conifer plastomes contains multiple other gene order changes, current gene order could be misleading. We investigated the total number of rearrangement mutations (mutations that change gene order, i.e. inversions and IR loss(es)) required to achieve the gene orders of the extant conifers under alternative hypotheses of IR loss to see if significantly fewer mutations are required under a particular scenario. The two hypotheses appear to be equally likely suggesting separate losses of the IR and a possible paraphyly of conifers.

PROCRASTINATION AND SELF-HANDICAPPING

Lake, Christopher; Linsley, Michelle; Jones, Joshua; Fierst, Katherine
Faculty Mentor(s): Marte Fallshore, Psychology

Session: 21 (Oral Session 1:20-2:40 in 201)

Procrastination is defined as delaying the start or completion of a task. Self-handicapping is defined as creating (or maintaining) obstacles that negatively impact performance. Whereas procrastination is a delay of effort, self-handicapping is a reduction of effort with no temporal element. Previous research demonstrates some overlap between these two psychological constructs. The aim of the present study is to further investigate the differences and similarities between procrastination and self-handicapping, and how each may be affected by the type of task being performed. In the present experiment, participants (n=64) who thought they were participating in a memory experiment experienced a (planned) computer malfunction and were given the opportunity to prepare for a (bogus) task while the computer was being fixed. The title of the experiment was altered based on participants’ random assignment to one of three task condition groups (a control, an evaluative condition, and a nonevaluative condition). A hidden observer recorded participants’ study habits from behind a one-way mirror. The amount of time that passed before participants began to study (procrastination) and amount of time spent studying (self-handicapping) was measured. Participants were then given a procrastination scale and a self-handicapping scale. An interaction between task type and procrastination/self-handicapping was predicted. An omnibus MANOVA was performed. Although there were no significant differences between groups, the data do display a pattern similar to what was predicted. The scale data demonstrated a significant correlation between procrastination and self-handicapping, thus making it difficult to untangle the differences between these two psychological constructs.
CAMPUS SUSTAINABILITY AND CARBON REDUCTION: STUDENT TRANSPORTATION
CARBON OUTPUT ANALYSIS
LaMie, Riley; McCanles, Kurt; Kantor, Annie; Norman, Amanda
Faculty Mentor(s): Jennifer Lipton, Geography and Land Studies
Session:  2 (Oral Session 8:00-9:40 in 137A)

On CWU’s campus many students commute to and from school using personal vehicles instead of other means of transportation which emit less carbon dioxide. Our research will address the amount of carbon dioxide released by student transportation activities including commuting to and from campus, around town, and to and from their permanent residence. The research will be conducted using a survey of randomly selected students attending CWU. Questions that will be addressed will pertain to student’s methods of commuting to and around campus, the number miles students drive each week if any, how eco-friendly their vehicles are, and why alternatives may not be considered. This research will be used to determine the possible solutions to reduce the amount of carbon emitted from student transportation. Student transportation can be categorized as person vehicles, Central Transit, biking, walking, and any other means transportation. Our intention is to formulate a policy based on our research to reduce the amount of carbon emitted from student transportation.

TRACING AXON DEVELOPMENT IN CHICKEN EMBRYOS (GALLUS GALLUS)
Landis, Brandi; Blaisdell, Megan
Faculty Mentor(s): Dan Selski, Biological Sciences
Session:  14 (Oral Session 9:55-11:35 in 202)

Our ultimate goal is to determine the function of certain gene products in the developing connections of the embryonic nervous system. The visual system in chick embryos is utilized to analyze connections from retinal neurons, through axons (nerve fibers that transmit information), to connections in the optic tectum of the brain. The visual system of chicks is particularly effective in revealing axon development because the connections are typically formed long before the chick hatches. The embryos are subsequently injected with fluorescent dye in the eye to label retinal neurons and axons. Retina and brain from embryos are then dissected two days later, and examined using fluorescent microscopy to ascertain labeling of neurons and axons. Preliminary results reveal strong labeling of neurons in the retina with intense fluorescence localized to the injection sites. Furthermore, fluorescently labeled axons have been identified at sites distant from the injection sites. However, labeling has yet to reveal neural or axon labeling in the tectum. Future strategies to address this issue include allocating longer time periods between injections to dissections in order for the dye to have time to travel to the brain in addition to making use of different dye types. This presentation will highlight the procedures used in this research and results obtained as well as problems encountered and speculation of future studies.
Ductile channel flow in the middle-crust of southern Tibet is driven by low-viscosity middle-crust, a pressure gradient between Tibet and India, and surface denudation along the southern flank of the high Himalaya. Mabja Dome, southern Tibet, exposes midcrustal rocks proposed to have originated from this midcrustal channel. To test this hypothesis kinematic, vorticity ($W_m$), and metamorphic petrography analyses on these midcrustal rocks were completed. Outcrop and thin section kinematic indicators show a transition with structural depth from top-N and top-S shear in chloritoid-zone rocks, dominantly top-S shear in garnet and kyanite-zone rocks, to solely top-S shear in staurolite-zone and deeper rocks. Along the northernmost transects, $W_m$ in schists and orthogneisses decreases from 0.63–0.84 (55–36% pure shear) in chloritoid- and garnet-zone rocks to 0.52–0.69 (63–51% pure shear) in kyanite-zone and deeper rocks. $W_m$ for the quartzite’s increase downward from 0.9–1 (27–0% pure shear). Deformation temperatures increase from ~450 °C in the chloritoid-zone to greater than ~700 °C in the sillimanite-zone, coinciding with peak metamorphism, hence the vorticity was recorded between ~35–16 Ma. Mabja Dome shows a complex flow regime involving (a) an increase in the pure shear component with depth in schists and orthogneisses as a result of increasing lithostatic load; (b) simple shear in quartzites, the mechanically weakest layers; (c) mixed top-N and top-S shear at high structural levels that may be a result of heterogeneous viscosities and/or varying channel thickness; and (d) a broad zone of shear along the Main Himalayan Thrust.

THE EVOLUTION OF RESOURCES IN UPPER KITTITAS COUNTY: COAL MINING, LOGGING, AND REAL ESTATE
LaRiviere, Maggie
Faculty Mentor(s): Nancy Hultquist, Geography and Land Studies
Session: 36 (Poster Session Afternoon in Ballroom)

Map interpretation skills and historical research methods were applied in a socioeconomic analysis of Upper Kittitas County, Washington. The author begins by linking the Northern Pacific Railroad with the development of the coal mining industry within Cle Elum and Roslyn. The focus then shifts to the economic relationship between railroad companies and the budding timber industry. Finally, the author presents the economic connection between the timber and tourist industries and questions the socioeconomic impact of the Master Planned Resort, Suncadia, in Upper Kittitas County.

MEASURING THE OXYGEN ISOTOPE RATIO OF SOIL CO$_2$ EMISSIONS ACROSS A CLIMATE GRADIENT IN THE EASTERN CASCADES, WA
Larkins, Clayton
Faculty Mentor(s): Carey Gazis, Geological Sciences
Session: 36 (Poster Session Afternoon in Ballroom)

Because different sources of CO$_2$ produced in the biosphere have distinct oxygen isotope ratios, a global $^{18}$O/$^{16}$O budget of atmospheric CO$_2$ can be used to understand how individual CO$_2$ sources and sinks influence atmospheric CO$_2$ concentration. The largest terrestrial carbon sink...
resides in soil organic matter, yet the $^{18}\text{O}/^{16}\text{O}$ ratio of soil CO$_2$ emissions remains poorly constrained. For this study in progress the $^{18}\text{O}/^{16}\text{O}$ of soil CO$_2$ flux to the atmosphere is being monitored across both spatial and temporal spectra. Measurements of soil emissions are being taken every two weeks at four sites across a climate gradient in the eastern Cascades for a period of eight months using an open chamber sampling method. Observed isotopic variation in soil CO$_2$ flux will be compared to model results in order to elucidate how different variables influence the $^{18}\text{O}/^{16}\text{O}$ of soil CO$_2$ flux. Results from this regional analysis will enable a refined global model of the $^{18}\text{O}/^{16}\text{O}$ ratio of soil CO$_2$ emissions and contribute to the scientific understanding of biosphere-atmosphere interactions in the carbon cycle.

THE IMPORTANCES OF KEEPING AN OPEN MIND TO CHANGES IN ONE'S SOCIETY

Lehrman, Nathan
Faculty Mentor(s): Matthew Altman, Philosophy – Douglas Honors College

Session: 27 (Oral Session 2:55-4:15 in 140)

In an ever-changing world, one must keep an open mind to the political and/or social changes going on in order for society to advance as a whole. Without change, a society is left to become stagnant because it cannot progress with the changing world around them. Salman Rushdie’s *Midnight’s Children* and Plato’s *Apology* present this idea of the conflict between making progress and a resistance to change. Even at the expense of their own downfall, these characters stood by their ideas. This was because they believed that their idea was a needed progression for the society they lived in. This concept of conflict to a needed change can also be seen and related to the civil rights movement in America during the 20th century. This event is a perfect example of a change that was needed for the better of the society that was resisted by some. By examining these works and relating them to this historical event, one can see the importance of keeping an open minded to changes that will help society advanced as a whole.

NORTHERN SCORPION SUPERCOOLING AND WINTER SURVIVAL

Lessig, Zach
Faculty Mentor(s): Jason Irwin, Biological Sciences

Session: 33 (Oral Session 4:30-5:50 137A)

The Northern scorpion (*Paruroctonus boreus*) is the only species of scorpion found in central Washington and ranges up into Canada. Because it is found so much further north of other scorpions, its method of winter survival is likely to involve some interesting physiological and behavioral strategies. Some other species of scorpion are known to supercool during periods of sub freezing temperatures to avoid internal ice formation. Supercooling occurs when a solution’s temperature drops below its freezing point and it remains liquid. This appears to be part of the Northern scorpion’s strategy as well. Data taken in October and December varies little and suggest that this species can supercool to -8.4°C with little or no difference between the sexes. It is possible that it is producing antifreeze proteins which allow it to do this but further investigations are needed to determine if this is the case.
CAN UNCLE SAM KEEP HIS PROMISE?

Lomax, Perry; Meeks, Domonique
Faculty Mentor(s): Teresa Francis, Law & Justice

Session: 3 (Oral Session 8:00-9:40 in 137B)

According to the Department of Justice there are over two million Americans in prison. They also report almost 1 million drug arrests. Many drug felons struggle to find jobs, housing and receive federal benefits. These barriers to successful re-entry into society lead many drug felons back into criminal involvement and the criminal justice system. The military may offer a solution. Due to a 58% military enlistment decrease the military has made enlistment exceptions for people with serious criminal misconduct in their backgrounds. It is alleged recruiters may be offering to excuse drug felons if they go to Iraq. If so, the question is, will the door opportunity open for the veterans when they return? Or will they come back and face the same obstacles? Through interviews, analyzing statutes and applying existing recidivism statistics we will answer these questions.

THREE SEASONS OF EXCAVATION AT THE WENAS CREEK MAMMOTH SITE IN CENTRAL WASHINGTON

Lubinski, Patrick; Shapley, Jake; Barton, Bax; Lillquist, Karl; Uebelacker, Morris
Faculty Mentor(s): Patrick Lubinski, Anthropology & Museum Studies

Session: 36 (Poster Session Afternoon in Ballroom)

Following discovery of a mammoth humerus during construction in 2005, Central Washington University has conducted three interdisciplinary summer field investigations of the locality near Yakima, Washington. These have revealed an accumulation of mammoth and bovid bones dating 13,400-14,000 RCYBP, near the base of a reworked, loess-dominated, colluvial unit with corroborating luminescence sediment dates. Two chipped stone flakes of unknown depositional age were recovered within the same geological unit about 15cm above the bones. Further investigations are planned.

INTERNATIONAL JOINT PROJECT USING BLACKBOARD WEB TECHNOLOGY: FOREIGN DIRECT INVESTMENT OF USA RETAILERS IN SLOVAKIA BY SLOVAKS AND USA COLLEGE STUDENTS

Lupton, Robert; Rawlinson, David
Faculty Mentor(s): Robert Lupton, Information Technology & Administrative Management

Session: 35 (Poster Session Morning in Ballroom)

The purpose of this paper is to introduce a cross-national Internet retail marketing learning activity for use in business and marketing courses. This activity uses the CWU eLearning Blackboard web software. The authors conclude with recommendations for future joint projects. The authors reviewed the literature integrating the IBM “four tiers of learning” model and Ligoria and Cordeschi’s (2005) success factors for computer-supported e-learning. Factors that help guide the project include “co-location”, “collaboration”, “interaction” and “information”. The study was implemented over ten weeks with three block units of learning using Blackboard software. The instructors discussed learning objectives and assignments with students during workshops. Additionally, students were trained about the cross-functional team activity as well as on-line learning. In the Slovak Republic, 14 male and 15 female students participated in this class study and in the U.S., 3 male and 24 females participated. To evaluate the international project, a 19-
question survey instrument was developed consisting of a series of dichotomous (yes/no), scalar questions, and open ended questions. One written exam was used for basic concept understanding, and a final course evaluation was used for overall learning. All the generally accepted success factors were observed in our project. A sample of the findings included both male and female students and considered the same factors as critical for successful e-learning. They considered discussion between US and Slovak students, information sharing between US and Slovak students, group activities and knowledge sharing between US and Slovak students for success.

GROOMING BEHAVIOR OF TIBETAN MACAQUES (MACACA THIBETANA) IN THE PRESENCE OF TOURISTS AT MT. HUANGSHAN, CHINA
Mack, Heather; Matheson, Megan; Sheeran, Lori; Li, Jin Hua; Wagner, Steven
Faculty Mentor(s): Megan Matheson, Psychology

Session: 21 (Oral Session 1:20-2:40 in 201)

Among non-human primates, grooming behaviors have been hypothesized to serve many functions including stress reduction, social bonding, and ectoparasite removal. This study was conducted to assess whether tourist presence affects the rates of grooming among Tibetan macaques (Macaca thibetana) at Mt. Huangshan, Anhui Province, China. Observations were conducted from August 5-26, 2007 with a total of 53.25 h of data recorded. Preliminary analyses of these data indicate adult males performed 1.55% (8/515), adult females 40.58% (209/515), and juveniles 57.86% (298/515) of grooming bouts. At the group level, when no tourists were present there were 8.77 grooming bouts per hour, compared with 10.79 bouts per hour when tourists were present (binomial p<.05). There were 5.77 self-grooming bouts per hour with no tourists, compared to 8.66 bouts per hour when tourists were present (binomial p<.001). Across 35 observation periods with tourists present, the mean number of tourists positively correlated with self grooming (r=0.353, df=33, p=0.04), but not with social grooming (r=0.259, df=33, p=0.13). Broken down by age/sex class of groomer, the mean number of tourists present showed a trend to be correlated with grooming by adult females (r=0.319, df=33, p=0.06), but not juveniles (r=0.142, df=33, p=0.42). Adult males did not initiate social grooming. However, tourist density correlated with self-grooming by adult males (r=0.345, df=33, p=0.04), but not adult females (r=0.235, df=33, p=0.17) or juveniles (r=0.264, df=33, p=0.13).

MAPPING OLD HOMESTEAD IRRIGATION DITCHES IN SADDLE CREEK, HELLS CANYON
Malkuch, Tyler; Quirk, Tony
Faculty Mentor(s): Morris Uebelacker, Allen Sullivan, Cameron McCormick, Geography and Land Studies

Session: 36 (Poster Session Afternoon in Ballroom)

Irrigation ditches at the abandoned Wilson homestead in lower Saddle Creek, Hells Canyon, Oregon are rapidly becoming obscured by brush and erosion. On March 17-18, 2008, a comprehensive mapping project of the irrigation systems was undertaken. Following a pedestrian survey of the former homestead to identify irrigation ditches, each conveyance channel was mapped using hand held GPS receivers. Location coordinates were collected at critical points (leg, channel bends, bifurcation, unusual features) along ditches. Photos were also taken to further document the contemporary nature of the irrigation system. The entire irrigation system was mapped and placed over a current aerial photograph to illustrate the extent and spatial distribution. A comparison made between the 2008 survey and earlier survey more fully illustrates the extent of the irrigation network.
COMPARING TWO METHODS OF ACQUIRING AND ANALYZING A SINGLE SLIT DIFFRACTION PATTERN

Masters, Evan
Faculty Mentor(s): Michael Jackson, Michael Braunstein, Physics

Session: 7 (Oral Session 8:00-9:40 in 271)

The phenomenon of single slit diffraction exemplifies the wave-like nature of light. Single slit diffraction was initially investigated independently by both A. J. Fresnel and J. von Fraunhofer in the early 19th century. Experiments involving single slit diffraction have evolved, even to the point where it has been used to further exemplify wave-particle duality via the diffraction of matter waves, as with C_{60}. Because of the wide array of applications, diffraction is a subject that is important to many areas of physics and is discussed in introductory physics courses as well as in Modern Physics and Optics courses. The initial phase of this experiment involves a traditional approach for investigating a diffraction pattern. A photodiode detector combined with a translation stage is moved across the pattern resulting in a plot of the intensity as a function of position. Once accomplished, the experimental data can be compared with theory. To expand upon this, a logarithmic ratio amplifier circuit was introduced into the system to provide an alternate way of analyzing the output data and comparing it to the theoretical model. The goal of adding the logarithmic ratio amplifier circuit was to determine if this method improved the identification of diffraction minima. Along with a description of the experimental setup and analysis of the data, a comparison of the logarithmic ratio amplifier method with a commercially available system will be presented.

