

THE UNIVERSITY OF MONTANA PRESENTS

THE 11TH ANNUAL
UM CONFERENCE ON
UNDERGRADUATE RESEARCH



PROGRAM
AND
ABSTRACTS

APRIL 13, 2012 ~ MISSOULA, MONTANA

UNDERGRADUATE RESEARCH COMMITTEE:

James McKusick (chair), Davidson Honors College
Earle Adams, Chemistry & Biochemistry
Tim Conley, Social Work
Dan Doyle, Sociology
Julie Edwards, Mansfield Library
John Hunt, English
Joanna Klink, English
Elizabeth Putnam, Biomedical & Pharmaceutical Sciences
James Randall, Music
Garon Smith, Chemistry & Biochemistry
Megan Stark, Mansfield Library
Arlene Walker-Andrews, Academic Affairs
Andrew Ware, Physics & Astronomy

CONFERENCE COORDINATORS:

Rachael Caldwell, Davidson Honors College
Karen Kaley, Davidson Honors College

WEBSITE MAINTAINED BY:

Andi Armstrong, Davidson Honors College
Craig McNinch, Spectral Fusion

INFORMATION TECHNOLOGY SERVICES:

Adam Carroll, Presentation Technology Services
Greg Garber, University Center
Robert Logan, College of Forestry and Conservation
Jay Bruns, Division of Biological Sciences

THANKS ALSO TO THE JUDGES AND VOLUNTEERS WHO HELPED
MAKE THIS CONFERENCE HAPPEN!

UMCUR 2012

THE UNIVERSITY OF MONTANA
**CONFERENCE ON
UNDERGRADUATE RESEARCH**

APRIL 13, 2012

SPONSORED BY:

The Office of the Provost

The Office of the Vice President for Research

The Davidson Honors College

UMCUR WELCOME

We are pleased to welcome students, faculty, staff, and alumni to the eleventh annual **University of Montana Conference on Undergraduate Research (UMCUR)**. Over 120 students will present their research and creative scholarship today, and we are delighted to celebrate their accomplishments!

This conference has been a tradition at The University of Montana since 2001. Undergraduate research has the potential to create a tremendous sense of empowerment, confidence, and intellectual growth, especially for students who may never before have had such an experience. Since people will continually encounter problems without established answers throughout their professional careers, the skills gained through participation in original research aimed at creating new knowledge will have long-lasting, beneficial consequences for students of all majors.

We extend special thanks to Provost Perry Brown and Vice President for Research Dave Forbes for their support of this conference and their commitment to undergraduate research and creative scholarship. Many undergraduate research projects at UM are carried out with scholarship support, and for that support we are truly grateful to many private donors. We also extend our sincere appreciation to all faculty members who have reviewed conference proposals and mentored the students presenting at the conference. We are likewise grateful to the faculty, alumni, community members, graduate students, and undergraduates who have volunteered their time and expertise as judges and facilitators for the conference. We could not do it without you!

We trust that you will have an enjoyable day, will learn some new information, and will see that celebrating undergraduate scholarship has many benefits.

James McKusick

UMCUR Director

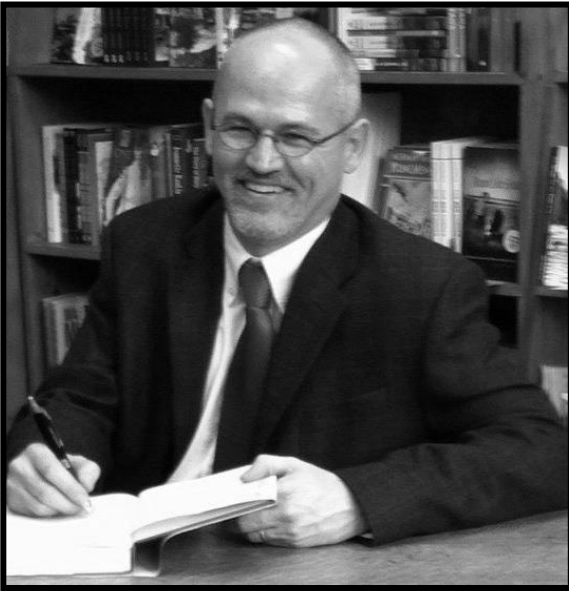
Undergraduate Research Committee Chair

Dean, Davidson Honors College



UMCUR KEYNOTE SPEAKER

12:20 pm, UC Theater ~ April 13, 2012



DR. TOBIN MILLER SHEARER

*Director, African-American Studies Program
Assistant Professor, Department of History*

The University of Montana

Prayer, Guns, and Civil Rights: How to Craft New Research Questions

Abstract:

At first glance, prayer, guns, and civil rights don't seem to go together. Little would appear to connect religion, weapons, and social movements. Yet this talk will explain the connections among the three and show how those connections reveal practical lessons about how to craft new research questions. Students in the hard sciences, humanities, social sciences, business, and other disciplines where research remains central will discover the importance of building sand piles, mapping mentalities, and sorting socks (among other engaging insights) in creating knowledge of the world around us. Rather than a dry and intimidating process, research can become a creative, energizing, and collaborative project, one that undergraduate students can contribute to in real and measurable ways. Based on a study of how one researcher came to compare public prayer by civil rights activists and the public presentation of guns by black power advocates, the talk promises to inform and excite about the invigorating challenge of research in any discipline.

About Dr. Shearer:

Tobin Miller Shearer is the Directory of the African-American Studies Program and an Assistant Professor of History at The University of Montana. His most recent book, *Daily Demonstrators: The Civil Rights Movement in Mennonite Home and Sanctuaries*, came out in 2010 from Johns Hopkins Press. He has also written two other books, multiple book chapters, and several journal articles on the broad theme of race and religion. An engaging lecturer, Dr. Shearer enjoys working with undergraduate students and teaching classes like "Voodoo, Muslim, Church: Black Religion" and "The Black Radical Tradition." Dr. Shearer's research interests have taken him to dusty attics in rural Kansas, crawfish boils in New Orleans, New York City Skyscrapers, and Pennsylvania's Amish country. An avid runner, Crossfit devotee, and backpacker, Dr. Shearer also loves to bake pies – whether peanut butter, apple, or banana cream – that he shares with his students each semester.

UMCUR GUEST SPEAKER

2:20-3:00pm, UC 332 ~ April 13, 2012

BRIDGET WHEARTY

Stanford University Ph.D. Candidate in English and University of Montana Alumna

Demystifying Grad School: From Initial Curiosity to Applications and Beyond

Have you ever done research and been surprised by how much you *enjoyed* it?

Have you discovered issues that you're *passionate* about and feel as if you've only just begun to work on them?

Have your professors ever said you should think about *grad school*?

If so, you should join Bridget Whearty for this *frank* and *engaging* conversation about graduate school.

Learn more about “grad school” and how to decide if it’s right for you, get insider tips on picking out schools and programs to apply to, find out how to manage the application process, and learn survival tips for life in grad school!

This session is open to all students – from those who are unsure about what they want to do next to those who have always wanted to go to grad school.



Students from diverse backgrounds and those who have unusual life paths are strongly encouraged to attend!

UMCUR SCHEDULE OVERVIEW

The University of Montana
Conference on Undergraduate Research (UMCUR)
April 13, 2012
UC 3rd Floor

- 8:00 AM** **REGISTRATION & POSTER SET-UP** ~ UC 3rd Floor,
Grand Foyer
- 8:45 AM** **WELCOME** ~ UC Theater
- 9:00-11:00 AM** **ORAL SESSIONS** ~ UC 326-333
- Social Sciences, Physical Sciences, Humanities, and Creative Works
- 11:00-12:00 PM** **POSTER SESSION # 1** ~ UC Ballroom
- 12:20-1:30 PM** **KEYNOTE SPEAKER** ~ UC Ballroom
- *Prayer, Guns, and Civil Rights: How to Craft New Research Questions* ~ **Dr. Tobin Miller Shearer**
- 1:40-3:00 PM** **ORAL SESSIONS** ~ UC 326-332
- Social Sciences, Life Sciences, Humanities, and Creative Works
- 2:20-3:00 PM** **GUEST SPEAKER** ~ UC 332
- *Demystifying Grad School: From Initial Curiosity to Applications and Beyond* ~ **Bridget Whearty**
- 3:00-4:00 PM** **POSTER SESSION #2** ~ UC Ballroom
- 4:00-5:00 PM** **ORAL SESSIONS** ~ UC 326-333
- Physical Sciences, Social Sciences, and Humanities