FORGETTING THE SELF: MEMORY AND IDENTITY IN W.G. SEBALD’S AUSTERLITZ

Mayer, Christopher
Faculty Mentor(s): Laila Abdalla, English

Session: 5 (Oral Session 8:00-9:40 in 201)

What we do not remember, we do not know. Nonetheless, it is in the realm of this loss that our identities are forged. This poses an obvious problem to the construction of our identities; if we cannot remember, how do we know ourselves? Our personal histories are formed by our memories, the memories of others, and even the memory imbedded in the objects we encounter daily. Indeed, our sense of self is parasitic on the assumption of memory. But the majority of our past is irrevocably lost, and yet it still informs our identity. Thus, what we forget about ourselves is equally important to the formation of our identity as what we remember. The exchange between remembrance and forgetting is our identity. W.G. Sebald’s melancholic novel, Austerlitz, displays this exchange between remembrance and forgetting. By deconstructing the novel we can deconstruct the self and recognize the logocentric illusion that selfhood is formed by the presence of memory. The presence of memory creates an illusion of a transcendental subject, but there is no transcendental subject, no essential self. I will show that the novel displays assumptions of selfhood that are problematized by the exchange between memory and forgetfulness; the novel lets us see the aporia of memory-forgetfulness. The hyphen in this aporia illustrates the blind spot and contradiction in the relationship between memory and forgetfulness. Memory cannot exist without forgetfulness nor can forgetfulness exist without memory.
TRANSATLANTIC FILM TRADITIONS IN THE CRYING GAME
McCorkindale, Don
Faculty Mentor(s): Liahna Armstrong, English
Session: 5 (Oral Session 8:00-9:40 in 201)

In late 1992, the film *The Crying Game* was released to European and United States audiences. Directed by the dean of Irish filmmakers, Neil Jordan, the fundamental storyline of *The Crying Game* presents an engaging mixture of contemporary British/Irish issues that certainly make the film seem indigenous to the United Kingdom—military rule of Northern Ireland, class distinction, the Irish Republican Army, and postcolonial effects on British culture and society. Moreover, the film uses techniques generally associated with classic Hollywood narrative form—film noir motifs, gender politics, male identity crisis, validation of said male figure—to create a film that is hybrid in nature. At the center of *The Crying Game*’s amalgam of a plot is the male protagonist Fergus (Stephen Rea). Through his involvement with the IRA, Fergus’s male identity is thrown into crisis in two separate and distinct ways. By incorporating the filmic conventions of both Hollywood and the United Kingdom, *The Crying Game* places Fergus in disastrous situations involving his politics and his sexuality. His association with the Black soldier Jodie, with its immersion in postcolonial themes, creates the crisis for Fergus’s politics, and his sexual and erotic tie with the transvestite Dil forms the basis for the gender politics that is more representative of Hollywood narrative cinema. What gives *The Crying Game* its great distinctiveness is the manner in which the film blends the characteristics of the national cinemas of both Great Britain and the United States.

EVALUATING THE CHRONOLOGY FOR HUMAN LAND USE IN THE SOUTHERN WASHINGTON CASCADE MOUNTAINS
McCUTCHEON, Patrick; VAUGHN, Kevin; SMITH, Nicholaus; GAUTHIER, Tara
Faculty Mentor(s): Patrick McCutcheon, Anthropology & Museum Studies
Session: 36 (Poster Session Afternoon in Ballroom)

Models for prehistoric human land use in the southwest Washington Cascade Mountains are tied to the distribution of dates from archaeological sites in this region. Initial efforts found gaps or hiatuses, while more recent efforts have filled in these gaps with additional dates. We present a critical evaluation of those dates and their archaeological context from which they were recovered to determine the accuracy and precision of the chronology. The removal of ‘low quality’ dates re-introduces what may be hiatuses in human land use of these mountainous landscapes and provides a new view of upland human land use during the Holocene.

ROCK OUT WITH YOUR WHAT OUT?!?!
Mecham, Christian
Faculty Mentor(s): Cynthia Coe, Philosophy
Session: 15 (Oral Session 9:55-11:35 in 271)

Throughout history, the contributions of women in music, when compared to their male counterparts, has at best been regarded as a second-class of less serious art and at worst, seen not as art at all. I believe this is directly related to ancient Greek philosophy of music, Cartesian dualism, and modern adherence to these two ideals. Both Socrates and Descartes argue for the separation of mind and body (in this case I will use Socrates’ example of “The Speech of Diotima” and Descartes’ *Meditations*). By associating the mind with the intellect and
the intellect with the masculine (as Socrates does and as Descartes implies), artistic creation and performance became the domain of the masculine. However, if we were to re-examine the mind-body scenario crafted for us by Descartes through a phenomenological view, such as that espoused by Merleau-Ponty in *The Phenomenology of Perception*, then we are presented with a scenario where art, including and especially music, is not structured and segregated along gender lines. By seeing mind and body as one, as opposed to the Cartesian dualistic ideal, then we are presented with a view of music experienced bodily by human bodies.

**THE CARBON FOOTPRINT OF TOBACCO**

*Merrill, Adam*

Faculty Mentor(s): Robert Hickey, Geography and Land Studies

*Session: 36 (Poster Session Afternoon in Ballroom)*

The average air temperature of the Earth’s surface is increasing, which has been attributed primarily to anthropogenic greenhouse gas emissions. Given the projected negative impacts of global warming, studies of carbon emissions from non-essential agricultural products are warranted; however, these emissions have generally not been quantified. The purpose of this study is to quantify the yearly worldwide carbon emissions generated from the tobacco industry. Emissions from tobacco are generated by four main sources: growing, curing, transporting, and burning. Growing tobacco generates carbon emissions primarily from farm machinery, pesticide use, and fertilizer use. Curing (i.e. drying tobacco) generates carbon emissions primarily from fuel use, which is primarily wood, coal, and natural gas. The major carbon source from transporting tobacco is fuel use. Lastly, significant carbon emissions result from burning tobacco, as cigarettes are the dominant tobacco product used worldwide. Also included in the study is the opportunity cost of lost carbon sequestration potential from the clearing of forests for tobacco growing and curing. Carbon emissions and sequestration were estimated using existing data from the scientific literature and other professional studies.

**THE SOCIAL CONSTRUCTION OF PREMENSTRUAL SYNDROME BY COLLEGE AGE MALES**

*Mirus, Matt*

Faculty Mentor(s): Laura Appleton, Sociology

*Session: 3 (Oral Session 8:00-9:40 in 137B)*

College age American women’s experiences and opinions on Premenstrual Syndrome (P.M.S.) have been well documented in scientific literature but as of yet there has been no scientific inquiry into how men construct this phenomenon. In this exploratory research project surveys were given to 100 male students attending Central Washington University to obtain experiences and opinions on P.M.S, the degree of integration into masculine culture, and the amount of time spent in female company to assess the degree to which interaction with females and integration into male culture constructs beliefs on P.M.S.
THE EFFECT OF KITITAS COUNTY HEAD START ON NUTRITION STATUS OF PARTICIPANTS: AN EXPLORATORY STUDY
Mize, Charlene; Cashman, Linda; Gee, David; Madlem, Melody
Faculty Mentor(s): Linda Cashman, Health, Human Performance & Nutrition

Session: 36 (Poster Session Afternoon in Ballroom)

This study sought to learn if the nutritional status of preschool children (three to five years of age) improved or changed upon one year of participation in Kittitas County Head Start. Each child’s height, weight, body mass index (BMI), BMI percentile, height for age, weight for age, and weight for height were observed at enrollment and at one year participation. Additional data included classification of BMI (referencing Centers for Disease Control and Prevention growth charts), frequency of vitamin and iron supplementation, intake frequency of dairy, grains, protein, and fruits and vegetables, vitamin A food sources, vitamin C food sources, and intake of fat and sugar type sweets. Secondary data was analyzed for seventy six Kittitas County preschool aged children, significance denoted at p<0.05. No significant difference was found between enrollment and one year participation for BMI, BMI percentile, height for age, weight for age or weight for height. No significant difference was found between enrollment and one year participation for classification of BMI, frequency of vitamin and iron supplementation, intake frequency of grains, protein, and fruits and vegetables, vitamin A food sources, vitamin C food sources, and intake of fat and sugar type sweets. Intake of dairy products decreased significantly (p=0.05) at one year of participation. Although results did not show significant improvements in anthropometric measurements or nutritional intakes, there were no significant increases in weight related health risks. Future researchers might consider surveying a larger sample size of preschool aged children.

THE DAO OF JOB: COMPARATIVE RELIGION THROUGH METHODOLOGY
Moceri, Mike
Faculty Mentor(s): Matthew Altman, Philosophy – Douglas Honors College

Session: 34 (Oral Session 4:30-5:50 in 140)

What is the link between the God of the West and the Daoist tradition of the East? Could it be a link which transcends mystical experience, religious dogma, and transient nature to arrive at the origin of human experience? The answer to that question best defines the unified reality in which all mystical, religious, and temporary states of consciousness reside. For it is a fact of human existence that men and women throughout the ages, across the broad spectrum of cultures and regions, have experienced spiritual awakenings. Despite the varying philosophies inherent in these religions, practitioners have discovered similar truths through similar methods. By showing that a perennial philosophy can, and probably does exist, the field of religious studies can be propelled beyond comparisons of dogma to arrive at the root of human spirituality.

FUEL EFFICIENCY
Moe, Andrew
Faculty Mentor(s): Mike Lundin, Mathematics

Session: 35 (Poster Session Morning in Ballroom)

Which car companies have become more fuel efficient over the years? This study is being done to find out which companies are really worried about the gasoline crisis and are finding new
ways to become efficient. I will examine different automakers possibly from different countries that build a compact sedan and a mid-size sedan. I will compare the different makes throughout the years, using the miles per gallon (most important statistic), against the vehicles weight and horsepower. This way I will see which of the manufactures have spent money on research and development for lighter and more powerful cars while making them larger and still become more efficient. By using the different years it will show which companies are improving at the fastest rate and also which recent cars are the most efficient. I think that this study will be very interesting for many people as well as myself because of the times we are living in and the future that is coming for the automobile industry. This will also help to inform the viewer of what cars not to buy, which cars to look for in the future, and which company is really looking out for our best interests.

DETERMINING THE CARBON DIOXIDE FOOTPRINT OF CWU SPONSORED AIR TRAVEL

Morton, Stephen; Volker, Gretchen  
Faculty Mentor(s): Roger Beardsley, Industrial & Engineering Technology

Session: 17 (Oral Session 1:20-2:40 in 135)

Many colleges and universities are participating in an agreement (American College and University President’s Climate Commitment, or ACUPCC) to generate a plan to reduce or eliminate campus CO$_2$ emissions by a future date. CWU is beginning this process also. The first step is to determine the current emissions, followed by efforts to reduce and monitor progress. One category of emissions is related to university sponsored air travel. This presentation will outline a method to be used by CWU for determining the carbon dioxide footprint of CWU air travel based on statistical analysis of available accounting data and additional data sources.

CAMPUS SUSTAINABILITY: CAMPUS CARBON EMISSIONS AND REDUCTION PLANS FOR TRANSPORTATION

Moynihan, Mark; Collins, Brian; Culliton, John; Nelson, Curtis  
Faculty Mentor(s): Jennifer Lipton, Geography and Land Studies

Session: 2 (Oral Session 8:00-9:40 in 137A)

This research will address particular problems involved with inefficiencies in Central Washington University’s transit fleet. Our goal is to try to reduce the campus’ carbon footprint. We will present issues related to the use of petroleum fuel by the schools transit fleet. The fleet includes all maintenance vehicles, parking vehicles, and Central Transit. Improving the fuel efficiencies of these vehicles, the scheduling and popular awareness of these vehicles, along with the potential conversion to biofuels, would all contribute to a reduction of the University’s carbon footprint and improve transportation effectiveness. A standard needs to be set for new campus vehicles considering their fuel economy and emissions according to the President’s Climate Commitment focused on Carbon Reduction. We will present our research on campus transportation and coordination through the various CWU departments. To examine the complete carbon footprint of CWU’s transportation system, we will also present information and documentation on how to confront the carbon emissions from air travel done by the University’s faculty, which is not currently documented.
CHEMICAL KINETICS: A TURBIDIMETRIC APPROACH TO SOLVING RATE ORDER WITH MICROLAB 10-COLOR COLORIMETER

Mullen, Kellie; Helland, Terry
Faculty Mentor(s): Tim Sorey, Chemistry

Session: 35 (Poster Session Morning in Ballroom)

Sodium thiosulfate, when reacted with hydronium ions, produces colloidal sulfur in solution. The rate at which this chemical process occurs can be measured turbidimetrically using the MicroLab 10-Color Colorimeter; rate orders for the reagents can then be calculated from these data. This research is a continuum of the development of an effective, educational Chemical Kinetics lab for General Chemistry students that utilizes turbidimetry to examine a chemical system. Through the administration of pre- and post-lab quizzes with control and treatment groups, we can assess content knowledge. Also, we plan to test the affordances of the MicroLab 10-Color Colorimeter and its effectiveness in the lab. Our goal is to increase student awareness and understanding of Kinetics using the MicroLab 10-Color Colorimeter.

EMPATHY AS A PREDICTOR OF PARTICIPATION IN THREE TYPES OF BULLYING

Mundt, Jennifer; Stahelski, Anthony
Faculty Mentor(s): Anthony Stahelski, Psychology

Session: 21 (Oral Session 1:20-2:40 in 201)

Bullying is a common experience among American youth, with 30% reporting moderate or frequent involvement in bullying. This study examined connections between empathy (including cognitive and affective components, as measured by the Basic Empathy Scale) and participation in bullying among 6th- to 12th-grade students (N=272). Based on their responses to a modified version of the Participant Role Questionnaire (PRQ), participants were assigned a bullying role (victim, bully, assistant, reinforcer, outsider, or defender) for physical, verbal, and indirect bullying. Although previous studies have found that low empathy predicts greater involvement in bullying, this study sought to investigate whether bullies may be skilled manipulators who have high cognitive empathy (the ability to understand others' emotions), which would enable them to effectively organize and manipulate the actions of others in bullying situations. Individuals classified as bullies reported the lowest levels of empathy, while defenders reported the highest. Bullies and followers (assistants and reinforcers) showed similar levels of affective empathy, but bullies reported significantly less cognitive empathy than followers. Males were more likely than females to be classified as perpetrators of bullying. Males were also more frequently the victims of physical bullying, but females were equally likely as males to be the victims of indirect bullying. The frequency of bullying showed a general decline with increasing grade level.

ONTOGENETIC CHANGES IN FEEDING MORPHOLOGY AND DIET IN THE CHISELMOUTH MINNOW, ACROCHEILUS ALUTACEUS

Murray, Corrie
Faculty Mentor(s): Paul James, Biological Sciences – Science Honors Program

Session: 25 (Oral Session 2:55-4:15 in 137A)

The chiselmouth minnow, Acrocheilus alutaceus, is only native herbivorous fish in the Columbia River drainage and is endemic to the Pacific Northwest. The locally abundant Chiselmouth minnows are found within mid-reaches of the Yakima River. Uncommon in temperature
streams, herbivorous fish are ecologically important because they provide a direct link between primary production and fish biomass. The chiselmouth minnow undergoes an ontogenetic morphological change as its diet changes from insectivorous to herbivorous, these changes and relation to diet and ecological status are poorly understood. By quantifying the morphological changes between jaw shape, body size and intestine contents, we describe how key morphological features change. Data supports that as fish size increases, jaw curvature decreases and intestine length growth rate increases. Analysis of stomach contents showed high variability of food items in small fish and a rapid decrease in insect material with increasing size, this suggests a key event in the ecological role of the chiselmouth minnow in the Yakima River.

AGE RELATED PERFORMANCE DECREMENTS IN TRIATHLON SUB-COMPONENTS IN ELITE AGE-GROUP ATHLETES
Nethery, Vincent; Pritchett, Robert; Derkacs, David
Faculty Mentor(s): Vincent Nethery, Health, Human Performance & Nutrition

Session: 11 (Oral Session 9:55-11:35 in 137B)

Highly trained age-group triathletes vie for the few coveted slots for National or World Championships at selected qualifying events. Little is known about the age-related performance decrements in elite multi-discipline endurance athletes. PURPOSE: This paper determined the magnitude and rate of decline in triathlon sub-discipline performances across an 18-70yr age-span in males and females. METHODS: Swim, bike, and run performances of the top five for each age (5yr categories) in world-championship “Ironman 70.3” (half-iron) qualifying events were retrospectively assessed. Age group performances were compared (one-way ANOVA) on times for swim (1.2 mi), cycle (56 mi), and run (13.1 mi) components. Absolute and relative differences among age groups were calculated, comparisons made between the best performing age group and professionals and between males and females at each age level. RESULTS: Age impacted elite age-group triathlon performance for each sub-discipline (p=0.0001), however decrements were not evident until age 45 years for any sub-discipline for either gender. Performance decrements (per half-decade) among the over 45yr old age groups were smaller for cycling (4-7% both) than for either running (7-13% both) or swimming (7-14% males; 7-24% females) with direct relationships noted between age groups and percent decrement. Professionals were faster than best performing age group competitors (swim: 14-16%; cycle: 7%; run: 10-13%; p<0.0001). For each age group, males were consistently faster (swim: 11-14%; cycle: 10-14%; run: 10-19%). CONCLUSIONS: These data provide a clear indication of the triathlon performance abilities of highly trained males and females across the age spectrum. The synthesis of laboratory and performance based research offers a unique blend that fosters an understanding of the biologic underpinnings of aging and exercise capacity.

VISUAL LOCALIZATION OF TWO NEW PROTEINS OF THE PARAFLAGELLAR ROD OF TRYPANOSOMA CRUZI AND THEIR IMPORTANCE TOWARDS PROVIDING PROTECTIVE IMMUNITY
Neumann, Evan
Faculty Mentor(s): Gabrielle Stryker, Biological Sciences

Session: 14 (Oral Session 9:55-11:35 in 202)

American trypanosomiasis, or Chagas disease, causes significant morbidity and mortality throughout much of South and Central America. Thus far, no successful medical cure or
approved vaccination has been developed. The disease is caused by a single-celled flagellated parasite named *Trypanosoma cruzi*. The Paraflagellar Rod (PFR) is a structure that lies alongside the flagellum of the parasite. This unique and complex structure is critical for cell motility and attachment, though little is known about its molecular assembly or its role in the lifecycle of trypanosomes. To date, only four PFR proteins have been described, yet all four proteins have been experimentally shown to protect mice against an otherwise lethal challenge of the parasite. Recently, two new PFR-like proteins have been identified in the DNA of *T. cruzi*. They have been named PFR5 and PFR6 because they share many similarities with other previously identified PFR proteins; however, their placement within the cell has yet to be established. This project aims to demonstrate the cellular location of them within the parasite. Using molecular biology techniques, the PFR proteins will be attached to Green Fluorescent Protein (GFP), which fluoresces green when exposed to certain wavelengths of light. These recombinant proteins, PFR5-GFP and PFR6-GFP, will be expressed in the parasite to visually determine where they are located. The identification of two new PFR genes increases by 50% the number of available genes to utilize in the promising studies of vaccine development.

**DNA BARCODING AND Saprolegnia**

*Nielsen, Kim; Johnson, Jim*

*Faculty Mentor(s): Jim Johnson, Biological Sciences*

**Session: 35 (Poster Session Morning in Ballroom)**

Saprolegniasis is an ecologically important disease of fish and amphibians caused by members of the water mold genus *Saprolegnia*. Traditionally, these species have been identified using anatomical characteristics. Recent molecular studies of *Saprolegnia* suggest that traditionally used characteristics do not accurately identify natural groups or species in these organisms. DNA barcoding is an increasingly popular technique that uses short sequences of DNA to achieve accurate species identifications. However, different scientific communities have employed the Cytochrome Oxidase Subunit 1 (CO1) or the Internal Transcribed Spacer (ITS) as barcoding markers. Previous work suggests that the ITS region will provide adequate identifications in this group, but since CO1 is the more commonly used region, we wanted to determine the relative effectiveness of this region as a barcoding marker. Initial analysis of previously published sequences of other genera in Kingdom Stramenopila suggests that levels of sequence variation may be appropriate for DNA barcoding and provided the basis for designing an initial set of PCR primers. These primers allowed the successful amplification of an 800 bp fragment in most, but not all, of the species available for this study. A second set of primers was designed, but has also failed to amplify the remaining species. Since ease of amplification and sequencing is a critical factor for DNA barcoding, these data suggest that the ITS region may be superior to the CO1 in this group of organisms because all of the samples were successfully amplified for the ITS using a single set of commonly available primers.

**HEMSTITCH AND THE MANDREL**

*Nott, Melissa; Goeltzenleuchter, Brian*

*Faculty Mentor(s): Brian Goeltzenleuchter, Art*

**Session: 19 (Oral Session 1:20-2:40 in 137B)**

*Hemstitch and the Mandrel* is a C. Farrell Scholarship project that investigates consumer desire through the creation of five monumentally sized paintings of retail shop windows, painted life-size and installed in an art gallery. After measuring and photographing approximately 30 shop
windows around the Seattle, Bellevue, and Portland shopping centers, I choose five images with the strongest compositions from which to work. By painting the images life-sized, I simulate what the average viewer may see while browsing shop windows on the street or in the shopping mall. However, my images exist in a gallery setting, where they do not have to compete for attention, and can be given a closer consideration. This method of display brings a critical view to the elements that create the narrative of desire for the objects or ideas displayed for consumption within the given space. For me, the most interesting part of this project is questioning how visual consumer culture seduces us. In Hemstitch and the Mandrel, I am attempting to expose the hegemony manufactured by capitalist marketing. At the same time, I am interested in using the (seemingly archaic) medium of paint to justify to myself the relevancy of painting as a contemporary artistic medium.

GUIDELINES FOR NEW CONSTRUCTION PERMITS

Nouwens, O'Neil
Faculty Mentor(s): Bill Bender, Industrial & Engineering Technology
Session: 17 (Oral Session 1:20-2:40 in 135)

Submitting plans for city approval can be a daunting task. Waiting for plans to be approved and applications to be accepted by the city can delay a project costing time and money. To help move the permit process along it is important to have all of the requirements complete before submitting a new construction application to the city, therefore reducing the odds of having to submit an application to the city a second time. This presentation will help interpret the guidelines and help the submittal process go smoother for both the city as well as the constructor of the project. The items covered during this presentation will include: plan requirement, submittal checklists, building permit application, regulations, design criteria, and a timeline.

SYNTHESIS OF 5,6-DIHYDROPYRAN-2-ONES AS POTENTIAL INHIBITORS OF HIV-1 PROTEASE

Nye, Jesse
Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry – Science Honors Program
Session: 24 (Oral Session 2:55-4:15 in 135)

HIV/AIDS has affected about 40 million people. One type of drug that is used to treat HIV/AIDS is a protease inhibitor. HIV-1 protease is an enzyme responsible for the release of mature HIV viral particles in the body. HIV-1 protease eventually becomes resistant to the inhibitors that are used as drugs and new inhibitors are needed. This research builds on a previous research effort, in which structures for HIV-1 protease inhibitors were designed using molecular modeling methods. These inhibitors were designed to possess better inhibitory properties, and possibly have increased bioavailability and less toxicity, than the inhibitors currently in use. These novel structures are currently being synthesized using known methodologies; their inhibitory values will be determined by outside collaborators and then compared to inhibitory values predicted by the neural networks used to design them. We hope that these compounds will become lead compounds for further drug discovery for HIV/AIDS.
VALIDATION OF A BIOELECTRICAL IMPEDANCE ANALYSIS EQUATION PREDICTING BODY COMPOSITION USING CONDUCTOR LENGTH INSTEAD OF HEIGHT

Nye, Jessica
Faculty Mentor(s): David Gee, Health, Human Performance & Nutrition – Science Honors Program; Cen-Tsong Lin, Mathematics

Session: 11 (Oral Session 9:55-11:35 in 137B)

Bioelectrical impedance analysis (BIA) is widely used in predicting body composition. Impedance of an electrical current is related to the composition of the body and the length of the conductor, conventionally estimated using height. The purpose of this study was to compare a BIA equation predicting fat-free mass (FFM) that utilized actual conductor length (Parsons) with a conventional BIA equation (NHANES), using hydrodensitometry as the reference method. Thirty-nine male and 53 female subjects were studied. For both genders, FFM predicted by both Parsons and NHANES equations were equally and highly correlated with FFM (r=0.88 to 0.91). For males, both equations had equal precision in predicting FFM ($R^2$(Parsons)=0.711, $R^2$(NHANES)=0.718). However, for females, FFM predicted with Parsons equation had a much higher precision than for NHANES ($R^2$(Parsons)=0.771 and $R^2$(NHANES)=0.578, respectively). These results suggest that using conductor length in BIA equations may result in more precise predictions of FFM for females.

SYNTHESIS AND ANALYSIS OF BIODIESEL: ACIDIC OR BASIC CATALYSIS?

O’Brien, Ian; Proulx, Josh
Faculty Mentor(s): Timothy Sorey, Chemistry

Session: 35 (Poster Session Morning in Ballroom)

Our research has two main goals. First, we plan to synthesize biodiesel using both waste oils and fresh, off the shelf, vegetable oil. During the synthesis, we will utilize two methods of production and analyze their effectiveness. One synthetic method will use a strong base and the method will use acid. The second main part of our research will make use of a Gas Chromatograph (Hewlett-Packard 6890) to analyze our finished biodiesel product and compare its purity and percent yield with commercially available biodiesel and petroleum diesel.

Research Hypothesis: If an acidic catalyst is used to synthesize bio-diesel, then it will yield a better quality product (maybe also a greater quantity of product) then a basic catalyst because the basic catalyst will have an undesired affect on the triglycerides (feedstock).

GAGAKU AND RYUTEKI: JAPANESE TRADITIONAL MUSIC AND FLUTE

Ogawa, Emi
Faculty Mentor(s): Hal Ott, Music

Session: 23 (Oral Session 1:20-2:40 in 271) and Performance (Second Afternoon Intersession)

My project is about Japanese traditional flute, ryuteki. To study the ryuteki, I was led to study Japanese traditional music, Gagaku. The ryuteki is the flute that is used in the gagaku orchestra, which is said to be the world’s oldest orchestra. I was particularly attracted to the ryuteki because flute performance is my academic major. Furthermore, I wanted to learn more about my own culture and the aspects of a culture are often reflected in its music. My poster includes pictures of the instruments that are used in a typical gagaku orchestra and models the ryuteki. Furthermore, I will have a recording of a gagaku orchestra playing in the background. I will discuss gagaku history and theory and demonstrate how to play ryuteki. Additionally, I will explain how to read a score written in the traditional gagaku style, how to practice a piece of
music, and discuss my experiences from taking private lessons with a Japanese ryuteki teacher. Finally, I will bring my flute and piccolo so that I can show the similarities and differences between the ryuteki and the European flute and piccolo.

THREE PIECES
Ohrstrom, Thomas; Newbury, Anna
Faculty Mentor(s): Keith Edie, Theater Arts
Session: 31 (Performance 2:55-4:15 in Theatre)
Refuge by Jessica Goldberg, a scene. Personals by David Crane, Marta Kaufmann and Set Friedman, a scene. Happy Birthday, Dad a monologue by Don P. Norman.

ELUDING A POLICE VEHICLE IN WASHINGTON STATE: THE PROBLEM OF ENDANGERMENT
Ormberg, Justin
Faculty Mentor(s): Rex Wirth, Political Science
Session: 35 (Poster Session Morning in Ballroom)
Lives are lost every year due to accidents connected with police high speed pursuits. What is the best policy to eliminate or reduce these fatalities?

TO CONVERT OR NOT TO CONVERT: BIODIESEL AND BUSES IN WHITE SWAN, WASHINGTON
Othus, Shannon; Rice, Tyler
Faculty Mentor(s): Lisa Ely, Geological Sciences
Session: 35 (Poster Session Morning in Ballroom)
The Yakima WATERS Project is a National Science Foundation funded program used to introduce authentic interdisciplinary watershed research into elementary through high school curriculum in public schools. The chemistry class of White Swan High School is one such class that been chosen to participate in this program. White Swan High School draws its students from a wide area. As a result, the school buses used by the Mount Adams School district travel hundreds of miles per year using thousands of gallons of diesel. This diesel usage increases the already high concentration of particulate matter and chemical compounds that are problematic in the increasingly poor quality of the Yakima Valley air. The White Swan chemistry students researched both the economic feasibility and environmental advantages of converting the Mount Adams bus fleet to biodiesel. Biodiesel, made from renewable resources, is a cleaner burning fuel source in comparison to petroleum-based diesel. Biodiesel is biodegradable, nontoxic, and is the only alternative fuel to have completed the health effects testing required by the Clean Air Act. The use of biodiesel has been shown to substantially reduce the amount of unburned hydrocarbons, carbon monoxide, particulate matter, and the emissions of both sulfur oxides and sulfates in comparison to the combustion of petroleum-based diesel. Currently, biodiesel is used mainly as an additive in petroleum diesel to create biodiesel blends, which are little utilized by US fuel consumers. Biodiesel is easily made through a process called transesterification, which separates glycerin from vegetable oil, in this case, creating biodiesel.
Channel-encroaching landslides have impacted the Owyhee River for millennia, ultimately affecting the progression of valley evolution. We propose that 1) the mass wasting style along the Owyhee River depends on the ratio of local basalt cap thickness to the thickness of exposed underlying sediments, the composition of the slip surface, the canyon geometry, and the frequency of mass wasting in the area, and 2) that characteristics of outburst flood deposits related to landslide dams depend directly on the mass wasting style creating the dam. The largest exemplary mass wasting events representative of two morphologic categories were examined to compare effects these events have had on the river channel. Artillery Landslide is a large slump event that could have dammed the river channel and failed catastrophically, creating flood bars immediately downstream. Flood boulders, up to 3m in diameter, were measured on associated flood surfaces and decrease in size with distance from the blockage. Greeley Debris Flow is a large debris flow that blocked the channel, creating extensive fill terraces behind the dam and a depositional bar downstream of the dam. Downstream of both landslides, outburst flood deposits of large boulders were measured to determine the velocity of the outburst flood that entrained them. The minimum peak velocities of Artillery Landslide and Greeley Debris Flow were 9.2m/s and 4.7m/s, respectively. Data collected in both reaches shows that mass wasting style and outburst flood deposit characteristics depend mainly on canyon geometry and ratio of basalt cap to underlying sediments.

METAL PLATING OF SILVER AND COPPER VIA GRAVIMETRIC COULOMETRY

We are to configure an electrochemical experiment to plate metals through electrolysis, so that we may implement our lab in a real classroom environment, because it will benefit the chemistry department by making an electrochemistry lab available to its first year students. Due to the complexities and contradictions of electrochemical electrolysis experiments, exposure to such projects is typically reserved for upper-level undergraduate research groups. Instruments such as the computer, however, can be coupled with a multitude of minor and inexpensive electronic attachments to allow a general chemistry laboratory student to explore electrochemistry in depth. By studying the ratio between coulombs applied over time and a change in mass, both in the anode and cathode, students may observe a quantitative relationship between electrons and oxidized/reduced metallic species. To prove this, our experimental goal is to experimentally validate the charge of metallic cations, and perhaps hydrolyze water, in a reproducible fashion.
SYNTHESIS OF FOUR NOVEL 5,6-DIHYDROPYRAN-2-ONES AS POTENTIAL HIV-1 PROTEASE INHIBITORS  
Palmer, Scott  
Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry  
Session: 35 (Poster Session Morning in Ballroom)  
The main objective of this study is to synthesize four novel HIV-1 protease inhibitors. Currently, there are nine FDA approved HIV-1 protease inhibitors. However, 30-50 percent of patients using these drugs develop drug resistance. Furthermore, due to low bioavailability, high amounts of these drugs need to be taken, which can lead to toxicity problems. For these reasons it is essential to continue creating new inhibitors that have better affinity and bioavailability and that are less toxic than the currently available therapies. We are synthesizing four novel 5,6-dihydropyran-2-ones as potential inhibitory structures. Analogs of these structures were already proven to be good inhibitors of HIV-1 protease.

OBSERVATIONS OF SNOW NEAR ELLensburg AND AT SnoQUALMIE PASS, WASHINGTON: A YAKIMA WATERS RESEARCH PROJECT WITH ELLensburg HIGH SCHOOL  
Parker, Emily; Hashimoto, Jeff  
Faculty Mentor(s): Beth Pratt-Stiaula, Geological Sciences  
Session: 35 (Poster Session Morning in Ballroom)  
9th grade students at Ellensburg High School conducted snow research in their backyards and at Snoqualmie Pass. The purpose of the project was for students to measure spatial and temporal variability in snow fall and snow pack in the Yakima watershed. Snow is an important resource, as it supplies melt water during the dry summer for irrigation and other uses. Estimation of water supply hinges on understanding the snow pack present in any given year. Snow pack estimation is modeled from limited ground observations such as SNOTEL sites combined with remote sensing satellite data. Understanding of how snow pack varies between SNOTEL sites is limited. Student observations of snow fall and snow pack in their backyards throughout the Ellensburg area can provide insight into spatial variation in snow pack in general. Students measured snow fall with snow collectors and snow pack with snow stakes. Students also spent one day at the Washington Department of Transportation snow study plot at Snoqualmie Pass, where they dug snow pits and measured snow depth as well as snow density throughout the pit to calculate the Snow Water Equivalent (SWE). Their measurements will be compared with NASA modeled estimates of snow pack to improve the models in the future.

SUSTAINABILITY AND CAMPUS LIFE: IMPROVING CENTRAL’S ECOLOGICAL FOOTPRINT THROUGH DINING, PURCHASING, AND PRODUCT USE  
Parmelee, Nell; Langer, Laura; Todd, Dakotah; Walling, Jessie  
Faculty Mentor(s): Jennifer Lipton, Geography and Land Studies  
Session: 2 (Oral Session 8:00-9:40 in 137A)  
Our group’s research is aimed at both calculating and reducing Central’s ecological/carbon footprint regarding its recycling, purchases, and product use. Another aspect of our research will be focused on the carbon footprint generated by the shipping of food products served by the Dining Services, as well as the non-textbook items sold in the Wildcat Store and items sold in Cat Trax West. We will be presenting different options for both products and carriers that would
help decrease the shipping distance, in addition to promoting more local vendors and eco-friendly products. Our product research will also include eco-friendly cleaning products to be used by the kitchen and janitorial staff.

**ISOTOPIC AND TRACE ELEMENT SIGNATURE OF THE YELLOWSTONE MANTLE PLUME: EVIDENCE FROM IMNAHA BASALTS**

*Patterson, James D.; Ramos, Frank C.; Wolff, John A.*

Faculty Mentor(s): Frank C. Ramos, Geological Sciences

Session: 9 (Oral Session 9:55-11:35 in 135)

Characterizing the geochemical signatures of mantle plumes is important for identifying the processes involved in plume-related volcanism. Flood basalts, the volcanic expression of plume-related volcanism, represent the largest volcanic events on Earth. The Columbia River basalt province is the most well-studied flood basalt province in the world. The Steens, Imnaha, Grande Ronde, and Picture Gorge formations comprise the main eruptive phase (16.6-15.0 Ma) of the Columbia River basalts. Isotopic ratios and trace elements of whole rocks from select basalts of the main eruptive phase were measured using Thermal Ionization Mass Spectrometry (TIMS), Inductively Coupled Plasma Mass Spectrometry (ICPMS) and X-Ray Fluorescence (XRF). Isotopic signatures define distinct chemical trends which result from contamination of plume-derived basaltic magma with surrounding country rock. The isotopic signatures of select Imnaha lavas reflect incorporation of fluid-fluxed mantle or crust (Picture Gorge) and more evolved (relatively higher SiO₂), ancient continental crust (Grand Ronde). Changes in chemical characteristics are also manifested in individual minerals. Single minerals, analyzed from the core to the rim, constrain chemical changes in the magmatic system during magma residence in the crust. Although modified, plume chemical and isotopic signatures remain largely intact. Constraining the isotopic and trace element characteristics of the Yellowstone plume allows for additional volcanic effects such as crustal contamination to be identified in subsequent (<15 Ma) eruptions.

**CHARDONNAY GRAPE SEED FLOUR AS AN ACCEPTABLE PARTIAL SUBSTITUTION FOR ALL-PURPOSE FLOUR IN A FUDGE COOKIE BAKED GOOD PRODUCT**

*Pellicer-McCann, Jamie; Peters, Jamey; Arriaga, Alexandria*

Faculty Mentor(s): David Gee, Health, Human Performance & Nutrition

Session: 36 (Poster Session Afternoon in Ballroom)

Though health benefits may be derived from a diet inclusive of polyphenols, foods naturally high in this class of antioxidant are typically bitter, astringent, and are found to be less acceptable in consumer evaluations. The aim of this study was to examine the effects of partial substitution of all-purpose flour with Chardonnay Grape Seed Flour (GSF) in a baked product in fudge cookies. Forty-five untrained volunteers from Central Washington University participated in the sensory evaluation of a baked product containing all-purpose flour (APF), 5% substitution of APF with GSF, and 10% substitution of APF with GSF. No significant differences were found in sensory evaluations consisting of duo-trio tests, triangle tests, and the assessment of bitterness, sweetness, moistness, and preference using a 9-point intensity scale. Objective tests performed using a TA.XT2 universal texture analyzer included puncture force with a 2mm puncture probe, penetration force using a 60° acrylic cone probe and compression force using a 0.5 inch acrylic cylinder probe. Density of the baked product was also determined using a loaf volumeter and electronic weighing scale. Significant differences were found in the penetration force between APF and 10% GSF, and between 5% GSF and 10% GSF with the later in both instances.
requiring less force than the former sample variation. Overall results indicate that GSF as a partial substitute for APF in a baked good produces a product that is both high in polyphenols and acceptable in consumer evaluations.

GENERAL ECOLOGY AND DISTRIBUTION OF THE HACKBERRY TREE WITHIN SADDLE CREEK, OREGON
Pennebaker, Rachel; Humphries, Katherine; Smith, Andrew; McEvoy, Steven; Nesbitt, Andrea
Faculty Mentor(s): Morris Uebelacker, Geography and Land Studies
Session: 36 (Poster Session Afternoon in Ballroom)

Netleaf hackberry (Celtis reticulata) is the primary riparian vegetation found along the Snake River within Hell’s Canyon. Many organisms rely on the edible drupes for their nutritional value and the tree as a habitat. This particular tree is well adapted to arid environments and fire regimes. The opportunistic nature of the hackberry tree allows it to both re-grow quickly and spread rapidly after wildfires. The tree core data collected within the Saddle Creek drainage, aid in dating historically significant archaeological sites.