***Please check the schedules outside each room for the most up-to-date times for each presenter.*

UMCUR SCHEDULE BREAKDOWN

8:00	REGISTRATION AND POSTER SET-UP ~ UC 3rd Floor Grand Foyer
8:45	WELCOME ~ UC Theater
CONCURRENT ORAL SESSIONS: 9:00-11:00 A.M.	
SOCIAL SCIENCES ~ UC 326	
9:00	<i>Montana Dog Food: A Value-Added Montana Product, Alyssa Komac, Business Administration</i>
9:20	<i>Employment Opportunities: Are They Equal?, Caitlin Schwinden, Business Administration</i>
9:40	<i>Disruptive Innovation in Agribusiness, Tyler McGee, Business Administration</i>
10:00	<i>European Indexes: Do they behave like managed mutual funds? Jon Marchi, Economics</i>
10:20	<i>The Value of Foreign Language Study within the U.S. Labor Market, Travis Vincent, Economics</i>
SOCIAL SCIENCES ~ UC 327	
9:00	<i>The Poverello Center's Homeless Outreach Team: Looking Between the Cracks, Christopher Cadotte, Maria Newbold, & Allyson Talaska, Sociology</i>
9:20	<i>Children: Products of Their Environments?, Emily Peters & Sammy Schreiner, Sociology</i>
9:40	<i>Advancing Amidst Adversity: Missoula Homeless Shelters as High Reliability Organizations, Meghan Eckert, Communication Studies</i>
10:00	<i>Relationship Development at the Poverello, Elise Cunningham, & Leng Moua, Sociology</i>
10:20	<i>Conversations with the Homeless in Missoula: What People Experiencing Homelessness Want to Share, Paige Ely & Dustin Satterfield, Sociology</i>
SOCIAL SCIENCES ~ UC 330	
9:00	<i>The Effects of Social Movements on Policy Change, Kate Hildner, Political Science</i>
9:20	<i>Cross-Cultural Differences in Autism Spectrum Disorders, Lakiash Gregerson, Psychology</i>
9:40	
10:20	<i>From War to Reconciliation: Tajikistan and the Integration of Islam into Politics, Wesley Furlong, History</i>
10:40	<i>Minority Rules: How Being Black Saved Joan Little's Life and Unified Feminism David Baker, History</i>
PHYSICAL SCIENCES ~ UC 331	
9:00	<i>Determination of tris buffer pH using impure and purified meta-cresol Purple (mCP) indicator, Emma Jaqueth, Andre Umansky, Reggie Spaulding, Environmental Chemistry</i>
9:20	<i>Dilution of a solution could produce even more pollution, Daniel Barry, Biochemistry</i>
HUMANITIES ~ UC 332	
9:00	<i>A Campaign to End Female Genital Mutilation: An Argument Based on Common Grounds, Tess Carlson, Philosophy</i>
9:20	<i>Anonymity Unmasked: Rethinking Biography in Literary Criticism, Constance Shepardson, English Literature</i>
9:40	<i>The Pervasion of Hopelessness in a Modernist World, Ashlynn Andersen, English Literature</i>
10:00	
10:20	<i>Remembering Beneath the Big Sky, John Lovell & Sandra Williamson, English Literature</i>
10:40	<i>Ornamentation in the Baroque and Classical Eras of Music, Rebecca Pershouse, Music</i>
HUMANITIES ~ UC 333	
9:00	<i>The Roll of Syllabic Consonants in Georgian, Lindsay Combs, German</i>
9:20	<i>The Works: A Loss of Childhood Innocence and Cultural Identity, Yuanyuan Bao, Art</i>
9:40	<i>Skeletons: A Short Screenplay, Jessica Johnston, Creative Writing</i>
10:00	<i>Diversity in the American Newsroom, Emily Foster, Journalism</i>
10:20	<i>Vital Resource: Fort Belknap's Struggle to Secure the Bison as the Future of Its Economy, Victoria Edwards, Journalism</i>
10:40	<i>"Strength Enough": Recreating FSA Images from 1930-40 Eastern Montana, Jayme Fraser, Journalism</i>

POSTER SESSION: 11:00-12:00 P.M.
UC South Ballroom

- Water is for Fighting*, **Hannah Grover**, Journalism
- Brain activity preceding speech initiation*, **Jenna Griffin & Aubrie Beard**, Communicative Sciences & Disorders (CSD)
- The use of personal listening devices and multimedia by students in Great Falls, Montana*, **Cassandra VandenBos**, CSD
- Comparison of articulation intervention in children using iPad technology*, **Kelly Heard, Kelsey Johns, & Katelyn Riordan**, CSD
- Relationship between target selection and speech adaptability*, **Ashley Glover & Sarah Waarvik**, CSD
- Serially recorded otoscopy and tympanometry in children in day care*, **Meredith Levinson & Braden Warehime**, CSD
- Metacognition and allocation of study time following a traumatic brain injury*, **Sarah Flanary**, CSD
- Description of the "noise notch" in noise-induced hearing loss*, **Raquel Moes**, CSD
- Noise-induced hearing loss and the use of personal music devices*, **Emily Berendts & Allix Linrude**, CSD
- Hearing loss and iPod use among adults in Missoula, Montana*, **Laura Fullerton**, CSD
- Learning the room*, **Lindsey Schwickert**, CSD
- Assessment of Skill Acquisition and Athletic Training Student Satisfaction in Clinical Education*, **Kiri Weeks**, Athletic Training
- Misuse of Adderall and Concerta among University of Montana college students*, **Erin Burt**, Human Biology
- SPARC and extracellular matrix production after asbestos exposure*, **Cicily Tatsey-Bull Calf**, Pre-Pharmacy
- Vaccination practices and barriers in Anchorage pharmacies*, **Christopher Chong, Katherine Hale, Jean Carter, & Sherrill Brown**, Pharmacy
- Biogenic amines in neuronal development*, **Genevieve Lind, Jonathan Andrews, & Sarah Certel**, Biology
- The interaction between anastellin and beta-strands ABC, ABCD, and ABCDE from the 3rd type 3 domain of fibronectin*, **Domnita-Valeria Rusnac**, Biology
- Induction of system xc⁻ in mouse bone marrow-derived macrophages by bacterial ligands*, **Krissy Finsaas**, Human Biology
- Blood flow in skeletal muscle as it relates to force production during dynamic muscle contraction*, **Lauren Christian & Christopher Sundberg**, Human Biology
- Microscopic structure and significance of male Japanese Rhinoceros Beetle horns*, **Paul Weingarden**, Organismal Biology & Ecology
- Investigating the post-Mazama sedimentary record in lakes of western Montana*, **Ryan Kadlik**, Geosciences
- Resin duct density and flow as a function of fire damage in Ponderosa Pine*, **Daithi Martin**, Resource Conservation
- Extremophilic microbes from acidic mine waste lake produce novel anticancer compounds*, **Sarah Hamblock & Teri Girtsman**, Environmental Chemistry
- Processing of ribosomal RNA in *Borrelia burgdorferi**, **Richard LeCoutre & Melissa Hargreaves**, Biochemistry
- Investigation of cm-scale heterogeneity and relationships among organic carbon, mineralogy and rock fabric in mudstone and siltstone of the Permian Phosphoria Formation*, **Chris Gold**, Geosciences
- Investigating the paleodelta type of the Ferron Sandstone in the Willow Spring Wash, East-Central Utah*, **Jean Bullock, Martin Lang, Tetsuro Nagase, & Swiad Worms**, Geosciences
- Correlating stacking patterns between fluvial and marginal marine environments of the Castlegate sandstone*, **Evan Hanson, Rebecca Keeley, Katie Monaco, & Friedrich Volkmer**, Geosciences
- Healthy Roads, Healthy Schools: A Look into the Effects of Public Transportation*, **Christopher Cordingley**, Political Science
- Attention Deficit Hyperactivity Disorder: Age of Diagnosis, Mediation Efficacy, and Performance on the Stroop Color-Word Test*, **Hannah Wadsworth**, Psychology
- Reasons Heterosexual Youth Do Not Join GSAs*, **Christopher Brennan & Brandon Stewart**, Psychology
- Religiosity and Stereotype Acceptance*, **Emily Steinberg**, Sociology
- Can the "Fake-Good" Motivation of Child Abusers be Negated Through an Interview?*, **Tawna Chapieski, Ka Wun Chan, Kassandra Gahagan, Maria Spire, & Nona Stoker**, Psychology
- Catching Abusers When They Lie*, **Julie Walsh**, Psychology
- Some Risk Factors for Child Abuse*, **Lindsey Jackson, Kylene Caquelin, Amanda Powers, Christopher Ruby, Kristy Kees**, Psychology

12:20 - 1:30	KEYNOTE SPEAKER: Tobin Miller Shearer <i>Assistant Professor of History & Director, African-American Studies Program</i> Prayer, Guns, and Civil Rights: How to Craft New Research Questions
----------------------------------	--

CONCURRENT ORAL SESSIONS: 1:40-3:00 P.M.

SOCIAL SCIENCES ~ UC 326

1:40	<i>Living Learning Communities: Increasing Student Retention through the Integration of Academics and Residence Life, John Loomis, Chemistry</i>
2:00	<i>Re-Imagining International Law Enforcement, Gabriel Heyl, Sociology</i>
2:20	<i>Projectile Point Analysis of the Sarpy Bison Kill, Andrew McElroy, Anthropology</i>
2:40	<i>Macro-Siouan: The View from Fort Berthold, Erika Grantier, Anthropology</i>

LIFE SCIENCES ~ UC 327

1:40	<i>Cell type-specific cholinergic innervation of hippocampal interneurons, Jackson Ball, Psychology</i>
2:00	<i>Determining cell-type specific effects of M1 muscarinic acetylcholine receptors, Samantha Mitchell, Biology</i>
2:20	<i>Effects of cell-specific MeCP2 expression on aggression using drosophila as a model system for human disease, David Hess-Homeier & Brittany Felgate, Human Biology</i>
2:40	<i>The role of Pinus lambertiana cones as a surface fuel in Sierra Nevada mixed-conifer forest, Anton Gabrielson, Resource Conservation</i>

SOCIAL SCIENCES ~ UC 330

1:40	<i>Evaluation of compensatory responses to suppression of an invasive northern pike population in western Montana: implications for success, William Glenn, Wildlife Biology</i>
2:00	<i>Assessing the effects of biochar amendments on plant growth and nutrient cycling in Montana top soil, Erika Foster, Resource Conservation</i>
2:20	<i>Variation of mood states in athletic training students in an accredited athletic training education program, Kara Wesen, Health & Human Performance</i>
2:40	<i>An analysis of relevant certifications available to IT Advisory professionals and their respective applications in public accounting, Victoria de Onis, Management Information Systems</i>

HUMANITIES ~ UC 331

1:40	<i>The Reality in Fantasy: Using Harry Potter to Promote Social Justice in the Classroom, Alice Krebill, English Teaching</i>
2:00	<i>Song of the Tui: An Exploration of New Zealand Birds, Clare Antonioli, Dance</i>

HUMANITIES ~ UC 332

1:40	<i>The Bad Man, Coleman Pape, Creative Writing</i>
2:00	<i>An Invincible Summer, Andrew Fitzgerald, English Literature</i>

2:20 - 3:00	GUEST SPEAKER: Bridget Whearty <i>UM Alumna & Ph.D. Candidate in English</i> Demystifying Grad School: From Initial Curiosity to Applications and Beyond
---------------------------------	--

POSTER SESSION: 3:00-4:00 P.M.
UC South Ballroom

One More Round: The Best Materials for Cooling the Face in 60 Seconds or Less, **Tyler Beauregard, Jade Vaile, & Lucas Whitney**, Athletic Training

Exploring the Effects of Moist Heat Pack on Vertical Jump Performance, **Alyssa Frei & Rebekah Truitt**, Athletic Training

Emotive responses to naturally occurring auditory stimuli: EEG bases in lateralized function, physiological and behavioral self-report, **Bailee Guisti & Alexandra Reiner**, Communicative Sciences & Disorders (CSD)

Measuring vocal jitter: continuous speech vs. sustained vowels, **Julianne Lally & Elizabeth Gianotti**, CSD

The use of the acoustic stapedal reflex as an indicator of high level noise exposure, **Mandy Ralston & Jennifer Silvernale**, CSD

The microstructure of auditory sensitivity in the audiometric frequencies, **Melissa Reamer**, CSD

Using iPods: "If I can hear it, it is too loud!", **Laurell McAlpine & Megan Breckenridge**, CSD

Consonant perception with reverberant monaural and binaural presentation, **Jennifer Ginn & Aericka Dunn**, CSD

A tangled web: The effects of an invasive plant on the Montana native Dictyna spider, their prey items, and the parasitoid wasp that feeds on them,
Mary Bruen, Ecology & Organismal Biology

Breast cancer enzyme CYP1B1 polymorphisms in Salish Kootenai ethnicities, **Alex Willoughby**, Human Biology

The role of ClpP protease in gene regulation of the Lyme disease bacterium, **Megan Hatcher**, Human Biology

Pharmacogenetics and the CYP1A1 m1 Variant,
Bradley Lerud, Human Biology

Characterization of multiple lipophilic binding pockets on the L-cystine/L-glutamate antiporter System xc-,
Jayne Newell, Pharmacy

Heads up! How Nuthatches communicate danger,
Nora Carlson, Wildlife Biology

Prey responses to raptor calls, **Maggie Raboin**, Wildlife Biology

The effect of protein stability on the dynamics of an electron transfer protein, **Matthew Goldes**, Biochemistry

Sustainable computing through desktop virtualization,
Lance Pellerin, Computer Technology

Assessment of fluvial vs. wave-dominated processes in the formation of the lobate geometry of ancient Panther Tongue delta deposits, east-central Utah,
Adam Hessenkemper, Katie Quinn, Katrina Zigan, Maximillian Frick, & Stephen McLaughlin, Geosciences

Determining the hydraulic conductivity of river beds using slug test techniques, **Zackary Rambo**, Geosciences

Effect of salt diapirism and salt withdrawal on deposition of the Chinle Formation, Paradox Basin, Utah,
Matthew J. Gilbert, Theodore Becker, Dylan Inskeep, Patrick Moffitt, & Robert Rader, Geosciences

Spectroscopic design for analysis of sunscreen,
Daniel Lehman, Peter Burns, JohnPaul Crawford, Arlan Titchbourne, Jonathan Wagner, & Allison Mueller, Physics

Testing Transport and Flow Generation in a Linear Plasma Model, **Lucas Jones, M. Gilmore, & E. Schuster**, Physics

Dissolution of Young Super Star Clusters in NGC 1569,
JohnPaul Crawford, J. Graham, & W. Vacca, Physics

Measuring the influence of spin-orbit coupling on the ultrafast magnetic response, **Briana Peck & Michael Schneider**, Physics

The trade off between smoking and obesity, **Erica Birk**, Economics

The effect of state-funded scholarship programs on the price of higher education, **Megan Ormseth**, Economics

Using GIS to construct an archaeological predictive model, **Jared Fischer**, Anthropology

Forensic soil effects and chemistry of a corpse burning site, **Megan McCallum**, Anthropology

Linguistic analysis of intimate partner violence,
Mara Burmeister, Psychology

Impulsivity measures in an ADHD population,
Elizabeth Corrigan, Psychology

Causal factors that contribute to the low graduation rate of Native American students at The University of Montana,
Myron Gardipee, Eagle Heart-Thomas, Psychology

Empathy and narcissism as predictors of child abuse,
Bridget O'Connell & Peter Kowalski, Psychology

CONCURRENT ORAL SESSIONS: 4:00-5:20

PHYSICAL SCIENCES ~ UC 326

4:00 *Edge-distinguishing colorings of graphs in Maker-Breaker games*, **Daniel Barthelmeh**, Mathematics

4:20 *Geometry of an (infinite) family of tangles*, **Jay Egenhoff, Holt Bodish, & Kyle Doyle**, Mathematics

SOCIAL SCIENCES ~ UC 327

4:00 *Enrollment in Academic Minors: The Role of Self-Efficacy, Behavior Models and Recollection of Conversations in Determining Academic Decisions*, **Elizabeth Vigeland**, Education

4:20 *4th Grade Math: What We Learned in Five Weeks or Less*, **Nicole Baughn**, Elementary Education

HUMANITIES ~ UC 330

4:00 *Harsh Truths: The Struggle with the Myth of the Caucasus in Russian Literature*, **Travis Vincent**, Russian

UMCUR ABSTRACTS: ORAL SESSIONS

(in alphabetical order by presenter's last name)

The Pervasion of Hopelessness in a Modernist World

Ashlynn Andersen

UC 332 ~ 9:40am

Through my research and close analysis of both T.S. Eliot's *The Waste Land* and F. Scott Fitzgerald's *The Great Gatsby*, I have found that, though the two works appear very different at the surface, both share a pervading sense of hopelessness, and use similar techniques to convey this dissolution. Eliot's *The Waste Land* epitomizes the hopelessness felt by many modernist writers in the years following WWI, after the near-complete devastation of Europe. Eliot's wasteland is a vortex of hopelessness, where no possibility for regeneration exists. It is as though the world had ended but people went on living as Eliot suggests through his image of an "Unreal City" and his assertion that he "had not thought death had undone so many." Europe has become a vast continent of the living dead. In contrast, F. Scott Fitzgerald's *The Great Gatsby*, another modernist work, appears, on the surface, lighthearted and all-American, a tale about love, the American Dream, and prosperity in 1920's New York. In my paper, I show that, upon deeper examination, Fitzgerald's *The Great Gatsby* shares Eliot's pervasive sense of hopelessness, and that he demonstrates this concept just as well as Eliot does, through the use of similar thematics – namely, the idea that humanity's needs and desires will eventually bring about destruction in a hopeless world, and through the inclusion of hope so as to intensify this hopelessness.

Mentor: Brady Harrison, English

Song of the Tui, an Exploration of New Zealand Birds

Clare Antonioli

UC 331 ~ 2:00pm

An important and integral part of the education of a dance student is identifying and exploring one's creative process. Embarking on a choreographic process, the making of a new and original dance, enables one to learn about her or his creative process. Through the course of the 2011-2012 academic year, I have been and will continue to be choreographing a new dance entitled "Song of the Tui, an exploration of New Zealand Birds." This piece is an investigation of the habitat, ecology, and behavior of New Zealand Birds. In the process of making "Song of the Tui, an exploration of New Zealand Birds" I have been researching the mating structure, social organization, and conservation of five New Zealand birds (The Tui, Fantail, Kiwi, Kea, and Albatross). My choreographic intention is to showcase these exotic birds and educate audiences about New Zealand conservation and New Zealand bird life. I am taking movement inspiration from these birds and translating it into dance vocabulary for the University of Montana dance students who will perform the work.

Mentor: Nicole Bradley-Browning, Dance

Minority Rules: How Being Black Saved Joan Little's Life and Unified Feminism

David M. Baker

UC 330 ~ 10:40am

For Joan Little, the trial for the murder of her jailor at the Beaufort County Jail in North Carolina was a matter of life and death. But by the time of her acquittal in 1975, her victory influenced many more people. While remembered primarily as a civil rights case, "Minority Rules" demonstrates how by winning a case primarily focused on southern racism, Joan Little was able to strike an even bigger blow against sexual violence that up to that point white feminists had been unable to deliver, and, in doing so, Little and her supporters demonstrated to the world the centrality of African-American women to the fight against sexism.

In order to explore the importance of Joan Little to the unification of the white and black feminists, I utilize primary sources such as newspaper articles, trial proceedings, initiatives, and interviews. With these I show how Joan Little's trial brought together black women's rights advocates. Secondary sources provide context for my work, giving me insight into the state of feminism and the sexual-violence movement in the 1970s. These sources, gathered from the Mansfield Library, internet databases, and my university sponsored research trip to the University of North Carolina, allow me to synthesize the implications of Ms. Little's movement with the chronology of neo-feminism and demonstrate the depth of her impact on women's rights.

While Joan Little's trial has been documented quite extensively, little has been done to give it significance in the context of black-white feminist relations in the 70s and 80s. This project will demonstrate that significance and attempt to place it at the center of the feminist shift toward racial integration.

Mentor: Tobin Shearer, African-American Studies

Cell type-specific cholinergic innervation of hippocampal interneurons

Jackson C. Ball

UC 327 ~ 1:40pm

Neural interactions involving the synaptic release of the neurotransmitter acetylcholine onto inhibitory interneurons are essential for regulating normal brain function but are implicated to be dysfunctional in many disease states, including Alzheimer's disease (AD), Autism Spectrum Disorders (ASD), and epilepsy. Clarifying the relationship between cholinergic inputs and GABAergic inhibition functioning may be central to understanding the driving forces of neurological dysfunction. By elucidating cholinergic targeting of specific interneuron populations, we can gain insight into a variety of neurodegenerative disease states that impact connectivity between specific populations of cholinergic and GABAergic interneurons. In our study, transgenic mouse lines that express fluorescent protein labeling in interneuron subtypes were utilized, focusing on GABAergic cells expressing somatostatin(SOM) and parvalbumin (PV). Hippocampal brain slices were counterstained with the vesicular acetylcholine transporter (vAChT) antibody, which enables visualization of acetylcholine release sites. After immunostaining, slices were imaged on a confocal microscope. Image processing involved deconvolution, which corrected for light distortion and blurring, and quantitation of bouton numbers, bouton surface area, cell surface area, overall cholinergic bouton density, and cell layer. Consistent with targeting of cholinergic fibers to a subset of interneurons, our findings demonstrate that the level of cholinergic innervation on hippocampal GABAergic interneuron subtypes is heterogenous, depending on both cell type and cell location within the hippocampus. Because both SOM and PV hippocampal cell types are selectively reduced in human cases and mouse models of AD, we predict that GABAergic interneuron populations that are the most heavily innervated by cholinergic synapses will be selectively vulnerable in disease states.