CAMPUS SUSTAINABILITY AND CARBON REDUCTION: ENERGY REDUCTION
Perkins, Jeffrey; Chisholm, Markus; Jenkins, Justin; Vashist, Radha
Faculty Mentor(s): Jennifer Lipton, Geography and Land Studies
Session: 2 (Oral Session 8:00-9:40 in 137A)

Central Washington University (CWU) is a charter signatory of the American College & University Presidents Climate Commitment (ACUPCC). The purpose of the ACUPCC is to have the signed institutions neutralize their greenhouse gas emissions by a set time. In an effort to fulfill the commitment to ACUPCC our group from the Environmental Policy course will conduct a project on energy efficiency dealing with the entire campus. The goal of the project is to find problems and possible solutions so that our campus can be more energy efficient. Detailed analysis will be presented in determining some of the short and long-term energy issues. Our primary focus will be on short-term solutions such as switching off unnecessary campus building lights at night and lowering the thermostat 1°C for all the buildings. These simple actions will save significant amounts of energy daily thus helping to lower the overall campus CO₂ emissions. Campus building design for preexisting and future construction will be analyzed for long term energy solutions. Campus building designs will be compared to standards of the Leadership in Energy and Environmental Design (LEED). Research will be conducted on the basis of cost and efficiency, while looking at alternative energy solutions. Several campus groups will be consulted such as campus Carbon Reduction Task Force and the CWU sustainability coordinator. After evaluating the potential improvements to our current campus energy consumption, a written policy will be presented outlining energy reduction actions.

KINEMATIC CHARACTERISTICS OF YOUNGER AND OLDER TRAINED MALE RUNNERS
Perkins, Ryan; Swanson, Nicole; Green, Amber; D’Acquisto, Leo
Faculty Mentor(s): Leo D’Acquisto, Health, Human Performance & Nutrition
Session: 36 (Poster Session Afternoon in Ballroom)

Purpose: The purpose of this study was to examine stride length (SL), stride rate (SR) and oxygen uptake relative to SR in younger (Y, n=11) and older (O, n=9) trained, male runners.
Methods: Height, weight, lean body mass and % adipose tissue (skinfold technique) were measured. SR (stds/min) and SL (m/std) were determined during a series of treadmill running efforts ranging from 7 to 10 mph. Oxygen consumption (indirect calorimetry) was measured for each running effort. Results: Y and O were similar in weight and height, with the older group having a lower lean body mass (61.6 vs 57.4 kg, p=0.07), and a greater percent adipose tissue (11.8 vs 6.9%, p<0.05). From 7-10 mph, the O\textsubscript{2} uptake per stride (ml O\textsubscript{2}/std) ranged from 27.6 to 39.0 and 25.1 to 36.7 for the Y and O runners, respectively, with a tendency for the O group to have lower values (p=0.22). SL and SR increased with running speed regardless of group (p<0.05). Overall, the Y group had a greater SL (p<0.05). SL for Y ranged from 2.29 to 3.11 m/std, while values for the O group ranged from 2.16 to 2.91 m/std over 7-10 mph. The O group exhibited a greater SR compared to Y (p<0.05). SR ranged from 82.2 to 86.5 stds/min and 88.3 to 92.3 stds/min for the Y and O groups over 7-10mph, respectively. Conclusion: In order to maintain a given running speed, older trained runners utilized a greater stride rate which resulted in a lower oxygen uptake per running movement cycle. The greater stride rate for a given speed indicates less time spent in the air (swing phase), theoretically reducing ground reactive forces upon foot strike, an outcome that may be desirable for an older runner.

INFLUENCES OF PHENOMENOLOGY AND LOGICAL POSITIVISM ON THE NATURAL SCIENCES

Petersen, Travis
Faculty Mentor(s): Matthew Altman, Philosophy

Session: 15 (Oral Session 9:55-11:35 in 271)

In the beginning of the twentieth century there was much debate about whether natural science could establish what was true about reality. The two main schools of thought that initially dealt with this problem were Logical Positivism and Phenomenology. This paper will examine the strength of Phenomenology’s emphasis on subjectivity versus the argument that claims made objectively about the world retain their values as truths. It will be shown that Logical Positivism claims that truths about the world can be attained only through experience, that the experience is objective and corresponds directly to reality. Husserl argues this claim by showing that human subjectivity is an essential component of experience that eliminates the necessity of human experience to correspond directly to reality. In addition I will show that in fact the Natural Sciences have escaped Husserl’s criticism of the sciences. By utilizing various postulates and principles, the Natural Sciences have begun to integrate human subjectivity, as a necessary component of experience, into the empirical process of observation.

INVESTIGATION INTO THE CHARACTERISTICS AND PROCEDURES OF NUMERICAL CALCULATION FOR THE LYAPUNOV EXPONENT

Petersen, Travis
Faculty Mentor(s): Michael Braunstein, Physics

Session: 7 (Oral Session 8:00-9:40 in 271)

Although there exists no universal consensus on an exact definition, chaos is usually described as a deterministic system that displays aperiodic, long-term bounded behavior with sensitive dependence on initial conditions. An effective way to determine this sensitivity is through examination of the Lyapunov exponent. During the investigation of chaotic behavior in simple systems it was found that the largest Lyapunov exponent was necessary in determining the sensitivity to initial conditions. Because the largest Lyapunov exponent is able to characterize the rate of separation between infinitesimally close orbits, its value is able to determine how
chaotic a system will behave. Because of this property, the Lyapunov exponent is a powerful asset when analyzing chaotic systems. This research seeks to understand the properties of Lyapunov exponents in general and the methods of calculation relating to the largest Lyapunov exponent. This study utilizes an algorithm outlined by J.C. Sprott which has been compared with methods using analytic derivatives. Calculated values for multiple systems will be presented and shown to agree with previous findings. In addition, the largest Lyapunov exponent will be mapped for a span of control parameter values that create chaos in a specific third order nonlinear differential equation.

ELECTRONIC REALIZATION OF CHAOTIC SYSTEMS
Petersen, Travis; Kangas, Eric; Parker, Chris; Masters, Evan; Bakke, Erick; Abdul-Wahid, Sami; Leiseth, Jeff
Faculty Mentor(s): Michael Braunstein, Physics
Session: 36 (Poster Session Afternoon in Ballroom)
The CWU chapter of the Society of Physics Students is investigating electronic realizations of chaotic systems. Understanding the fundamental principles that govern this behavior is sought not only for its inherent educational value, but for its applications in physics, information theory, meteorology, biology and mathematics. J.C. Sprott has reported on a class of chaotic differential equations that can, in principle, be simply realized using discrete electronic components. These circuits can be used to investigate chaotic behavior in a simple system. We will present computational and experimental data collected from one simple chaotic circuit. Our computational results include eigenvalues and eigenvectors of the Jacobian, return maps, largest Lyapunov exponents and the numerical approximation of solutions to the differential equation utilized. Our data include output voltages at different points in the circuit representing the phase space behavior of the system. A comparison between the model and collected experimental data will be provided to analyze the realization of the nonlinear differential equation.

INQUIRY AND THE ESSAY
Phill, Ryan
Faculty Mentor(s): Patsy Callaghan, English
Session: 12 (Oral Session 9:55-11:35 in 140)
Inquiry in English composition is an essential asset both to the student and to the liberal institution of higher education. Inquiry is linked to a liberal education because it fosters a sense of discovery and rationality of ideas; in other words, inquiry is characterized by multiple perspectives and exploration. The value of inquiry can be seen at a local level, in Central Washington University's writing outcomes, and at national level, in WPA's outcome statement for first-year composition. However, critics such as William Zeiger and Keith Fort suggest that, despite new teaching trends intended to promote exploration in composition, the spirit of inquiry is declining in America because of an adherence to a stringent expository essay as the dominant form within the college curriculum. For Zeiger and Fort, the demand for a predetermined essay form, which requires a thesis, controls and hinders inquiry. Both of these accusations should be taken seriously by all involved in the institution of education. By synthesizing and examining the arguments of Fort and Zeiger, in conjunction with the alternate views of critics who support certain forms of the expository essay, such as John T. Gage, this paper examines the relationship between fostering inquiry and the varying forms of essays taught in college composition. Though veering from a single, arguable claim, this paper belongs
to an important dialogue that both questions the fecundity of the traditional essay and, in turn, offers the composition instructor several theoretical approaches to teaching the essay.

THE BIRTH OF GODS IN THE UNITED STATES: HOW MYTHOLOGIES ARE CREATED WHICH MAINTAIN THE MODERN AMERICAN REPUBLIC

Pierce, Alex
Faculty Mentor(s): Matthew Altman, Philosophy – Douglas Honors College

Session: 27 (Oral Session 2:55-4:15 in 140)

In The Republic Plato describes how mythology is needed to create a utopian republic. Within the culture of the United States there are many myths about its history and political figures. The political parties in America, whether consciously or subconsciously, craft myths that unify the party ideologically. Within the mythology of Democratic Party Franklin D. Roosevelt has become deified and for the Republicans Ronald Reagan is the figure worshipped by its members. Each party vilifies the opposition’s deity figure. The conflict between the two mythologies is beneficial because it creates an environment that sustains the American republic.

A GRAND ENTRANCE

Pribula, Jessica
Faculty Mentor(s): William Folkestad, Art

Session: 26 (Oral Session 2:55-4:15 in 137B)

Museums are artificial environments specifically designed for the display of art. Museums also encourage the practice of creative and practical interactive visitor skills. This paper presents my findings on how museum architecture, specifically the entrance, promotes and communicates with visitors. The entrance to any museum is a type of doorway; a doorway into a world of culture, history and creative expression. The entrance of a museum may be a grand entrance or a long, drawn out affair as in the case of the J. Paul Getty Museums. Whether private or public, entrances build on the anticipation a visitor may feel and are also designed to influence a visitor’s decision to linger longer in order to get the most out of the experience. The research presented here was conducted as a part of my study on how visual communication is accomplished by examining the architectural settings and intra-gallery traffic flow patterns of the LA County Museum and the J. Paul Getty Museum and Center.

PERFORMANCE DECREMENTS BASED ON AGE AND GENDER IN ELITE TRIATHLETES

Pritchett, Robert; Nethery, Vincent; Derkacs, David
Faculty Mentor(s): Robert Pritchett, Health, Human Performance & Nutrition

Session: 11 (Oral Session 9:55-11:35 in 137B)

Purpose: A retrospective analysis of a multi-sport endurance event to investigate the magnitude and rate of decline in elite age group triathlon performance (“Ironman 70.3” Triathlon World Championship Qualifying Races) between genders and across the age range (18-70 yrs).

Methods: Performances for 5-year age group increments were extracted from official results of qualifying events held at both on a national and international stage. Age group performances for each gender were compared (one-way ANOVA) on overall finishing times. Absolute differences and percent declines between genders and age groups were calculated, comparisons were made between the best performing age-group and professional performances for each gender,
and probability levels reported. Results: Age significantly impacted overall elite triathlon performance, (male and female: p=0.0001), however decrements in performance were not evident until age 45yrs in either gender. Decrement of between 4% and 6% were observed for each half-decade between 45 and 54 yrs while significantly larger decrements (8% to 10%) were observed for each subsequent 5-yr category. Professional triathletes were significantly faster than the best performing age group competitors (~11% for both genders: p<0.0001). Males were consistently faster than females with the greatest observed difference after age 55. Conclusion: Although performance data were obtained from races that differed in environmental and geographic characteristics, it does provide a clear indication of the endurance abilities of highly trained male and female triathletes across the age spectrum.

FIELD INVESTIGATIONS FROM THE UPPER YAKIMA RIVER WATERSHED & ACTIVE STEWARDSHIP THROUGH RESOURCE INQUIRY

Proszek, Kristina
Faculty Mentor(s): Jennifer Lipton, Geography and Land Studies
Session: 35 (Poster Session Morning in Ballroom)

As part of the Yakima WATERS Project, students from the Cle Elum-Roslyn’s 9th grade Discovery Institute are conducting an ongoing investigation of land use, water quality and stream ecology of the Upper Yakima River Watershed. In research teams, students have collected and analyzed qualitative and quantitative data at different sites along the Yakima River from Snoqualmie Pass to Ellensburg. Their results offer a deeper understanding of the Upper Yakima River Watershed’s biophysical and cultural landscape from a spatial perspective. In addition, students have investigated a resource or industry in our area, including an examination of its historical development, an analysis of current economic, environmental, and social impacts, and a proposal for current and future management strategies based on quantitative, qualitative and geospatial technologies.

MICROHABITAT PARTITIONING IN AN EASTERN CASCADES STREAM FISH ASSEMBLAGE

Puls, Andrew
Faculty Mentor(s): Paul James, Biological Sciences
Session: 25 (Oral Session 2:55-4:15 in 137A)

Throughout the Pacific Northwest, stream ecosystems have been altered extensively by anthropogenic factors, however, little data exists on how many of these stream ecosystems functioned prior to disturbance. Today, there is much interest in both restoring native fish species to streams from which they have been extirpated and enhancing declining populations. Previous research of stream fish assemblages has shown that microhabitat availability is an important component of fish species distribution, therefore the ability to identify suitable locations for restoration and enhancement efforts will increase the likelihood of success of such endeavors. Furthermore, the ability to effectively enhance or rehabilitate disturbed sites is increased with knowledge of the critical components of a species’ preferred microhabitat. Goals of this research were to identify diel shifts in microhabitat use within a species, identify preferred day and night microhabitat types for each species, detect interspecific differences in microhabitat use, and detect intraspecific differences in use between different age classes of a species. The American River, WA, a tributary of the Yakima River, served as the study site for this research. Day and night snorkel surveys were conducted to locate and mark fish locations. Results indicate that inter- and intraspecific microhabitat partitioning occurs within the American
River fish assemblage, although there is also considerable overlap between some species’ microhabitat use. Also, diel shifts in microhabitat use did occur, emphasizing the importance of taking both day and night microhabitat needs into account when developing restoration strategies.

FLUORESCENT CELL LABELING & IDENTIFICATION OF RETINAL NEURONS & THEIR AXONAL GROWTH PATTERNS WITHIN CHICKEN (GALLUS GALLUS) EMBRYOS

Quisenberry, Jennae  
Faculty Mentor(s): Dan Selski, Biological Sciences  
Session: 35 (Poster Session Morning in Ballroom)

A study of embryonic retinal neurons (nerve cells) and identification of their axonal target destinations was performed in order to develop a better understanding of neuronal growth patterns within the chicken visual system. Visual neurons develop first within the retina and then extend nerve fiber protrusions, called axons, toward the visual portion of the brain, the optic tectum. Cell labeling was obtained using a fluorescent dye that can readily diffuse into the lipid based membrane of a cell and disperse itself throughout the entirety of the cell. It was hypothesized that this fluorescent dye, when injected into the tectum of a normal developing Gallus gallus embryo, should transport along neuronal cell axons and accurately label the neuronal cell bodies within the retina. This question was tested with precise injections into discrete tectal regions of developing Gallus gallus. After continued embryonic development, to ensure axonal connections had reached the tecta, the tecta and retinas were dissected and analyzed with fluorescence microscopy. Clear cellular and axonal labeling was demonstrated in most embryonic tecta. Cellular labeling was also detected in several retinas. While positive results were found by the utilization of this neuronal mapping technique, consistency amongst the samples needs to be improved in order to acquire more conclusive data. Further research is being conducted to analyze the timing of retinal axonal connections to the tecta and the length of time after injection that allows for efficient dye diffusion along the full extent of retinal cells.

NOVEL SYNTHESIS AND CHARACTERIZATION OF STRONTIUM BORATES

Rabinovitz, Rosa  
Faculty Mentor(s): Anthony Diaz, Chemistry  
Session: 35 (Poster Session Morning in Ballroom)

Ternary borates are the most complicated compounds in the SrO-Y2O3 (or La2O3)-B2O3 system, but once a reliable synthesis is available, the optical properties of these materials could prove to be useful. We are investigating multiple synthesis methods for producing Sr3Y2(BO3)4, and Sr3La2(BO3)4 samples, both undoped and doped with Eu3+. X-ray diffraction (XRD) is used to determine the purity of samples. Vacuum ultraviolet (VUV) spectroscopy is used to establish the most efficient excitation and emission energies of doped samples. For each synthesis, the XRD data show that the samples are phase pure, but when optical property measurements are completed, large amounts of YBO3 impurities are apparent. By changing mole percentage amounts of the reactants, we hope to generate a reliable and reproducible synthesis for each of the three ternary borates listed above.
DESCARTES' PROBLEM WITH EVIL

Radabaugh, Allison
Faculty Mentor(s): Matthew Altman, Philosophy

Session: 28 (Oral Session 2:55-4:15 in 201)

After Descartes proves the existence of God in the Meditations, he then must deal with the problem of evil. If God is all-knowing, all-loving, and all-powerful, how is it that there is evil in the world? Descartes originally tries to attribute it solely to people. Through the misuse of our will and understanding (two attributes which in and of themselves are perfect), we cause ourselves to make judgments about things we do not fully understand, which can lead to wrong actions. This explanation makes sense, but then the question arises as to why an all-knowing God would give attributes that lead to error. Descartes recognizes that if God had made us differently (such as without a free will or with better understanding) this would not be a problem. He tries to defend God by suggesting that perhaps in the larger view of things, God allows us to err for some “greater good” beyond our understanding. However, by allowing God to facilitate evil (even in the name of the overall good) he can no longer claim that God is not a deceiver beyond a shadow of a doubt. There is nothing to suggest that deception cannot and does not fall under the same exception. Descartes’ defense creates a way in which God can be a deceiver but still not violate his nature, which completely defeats the purpose of why he brought God into the argument it in the first place.

POTENTIAL GROWING SITES FOR PRODUCTION OF THE TEA PLANT (CAMELLA SINENSIS)

Ray, Eian
Faculty Mentor(s): Nancy Hultquist, Geography and Land Studies

Session: 36 (Poster Session Afternoon in Ballroom)

This project is intended to show the possible growing locations in western Washington state for the Tea plant, Camellia sinensis. It is believed that the mild weather present in that part of the state might lend itself to the development of certain subtropical agricultural crops. Suitable areas for the cultivation of this plant were found by running a GIS calculation based on environmental criteria specific to the Tea plant. It included criteria related to temperature, precipitation, slope, elevation, and aspect. What was found were several stretches of territory that matched all the required criteria. This project has shown that there is potential for tea production in these areas.