Mentor: Josh Lawrence, Biomedical and Pharmaceutical Sciences

The Works: A Loss of Childhood Innocence and Cultural Identity

Yuanyuan Bao

UC 333 ~ 9:30am

My works revolve around the importance of innocence; the magic of childhood; the often overlooked casualties of growth. There is a sense of wonderment, naivety, and curiosity born in each person, an inherent spark of vivacity that grows, flares, and in too many cases, peters out. In the face of the myriad forces of the world—pressures, dangers, responsibilities—oftentimes one loses their sense of self. And the first part to go is the child within; the carefree, short-sighted, impetuous side that finds itself so out of place in a grown-up world.

In my art I wish for that childhood never to cease. I explore subjects such as personal growth and identity. Societal structures and expectations often warp the task of finding oneself into redefining oneself, discarding the past for a leaner, meaner, and more efficient future. My works questions these processes; is growing old really growing up? Or are we all really growing down instead? I try to create spaces in which idealism is not a burden but a gift, not shackles but wings. Most importantly, I strive to rediscover that happiness which so many people leave behind.

I try to convey these broad ideas not necessarily through specific imagery, but also through bold shapes, vibrant colors, and abstract compositions. While I don't limit myself to specific media, I mostly work with oil or acrylic paints on canvas or panels, in series, single works, and installations. Each piece or series of pieces is a narration of emotional experience embellished with hints of optimism and playfulness, meant to be viewed with an adult's eyes, but with a child's heart.

Mentor: Kevin Bell, Art

Dilution of a solution could produce even more pollution

Daniel Barry

UC 331 ~ 9:20am

“Dilution is the solution to pollution” is a familiar catch-phrase, but it might not always be the case. This project describes a situation in which the concentration of metal ions in a solution increases as the system is successively diluted. Termed “anti-buffering”, it is a consequence of metal complexes possessing a stoichiometry higher than 1:1. Under conditions for which the complexing ligand is in excess, the dissociation that accompanies dilution will release metal ions in amounts that are significant compared to what was there before. While the level of metal ions increases, the levels of complexed metal and free ligands diminish with dilution. The extent of anti-buffering conditions can be shown by means of a composition grid. The analytical concentration of metal is plotted on the x-axis of the grid and the analytical concentration of ligand is on the y-axis. The z-axis then records the equilibrium activity of metal ion. Anti-buffering has been demonstrated in the laboratory using a 10:1 ethylenediamine / Cu^{2+} mixture in a sealed reaction chamber. The system was successively diluted under an inert N_2 atmosphere at constant pH and temperature. In one case, the free metal activity increased two orders of magnitude while the system underwent a 26-fold dilution – a result 2600 times larger than might ordinarily be expected in such a scenario. Conditions similar to the experimental setting could occur in the environment as water from a tributary stream enters a larger body of water. This could lead to increased bioavailability of toxic heavy metals.

Mentor: Garon C. Smith, Chemistry

Edge-distinguishing colorings of graphs in Maker-Breaker games

Daniel C. Barthelmeh

UC 326 ~ 4:00pm

A Maker-Breaker game is one where the Maker tries to accomplish a defined goal while the Breaker tries to prevent this. The particular Maker-Breaker game under investigation is played on a graph, which is a mathematical object composed of vertices and edges. One colors the graph by assigning a color to each of the edges. A coloring of the graph is edge-distinguishing if the edges are colored in such a way as to force asymmetry on the graph. The Maker's goal is to make the coloring edge-distinguishing. The players take turns coloring each uncolored edge with a color of their choice. The number of colors each player can choose from is at least the graph's distinguishing number, which is the minimum number of colors needed to make an edge-distinguishing coloring. The study of Maker-Breaker games and edge-distinguishing colorings of graphs are both young and active areas of research. To examine the two concepts together is novel. This approach uses previous work on edge-distinguishing colorings of graphs and extends the scope of study of Maker-Breaker games.

Mentor: Jenny McNulty, Mathematical Sciences

4th Grade Math: What We Learned in Five Weeks or Less

Nicole M. Baughn & Kayla C. Friedley

UC 327 ~ 4:20pm

As one component of our Elementary Math Methods course, we completed a five week immersion teaching in a 4th grade classroom. We each taught one individual whole group lesson, team taught one whole group lesson, and instructed multiple small group lessons throughout the immersion. Our immersion project sought increased engagement and opportunities in math with a diversified curriculum using manipulatives and problem based activities and utilization of additional teachers available to help with the wide-range of students and their varying abilities. Data includes a pre assessment, post assessment, and related data analysis. The three aforementioned items are criteria required for a Teacher Work Sample (TWS). The TWS was geared towards geometric concepts. Additionally, data includes observational notes, qualitative data, and anecdotal records. The TWS assessed and evaluated our effectiveness in the classroom. It specifically pinpointed areas of strengths and weaknesses within our lesson by comparing pre-assessment scores to post-assessment scores. We identified misconceptions in student learning and developed a better understanding of how to assess student progress. There were limitations in our study due to our entrance date into the classroom, the inequality in authority and trust between the presiding teacher and student teachers, and the respect and authority between the students and the student teachers given the short time frame. We were not invited into the classroom to run a research experiment. The priority was to teach the students.

Mentor: Georgia Cobbs, Curriculum and Instruction

Relationship Development at the Poverello
Elise Cunningham & VaYee Leng Moua

UC 327 ~ 10:00am

Many people who use the services of the Poverello find service beyond the basic necessities of food, clothing, and shelter. They often develop a relationship with someone at the Poverello that will listen to their story and make them feel heard. This paper will explore why clients can develop these relationships at the Poverello. Our data will draw upon ethnographic fieldnotes written about 100 hours of participant observation at the Poverello Center. From this data we expect to find that due to the Poverello's availability, clients are able to access individuals when the client is ready to talk. This allows the client some control that they may not otherwise have in their life.

Mentor: Daisy Rooks, Sociology

Goemetry of an (infinite) family of tangles
Jay M. Egenhoff, Holt W. Bodish, & Kyle D. Doyle

UC 326 ~ 4:20pm

Topology is a branch of mathematics which may be loosely described as the study of "flexible" spaces. While fascinating from a theoretical standpoint, topology also has many applications in such diverse fields as genetics, superconductors and robotics. One particularly interesting branch of topology is the study of knots, and their cousins, links, and tangles. A knot can be visualized as a loop of string in 3-space. A tangle is similar, this time using strings, which are not joined up into a loop, embedded in a solid ball so that only the ends of the strings lie on the boundary of the ball. Because of their geometric properties, we are especially interested in a class of 2-strand tangles called irrational tangles. A very powerful tool for understanding and distinguishing tangles is hyperbolic geometry. In comparison to Euclidean geometry, hyperbolic geometry is where triangles are "thin," meaning that the interior angles sum to less than 180 degrees, and parallel lines are not unique. We are working on how to understand the geometry of a certain infinite family of irrational tangles. We are examining the less complex members of the family in order to generalize the geometry for all members.

Mentor: Eric Chesebro, Mathematical Sciences

A Campaign to End Female Genital Mutilation: An Argument Based on Common Grounds

Tess A. Carlson

UC 332 ~ 9:00am

Female genital mutilation (FGM) is a significant and longstanding tradition practiced by select cultures. It is also a serious human rights violation that has caused damaging psychological and physical pain to an estimated 100-140 million women throughout the world. FGM involves the surgical removal of all or part of female external genitalia and is thought by its practitioners to curb women's sexual desire. Despite its widespread legal prohibition, FGM is still widely practiced in 28 African countries, parts of the Middle East and India, the United States, Canada, New Zealand, Australia, and Europe.

In the summer of 2011, I had the opportunity to work with a non-governmental organization, the Foundation for Women's Health Research and Development (FORWARD), on their campaign to end FGM. Through my work at FORWARD, I became committed to ending the practice of FGM by addressing the social constructs that perpetuate it. This paper describes and defends a certain method of advocacy, which I call the 'grassroots approach,' as the best way to abolish this practice. The grassroots approach works to create a shared awareness and understanding of FGM's damaging effects, ultimately allowing women to make informed decisions on behalf of themselves and their families. By presenting this paper I hope to demonstrate that it is both possible and necessary to advocate for the abolition of harmful traditions in a way that is sensitive to cultural differences.

Mentor: Bridget Clarke, Philosophy

The Role of Syllabic Consonants in Georgian

Lindsay N. Combs

UC 333 ~ 9:00am

Georgian, a South Caucasian (Kartvelian) language spoken in the Caucasus region, is known for its phonological complexities such as strings of consonants in a single word. For example, the initial consonant cluster in the word 'prckvna' (to peel) contains six consonants in a row (Butskhrikidze 2002). In comparison, consonant clusters in English have at most only three sounds (e.g., 'split'). What is important to notice in these consonant sequences are sounds called sonorants (e.g., the 'r' in 'prckvna'). Sonorants are consonants that have a high acoustic energy and can sometimes be syllabic, or play the role of a vowel by acting as the syllable nucleus. This occurs in English with words like 'puddle' and 'chasm', where there is no vowel in the second syllable and 'l' and 'm' respectively act as the nucleus. This study aims to analyze whether or not Georgian sonorants are syllabic, a topic that is highly debated in the literature. Working with a native speaker of Georgian, I used rhythmic techniques to identify syllables in words with sonorants and consonant clusters to determine if a sonorant acted as a syllable nucleus or not. I propose that sonorants do act syllabically in specific phonological environments, which serves to break up consonant clusters. However, there are restrictions on this behavior. Factors such as speed, context, style and word isolation alter whether or not sonorants will be syllabic. My findings have implications for Georgian linguistics by providing more insight into a currently debated topic. Additionally, this research makes a significant contribution to our understanding of syllables and syllabic theory in the field of phonology. This project also provides us with more knowledge about how sound systems can act similarly across unrelated languages, even when other aspects of the languages remain extremely diverse.

Mentor: Leora Bar-el, Linguistics

An analysis of relevant certifications available to Information Technology (IT) audit professionals and their respective applications in private accounting.

Victoria de Onis

UC 330 ~ 2:40

Distinguishing oneself in the professional accounting services industry is a strategic enterprise that can serve to position accomplished professionals for career advancement. This analysis provides insight specific to the IT auditing profession surrounding the practical advantages of Continuing Professional Education (CPE) qualifications in information security and assurance, risk management and information integrity, and Project Management (PM). Of the relevant globally accepted and recognized certifications available to IT auditing professionals, the Certified Information Systems Auditor (CISA), Certified in Risk and Information Systems Control (CRISC), Certified Information Privacy Professional (CIPP/IT), and the Certified Information Security Manager (CISM) designations are the most fundamentally critical. Furthermore, the Project Management Professional (PMP) certification is recommended for veteran professionals working in specific practice area management roles. Through the balanced combination of industry know-how and CPE designations, auditing professionals are more likely to experience increased efficiency, widened earnings potential margins, and heightened client and firm leadership recognition. In addition, high achievers who pursue CPE enrichment also contribute to the reputability and credibility of the accounting profession at large by executing leading practices and the highest ethical standards. While the IT auditing certifications examined in this analysis are optional and a plethora of supplemental certifications within various accounting topic concentrations exist, these esteemed designations play an important function in facilitating the acquisition of knowledge necessary to execute auditing industry leading practices and the comprehensive alignment between security, systems, and business continuity.

Mentor: Ron Premuroso, Accounting and Finance

Advancing Admistr Adversity: Missoula Homeless Shelters as High Reliability Organizations

Meghan Eckert

UC 331 ~ 9:40am

Non-profit organizations face uncertainty in various aspects of their work; this is particularly true for homeless shelters. However, despite adversity, I have found that one homeless shelter in Missoula is able to maintain stability because of particular organizational elements. This paper will analyze infrastructural components of the Poverello Center in Missoula based on the principles of a High Reliability Organization (Weick and Sutcliffe 2007), principles which include: organizational commitment to resiliency, sensitivity to operations, deference to expertise, a reluctance to simplify, and a preoccupation with failure. I will use a qualitative analysis that explores emergent themes and provides evidence based claims from ethnographic field notes. In utilizing an HRO framework to consider links between HRO principles and the infrastructural activities that occur within the Poverello Center, I will examine and learn much of what it is that makes the Poverello Center resilient in the face of adversity.

Mentor: Daisy Rooks, Sociology

Vital Resource: Fort Belknap's Struggle to Secure the Bison as the Future of Its Economy

Victoria A. Edwards

UC 333 ~ 10:20am

The American bison has been a cultural and historical icon for Plains Indians for centuries, but on the Fort Belknap Reservation in north-central Montana the animal is more than just a tie to the past – it offers hope for the reservation's future. Reintroduced in 1974, the bison managed by Fort Belknap's Gros Ventre and Assiniboine tribes have become a symbol of economic progress. But the path forward has not been easy. I traveled to Fort Belknap in the spring of 2011 and found the reservation struggling to restore bison as a natural resource. In 2002, the tribes established The Little Rockies Meat Packing Company in Malta – the first tribally owned, U.S. Department of Agriculture-certified meat packing plant in the country. In 2006, the tribes created The Little River Smokehouse on Fort Belknap Agency to process and sell buffalo products from the tribes' herd of more than 400 animals. Today, both projects face hardships. The meat packing plant has recently shifted its focus to processing beef from local ranchers' cattle herds. The smokehouse has yet to turn a profit, and it shut down temporarily in March 2011 because operators were unable to fill orders or cover operating costs. My in-depth story titled "Vital Resource," examines the reservation's effort to break into the growing market for buffalo meat despite a history of poor management of the meat packing plant and smokehouse, tensions with neighboring landowners, and protests from state lawmakers who oppose the tribes' plan to import more bison from Yellowstone National Park.

Mentor: Dennis Swibold, Journalism

Conversations with the Homeless in Missoula: What People Experiencing Homelessness Want to Share

Paige Ely & Dustin Satterfield

UC 331 ~ 10:20am

Many people using services at the Poverello enjoy sharing about their life. They tend to discuss their relationships with family and friends in particular. From our observations, clients using only day services at the Poverello have stronger relationships than those residing at the Poverello. The residents of the Poverello have varying degrees of their relationships. Some have no relationships, some develop relationships while there, some have cut off their relationships, and some rekindle past relationships. Using ethnographic fieldnotes of 70 hours of observation, we have found that having a relationship, especially a strong one, may be a gateway to moving out of the Poverello and out of homelessness.

Mentor: Daisy Rooks, Sociology

Poisoned Love: The Aftermath of World War I and Its Effects on Society

Paige M. Ferro

UC 331 ~ 2:20pm

Post World War I Europe and United States were emotionally damaged and dismal places. Millions of people, both troops and innocent civilians lost their lives, families, and homes. However, the resulting losses could not be tallied only on the battlefield. The emotional casualties left by the war plagued society for numerous years. A genuine sense of despair and hopelessness pervaded the mindset of many people in the subsequent years. These feelings of despair at the human condition of the world led T. S. Eliot and F. Scott Fitzgerald to write their respective works, *The Waste Land* and *The Great Gatsby*. These two works complement each other in how they explore and expound on similar subjects, one of which remarking on the state of love in post-World War I society, and what it has become. During my discussion, I will argue that post World War I society as depicted in *The Waste Land* and *The Great Gatsby* appears as a ravished world, and many of the once highly esteemed values, such as love, fell to the wayside, corrupted and tarnished in contemporary American and European societies as result of the war. Both Fitzgerald and Eliot examine the poisoning of love in the modern world; lust wears a deceitful façade in these two works, masquerading as love in the interactions between the depicted couples. I will highlight how both Fitzgerald and Eliot focus on this effect in their respective works, *The Waste Land* and *The Great Gatsby*, how World War I seems, partially, to strip society of love, this being only one of the emotional casualties of war.

Mentor: Brady Harrison, English

An Invincible Summer

Andrew T. Fitzgerald

UC 332 ~ 2:00pm

Albert Camus' "The Myth of Sisyphus" famously begins: "There is but one truly serious philosophical problem, and that is suicide. Judging whether life is or is not worth living amounts to answering the fundamental question of philosophy." He sets out to ask, quite plainly, whether life is worth living and whether any meaning can be found. The inevitability of death injects human experience with the taste of absurdity; death forces us to question the meaning and value of life. Through close reading of Camus' philosophical, fictional, and dramatic works, I am exploring his struggle with death and meaning. This struggle resolves through a progression of three concepts: the absurdity of life, the question of suicide, and the potential for redemption or ultimate meaning. I have found that, without appealing to the metaphysical, "unknowable," or spiritual, Camus does indeed find meaning in human life that can reconcile death. This meaning is manifested in the subjective experience of his protagonists, yet is appropriately multifaceted; the two most important facets are solidarity and location. These characters reveal greater or lesser meaning proportionately to the quality of their interpersonal relationships and of their identification with the natural landscape or sense of place. The paper will explore how these two elements give varying degrees of meaning to the individual lives of Camus' characters, and it will suggest how these elements can and do influence real, living individuals.

Mentor: Ashby Kinch, English

Diversity in the American Newsroom

Emily J. Foster

UC 333 ~ 10:00am

“Diversity in the American Newsroom” includes research on the ever-changing world of diversity in American journalism—both in the classroom and the newsroom. This research includes findings on the use of the term “minority” to describe a person of color in journalistic writing. This research explores whether or not the use of the term is appropriate in the modern day United States, where minority groups are actually becoming a majority. Should modern day language, especially in news media, shift to include a new word for the growing ethnic populations in our nation? Many experts in the field, including Kenny Irby of the Poynter Institute, agree that the term has lost direct relevance in contemporary world of journalism.

Many fields of study uphold some form of diversity standard within their curriculum, employment and enrollment. However, journalism schools in particular churn out graduates who enter a workforce that is largely in the public eye. Should journalism schools therefore seek to reach and maintain much higher inclusion standards? Most experts in the field agree upon the following conclusion: Diversity initiatives should absolutely be a crucial component in American journalism schools’ curriculum.

This project also includes research on the current decline of employed people of diverse ethnic and cultural backgrounds in newsrooms. The hiring and firing of employees, whether due to diversity standards or not, is an important topic to explore in light of the current economic slump.

Journalists of color are of course still hired in newsrooms across the country. But are these professionals forced to cover only the diversity beat? Can journalists of color avoid advocacy while maintaining their cultural and racial identity? Emmy award-winning news reporter TaRhonda Thomas, who currently works at 9News Denver, has had positive experiences covering issues of race as a journalist of color. However, other professionals have felt obligated to avoid covering diversity issues to maintain objectivity.

Mentor: Denise Dowling, Radio-Television

Assessing the effects of biochar amendments on plant growth and nutrient cycling in

Montana top soil

Erika J. Foster

UC 330 ~ 2:00pm

This project examines the effects of biochar application rates on soil properties and plant growth in a Missoula topsoil. Recent research delves into the many possible uses of biochar, from agriculture to soil reclamation and restoration projects. In Idaho and Montana portable biochar burners have been transported to timber harvest sites. The unusable slash piles can be burned through a pyrolysis process, creating biochar, a fine porous charcoal-like substance that attracts and sorbs water and nutrients. When added to soil, biochar makes these substances readily available for plant uptake, which has potential uses for facilitating native plant establishment and growth. This investigation focuses on the effects of biochar on two common species native to western Montana, *Pseudoroegneria spicata* (bluebunch wheatgrass) and *Lupinus albifrons* (silvery lupine) and one exotic invasive species, *Centaurea maculosa* (spotted knapweed). A treatment of 0%, 5% and 15% (v/v) biochar was mixed into the soil and the seeds planted and monitored over a two month period. The assessment includes measuring final above and below ground plant biomass and examining soil properties, including pH, soil organic and inorganic nitrogen content, microbial biomass and water holding capacity. The results provide information to those involved in forest management and restoration who are interested in strategies for enhancing soil quality and native plant growth.