REGARDING WRITING

Richardson, Elizabeth
Faculty Mentor(s): Patsy Callaghan, English

Session: 12 (Oral Session 9:55-11:35 in 140)

This paper is a synthesis of ideas, theories, and observations about teaching form in composition. Because writing serves an integral role in communicating thoughts and ideas clearly, not only is writing the key to academic success and an essential job skill, it also provides pathways for learning by fostering the discovery of new meanings. Writing makes thinking explicit, preserves ideas, and promotes the ability to pose worthwhile questions while giving structure and cohesiveness to thought; it encourages the ability to explain complex views to others and solidifies the writer’s own understanding. Therefore, the writing process runs parallel to the thinking process. Unfortunately, making thoughts explicit, in an organized, unified,
accessible fashion through composition proves difficult for most, and teaching writing (especially teaching cohesion in writing) is a daunting task. Many instructors teach predictable forms to help writers organize their ideas and grasp the concept of form. However, the traditional form used when writing essays on literature has been criticized for potentially limiting exploration and inquiry; its benefits are often overlooked in an attempt to highlight the inadequacies inherent in teaching only one type of form.

EVALUATING THE TIMING OF MAGMATISM AT BAITOUSHAN VOLCANO; INSIGHTS FROM SINGLE MINERAL ISOTOPE ANALYSES
Rodgers, Sarah; Ramos, Frank
Faculty Mentor(s): Frank Ramos, Geological Sciences
Session: 36 (Poster Session Afternoon in Ballroom)

Baitoushan volcano, located along the North-Korean/China border, generated one of the largest caldera-forming rhyolitic eruptions in the northern hemisphere in the last 2000 years. In addition to an ~1000 AD eruption, additional activity occurred at ~0 AD and ~2000 BC. These eruptions ejected large volumes of comenditic airfall and pyroclastic materials in addition to a small pantelleritic (K-Na rich rhyolite) airfall deposit. We have evaluated the isotopic signatures of single mineral crystals from this pantellerite deposit to evaluate the sources, petrogenetic history, timing, and residence of highly alkaline rhyolitic magma systems. Mineral characteristics of this pantellerite are complex. Two distinct potassium feldspar populations; one with $^{87}\text{Sr}/^{86}\text{Sr}$ signatures similar to those of ~1000 ka comendite are consistent with early crustal inputs of either a limited amount of regional Archean basement or more extensive assimilation of Baitoushan "root" rocks with similar isotopic ratios. A second population of potassium feldspar with lower $^{87}\text{Sr}/^{86}\text{Sr}$ ratios are similar to young (<10 ka) Baitoushan satellite basalts that are generally characterized by somewhat lower $^{87}\text{Sr}/^{86}\text{Sr}$ and higher $^{143}\text{Nd}/^{144}\text{Nd}$. Analyses of crystal free pumice grains suggest a pantellerite residence age of ~350 ky, similar to residence ages determined for Long Valley Caldera and Valles Caldera. Rb/Sr and U/Pb systematics of single mineral crystals, however, suggest the presence of multiple crystal populations and undermine any age significance of the pumice defined "isochrons".

AN INVESTIGATION OF SALMON REMAINS FROM THE ARCHAEOLOGICAL SITE IN HELL'S CANYON, OREGON
Rogers, Devon
Faculty Mentor(s): Steve Hackenberger, Anthropology & Museum Studies
Session: 36 (Poster Session Afternoon in Ballroom)

Salmon has been a staple of many cultures in the Pacific Northwest for thousands of years. Relatively few salmon and other fish remains remains were recovered during excavations of the Tryon Creek Site on the Snake River in Hell's Canyon, OR. However, archaeologists did recover a single near-complete salmon skeleton. This skeleton was found in a layer within a house feature that dates to roughly 1400 years ago. The objectives of this research were to determine the species and possible age of this individual salmon. It is also possible to outline alternative explanations regarding the interment of the fish within the house. These explanations give consideration to both the methods of processing salmon and the nature of house occupations in prehistoric Hell's Canyon.
ELEMENTARY SCHOOL CHILDREN CONSUME LESS THAN RECOMMENDED INTAKE STANDARDS OF CALORIES, FIBER, IRON AND CALCIUM FROM NATIONAL SCHOOL LUNCH PROGRAM MEALS

Romo, Megan; Aragon, Maria; Bergman, Ethan; Cashman, Linda; Englund, Tim
Faculty Mentor(s): Ethan Bergman, Food Science and Nutrition

Session: 36 (Poster Session Afternoon in Ballroom)

The National School Lunch Program (NSLP) is designed to meet nutrient needs of school age children, however much of the lunch is often wasted. The purpose of this study was to determine the percentage of students who met the recommended intake standards for Calories and nutrients. Plate waste data was collected in one central Washington elementary school for ten days. A total of 1,361 plates were studied to determine the amount of food consumed and wasted. Results showed 8.7% of the students met the standard of 667 Calories; 11% met the Vitamin A standard of 353 Retinal Equivalents; 33% met the Vitamin C standard of 15 milligrams; 37% met the fiber standard of 1 gram per 100 Calories; 41% met the iron standard of 3.3 milligrams; 41% met the calcium standard of 267 milligrams while 92% met the protein standard of 9.3 grams. 41% exceeded the maximum standard for total fat (30% of Calories); 20% exceeded the maximum standard for saturated fat (10% of Calories) and 8% exceeded the maximum standard for cholesterol (72mg). In addition, 51% of the students exceeded the maximum standard for sodium (2mg per Calorie). Based on this data, the NSLP may need to make adjustments in menus to enhance meeting the standards for several nutrients that are important for growth such as calcium, iron, vitamin C, and vitamin A. Menus also need to be developed to reduce sodium content.

STUDYING THE VARYING EFFECTS OF BUCKMINSTER FULLERENES ON MITOCHONDRIA

Rosario, Sara
Faculty Mentor(s): Carin Thomas, Chemistry

Session: 13 (Oral Session 9:55-11:35 in 201)

Since the discovery of Buckminster Fullerenes (C_{60}), hours have been devoted to the study of this carbon nanoparticle. C_{60} has been investigated in such applications as photodynamic therapy of cancer, photovoltaic cells, semiconductors, and enzyme inhibition. Despite two decades of research, the biological effects of C_{60} remain enigmatic. The intention of this study is to examine the effects of Buckminster Fullerenes on mitochondrial function to determine the concentration of C_{60} as well as the time frame of exposure that cause maximum dysfunction. Bovine heart mitochondria will be exposed to different doses of C_{60} and tested for the ability to respire normally. To demonstrate that C_{60} dosages result in varying effects on mitochondrial function, two mitochondrial enzymes will be measured. Hydrogen peroxide and lipid peroxidation will be measured as indicators of oxidative stress and membrane oxidation. Preliminary results indicate 27% inhibition of enzyme activity after fifteen minutes of exposure.

AM I BEING CLEAR? THE COMPLEXITY OF RESPONDING TO STUDENT WRITING

Ross, Amanda
Faculty Mentor(s): Patsy Callaghan, English

Session: 12 (Oral Session 9:55-11:35 in 140)

Teachers and writing consultants face many difficult tasks in their respective jobs; arguably, the
most problematic task is responding to student writing. The complexity of this issue comes not only from what teachers and consultants say or write in response but also how they say it or write it. Simultaneously, educators (teachers and writing consultants) must balance their attempt to provide feedback that will encourage students to voice original thoughts and opinions in meaningful ways with the ingrained notion that they, in some way, must correct or censor what students write. For the teacher and writing consultant, the purpose of responding to student writing is to address both strengths and weaknesses, ideally eliciting student improvement. However, if a student cannot understand his or her educator’s response he or she may not recognize writing weaknesses, resulting in a lack of improvement. This essay reveals some of the common errors that educators make when responding to student writing and concludes with a proposal of how teachers and writing consultants might overcome those errors.

ELITE MASTER AGE GROUP RUNNERS SHOW DIMINISHED MACRONUTRIENT INTAKE PER KG BODY WEIGHT COMPARED TO COMPETITIVE COLLEGE RUNNERS

**Rust, Bret; Swanson, Nicole**
*Faculty Mentor(s): David Gee, Health, Leo D'Acquisto, Health, Human Performance & Nutrition*

Session: 36 (Poster Session Afternoon in Ballroom)

Proper balance of macronutrient intakes is essential for competitive athletes of all ages to perform at optimum levels. Purpose: In an observational study of the dietary intakes of nine, high-performing, master’s level, long distance runners, ages 36-53, analysis of macronutrient and micronutrient intakes were compared with subjects in a study of dietary intakes of competitive college long distance runners. Methods: Three day diet records were collected from the athletes and analyzed for macronutrient intake and eight micronutrients of importance in energy metabolism and compared with the same nutrient intakes of athletes in the Ellsworth study. Body composition analysis was performed on each group using skinfold calipers. Results: Overall Caloric intake was higher among the college aged athletes (p<0.05). Overall protein, carbohydrate and fat intake were not significantly different between groups, nor was the percentage of total calories for any of the macronutrients, but all were significantly lower per kilogram body weight among the masters aged runners (<0.05) compared to the college aged runners. Of the micronutrients, only magnesium was significantly different between groups, higher among the masters aged runners. Body fat percentage was significantly higher among the masters level runners (13%) than that with the college runners (7%). Conclusions: Macronutrient intakes of master’s level runners may reflect over all declining energy needs with aging and increased stores of body fat.

GOD AND RELATIONSHIPS, SOPHROSYNE AND OLOLYGA IN ANNE CARSON’S GLASS, IRONY AND GOD

**Sander, Dustin**
*Faculty Mentor(s): Katharine Whitcomb, English*

Session: 5 (Oral Session 8:00-9:40 in 201)

In my analysis of Anne Carson’s seminal book of contemporary poetry, *Glass, Irony and God*, I use her unique last section, a feminist critical essay, as a lens through which a reader can view the preceding poetry and its multifarious themes and circumstances. Carson’s critical essay (and I would submit the whole book of poetry) deals primarily with two ancient Greek concepts: sophrosyne, or male oriented self-control and calmness; and cathartic oolyla, or the feminine practice of bringing to the outside ugly inside thoughts and feelings. When one examines *Glass, Irony and God* in light of these ancient Greek principles, the book becomes a treatise on female
freedom and spirituality. By reading the whole work in the context of this one essay, it is clear that Carson thrusts the book at a male-dominated western society as an affront to very old expectations of the behavior of women. The ancient act of ololyga was supposed to be conducted well away from the sensitive ears of men and never in public, but Carson demonstrates a complete lack of sophrosyne by performing her ololyga in a very public (in fact published) space—her book of poetry.

TEACHING GRAMMAR IN THE NEW MILLENNIUM: STUDENTS BENEFIT FROM THE CONTINUED DEBATE
Sander, Dustin
Faculty Mentor(s): Patsy Callaghan, English
Session: 12 (Oral Session 9:55-11:35 in 140)

Virtually all research into the effects of traditional grammar instruction proves that it is not helpful for improving students' writing, yet the practice of teaching such grammar has not been abandoned. Traditional grammar instruction is still widely believed to be beneficial for student writing. In the 1980s, Richard Hartwell and Martha Kolln had a public debate on the issue carried out in the journals College Composition and Communication and College English. Martha Kolln fiercely advocates the teaching of grammar despite recent trends in response to overwhelming research against grammar’s effectiveness. And Hartwell maintains that such instruction is at best ineffective and at worst damaging due to the fact that it detracts from valuable instruction time. That was the status of the debate in the 1980s. However, nearly thirty years later, the issue is far from settled. The most important implications still loom large: What is to be done about “correctness” in student papers? Is one to believe that by just letting students write prolifically and freely, the improvement in conventions of academic American English will just come? Or are teachers supposed to ignore the research and push on teaching grammar on the faith that it will eventually help some students? Or maybe there is a middle ground. My intent with this synthesis is to explore the debate as it has played out after the Kolln/Hartwell spat of the 1980s, particularly since the turn of the millennium.

THE NOBLE RIGHT TO RULE
Sanford, Janna
Faculty Mentor(s): Matthew Altman, Laila Abdalla – Douglas Honors College
Session: 20 (Oral Session 1:20-2:40 in 140)

In 1343, Geoffrey Chaucer was born into what is known in England as the third estate or working class. As a young man, he was first hired into the service of a noble household, and later into the court of King Edward III. Consequently, these positions helped shape his perceptions of the various classes within London, and his point of view is reflected in the characterization of the pilgrims in the Canterbury Tales. In this presentation, I will explore how these characters illustrate Chaucer’s overall belief that many of the members of the third estate as well as the clergy are corrupt. Because of this corruption, they are therefore unfit for positions of authority or power. I will demonstrate this belief by using the elements of education, honor, and respect for divine authority as applied to The Knight. As a member of the ruling class, The Knight is an example of someone who embodies all of the characteristics of a fit ruler and moral person during Chaucer’s time. Using the elements listed above, I will show how Chaucer’s characterization of The Knight implicitly reveals his view that the clergy and third estate are unfit to rule.
THE BLACKWATER PROBLEM: ACCOUNTABILITY & OTHER POLICY ISSUES
Scanlon, Brian
Faculty Mentor(s): Rex Wirth, Political Science
Session: 35 (Poster Session Morning in Ballroom)

Within U.S. national defense establishment, efforts have been made at the highest levels to greatly expand the use of private contractors in every aspect of war. This is part of a global expansion of the private military market that can be traced to the end of the Cold War. However, the 9/11 attacks and the resulting War on Terror brought with it a highly accelerated growth in private military corporations performing core military functions that, until now, were monopolized by sovereign governments. The invasions of Afghanistan and Iraq opened a $100 billion market in contracts for these companies, ensuring that they will be around for the foreseeable future. Recently Blackwater has become one of the most powerful security contractors, offering the services of a 20,000 strong mercenary army complete with its own military base and a fleet of aircrafts. Blackwater operates at home and abroad immune from both military and civilian legal constraints. Additionally, conflicts of interest between public and private motives have been demonstrated to exist. Due to numerous accusations of civilian shootings in Iraq at the hands of Blackwater employees, this issue has recently been brought to the national policy agenda. The purpose of this analysis is to explore the various issues associated with the sweeping free-market reforms of Pentagon policy. These issues will be examined using Blackwater as a case-study because of the size and scope of their war-servicing activities.

MR. FREUD ON MR. BROOKS: AN ATTEMPT TO EXPLAIN THE MIND OF A MURDERER
Schornak, Nate
Faculty Mentor(s): Laila Abdalla, English
Session: 5 (Oral Session 8:00-9:40 in 201)

Psychoanalysis has a somewhat sour reputation in our present day. Most people view the theories as “crackpot” in nature and are put off by Freud’s concept of the incestuous Oedipal complex. Despite past criticism, however, “the impact of Freud’s theories on the development of psychology [over the last century] cannot be overestimated...[and his theories] pervade popular notions of psychological processes to this day” (Nolen-Hoeksema 23). In the recent film Mr. Brooks, directed by Bruce Evans, Nolen’s statements ring true; the entirety of the film is rife with material that can be psychoanalyzed. The psychology of the main character in the film, Mr. Brooks, and his complex relationship with his “imaginary friend” Marshall, are portrayed in such a manner that a Freudian “viewing” of the film is necessary to comprehend the inner workings of Mr. Brooks' mind. This film sheds light on the makeup of the human mind, the nature of addiction, and the complexities of sexual deviance. The analysis of these issues in the film through psychoanalysis illustrates the continued importance of psychoanalysis in modern society, and also sheds light on the inherent truths that Freud has discovered; truths which still permeate in our cultural subconscious. Freud’s theories and Mr. Brooks both account for the inherent need of human society to find an explanation for extreme deviants. The way that Mr. Brooks is depicted in this film makes an attempt to find such an explanation.
MORE THAN MEETS THE EYE: ENVIRONMENTAL ARCHAEOLOGICAL APPLICATIONS OF AN IR+VISIBLE+UV SPECTRA SENSITIVE DIGITAL CAMERA

Schroeder, William
Faculty Mentor(s): Morris Uebelacker, Geography

Session: 36 (Poster Session Afternoon in Ballroom)

Problem: Can a digital camera sensitive to IR+Visible+UV light spectra and capable of recording image (JPG) files reveal more information about rock art images than we can see with our own (unaided) eyes? Purpose: To test variables of the camera, of light source type, quality, quantity, fluorescence, and/or reflectivity of rock art (pictograph) pigments under various lighting and/or climatic conditions. Significance: Systematic testing of digital cameras sensitive to IR+Visible+UV light spectra and their ability to record rock art images has not been done. The ready availability of digital technology and its capabilities lends itself to Environmental Archaeology/Cultural Resource Management applications. This technology can add one more method of evaluation or assessment to reports or files, e.g. fluorescent signatures of minerals in pigments might assist in determining the materials/resources from which the pigment was made. Environmental Archaeology might benefit from this new technology in ways that have not been applied yet.

THREE PERFORMANCE PIECES
Shanks, Andrew; TBD, TBD
Faculty Mentor(s): Keith Edie, Michael Smith, Elise Forier, Theater Arts

Session: 31 (Performance 2:55-4:15 in Theatre)

The Three Dramatic Performance pieces I will be performing were recently used in competition for the Irene Ryan Acting Award. With coaching and support from several department faculty mentors and my partner, I am proud to present these three diverse dramatic pieces for you; a scene from The Problem by A.R. Gurney, a scene from Danni & the Silver Dove by Elise Forier, and a monologue from Drop It by Rachel Claff

PIECES ON A BOARD: A DESIGN PROJECT FOR SHAKESPEARE’S ROMEO AND JULIET
Shields, Samantha
Faculty Mentor(s): Christina Barrigan, Theater Arts

Session: 35 (Poster Session Morning in Ballroom)

This project is comprised of twenty full color costume renderings for Shakespeare’s Romeo and Juliet. They were designed with chess as the theme and inspiration. The head-dress of each character reflects the chess piece that the character represents, from king to pawn. The clothing styles used are from the period of 1490 to 1520, Italian renaissance to early Tudor. Montagues are at the earlier end of the time frame while the Capulets are in the early Tudor style. This is indicative of the distance between the families. In chess, white begins the game. In the play, the first line is spoken by a servant of Capulet. Thus the Capulets are in white and the Montagues are in black. Gold and silver show the high rank and wealth of the two families. Characters belonging to neither house have neutral tones for the main color of their costumes. Red is the unifying color, a color that represents love as well as blood, death and destruction which are overarching concepts of the play and the only way to end the game.
ANT COLONY OPTIMIZATION FOR GRAPH COLORING
Sisson, Ben; Wysocki, Brandon
Faculty Mentor(s): Razvan Andonie, Computer Science

Session: 32 (Oral Session 4:30-5:50 in 135)

Ant colony optimization can be used as a more efficient method to solve graphical computational problems. Graph coloring was the problem we choose to solve. This involves finding the lowest number of colors needed to color a graph with no same colored adjacent nodes. We first looked at an iterative method and applied the ant colony optimization method to it. Some variables that we used were nodes, edges and chromatic number. The ant colony optimization code runs faster than the iterative method, but with less accuracy. Ant colony optimization has proved itself as a more efficient method to solve graphical computational problems.