Mentor: Cory Cleveland,

Access to and Affordability of Transportation on the Fort Belknap Reservation and Its Impact on the Local Economy and Quality of Life

Jayme K Fraser

UC 333 ~ 10:40am

It's difficult to get to work without a car, or to afford the drive to a doctor's appointment three hours away as gas prices rise. It's simple challenges like these that can help perpetuate poverty and lackluster economies in rural America and on rural reservations where unique legal and land issues, too, create barriers for business growth. Many stories been researched and written about the land and political issues that plague Native economies, but the geography of Montana's reservations and proximity to other urban areas, too, have shaped the economy and subsequently the quality of life for Natives in the state. Yet, even as non-profits and tribal governments work to improve public transportation, those solutions could just perpetuate an economic divide as paychecks can more easily be spent at existing off-reservation businesses rather than that money being reinvested in the tribal economy. My research focuses on how access to and affordability of transportation has impacted the economy and overall quality of life on Montana's Fort Belknap reservation in the last half century. I'll also compare the relevant indicators with neighboring off-reservation communities such as Harlem, Malta and Havre to better understand if my findings about Fort Belknap are unique to the reservation, or simply parallel to other rural Montana towns. I choose the Fort Belknap reservation because of its isolated location in rural Montana where population density averages just two people per square mile, yet is a short commute to more urban services in Havre and Great Falls. Also, a non-profit/government partnership launched several major public transportation initiatives beginning in 2007 that have generated a handful of studies on ridership and the local economy that will be a fruitful contemporary point of comparison.

Mentor: Jeremy Lurgio, Journalism

From War to Reconciliation: Tajikistan and the Integration of Islam into Politics

Wesley Furlong

UC 330 ~ 10:20am

Between 1992 and 1997, Tajikistan was embroiled in a bloody civil war, pitched between the Tajik government and Islamic-inspired religious extremists. Despite the vicious war, Islamic parties have been successfully integrated into the political process in Tajikistan (which is, coincidentally, the only Central Asian republic to hold open election since the fall of the Soviet Union). My work in the CSWA program has focused on post-Soviet Central Asia. In particular, I have focused on how the Soviet Occupation, and its repressive policies on Islam and Central Asian culture in general, has affected the political, social, and religious realities, vis-à-vis terrorism and Islamic-inspired religious extremism. Four out of the five Central Asia republics continued ruling their countries in Soviet-styled dictatorships, where the free expression of Islam was hindered. In most cases, this has resulted in violence. Yet, in Tajikistan, a level of political normality has followed the integration of Islamic parties into Tajik politics. My paper seeks to focus on how Tajikistan has been able to integrate Islam into politics and avoid any major conflicts since the civil war and whether there was a difference in Soviet policy in Tajikistan.

Mentor: Ardeshir Kia, Anthropology

The role of *Pinus lambertiana* cones as a surface fuel in Sierra Nevada mixed-conifer forest

Anton T. Gabrielson & James A. Lutz

UC 327 ~ 2:40pm

The developmental stage at which sugar pine (*Pinus lambertiana*) cones become surface fuels may influence behavior of surface fires in Sierra Nevada mixed-conifer forests. This study investigates how sugar pine cones of different sizes and conditions may differ in terms of mean biomass, burning characteristics, and relative contribution to surface fuel loads. A six-category classification was developed to describe cones of different lengths and developmental stages, or condition classes. Field sampling was conducted at the Yosemite Forest Dynamics Plot (YFDP), a 25.6 hectare mapped study area in Yosemite National Park. We randomly placed 90, 9 m² sub-plots within the YFDP and counted the number of cones per condition class in each sub-plot. Cones were returned to the laboratory, where the mean biomass and burning characteristics by condition class were determined. Sugar pine cones represent 601 kg per hectare of surface fuels in YFDP. Mean cone biomass, flame length, burn time, and mass loss differed significantly between cone condition classes (one-way ANOVA, P25 cm long) accounted for 56% of biomass per hectare. Burning characteristics were most extreme for recently-deposited mature cones: flame lengths for mature cones had a mean of 110 cm, while flame lengths for juvenile cones had a mean of 18 cm. Forest managers can use the cone classification presented here to improve accuracy of surface fuel estimates.

Mentor: Andrew Larson, Forest Management

Evaluation of compensatory responses to suppression of an invasive northern pike population in western Montana: implications for success

William N. Glenn

UC 330 ~ 1:40pm

Northern pike is an invasive species of fish that was illegally introduced into western Montana. As with many other exotic predators, population suppression strategies were implemented to reduce their predatory impact on native species of concern such as cutthroat and bull trout. Suppression of established predator populations is controversial, because of the potential unknown compensatory responses that may limit success. Montana Fish, Wildlife and Parks (FWP) began removing northern pike from Milltown Reservoir in 2002 and continued until the removal of the reservoir was approved in 2005. Between 2000 and 2005, FWP collected diet data, scale samples, and abundance estimates. I examined whether lowering abundances through suppression increased individual compensatory growth response by examining northern pike scales and measuring the distances between yearly growth annuli. I used the Frasier Lee method to back-calculate size at age and found an average 30mm increase in the size of age 1 and age 2 fish following the beginning of suppression. Increased growth rates may result in higher reproductive capacity through a younger age of maturity and higher fecundity. In addition, increased growth rates of pike increased individual predation rates. Interestingly, with suppression of the pike population there was a decrease in the proportion of bull trout and cutthroat trout in the diets of northern pike. These trends are likely explained by the shift in size structure associated with removal of larger, adult pike to a population composed primarily of younger, smaller fish. Overall, the suppression strategy reduced predation on native trout, however without reducing numbers of smaller pike in the population the positive results are dependent upon suppression continuing.

Mentor: Lisa Eby, Forestry and Conservation

Macro-Siouan: The View from Fort Berthold

Erika M. Grantier

UC 326 ~ 2:40pm

As people come into contact, they share various aspects of their cultures with one another: scientific and literary ideas, research and performance methods, and language. Language can be shared in many different ways, most of which are traceable and so can serve to further our understanding of the historic interactions between groups of people. When attempting to establish genetic links and understand the relationships among the over 300 Native languages of North America, we must differentiate between lexical and grammatical elements that are truly related, and those that have merely been borrowed or adapted from a neighboring tongue. This project aims to expand the current scholarship on the controversy over whether Macro-Siouan is an overarching language family containing the Siouan, Iroquoian, and Caddoan families, or if the similarities among the languages in these families is due to borrowing and diffusion. For this research, vocabulary lists, grammars, and previous linguistic scholarship of two Siouan languages, Hidatsa and Mandan, and one Caddoan language, Arikara, were used. These three languages were chosen because they, and the tribes who speak them, have been in close geographical and cultural proximity since they were all placed on the Fort Berthold reservation outside of Bismarck, North Dakota in 1845. While I do not claim to resolve this long-standing controversy, I contribute to the debate by adding another dimension of comparative data and by illuminating the difficulties posed by extensive borrowing for linguists attempting to reconstruct genetic relationships.

Mentor: Irene Appelbaum, Anthropology

Cross-Cultural Differences in Autism Spectrum Disorders

Lakiasha K. Gregerson

UC 330 ~ 9:20am

There are increasing prevalence rates of Autism Spectrum Disorders (ASD) in children around the world (Center for Disease Control and Prevention, 2012). The diagnostic criteria for ASD are internationally accepted; however, there are cultural differences among children with ASD (Marson, et al, 2011). ASD is a developmental disorder that is characterized by impairment in social interaction, communication, repetitive behaviors, and restricted interest (American Psychological Association, 2000). The symptoms and prevalence of this disorder may not be the same in different cultures. For example, the absence for eye contact is a presenting symptom of ASD; however, in Asian cultures, direct eye contact is disrespectful, and therefore may not be a relevant indicator of ASD (Wallis & Pinto-Martin, 2008). Similarly, treatments of ASD may differ depending on cultural values and health practices. While behavior therapy is commonly used in many Western cultures, holistic and vitamin therapies are commonly used in India (Daley, 2002). Finally, studies have shown differences in prevalence rates across cultures. One study, for example, found differences in prevalence rates between Denmark and Western Australia (Parner et al, 2011). These cultural differences may be important to consider, particularly for practitioners who are providing services to children with ASD. This paper presentation reviews the current literature on cross-cultural prevalence rates, cultural differences in symptom presentation, and the effect of culture and language on ASD treatment. Discussion will include calls for future research in Native American populations with regard to the symptom presentation, prevalence rates, and effective treatment.

Mentor: Anisa Goforth, Psychology

Effects of cell-specific MeCP2 expression on aggression using *Drosophila* as a model system for human disease

David L. Hess-Homeier

UC 327 ~ 2:20pm

Sporadic mutations in methyl-CpG-binding protein 2 (MeCP2) cause Rett Syndrome a severe, neurodevelopmental disorder characterized by loss of motor and language skills, unusual stereotyped movements, autistic features, anxiety, and an increase in aggression. Duplication of the MeCP2 gene in males results in multiple symptoms including mental retardation, autistic behaviors, stereotyped hand movements and anxiety-related behaviors. Although MeCP2 protein is found at high levels in essentially all cells in the nervous system, changes in neuronal or glial (support) cell MeCP2 expression may be responsible for the disease phenotypes. The heightened anxiety or aggression seen in people with MeCP2 disorders suggests neurons regulating moods such as serotonin, dopamine, or noradrenaline neurons may be involved. Using the UAS-Gal4 binary expression system we are able to express MeCP2 in both *Drosophila* octopamine neurons (the invertebrate equivalent of noradrenaline) and astrocytes (glial cells) separately. I am examining the effects of MeCP2 on the function of octopamine neurons in aggressive behavior. In *Drosophila*, aggression is a robust innate behavior comprised of reproducible, easily identifiable behavioral patterns. Two male flies of the same genotype are placed in a fight chamber, to compete for territory and food. After the fight, aggression is quantified by scoring the latency to aggression (time to first encounter), number of lunges (the predominant aggressive behavior), and percentage of trials that exhibit aggressive behavior. Because interactions between glia and neurons are essential for many critical brain functions, we propose that MeCP2 activity in astrocytes causes gene expression changes that change the function of neighboring neurons. I have observed increased latency to aggression and decreased lunges in flies expressing MeCP2 in OA neurons and in flies expressing MeCP2 in astrocytes. My results may be extrapolated to human beings via conserved cellular mechanisms.

Mentor: Sarah Certel, Biological Sciences

Re-Imagining International Law Enforcement

Gabriel H. Heyl

UC 326 ~ 2:00pm

In a world that has become highly interdependent through globalization, where many borders often effectively only exist on political maps, transnational organized crime has become a significant, systemic threat to human, national, and international security.

In “Re-Imagining International Law Enforcement” the clear focus is on the efforts of international law enforcement, which is the cooperation between states to engage and combat the problem of organized crime across borders.

Often believed to be an international police force, INTERPOL facilitates exchange of information but does not, in fact, act upon information. Similar to this model, other organizations try to foster cooperation between national police forces but leave eventual enforcement to national agencies.

The research focuses on establishing the current status quo, the level of cooperation throughout the last 200 years, and the current efforts put forth to build international cooperation. This is done through several case studies, which are evaluated from a political science perspective to provide the political reality in which possible solutions have to work. From that platform recommendations are produced that might improve the problems long-term, to limit a possible run-away prevalence of organized crime in the next decades. More specifically, national law enforcement models and theories are identified that might be useful on an international scale to approach the issue that is clearly beyond the scope of any single nation.

Mentor: Dusten Hollist, Sociology

Passing Legislation for Women's Rights:
The Impact of the Women's Rights Movement on Public Policy

Kate E. Hildner

UC 330 ~ 9:00am

Social movements are an important and visible part of the American government process. However, their impact on legislation is disputed among political scientists. A great amount of the research already conducted on this topic focuses on indirect impacts of social movements leaving their actual influence unclear. This project will examine the Women's Rights Social Movement and their work on two important pieces of legislation presented to Congress, The Violence Against Women Act and the Equal Rights Amendment. Testimony given to congress in order to inform and persuade will be examined in order to determine whether the research and work done by the Women's Rights movement had an effect on the outcomes of the legislation. Through in depth analysis of two monumental cases in women's rights history this project will analyze whether testimony given by a social movement has an effect on the passing of legislation. This paper will seek to further the knowledge on the actual power of social movements and may contribute knowledge to the area of Political Science and to individuals involved in social movements about the most efficient way of influencing policy change.

Mentor: Michael Salamone, Political Science

Determination of tris buffer pH using impure and purified meta-cresol
Purple (mCP) indicator

Emma Jaqueth

UC 331 ~ 9:00am

The accurate measurement of pH is essential for characterizing pH variability in natural waters. While our lab utilizes pH indicators for this purpose, a recent paper published in the journal of Environmental Science and Technology, volume 45, by Liu, Patsavas, and Byrne (2011) investigated the affects of different impure meta-Cresol Purple (mCP) indicators have on the calculated pH of a buffer solution. The impure indicators cause the absorbances of light at certain wavelengths to change to such an extent that the impurities impact the calculated pH of the solution. Further inspection of the pH perturbation was conducted in our lab on the impure (mCP) indicator in a tris buffer solution at 5°C intervals from 10°C-35°C. The indicator was placed in the buffer solution and the absorbances were recorded at 434 nm, 578 nm, and 780 nm using a Cary 300 Spectrophotometer. The pH was calculated using an established pH equation for the tris buffer used in the experiment. The pH error due to the impure indicator was found to be significant enough to need to be taken into account during pH calculations. UM researchers Andre Umansky and Chris Palmer purified the mCP salts. The measurements of the absorption of the commonly used impure indicator and purified indicators and their respective pH calculations are currently being compared. If our purified indicator shows minimal pH error, then all of the pH measurements will be determined using this new purified indicator. The small but significant improvement in accuracy will be important in future studies of natural waters where indicator-based pH measurements are used.

Mentor: Michael DeGrandpre, Chemistry

Skeletons: A Short Screenplay

Jessica Johnston

UC 333 ~ 9:40am

In today's fast-paced film industry, short screenplays can help new screenwriters garner attention from agents and producers. As part of my "calling card" I have written *Skeletons*, a short screenplay inspired by events in my hometown of Carlsbad, NM. The story follows Ian, a nervous college student who agrees to clean out the home of his friend Melanie's deceased grandmother. However, Ian's hopes of getting romantically close to Melanie are dashed when he discovers the corpse of her missing grandfather in a freezer chest.

This project explores the writing and filming of the short screenplay to expected industry standards. As part of my pre-writing process, I employed different methodologies from screenwriting critics in order to structure the pacing of the narrative in under 30 pages. During and after my writing sessions, I drew from the most useful tips, synthesizing my own methodology for writing and revising short screenplays. While most new screenwriters often focus on the craft of writing, revision should hold as much, if not more, importance in producing a professional, well-developed final draft to potentially be filmed. Furthermore, I have shot and edited a scene which I will present in conjunction with my analysis. By focusing on the construction of the short screenplay, new screenwriters can better mold their ideas into an eye-catching form, thereby increase their chances of selling their script.

Mentor: Sean O'Brien, English

Montana Dog Food: A Value-Added Montana Product

Alyssa M. Komac

UC 326 ~ 9:00am

Today's pet food industry is notorious for its lack of transparency. Today's dog owners often do not know where the product they're feeding their dog is made, what's in it and where those ingredients were sourced. I propose to start a Montana company that addresses these customer pains one bag of dog food at a time. The research completed for this proposal has been conducted as a part of a business plan for The Montana Dog Food Company. The Montana Dog Food Company proposes to manufacture an all-natural, nutritious, affordable and convenient dry dog food that is sourced primarily from Montana. My research outlines the core components of a valuable business plan: product, management, target market, customers, sales and marketing strategy, business model, competitive advantage and financial pro formas. This presentation will highlight the feasibility of starting The Montana Dog Food Company. Furthermore, I will discuss the company's initial strategy of marketing a niche product for athletic canines.

Mentor: Don Gaumer, Accounting and Finance

The Reality in Fantasy: Using Harry Potter to Promote Social Justice in the Classroom

Alice Krebill

UC 331 ~ 1:40pm

Harry Potter is a special series for a plethora of reasons, one of its most frequently referenced qualities being its widespread popularity. However, Harry Potter's literary merit may be dismissed by some as simple fantasy and entertainment. On the contrary, though Harry Potter takes place in a fantasy world with characters ranging from normal, non-magical "Muggles" to wizards, ghosts, goblins, centaurs, and others, the conflicts that stem from this magical diversity are far from trivial or fictional. In exploring diversity-related oppression, the series transcends the fantasy genre to undertake real-world issues. Through the disadvantaged, yet sympathetic characters of Hagrid, Lupin, Dobby and Griphook, readers of the Harry Potter series encounter the full spectrum of socially engrained injustice, allowing them to gain empathy for individuals in real life who face such injustices every day. Thus, the series lends itself to the secondary classroom quite well as teachers can use the fictional world of Harry Potter as pretext for broaching the otherwise inflammatory subject of real-world racism and social privilege. After approaching the topic from this angle, the teacher can eventually direct the conversation to reality and help students to illuminate parallels between the wizarding world and their own life experience. Ultimately, utilizing Harry Potter in this way goes beyond merely encouraging students to read for fun, as it promotes empathy and understanding and furthers critical thinking and creative problem solving.

Mentor: Heather Bruce, English Teaching

Living Learning Communities: Increasing Student Retention through the Integration of Academics and Residence Life

John N. Loomis

UC 326 ~ 1:40pm

The University of Montana class of 2007 had a four-year graduation rate of 23.1%; the class of 2005 had a six-year graduation rate of 47.8%. In addition, 28.2% of the 2010 freshmen class withdrew from The University of Montana before the end of their first year. In an effort to increase student retention, this project focuses on the development and implementation of a Living Learning Community (LLC) in a freshman residence hall. Research indicates that LLC programs result in improvement both in academic performance of the students involved and the students' perception of their first year experience. This combination of effects has resulted in increased retention rates for the universities that have integrated LLC programs into their residence halls. This LLC program focuses on a first year chemistry course for students in pre-health sciences, some biology degree options, and all chemistry options. The students chosen to be members of the LLC were Craig Hall residents that had placed into the course through the Chemistry Placement Exam. The course workshop experience, a two hour block of peer-led instructional time focused on concept development, student interaction, and development of problem solving skills, was transferred into the residence hall. In addition, hall programs were offered that focused on supporting the students of the LLC. The data analysis from the first semester indicates that the LLC students had a higher retention rate and a better average grade than the non-LLC students. This project will provide important lessons on implementation of future LLC programs in the residence halls by the Residence Life Office, which will begin in the fall of 2012.

Mentor: Mark Cracolice, Chemistry

Remembering Beneath the Big Sky
John J. Lovell & Sandra D. Williamson

UC 332 ~ 10:20am

The Gathering: Collected Oral Histories of the Irish in Montana is a long term oral history research project, conducting interviews of volunteer subjects. These interviews provided the basis for *Remembering Beneath The Big Sky* or *Ag Cuimhneamh Siar Faoin Spéir Mhór*, a catalog of brief overviews, which was composed by Project Director Dr. Bernadette Sweeney, Sandra Williamson, and myself during fall semester of 2011. The overviews were pulled directly from the interviews, allowing quick reference to each interview's themes. The catalog provides a creatively written narrative, to exemplify the contents of the individual interviews, and the information collected from the project as a whole. Contained in these interviews are stories of love, homesteads, ranching, mining, farming, immigration, emigration, legends, myths, politics, society, and personal history. Sandra Williamson's goal is to use the project as a model to develop an educational curriculum for young people to record the histories of their community members by interviewing their elders while attending high school, allowing the project to have a deeper impact both in their individual lives, and in the community at large. I find the most interesting revelation to be the connectivity of our world, as Montanans discuss events in Ireland, and subjects in Ireland speak of events in Montana, which was made readily apparent as I read through indexes and transcripts, as well as listened to interviews to compose the overviews of the catalog. In both instances, the project allows for the preservation of our history, which would otherwise be lost.