Sleigh-Layman, Staci; Slim, Deema; Beyer, Tiffanee
Faculty Mentor(s): Susan Lonborg, Psychology; Laura Appleton, Judith Hennessy, Delores Cleary, Sociology

Session: 3 (Oral Session 8:00-9:40 in 137B)

A comparative study was done to investigate climate-related experiences and perceptions of male and female faculty at Central Washington University (CWU). Archival survey data, including the 2004-2005 Higher Education Research Institute Faculty Survey (HERI), were used to examine demographic variables, academic rank, tenure status, attitudinal responses, job satisfaction, and retention in relation to sex and year of survey. Results show that female faculty at CWU have considered leaving the institution at a higher rate than national data would suggest. Significant differences in a number of attitudinal and job satisfaction variables were observed between male and female faculty who considered leaving academia or CWU between 2002 and 2004. 2007-2008 CWU HERI data was recently collected. Further comparative analysis was done to investigate changes in the significant differences discovered in the original 1974-2004 analysis. Strategies to improve the working life for all faculty and enhance the learning environment for students are suggested.

EARLY IDENTIFICATION AND MITIGATION OF TEST ANXIETY FOR AVIATION STUDENTS
Sloan, Teresa
Faculty Mentor(s): Teresa Sloan, Aviation

Session: 35 (Poster Session Morning in Ballroom)

Since joining the faculty of Central Washington University in 1998, my colleagues and I have directed many students to the Health and Counseling Center for evaluation and assessment for possible test anxiety. The Aviation faculty serve as members of a Board that is scheduled to meet weekly with the flight training provider and with students who have difficulties with their flight training. Many of these students have failed flight progress check-rides. The primary reason given by the students for these check-ride failures is anxiety about the check-ride. The purpose of this study is to determine how to provide for early identification of students at risk for test anxiety, and to review methods used to alleviate test anxiety in technical fields of study.
DISCLOSING CHILD SEXUAL ABUSE: INTERVIEWS WITH PACIFIC ISLANDER FEMALE SURVIVORS OF CSA

Smith, Jaynina
Faculty Mentor(s): Hong Xiao, Sociology

Session: 3 (Oral Session 8:00-9:40 in 137B)

Decisions to disclose about a child sexual abuse (CSA) experience are culturally influenced. Thus, while there are shared experiences among all CSA survivors, research suggests that there are certain characteristics unique to survivors of different ethnic backgrounds. While research on the relationship between race/ethnicity and CSA disclosure is increasing, little is specifically known about the Pacific Islander population. Studies often combine the ethnically diverse categories of Asian and Pacific Islander together for the convenience of the study. Considering the immense proportion of Asians to Pacific Islanders, more research on the Pacific Islander population is needed to justify such a combination. Recent research suggests that Asians, as well as other ethnic minorities, may be more likely than whites to experience a reaction of “shame or embarrassment” from the recipient of the disclosure. Interviews will be conducted with a snowball sample of 7-10 Pacific Islander female survivors of CSA. It is hypothesized that the expectation of shame and/or embarrassment, especially for one’s family, is an influencing factor in the disclosure process of the participants in this study. It is the goal of this research project to discover the underlying cultural beliefs which inhibit victims from seeking or completing medical treatment, counseling or legal assistance. Findings will be reported at a later date.

PERFORMANCE BY CWU HORN ENSEMBLE

Snedeker, Jeffrey
Faculty Mentor(s): Jeffrey Snedeker, Music

Session: Performance (Afternoon First Intersession)

The CWU Horn Ensemble has been invited to perform at the annual conference of top international professional society in its field, the 40th International Horn Symposium, July 22-27, 2008, in Denver, Colorado, sponsored by the International Horn Society. The opportunity to perform at SOURCE would be a wonderful way to demonstrate how/why this ensemble was invited. Featured on this program will be one original student composition, Fantasia for 12 Horns, by CWU senior Sean Brown. Another unique aspect of this performance is that the opening portion of the program will feature a large group improvisation called Warm-up, inspired by the writings of Jeffrey Agrell in his Improvisation Games for Classical Musicians (2008). These two pieces alone will likely fill 15 minutes, but additional standard works for horn ensemble may be added, if time allows.

SAVE BY THE LEAVE OF ALLAH: DOCTRINE CONCERNING SUICIDE IN ISLAM

Soldat, Tyler
Faculty Mentor(s): Heidi Szpek, Religious Studies

Session: 6 (Oral Session 8:00-9:40 in 202)

This paper illustrates a fundamental doctrinal concept in Islam, an often misunderstood religion. This concept is suicide, which is often portrayed by the modern media as acceptable within the world of Islam. Indeed this practice is condemned within the Qur’an and the Ahadith, Islam’s two major sources for doctrinal material. Using an exegetical methodology passages concerning the
subject are introduced, analyzed, and discussed. Three major themes are focused on; what is the nature of humanity, what does the Qur’an say about murder, and what these two previous subjects can teach us about suicide itself. Both the Qur'an and a Hadith will be used during this process. Finally, the paper concludes with introducing and briefly discussing two major concepts often discussed in the media today; euthanasia and martyrdom. These topics will be highlighted and then explained within the context of the paper, and illustrated through my presentation.

SIXTEEN POINTS: THE RADICALISM OF THE 1956 HUNGARIAN REVOLUTION
Soldat, Tyler
Faculty Mentor(s): Roxanne Easley, History
Session: 29 (Oral Session 2:55-4:15 in 202)

This paper concerns one of the most complex and interesting modern revolutions. The Hungarian Revolution of 1956 was a failure by most standards, and is a source of debate for the reasons of its creation and eventual repression. This paper first introduces the reader to the Polish Revolution of 1956, in which the country successfully overthrew its communist leadership just weeks before the Hungarians tried and failed. The success of the Polish October will be contrasted with the Hungarian Revolution in terms of their radicalism, as this is the thesis of the paper. Indeed, it seems to be the radicalism of the Hungarian Revolutionaries demands, as manifested in their Sixteen Points, which caused the revolution to fail. Finally the predicament of the Soviet Union is explored, and the Hungarian Revolution is understood from their point of view. One will come to the conclusion that the demands of the Hungarian revolutionaries were too radical to be ignored or allowed by the Soviet leadership and Nikita Khrushchev. These topics will be illustrated in my presentation.

WORLD OF WARCRAFT: THE RISE OF A SUBCULTURE
Soltz, Andrew
Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies
Session: 16 (Oral Session 9:55-11:35 in 301)

World of Warcraft: The Rise of a Subculture is a film that focuses on the emerging subculture created by the Massively Multiplayer Online Role Playing Game (MMORPG) called World of Warcraft. As of March 2006, World of Warcraft has more than 8,000,000 player’s worldwide. 1.9 million of these subscribers are from the United States alone. The film focuses on interviews with my subject Ben Clarke. Ben Clarke has been playing World of Warcraft since the release date of November 23rd, 2004. Throughout the movie Ben is presented with a wide range of questions from the filmmaker on topics like explaining the rudimentary aspects of the game, to more in depth questions such as whether or not aspects of World of Warcraft enter into his daily life and if they contribute to life skills.

BENEFAT AS AN ACCEPTABLE FAT SUBSTITUTE FOR COOKIES
Southards, Kasey; Balandova, Zhenya; Walker, Heather
Faculty Mentor(s): David Gee, Health, Human Performance & Nutrition
Session: 36 (Poster Session Afternoon in Ballroom)

Consuming low fat diets can help reduce risk factors for many leading causes of death today, such as cardiovascular disease, stroke, diabetes mellitus and some types of cancers. Benefat is
a reduced calorie structured triglyceride containing two short-chain and one long-chain fatty acids with a caloric density of only 5 kcal/gm. This study evaluated the effectiveness of Benefat as a 50% or 100% fat substitute in cookies. Sensory evaluation was done by 21 to 34 judges to determine tenderness, flavor, and moisture intensity, as well as tenderness preference and overall preference. Difference tests were done to see if subjects could tell the difference between the cookies. A significant difference was found between the control and 100% Benefat and between the 50% and 100% Benefat cookies. Objective testing was performed using a TA.XT2 universal texture analyzer (Texture Technologies Corp., Scarsdale, NY/ Stable Micro Systems, Godalming, Surrey, UK), to measure the shear and penetration force, and vernier calipers to measure cookie height. The results identified moistness and tenderness to be significantly increased with increasing amounts of Benefat in the cookie. However, flavor intensity, texture preference and overall preference were not significantly different between the types of cookies. Objective measurements of shear force and penetration force confirmed the sensory findings. Cookies made with all Benefat were significantly taller than the control cookies. In conclusion, Benefat was found to be an acceptable fat substitute in cookies.

AIDS IN SOUTH AFRICA: CRITICAL ANALYSIS OF AN ONGOING PROBLEM

Stacy, Lori
Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies

Session: 1 (Oral Session 8:00-9:40 in 135)

South Africa has an estimated 26 million people that are infected with HIV/AIDS. In spite of current attention to the presence of AIDS in South Africa, the percentages of people infected have progressed by roughly 1.2-2% per year since 1994 and AIDS is still on the rise. Drawing on analysis of some of the latest research and efforts at intervention, this project investigates the cultural, political and economic factors behind the ongoing rise of HIV/AIDS in South Africa.

FORENSIC ANALYSIS AND FACIAL RECONSTRUCTION OF A SKELETON FROM MEXICO

Steinkraus, Mark
Faculty Mentor(s): Stephen Hackenberger, Anthropology & Museum Studies

Session: 36 (Poster Session Afternoon in Ballroom)

The skeleton of a man that was found in the highland region of Michoacan, Mexico was uncovered in the summer of 2001 by a group of archaeologists from Central Washington University and the University of Connecticut. The skeleton dates to ca 5000 years ago and was only moderately well preserved. The remains were highly fragmented in a shallow grave found directly beneath a large, flat, horizontally oriented boulder. Reconstruction and forensic analysis of the bones continued during visit to Mexico in 2003, 2005, and 2007. Based on this work we can conclude that the skeleton was that of a male roughly 28 to 32 years of age and that he stood 5’ to 5’5” tall. The only visible pathological conditions are two advanced dental abscesses that were active perimortem. The upper dentition was intentionally mutilated prior to eruption of the third molars. This is most likely to accommodate some form of ceremonial prosthesis, or denture. Cranial reconstruction indicates the cultural practice of flattening of the frontal portion of the skull. Both the dental and cranial modifications provide some of the earliest evidence for these practices in Mexico. At the request of local Indian community leaders facial reconstruction will be done on the skeleton to get a glimpse of a face from the past.
ARCTIC MELTDOWN: GLOBAL WARMING AND THE ARCTIC

Stinnett, Alix
Faculty Mentor(s): Hong Xiao, Sociology
Session: 10 (Oral Session 9:55-11:35 in 137A)

This body of research analyses the issue of global warming and its particular affects on Arctic wildlife. Drawing from a multitude of sources, this study addresses both social and environmental components of the present day global warming crisis. The increase of atmospheric and ocean temperatures are melting away the Arctic’s foundation of snow and ice. A reduction of sea-ice coverage in the Arctic, which from 1973 to 2003 the Arctic lost approximately half of its ice mass thickness, leads to the reduction of a sustainable environment that serves as home to many wildlife inhabitants of the Arctic. Rising temperatures have forced many such wildlife inhabitants both aquatic and land residing, such as the Caribou, Red Fox, and several fish species, to migrate to other parts of the Arctic in order to seek refuge in familiar environments; however, this migration throws off the ecological balance of wildlife already present. Research regarding greenhouse gas emissions, Marx’s views on Capitalism, and post-Industrial economic development has been examined in order to detail the severe effects of global warming.

PHYSIOLOGICAL COMPARISON OF YOUNG AND OLDER RUNNERS

Swanson, Nicole; D’Acquisto, Leo; Pritchett, Robert; Nethery, Vince; Perkins, Ryan; Green, Amber
Faculty Mentor(s): Leo D’Acquisto, Health, Human Performance & Nutrition
Session: 11 (Oral Session 9:55-11:35 in 137B)

Purpose: Examine the metabolic and heart rate responses between younger collegiate (n=11; Y; 20.1+0.1 yr) and older (n=9, O; 45+5.3 yr) trained runners performing submaximal and maximal treadmill runs. Methods: Metabolic (indirect calorimetry), heart rate (telemetry), and blood lactate (Bla; YSI Sport Analyzer) responses were determined during a series of four submaximal runs (5 min each) at 11.3, 12.9, 14.5, and 16.1 km/hr and one maximal run to volitional exhaustion. Results: Y had a lower body fat (%BF, 6.9+1.1%) compared to O (%BF, 11.8+2.8%), with no difference observed in body weight (Y; 67.1+7.2 and O; 65.4+3.2 kg) or height (179.0+5.1 and 175.6+3.5 cm, respectively). Compared to O, Y had a greater maximal oxygen consumption (VO_{2max}, 60.9+2.2 vs. 58.3+2.6 ml/kg/min), maximal HR (HR_{max}, 192.9+5.5 vs. 178.1+7.1 bpm), maximal running speed (19.8+0.68 vs. 19.0+0.92 km/hr), and time to exhaustion (618.1+89.5 vs. 529.8+82.2 sec) (p<0.05) during the maximal run. HR response was higher for Y compared to O during the submaximal runs. VO_{2} was greater for O at the higher speeds (14.5, 16.1 km/hr) compared to Y (p<0.05). O ran at a greater %VO_{2max} for the submaximal runs. Conclusions: Higher maximal running speeds and time to exhaustion observed in Y was due to a greater aerobic power and better running economy.

THE COGNITIVE AESTHETIC: ART MUSEUM AS EDUCATOR

Talley, Sharon
Faculty Mentor(s): William Folkestad, Art
Session: 19 (Oral Session 1:20-2:40 in 137B)

Visitors attend art museums and libraries for two main reasons: education and entertainment. The most striking difference between the two is that in a library, visitors are encouraged to remove books from the shelves, but touching museum art is prohibited. Curators typically
categorize art by period, style and artist. Similarly, librarians categorize books by genre, subject and author. While this method of organization may help visitors to locate books, simply reading the covers will not provide sufficient information to understand the book in its entirety. Traditional art museums however, have historically asked visitors to do just that using wall labels. This study found that in order to attract and keep a broader audience, contemporary art museums are taking steps to provide visitors with more than just an aesthetic experience; they are also working to provide greater access to information and expanding educational programs.

USING A GIS TO FIND A NEW GEOCACHE LOCATION IN BELLINGHAM, WA
Thompson, Jason
Faculty Mentor(s): Nancy Hultquist, Geography and Land Studies
Session: 35 (Poster Session Morning in Ballroom)

As a game that is geographic in nature, the sport of geocaching can be analyzed using a Geographic Information System (GIS). I suggest that certain areas of the City of Bellingham, Washington, experience more geocaching activity than other places within the city because of a number of reasons, including shopping destinations and road networks. Using a GIS, I interpolate a surface of "geocaching activity" to serve as a model of the busiest and most popular geocaching areas. Using this model, I am able to predict the location of a general site within this city where a very frequently-found geocache may be placed.

LOW COST USB OSCILLOSCOPE
Thorsvik, Jonathan
Faculty Mentor(s): Lad Holden, Industrial & Engineering Technology
Session: 17 (Oral Session 1:20-2:40 in 135)

The goal of my project was to develop a low cost oscilloscope. The oscilloscope is a critical tool for anyone working with electronics as a hobby or commercially. Most oscilloscopes are priced far too high for the average person to afford, thus I have designed a low cost PC based solution to this barrier. The original version ran on a PIC16 series micro-controller using RS232 to transfer data to the PC for display. I then moved the design to use a dsPIC33 series micro-controller and transfer data over a USB connection (emulating a serial port). Through the use of buffering the system is quite functional, I am however working to increase the data transfer rate to expand the possibilities of this oscilloscope. Since the oscilloscope now uses USB and is fully functional I feel my design goals have been met, I do however hope to continue developing on it until can compete with oscilloscopes that cost about $500.

THE MANIPULATION OF LANGUAGE IN THREE WORKS OF WESTERN CULTURE
Tonnemaker, Heather
Faculty Mentor(s): Matthew Altman, Philosophy, Laila Abdalla, English, Gerald Stacy, English – Douglas Honors College, Roxanne Easley, History
Session: 20 (Oral Session 1:20-2:40 in 140)

Throughout their evolution, rhetoric and rhetorical strategies have altered significantly with every historical and philosophical movement, such as those of the Renaissance, the Enlightenment, and Modernism. Three significant works from each of the aforementioned movements, Macbeth by William Shakespeare, The Declaration of Independence by Thomas Jefferson, and Nineteen Eighty-Four by George Orwell, express serious political messages through the issue of how
language is manipulated. In each work, the author demonstrates the hazardous repercussions of rhetorical strategies as employed by various characters. Indeed, a political voice exists within the Declaration that has a public persona and is not Jefferson's own voice. The characters in the different works use different rhetorical strategies: equivocation in Macbeth, universals in The Declaration of Independence, and doublespeak and Newspeak in Nineteen Eighty-Four. Through the characters, each author shows the power as well as the danger behind rhetorical strategies, and each author makes a distinctive comment on the nature of rhetoric and linguistic manipulation. Such attitudes towards linguistic manipulation that the authors have towards linguistic manipulation are due to the historical and philosophical contexts in which they wrote.

HISTORICAL GLACIER AND CLIMATE FLUCTUATIONS ON MOUNT ADAMS, WA AND EFFECTS ON REGIONAL WATER SUPPLIES
Treser, Jared
Faculty Mentor(s): Karl Lillquist, Resource Management
Session: 9 (Oral Session 9:55-11:35 in 135)

Climate fluctuations since the Little Ice Age have produced a variety of responses in the areal extent of glaciers in the Pacific Northwest. Variability in the magnitude and timing of glacial meltwater has accompanied these climate shifts. Research has been shifting toward the development of accurate glacier-climate models to aid in the determination of glacial meltwater contributions to streamflow. This research fills a void in our current knowledge by addressing: 1) the terminus fluctuations and areal extent of each of the twelve glaciers on Mount Adams, Washington since ~1900; 2) the role climate has played in these fluctuations; and 3) the historic and current effects of glacier change on Klickitat River discharge. Preliminary analysis of the data shows similar patterns on Mount Adams’ debris covered termini with retreat through the late 1940s, followed by advance through the mid-1990s, and stable to slight retreat through 2006. Adjusting for significant increases in each glacier’s lag and response time as a result of heavy debris cover, these termini changes reflect patterns seen in weather and climate events, driven by the Pacific Decadal Oscillation. Slight deviations from this pattern can be attributed to localized differences in aspect, slope, altitude, topography, and debris cover thickness. The resulting information will add to our growing knowledge of glacier-climate interactions and aid decision makers in managing regional water supplies.

REPLACEMENT OF TRADITIONAL AUTOMOTIVE INSTRUMENTATION WITH DIGITAL GRAPHICAL INSTRUMENTATION (DGI)
Tunnell, James
Faculty Mentor(s): Lad Holden, Industrial & Engineering Technology
Session: 17 (Oral Session 1:20-2:40 in 135)

In the automotive industry, gauges and indicator lights have been the primary means for a car to communicate information to a driver. The integration of computer systems in a vehicle’s operations both expands and complicates the communication that can occur. Digital Graphical Instrumentation (DGI) is a more sophisticated method of instrumentation than gauges and indicator lights. In addition to being better suited for interfacing to computer-based control systems, it brings a dynamic dimension to instrumentation that can not be achieved with a static layout. This project uses an Intel PXA270-based System-on-Module to implement DGI on a color LCD. The instrumentation chosen targets application in an electric vehicle, and includes speed, battery charge remaining, battery discharge rate, miles remaining, and several dummy lights.
SIZE DISTRIBUTION OF *Margaritifera falcata* FROM THE SANDERS SITE (45KT315)

VanTine, Launi

Faculty Mentor(s): Steven Hackenberger, Anthropology & Museum Studies

Session: 36 (Poster Session Afternoon in Ballroom)

The mean size of shell was measured from trench 1502 of the Sanders Site (45KT315) in order to see if there was change in shell size overtime. Twenty-five comparison *Margaritifera falcata* were measured to find correlations between tooth height, hinge length, and shell length in order to assume shell length for the fragmented archaeological specimens. The archaeological specimens were found to be statistically smaller than the comparison specimens, which may be due to the fact that the shells from the site came from a limiting environment (Johnson Creek). Analysis of variance (ANOVA) revealed that there was no statistically significant change in mean size through time (levels). Therefore it is assumed that no over-exploitation by humans occurred to the shellfish population of the Sanders Site.

IDENTIFYING POTENTIAL ARCHAEOLOGICAL WET SITE LOCATIONS IN THE PUGET SOUND LOWLANDS, WASHINGTON: A GEOSPATIAL INVESTIGATION

VanTine, Launi

Faculty Mentor(s): Steven Hackenberger, Anthropology & Museum Studies; Marc Fairbanks, Facilities Management Department

Session: 36 (Poster Session Afternoon in Ballroom)

Archaeological wet sites offer unique preservation of organic materials, yet few wet sites are currently identified in the Puget Sound. A Geographic Information Systems (GIS) model was constructed to determine potential locations of wet sites in the southern seven inlets of the Puget Sound. The Qwu?gwes archaeological wet site in Eld Inlet, an ancestral site of the Squaxin Island Tribe, was used to determine model variables for identifying other wet site locations. ArcGIS 9.2 was utilized to map slope, aspect, soil type, and elevation for all seven inlets in the study area. Variables were evaluated using a Weighted Overlay to construct wet site probability zones. The preliminary model suggests there are potential conditions for the existence of more wet sites in the southern Puget Sound. Model results will be disseminated to the Squaxin Island Tribe to contribute to awareness and conservation of wet sites in the region. The addition of comparative identified wet sites and archaeological field investigation is needed to validate the model’s findings.

INVESTIGATING VARIABILITY IN PREHISTORIC STONE TOOL ASSEMBLAGES FROM THE SOUTHERN WASHINGTON CASCADES

Vaughn, Kevin

Faculty Mentor(s): Dr. Patrick McCutcheon, Resource Management

Session: 36 (Poster Session Afternoon in Ballroom)

Concentrations of artifacts are identified as 'sites' and after analysis, classified as 'sites types' such as 'Quarry Site' or 'Camp Site.' The concept of 'site type' is ubiquitous in the archaeological literature and often manifests itself as a primary unit of analysis in comparisons of the archaeological record. However, 'site type' comparisons suppress variation by subsuming artifact characteristics into predetermined classes, which are then used to infer the kinds of
activities that occurred at particular locations. We find this approach unfortunate as the variability that was initially identified is lost in reified interpretations of past human land use stories. We argue that an alternative approach, which focuses on variation in the archaeological record rather than some essential behavioral quality of interpretation, allows for discriminating inter-site comparisons based on artifact traits. This approach, known as 'artifact-scale' analysis, focuses on the distribution of specific traits of artifacts rather than the occurrence of 'site types' on the landscape. Artifact trait distributions are compared between localities so that differences and similarities can be identified statistically to determine if significant relationships exist across space. In this manner differences in stone tool technology and/or function are discriminated and multiple traits can be compared to identify what activities people performed at each locality. Using data from five different localities in the southern Washington Cascades we demonstrate this approach by comparing the distribution of technological and functional traits across those assemblages. The differential occurrence of these frequencies across space is compared to ecological setting and resource availability.

TOURIST IMPACT ON TIBETAN MACAQUE (MACACA THIBETANA) BEHAVIOR: MACAQUE RESPONSES TO TOURISTS OF DIFFERING SEX AND AGE

Vaughn, Clare; Sheeran, Lori K.; Matheson, Megan D.; Li, Jinhua; Wagner, Steven R.
Faculty Mentor(s): Lori K. Sheeran, Anthropology & Museum Studies; Megan D. Matheson, Psychology

The growth of ecotourism in China has the potential to lead to a more environmentally conscious country but ironically may cause damage to the very wildlife Chinese citizens hope to conserve. The Valley of the Wild Monkeys in Anhui Province is an example of how tourists can potentially impact wildlife. In this study, I used focal-animal sampling to collect data on aggressive responses of macaques to tourists of differing age and sex. The hypotheses were: 1) adult female macaques will interact more with human females, 2) adult male macaques will interact more with human males, and 3) adult macaques will interact more with human adults than with children. Macaques were found to threaten adults significantly more than children (z=7.07, p<0.01). There was no overall difference in overall threats given to human males versus females (z=1.5, n.s.). Contrary to the hypothesis, adult female macaques were found to threaten human males significantly more than human females (z=0.52). Adult male humans were threatened 13 times (57%) by adult male macaques. Adult macaques threatened adult humans 44 times (85%). This study will hopefully provide future researchers methods to study the interactions between macaques and tourists, and how these interactions as well as ecotourism as a whole, impact the macaque population.

REDUCING THE BARRIERS TO SMALL-SCALE LIVESTOCK PRODUCTION IN WASHINGTON STATE

Vicklund, Korbie
Faculty Mentor(s): Nancy Hultquist, Geography and Land Studies; Rex Wirth, Public Policy

During my internship at the Washington State Legislature I worked for Senator Ken Jacobsen from the 46th District in Seattle. While working there I researched various policy options for reducing the barriers to small-scale livestock producers and enhancing the farm to market connection. Senator Jacobsen sits on the Agriculture and Rural Economic Development Committee and has always had an interest in Ag issues. He was the sponsor of the original legislation creating the organics commission in Washington. He is also aware of the increasing
demand for fresh local agricultural products including meat. I am a small farmer and am very aware, and frustrated by the regulatory barriers impeding farmers’ ability to sell to their products in their communities. At the direction of Senator Jacobsen, and with much help from Bob Lee, the coordinator of the ARED Committee, I researched the policy options and we wrote three bills that were introduced at the end of the 2008 legislative session. They are SB 6954, 6955 and 6956. They were submitted to get the issue out on the table and start conversation about the need for reform in meat policy in Washington State. I have introduced them to various stakeholders throughout the state and they will be improved and changed as necessary and reintroduced next legislative session.

IDENTIFICATION AND MAPPING OF CULTURAL FEATURES HELLS CANYON NRA, (10NP464) COUGAR BAR, NEZ PERCE COUNTY, IDAHO
Volkenand, Todd; Nauer, Christian; Barrett, Kari; Stanley, Stacy; Killsnight, Adriann; Otu-tei, Clement
Faculty Mentor(s): Morris Uebelacker, Geography and Land Studies
Session: 1 (Oral Session 8:00-9:40 in 135)

This presentation discusses the findings of archaeological field survey conducted by members of the 2008 Geography of the West field class at Cougar Bar. In 2007 a wild land fire burned over the study area providing our crew a rare opportunity observe post fire ecological conditions while enjoying the greatly improved archaeological visibility. Contextualized by results of geophysical remote sensing work done by archeo-imaging lab director Kenneth L. Kvamme (University of Arkansas) and pedestrian survey of previous (Central Washington University) classes our objective was to enrich the existing cultural knowledge base through landform based pedestrian survey. Removal of the pre-existing vegetation by recent fire exposed subtle and previously obscured cultural features associated with Native American, Chinese mining period and Euro-American homestead period land use of Cougar Bar. Several previously unrecorded cultural features and artifacts were identified and recorded. Field derived spatial data was entered into ArcGIS 9.2 and layered over a combination of digital raster graphic mosaic, digital ortho quad mosaic and national elevation ten meter datasets to create a distributional map of artifacts and associated cultural features visible on the surface of Cougar Bar.

IDENTIFICATION AND MAPPING OF CULTURAL FEATURES HELLS CANYON NRA (10NP464), COUGAR BAR, NEZ PERCE COUNTY, IDAHO
Volkenand, Todd; Stanley, Stacey; Barret, Kari; Killsnight, Adriann; Otu-tei, Clement; Nauer, Christian
Faculty Mentor(s): Morris Uebelacker, Geography and Land Studies
Session: 36 (Poster Session Afternoon in Ballroom)

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ARE ECONOMIC VARIABLES AND NEW HOME SALES IN THE U.S. RELATED?

Voronov, Eliyahu  
Faculty Mentor(s): Mike Lundin, Mathematics  
Session: 35 (Poster Session Morning in Ballroom)

This study will explore the question whether economic variables like unemployment and new homes sales in the U.S are related. I will concentrate on looking at one long run and one short run time interval, data used from 1963 till 2007 will be used for the long run model and 1990 till 2007 for the short run model. Drawing constructive conclusions based on the statistical significance of the statistical models used will be done through the use of linear regression and time series analysis. Data presented in this study will be retrieved from government resources which are used by the financial industry and decisions makers alike. Making the information used in this study very reliable. Major problems of this study are the time series nature of the data, it’s impossible to retrieve multiple samples of the data to forecast future trends. An association might exist between economic variables and new home sales which will enable us understand how these two variables act in relation to each other. I will test economical variables such as CPI, Consumer Confidence, PPI, GDP, interest rates for any associations to new home sales. Any statistically significant economic variables will be added to the time series model to forecast future trends in new home sales. Many industries such as the construction industry would benefit from being better prepared for fluctuations in demand for new home sales. Such forecast will enable firms to reduce variable costs, making firms more efficient.

A KNIGHT OF STORIES: A COMMUNITY STORYTELLING EVENT AS CIVIC ENGAGEMENT

Walker, Sharryn; Fauth, Megan; Swick, Jenny  
Faculty Mentor(s): Sharryn Walker, Civic Engagement  
Session: 27 (Oral Session 2:55-4:15 in 140)

When academic service learning (ASL) is integrated into teacher education, the pre-service teachers involved gain a deeper understanding of theory and practice, while interacting within the local community. ASL gives students a chance to build teamwork and leadership skills, while making classroom learning relevant. During Winter Quarter 2008, pre-service teachers enrolled in EDRD 419 Storytelling Techniques planned and participated in a community storytelling event at Mt. Stuart Elementary. This session, co-sponsored by the Mt. Stuart Title I Program was fulfilled the expectation as a CWU Academic Service Learning experience. Additionally, this event met the requirement of a Family Literacy Event for the Mt. Stuart Community, a necessary component of Title I. Through this poster session, the pre-service teachers and their instructor will explain the process for planning such a community event. Pre-service teachers were paired in order to plan a 30-minute storytelling session in which Mt. Stuart families could attend. This planning process also included making contacts with the Mt. Stuart Staff, setting up the site, and advertising the event. As part of the planning process, the course Blackboard was used as the communication vehicle between the pre-service teachers. The successes and challenges of planning this event will be described. Successes included the enthusiastic reception by the Mt.
Stuart Community, while one of the challenges was the inability to predict the number of people who might attend the event. Revisions for next year’s Community Storytelling Event at Mt. Stuart Elementary will also be discussed.

DE TOCQUEVILLE IN AMERICA
Wallace, Elizabeth
Faculty Mentor(s): Matthew Altman, Philosophy – Douglas Honors College
Session: 27 (Oral Session 2:55-4:15 in 140)

In 1832, French aristocrat Alexis de Tocqueville visited America to study the new country’s prisons, but ended up writing one of the most insightful and prophetic accounts of democracy in America and its implications on society. De Tocqueville commented on education, and predicted America’s propensity for mediocrity in this realm, attributing it to the culture’s love of equality. He also thought negatively about individualism, which he believed ultimately dissolved into selfishness and hindered Americans’ contributions to society. Even today, educational legislation supports de Tocqueville’s claims of average achievement among Americans. However, his view of individualism is incorrect, as it is the main feature that will save the educational system. The negative effects of modern educational legislation can be reversed if teachers see students as individuals and teach accordingly.

THE RECENT EXPRESSIVE LEXICON OF A CROSS-FOSTERED CHIMPANZEE
Wallin, Jason; Jensvold, Mary Lee; Fouts, Roger; Fouts, Deborah
Faculty Mentor(s): Mary Lee Jensvold, Chimpanzee and Human Communication Institute
Session: 35 (Poster Session Morning in Ballroom)

This study examined the signs used during the last eight years by Tatu, a 32-year old female chimpanzee who lives at the Chimpanzee and Human Communication Institute (CHCI). Tatu was cross-fostered--raised as if she were a deaf human child--for the first five years of her life. In this rich and engaging environment, Tatu (and other cross-fosterlings) acquired signs of American Sign Language (ASL) in patterns that paralleled those of human children. Now at CHCI, Tatu and other signing chimpanzees continue to be frequent conversational partners with their human caregivers and one another. This study considers the signs of Tatu’s recent conversations, using data from daily sign checklists collected between 2000 and 2008. These checklists record the first observation of a sign each day, so this study is a measure of the variety of signs she uses, not a measure of her overall production. Tatu used 50,686 sign types during this period, averaging 17 different types each day. The average number of signs Tatu signed each day increased over these years, from 13 per day in 2000 to 19 in 2007. Tatu used 90% of the words in her vocabulary, from a number of different categories, during at least one day during this period. Finally, Tatu showed considerable variety in the signs she employed day-to-day, never using the same subset of signs on two consecutive days. In the future, this research will be expanded to describe the signs of the other CHCI chimpanzees and to include 20 additional years.
IDENTIFYING WILD HORSE IMPACTS USING AERIAL PHOTOGRAPHY

Walling, Jessica
Faculty Mentor(s): James Huckabay, Geography and Land Studies
Session: 36 (Poster Session Afternoon in Ballroom)

In 1971, the Free-Roaming Wild Horse and Burro act was passed into law, requiring these animals to be protected (from harassment, branding, capture, or death), managed, and controlled on public lands. Further, as declared by Congress, the act viewed them as living symbols of the historic and pioneering spirit of the West. It placed their care into the hands of federal agencies, like the Bureau of Land Management. However, though there had been a decline in wild horse numbers previous to the passage of the act, their protection saw a rapid rise in their population on the rangelands of the United States. This has implications for the health of the wild horse herds, as well as the health of the rangeland that they share with other wild and domestic ungulates. This project is an examination of how aerial photography and its interpretation might be used to identify horse grazing impacts on the landscape.

DETERMINATION OF HOST TO ACTIVATOR ENERGY TRANSFER EFFICIENCY IN YBO$_3$:$\text{Eu}^{3+}$ AND (Y,Gd)BO$_3$:$\text{Eu}^{3+}$

Warren, Katie
Faculty Mentor(s): Anthony Diaz, Chemistry – Science Honors Research Program
Session: 13 (Oral Session 9:55-11:35 in 201)

(Y,Gd)BO$_3$:$\text{Eu}^{3+}$ is the red phosphor in plasma displays and mercury free lamps. In this work the non-radiative host to activator energy transfer efficiency of YBO$_3$:Eu$^{3+}$ is being compared to (Y,Gd)BO$_3$:Eu$^{3+}$. Energy transfer efficiency is determined by taking excitation and reflectance spectroscopy under vacuum ultraviolet (VUV) excitation. It is well known that co-doping YBO$_3$:Eu$^{3+}$ with gadolinium increases the emission intensity. This research has determined that the addition of gadolinium increases the transfer efficiency.

I WANT YOUR GARBAGE: FOOD SCRAP RECYCLING AND THE CENTRAL WASHINGTON UNIVERSITY COMMUNITY

Washington, Natalie
Faculty Mentor(s): Hong Xiao, Sociology
Session: 10 (Oral Session 9:55-11:35 in 137A)

Currently in the United States the system of waste disposal has led to an over abundance of food related waste. This recyclable material typically accounts for 30% of the average landfill. With the increasing number of landfills filling to the brink, it is becoming more necessary to find sustainable ways of disposing of the waste we create. Central Washington is no exception to this problem. The largest amount of waste produced at CWU that has no option to recycle comes from Dining Services. This project was created to discover the waste production at Central, the recycling programs that are currently used, and the ways that implementing a food scrap recycling program would benefit the campus and Ellensburg communities. Data was collected from cities and universities across the country that already have food waste recycling programs in affect. Additional interviews with the local waste department, as well as with on-campus personnel, provided information that pertains directly to the Ellensburg waste problem. A survey was conducted at CWU to see the likelihood of a program such as this being actually used by students if implemented. Through these methods, a plan of action that could feasibly be
started locally was drawn up, and a scale model of the food scrap recycling process was built.

THE AGING URBAN FORESTRY: AN ANALYSIS OF THE LONGVIEW, WA STREET TREE PROGRAM

Weber, Juliana
Faculty Mentor(s): Rex Wirth, Political Science

Session: 10 (Oral Session 9:55-11:35 in 137A)

An analysis of the Urban Forestry program in Longview, WA is necessary to reform the current policies. Thousands of trees have grown to dangerous over maturity posing a threat to the community, but poor policy has provided inefficient removal and replacement procedures due to defective budgeting. An expansive GIS documentation is necessary to organize the current trees to understand and track trends of needed tree maintenance and replacement. Necessary components in this research are to accurately assess the funds required for the removal and replacement costs, an organization of each tree into zones using the GIS program, and the implementation of a 15 year plan I have strategically crafted. My analysis and new policy will be presented to the City Council in the hopes of influencing the program future. Many cities are facing this issue, as aging trees in communities have been left neglected and safety has been compromised, in this regard I wish to pursue publicizing my analysis further as an example of accurate budgeting to maintain such an important program.

KEEP YOUR FRIENDS CLOSE, YOUR ENEMIES CLOSER

Weitzel, Christie
Faculty Mentor(s): Robert Hickey, Resource Management

Session: 36 (Poster Session Afternoon in Ballroom)

In today's political climate, the citizens of the United States are led to believe that there are outside entities plotting to attack the United States. Our allies, on the other hand, enjoy treaties that include free trade, and further economic benefits. In this climate of political and economic uncertainty, I propose to analyze the terrorist threat and the economic ties of 150 nations in order to fully understand the danger posed to the United States. I will compile information for each country in a spreadsheet detailing trade relations with the United States, whether the nation has an existing economic treaty with the United States, and the terrorist threat posed by each nation. For each category, the data will be assessed on a scale of 1-5, 1 offering the least amount of threat while 5 is the highest amount of threat. After scoring each category, each nation will have an overall score with the highest scores posing the most threat to the United States. Each category will be weighted according to the level of threat posed. The final display of the data will be a unique cartogram map, designed to display the data accordingly, and normalized by population data from each of the countries listed. This graphic will offer a unique look at which nations pose the most danger, and which nations pose the least danger based upon terrorist threats and the economic ties to the United States.
IMPLEMENTING READING RESPONSE TO INTERVENTION MODELS: PILOT PROGRAM PRACTICES IN WASHINGTON STATE

Weston, Juliette  
Faculty Mentor(s): Christina Curran, Majsterek David, Education  

Session: 12 (Oral Session 9:55-11:35 in 140)  

As educators throughout the country look to evidence-based practices for improving reading achievement and providing early remediation to struggling readers, 3-tiered Response to Intervention (RTI) reading models are being implemented in growing numbers seeking to determine whether RTI models can provide solutions to these challenges are faced with the questions of where to start, what to do, and how to implement such models. In Washington State, the Office of Superintendent of Public Instruction (OSPI) has laid the foundation for the infrastructure, supports and training needed as schools pilot RTI models. More than 42 schools in 21 Washington school districts participated in the state’s OSPI pilot program for RTI reading models during the 2006-2007 school year. Major goals of the program focused on early reading remediation, reduction in referrals for special education, and improved reading scores. This study documents the first-year implementation practices of 27 schools that took part in Washington State’s RTI pilot program. Surveys were sent to participating schools whose RTI programs addressed reading intervention. RTI planning team representatives provided information on types of curricula and assessments used at each tier of intervention, how closely those curricula and assessments were aligned, what types of educators were implementing interventions at each tier of intervention, alignment of curricula and assessments used, roles of educators implementing interventions at each tier, types of expenses incurred in the implementation process, structure of district-level leadership assisting in the implementation, and reading goals set for each year’s implementation.

SHOWCASE  

Whitcomb, Katharine; Nelson, Jessi; Pybon, Rachel; Burt, Andy; Ross, Amanda; Grass, Brennan  
Faculty Mentor(s): Katharine Whitcomb, Lisa Norris, Joseph Powell, English  

Session: 22 (Oral Session 1:20-2:40 in 202)  

The English Department would like to showcase our student-edited, student produced annual literary and arts magazine. The presentation will feature a series of short readings by student writers whose literary work is featured in the current issue of and by students on the editorial or production staff of the magazine. The faculty editorial supervisor, Katharine Whitcomb, will introduce the reading with a few words about and the Manastash Practicum classes.

THE THEOLOGY OF THE FALL IN ROBOTIC SCIENCE FICTION FILMS  

Wickersham, Katy  
Faculty Mentor(s): Heidi Szpek, Philosophy - Religious Studies  

Session: 34 (Oral Session 4:30-5:50 in 140)  

Modern films are often used to explore social and cultural themes in an oblique way; many science fiction films examine religious themes, such as the relationship between the creator and the created. In my presentation, I suggest that there is a direct correlation between the Judeo-Christian relationship of God to man, and the relationship between man and his creations in the science fiction films _I, Robot, Blade Runner_, and _A.I.: Artificial Intelligence_. Specifically, I suggest that these films parallel the Genesis story of the Fall, and that while all aspects of the
Fall story are incorporated, each film focuses primarily on one aspect: self-awareness, sin, or reconciliation.

**UTILIZATION OF THE NUCLEAR GENE XDH TO INFER PHYLOGENETIC RELATIONSHIPS IN GYMNOSPERMS**

*Wilcox, Kevin; Peery, Rhiannon; Raubeson, Linda*

Faculty Mentor(s): Linda Raubeson, Biological Sciences

Session: 33 (Oral Session 4:30-5:50 137A)

Nuclear genes in plants make useful phylogenetic markers due to their high variability. However, chloroplast and mitochondrial genes have made up the majority of genetic markers used in plant studies because they are easy to sequence. Now, as sequencing of nuclear DNA has become more plausible, phylogeneticists have started to explore nuclear markers. The nuclear gene for xanthine dehydrogenase (XDH) has shown promise in flowering plants. We wanted to test its utility in gymnosperms. To do this, several things had to be accomplished: primers with a high locus specificity had to be created, an efficient amplification environment had to be found, nucleotide ambiguities (due to allelic differences) had to be tested for and the phylogenetic resolution provided by this marker had to be determined. First, we underwent three rounds of primer design until we found two sets of primers that specifically amplified the desired sequence universally. Next, after trying a number of different PCR recipes, we found a combination that reduced folding and promoted a single product. This solution contained an increased concentration of primers, bovine serum albumin and 10x enhancer with betaine. We then generated sequence data that showed very few ambiguities associated with heterozygosity and when they were there, they were easily identifiable. Lastly, a preliminary analysis of XDH sequence data in the Podocarpaceae (a family of gymnosperms) showed that the data is promising as a phylogenetic marker, generating a well-resolved tree that supports some phylogenetic relationships suggested by other markers while contrasting with others.

**THE PRESENCE OF SOCIAL JUSTICE IN BIBLICAL JUDAISM**

*Wilder, Kimberly*

Faculty Mentor(s): Heidi Szpek, Philosophy; Liahna Armstrong, English – Douglas Honors College

Session: 34 (Oral Session 4:30-5:50 in 140)

I will be looking into the relationship between the religious beliefs of the Israelites and their adherence to social justice within their society as these are presented in the Hebrew Bible. I will begin with their Exodus from Egypt, for this is a forming point in their history where they really become a people that can be identified and studied. It is at this time that their society is developed, their laws are established and their cultural identity is solidified. The supremacy of God over all aspects of their life identifies them specifically. He is not simply a deity of the harvest or fertility, but His laws literally touch all aspects of their lives. Their acknowledgement of God as sovereign influences their commitment to His laws. In Egypt, they experience the pain that follows social injustice. They are enslaved for centuries by the Egyptians, and are ruled harshly” beaten, mistreated, and having their children massacred by the Egyptians. The need to maintain justice is understood keenly by the Israelite people who have suffered at the hands of an unjust people. Thus, through their identity as God’s chosen people and their own experience of suffering injustice, social justice has become part of the Israelite identity, whether or not they are perfectly following the justice code. I will also be using the Books of Ruth and Amos to study how these concepts are either applied or neglected in later moments of Israelite history.
INTO THE LANDS BETWEEN: VICTORIAN TRANSGRESSIONS OF GENDER, NATIONALITY, AND SEXUALITY IN BRAM STOKER’S DRACULA

Willden, Andrew
Faculty Mentor(s): Jason Knirck, History
Session: 29 (Oral Session 2:55-4:15 in 202)

Research done over the past twenty years has held the view that Bram Stoker’s Dracula expresses the unconscious fears of change and upheaval in late Victorian society by projecting them onto a single being, the insidious Count Dracula. While true, the key flaw in this analysis is that it has parochially presupposed that the plot of the novel and the placement of Dracula as a person within Eastern Europe is only of superficial relevance, providing a frame to express abstract concepts of the Victorian horror at sexual inversion and the collapse of social order. Instead, a re-reading of the text in light of recent research into post-colonial notions of gender, sexuality, and identity suggests that thematic issues in Dracula are not solely indicative of an abstract sublimation of social fears onto a fictitious body, but instead represent the connection of those social fears to larger issues between the real world entities, nationalities, and places. This study hinges on exploring this correlation in context of late 19th century British imperialism, and how the representations of the conflict between foreign lands and foreign bodies symbolizes the larger divide between the East and the West, or more allegorically, the civilized world and the primitive world.

USING Sr AND Pb ISOTOPES TO IDENTIFY MAGMATIC PROCESSES AT BAITOUSHAN VOLCANO, CHINA

Wilson, Rodger; Ramos, Frank; Gill, James
Faculty Mentor(s): Frank Ramos, Geological Sciences
Session: 36 (Poster Session Afternoon in Ballroom)

Using Sr and Pb isotopes to identify magmatic processes at Baitoushan volcano, China. Abstract Baitoushan volcano on the border of mainland China and North Korea, is a geologic enigma. Petrologic, geochemical, and geophysical models addressing the origin of the volcano must account for the generation of highly evolved, peralkaline eruptive products having potential sources ranging from highly differentiated, mantle-derived melts, crustal-derived melts, to varying mixtures of these sources. Structural influences on both location of Baitoushan and related volcanic products include: the actively subducting Pacific oceanic plate 700 km beneath the region, hot upwelling asthenosphere and progressively thinning sub-crustal lithosphere, which is in-turn overlain by (~3.0 Ga) Archean age crust. Many fundamental questions at Baitoushan remain unanswered: What are the geologic processes that sustain this active volcano? Is the volcano subduction-related, rift related, or hotspot related? Could Baitoushan be a unique mix of all the above? To account for petrologic and geochemical characteristics of volcanic rocks at Baitoushan, analyses of whole rock and single grain Sr and Pb isotopes were undertaken. The analyses targeted comenditic pumice erupted from the summit (tentatively dated at 4000 BP) and a Holocene age (<10,000 yr) alkali basalts, the least differentiated products from the volcano, which were extruded along the lower flanks of the edifice. Similarity between $^{87}\text{Sr}/^{86}\text{Sr}$ ratios in highly-evolved pumices and low silica basalts indicate that the latter have assimilated crustal rocks or incorporated crustal melts on their rise to the surface. This is supported by lower $^{87}\text{Sr}/^{86}\text{Sr}$ ratios in clinopyroxene versus plagioclase.
MONITORING MOVEMENT OF THE NACHES LANDSLIDE
Wilson, Rodger; Shurtleff, Brett
Faculty Mentor(s): Lisa Ely, Geological Sciences
Session: 36 (Poster Session Afternoon in Ballroom)

Anecdotal evidence suggests the Naches landslide is at least 40 years old. Limited geologic studies have been conducted near the slide. For this study, twelve geodetic stations were established on the Naches Landslide in late April 2007. The stations were re-occupied on a weekly basis between 30 April and 23 May 2007, and on a monthly basis from June through October 2007 to detect possible continued downslope movement of the feature. Preliminary data indicate that downslope movement along the landslide may be correlative with seasonal precipitation.

BLUESTONE GIRLS
Witkowski, Elizabeth
Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies
Session: 16 (Oral Session 9:55-11:35 in 301)

The documentary short, Bluestone Girls, investigates the daily challenges and accomplishments experienced while attending beauty school. Group dynamics between the students as well as their interaction with their clients is explored and addressed by the subjects. Two diverse students with different background and life experiences reveal why they decided to go to beauty school, and what they have learned about the industry so far. Sammy Joe is a bubbly recent Ellensburg High School graduate who always knew she wanted to be a hairdresser, while Stephanie who has traveled and lived across the United States came to Ellensburg with her husband to go to beauty school. Theresa the director of Bluestone Academy and mentor to the girls gives an alternative perspective on the school, and the young women. The students discover how to handle possible tension and differences among themselves in a professional manner along with learning the technical skills required in order to be successful.

RADIOCARBON CHRONOLOGY FOR VANTAGE AREA PITHOUSE SETTLEMENTS: MIDDLE COLUMBIA RIVER
Witkowski, Elizabeth
Faculty Mentor(s): Steve Hackenberger, Anthropology & Museum Studies
Session: 36 (Poster Session Afternoon in Ballroom)

McGuire and Hackenberger reported five radiocarbon dates from two archaeological sites (45KT10 and 45KT27). These dates range between AD 1185 and 1650. Previous dates for house occupations along the Middle Columbia River, reported in the 1960's, include age estimates for house occupations that are as early as AD 400. New radiocarbon results obtained by Witkowski provide additional age estimates and include dates for house occupations at 45KT17 and 45KT28. These new results help place a sequence of house occupations that date to periods before, during, and after the Little Climatic Anomaly (AD 800-1300). Results suggest that as the Little Climatic Anomaly was replaced by the Little Ice Age, use of the upland resources declines and settlement intensifies along the Columbia River.
ANTS NEED THIS SOFTWARE
Woodard, Ben; Wilson, Michael; Magill, Luke; Bucse, Sorin
Faculty Mentor(s): James Schwing, Razvan Andonie, Computer Science
Session: 32 (Oral Session 4:30-5:50 in 135)

ANTS Need This Software is a project whose aim is to test an agent-driven algorithm for data distribution across a peer-to-peer network. In recent years the requirements of computers to facilitate massive data storage has increased dramatically. While many companies employ extensive data servers to this end, we propose a simpler approach. In our approach, nodes will connect to our peer-to-peer network and contribute to the data storage. Each node will be able to search through other nodes' data. This approach is advantageous over the client-server architecture that businesses commonly employ. This is because in traditional client/server systems the client manipulates the data but the server does the actual work. This is essentially a waste of the clients’ clock cycles, and the server will have a great deal of stress to cope with. Our peer-to-peer system will distribute this workload across the network, alleviating stress that would occur on the server, and giving nodes work to do.

EFFECTS OF SALVAGE LOGGING ON AN EASTERN CASCADE BIRD COMMUNITY 12-13 YEARS POST STAND-REPLACEMENT FIRE
Woodrow, Aja
Faculty Mentor(s): Dan Beck, Biological Sciences
Session: 18 (Oral Session 1:20-2:40 in 137A)

The frequency of stand-replacement fire, which results in part from past forest practices, is increasing in the eastern Cascades. There is economic pressure to remove snags after fire, yet few studies have investigated how different snag densities resulting from salvage logging after stand-replacement fire affect wildlife populations. In 1994, the Rat Creek fire burned through the Wenatchee National Forest Boundary Butte Late-Successional reserve and adjacent private land. Three stand snag densities (low, medium, and high) were selected for bird community research. Point-count, nest-monitoring and habitat data collected will provide information on the effects of salvage logging on birds 12-13 years post-fire.

THE BIRDS
Wright, Heather
Faculty Mentor(s): Chris Sousa-Wynn, Theater Arts
Session: 35 (Poster Session Morning in Ballroom)

The broad concept of this project consists of simply reading the Roman comedy, The Birds, by Aristophanes, and to ultimately create a possible set design by taking the text and theatrical elements into consideration. The challenging part of this assignment though is by far the artistic skill required to verbalize and eloquently portray a concept that makes sense to an audience, allowing them to be magically be pulled into the world you’re trying to create. This creative process requires patience and a great deal of time to research anything required to also make this “world” believable. This project challenged every student’s ability to verbalize and conceptualize their ideas into one unifying composition. To help teach us students ways to do so, concept collages and statements were produced, a drafted ground plan, as well as a scale model of our possible set design in a realistic theatre space.
SELF-DIRECTED BEHAVIORS IN TIBETAN MACAQUES AS A FUNCTION OF TOURIST DENSITY AND PROXIMITY AT THE VALLEY OF THE WILD MONKEYS

Yenter, Terrence A.; Matheson, Megan D.; Sheeran, Lori K.; Li, Jinhua; Wagner, R. Steven
Faculty Mentor(s): Lori Sheeran, Anthropology & Museum Studies

Session: 9 (Oral Session 9:55-11:35 in 135)

Prior work has found a relationship between tourist density and self-directed behaviors (SDBs) in Tibetan macaques (*Macaca thibetana*) at the Valley of the Wild Monkeys. Focal sampling was used to collect data on two groups, one with eight adults and the other with 20, during August 2007. Consistent with past research, we found that the quadrat of the study site where monkeys are at eye-level with humans was both least visited by the monkeys and had the highest SDB rates. Of the remaining tourist adjacent quadrats, monkeys spent significantly less time in these areas (T=0, n=8, p=0.01), but showed significantly fewer SDBs (T=1, n=8, p=0.02) than in non-adjacent quadrats. The current research also compared SDB rates of the two groups (YA-1 & YA-2), and found a significant difference between males in the two groups (M=0.323 per minute vs. M=0.998; U1=0, U2=27, n1=3, n2=9, p=0.01). A trend toward a positive correlation between tourist density and SDBs was found in one group in the quadrat of the study site at which monkeys are at eye-level with humans (r=0.375, df=24, p<0.10). The difference in SDB rates of the males seems counterintuitive because YA-1 had a new alpha male and a male immigrating. A possible explanation is that YA-1 has been the subject of research and ecotourism for longer and is more habituated to human presence.

CRAZY DICE

Zimmer, Alisha
Faculty Mentor(s): Tim Englund, Mathematics

Session: 30 (Oral Session 2:55-4:15 in 271)

One might wonder if you could re-label a pair of ordinary 6-sided dice and preserve the probabilities for the sums of the dice. The question was answered in the affirmative in 1978 by George Sicherman. These dice with re-labeled sides are often referred to as "crazy dice." Using the Unique Factorization Theorem of Polynomials we were able to extend Sicherman’s results and find "crazy dice" for pairs dice with a variety of number of sides. We also looked at mix/matching the dice, as in pairing a 6-sided die with a 20 sided die. Through this, patterns emerged for which combinations had "crazy dice." In addition, for some combinations the "crazy dice" did not have to be unique, meaning that there are more than one set of "crazy dice." In this presentation we will discuss the techniques we used, the solutions for a variety of pairs of dice and the pattern of existence and uniqueness that we noticed.

THE PRECISION OF TACKING AND JIBING

Zimmer, Alisha; Goodrich, Amber; McGregor, Elizabeth
Faculty Mentor(s): Dan Curtis, Mathematics

Session: 30 (Oral Session 2:55-4:15 in 271)

Tacking and jibing are sailing terms involving turning the boat so that the wind hits the boat from the opposite side. Our goal was to calculate the angle through which it would be necessary to turn the boat to preserve the angle between the apparent wind and the boat. We give a formula using only the magnitude of the apparent wind, the boat speed, and the angle between them,
which calculates the exact angle to turn the boat to produce the desired result. We implement
the calculation in a Mathematica notebook, producing a graphical display of the results.