Mentor: Berndatte Sweeney, Theatre and Dance

European Indexes: Do they behave like managed mutual funds?

Jon Marchi

UC 326 ~ 10:00am

The financial metric “alpha” has been utilized in the past as a metric intended to describe whether a portfolio of an actively managed portfolio has under or over performed the market on a risk-adjusted basis. Using this measure, I intend to analyze a series of European indexes with the intention of discovering any statistically significant anomalies. Using modern portfolio theory as a guide, all indexes to be analyzed must have an alpha of zero. The presence of this situation signifies that there has been no active management of the securities that make up this index and that there are neither positive or negative performance results when compared to a broader measure of the market. This analysis will be conducted by performing a series of regressions with a four factor model brought forth by Professors Fama and French and later modified by Carhart. The monthly performance statistics will be regressed against the factors of: high minus low performance results, small minus big capitalized stocks, a momentum factor that measures the tendency of people to hold onto winners while selling the losers, and a measure of market performance minus the risk-free rate.

Mentor: Bruce Costa, Accounting and Finance

Projectile point analysis of the Sarpy Bison kill

Andrew J. McElroy

UC 326 ~ 2:20pm

In 2010 and 2011 archaeological excavations were conducted at the Sarpy Bison Kill site located in southeastern Montana or better known as site 24BH3078. The site is a bison communal hunting site located in a drainage that leads to sandstone wall outcropping, where the bison were killed and processed for meat, hides, and bone marrow. The site is dated to 1980+/ 40BP or roughly 50 BC to 90 AD. The excavations at the site were conducted as a cultural resource management project for the excavation of the underlying coal by a local coal company. A preliminary analysis was performed on the projectile points found at the Sarpy Bison Kill in 2010 field season to determine the use-life of a projectile point used in such a hunting process. The projectile points found at this site indicate in some detail the use-life of a projectile point from accruing material from both local and far off sources, manufacturing, use, recycle/rejuvenation, and finally disposal. This analysis gives a great glimpse into communal bison hunting and from these tools provides insight on how these types of tools and hunts both worked and played into the role of stone tools in plains bison hunting strategy.

Mentor: Anna Prentiss, Anthropology

Disruptive Innovation in Agribusiness

Tyler C. McGee

UC 326 ~ 9:40am

Purpose: To analyze how the process of disruptive innovation will impact the agribusiness industry, and how this transition will take place. This analysis will be demonstrated through scenario analysis, with three potential scenarios being demonstrated and explained. **Methods:** This project was developed using research from a broad range of sources over the course of several years, as well as studies conducted within the industry itself through first hand experience gained while working for one of the largest firms operating in this industry. **Originality:** While disruptive innovation has been a phenomenon studied in several industries and areas, it has not yet been applied to agribusiness. This approach looks at this well documented process, but analyzes it from the standpoint of the agribusiness industry, an area that has yet to be examined. **Significance:** Agribusiness affects every person on the planet. From the subsistence farmer in Africa, to the large scale commercial farmer in the American Midwest, to consumers, nearly the entire population relies on the agribusiness industry to manage, transport, and process simple crops into foods, ingredients, chemicals, and products that nourish our bodies and build our world. Any changes that occur in this industry will theoretically spread to impact every person who consumes food, and every industry that is, in any way, connected to the crops and other raw materials produced by agriculture.

Mentor: David Firth, Management Information Systems

Determining cell-type specific effects of M1 muscarinic acetylcholine receptors

Samantha Mitchell

UC 327 ~ 2:00pm

Although it is well known that the neurotransmitter acetylcholine (ACh) is crucial in the central nervous system, the roles of its specific receptors are less clear. Within the brain, the most important type of receptor is the muscarinic acetylcholine receptor (mAChR), which exists as one of five subtypes. Distinguishing the unique role of each subtype could lead to the development of more effective treatments for central nervous system disorders such as Alzheimer's disease. One subtype, the M1 mAChR, is of particular interest because it is linked to cognitive functions and has been shown to be dysfunctional in disease states. Recent evidence suggests these receptors are prevalent in the hippocampus on parvalbumin (PV)-positive interneurons. Although various genetically-modified mouse strains have been developed to study the effects of removing specific receptor subtypes, the line I worked with is unique in that M1 mAChRs have been removed only from PV cells. As part of a comprehensive study on the role of M1 mAChRs, I compared the performance of mice lacking the receptors to those with intact receptors in a behavioral cognitive test called the Morris water maze (MWM). The MWM consisted of a tank of water in which the mice were required to find and remember the location of a hidden platform. In addition to the MWM, supplementary tests are being conducted to examine M1 mAChRs on PV cells, which will lead to a better understanding of the role of M1 receptors in hippocampus-dependent cognition and its associated diseases.

Mentor: Josh Lawrence, Biomedical and Pharmaceutical Sciences

Full Collapse: How Ciudad Juarez Became the Most Dangerous City in the World

Coleman Pape

UC 332 ~ 1:40pm

Ciudad Juarez, a border city in the Mexican state of Chihuahua, is home to one of the fastest growing economies in Mexico, with workers flocking to jobs in the maquiladoras - factories along the border where companies take advantage of cheap labor to make things like pants or purses. But the true beating heart of Juarez, one estimated to rake in \$50 billion a year, is the drug trade. Fueled by demand in America, Mexican cartels battle for dominance in a city that greed has turned into a war zone. The middle class, around 250,000 of Juarez's 1.3 million, have fled the city, seeking refuge across the border in one of the safest cities in America - El Paso, abandoning 116,000 homes and taking with them 40% of all local businesses. What remains looks like bullet-ridden ghost town where people don't leave their houses unless they have to - the risk of getting shot is too high.

The conditions of Juarez today are baffling - more Mexicans have died there than Americans have died in the entire war on Afghanistan and the city of Baghdad combined, making Ciudad Juarez the most dangerous city in the world. So the lingering question is how did things get so bad? In an essay, I will examine the origins of the turf war between two rival cartels, the Juarez Cartel and the aggressively expanding Sinaloa, and how the legitimate maquiladora economy fuels that war by providing armies of the poor and disillusioned, ready for opportunity at any cost. I will also address the way the cartels have been forced to change the way they operate by the Mexican government's ambitious War on Drugs - a war that, at least for now, is lost in Ciudad Juarez.

Mentor: Dierdre McNamer, English

Measuring the influence of spin-orbit coupling on the ultrafast magnetic response

Briana Peck

UC 326 ~ 3:00pm

The invention of ultrafast lasers, which emit pulses of light that are as short as a few femtoseconds (10^{-15} seconds), has led to significant discoveries in the properties of materials, including the ultrafast reaction of ferromagnetic metals. When ultrafast laser pulses interact with a ferromagnetic material, it has been shown that the magnetization of the material can be influenced on the femtosecond (fs) time scale. This is interesting because changing the orientation of the magnetic moment of a ferromagnetic material has been classically determined to occur on the much longer picosecond (10^{-12} seconds) time scale. The physical mechanisms responsible for this ultrafast response are not well understood, but current research suggests that it likely occurs because of an interaction between the laser pulse and the atomic spin system in a process called spin-orbit coupling. The goal of this research is to add to the fundamental understanding of this effect by directly measuring the influence of the spin-orbit coupling strength on the ultrafast magnetic response. This will be accomplished by measuring a series of ferromagnetic nickel-iron alloys with an ultrafast laser that has pulse durations of about 60 femtoseconds. The samples have varying ratios of nickel and iron, which varies the spin-orbit coupling strength without significantly changing other properties among the samples. With these methods, the ultrafast magnetic response from a NiFe sample was observed. This research could provide fundamental knowledge on the ultrafast magnetic response, and could have future applications for ultrafast data storage.

Mentor: Nate McCrady, Physics & Astronomy

Ornamentation in the Baroque and Classical Eras of Music

Rebecca E. Pershouse

UC 332 ~ 10:40am

Many students who study a classical instrument will someday be asked to perform a piece from the Baroque or Classical eras of music. These pieces are standards of the repertoire for almost every instrument and can be very challenging, but many are also simple in nature and are appropriate for younger students. For every level of expertise, one of the most challenging and confusing aspects of these styles of music is ornamentation. In the Baroque and Classical eras, improvisation and ornamentation were expected and if done well, gave the performer a stellar reputation. Improvisation is no longer expected of our current classical performers, but the ornamentation remains. This aspect is made even more difficult by the ever-changing nature of musical tastes. The result is that basic musical ideas, such as trills and grace notes, mean very different things musically, when presented in a Classical piece vs. a Baroque piece. My goal in this project is to use primary sources from the eras and expertise of modern musicians to clarify the stylistically appropriate approaches to ornamentation in the Classical and Baroque eras, and create a resource for other performers to use when approaching their own performance. In my presentation I will explain and demonstrate examples of Classical and Baroque ornamentation through Mozart's Oboe Concerto in C Major and Telemann's Oboe Sonata in G minor. I will also briefly explore the important events of the eras that shaped music and performance practice.

Mentor: Jennifer Cavanaugh, Music

**Children: Products of Their Environment?
Emily A. Peters & Sammy B. Schreiner**

UC 331 ~ 9:20am

The Joseph Residence is a transitional housing facility for families experiencing homelessness that provides a safe and nurturing community. In this environment, staff helps parents create a better future for themselves and their families. The energy put towards improving their current situation affects the lives of their children on a daily basis. Using ethnographic field notes on 60 hours of participant observation, we will explore how parents at the Joseph Residence try to counteract past decisions that have influenced their family in a negative way. We predict that the staff's role will positively influence the lives of each family.

Mentor: Daisy Rooks, Sociology

Employment Opportunities: Are They Really Equal?

Caitlin B. Schwinden

UC 326 ~ 9:20am

1. Title: My research paper and presentation involve a study regarding employment law and how it relates to establishments that require wearing uniforms and have hiring practices that are controversial. Here in Montana, these establishments include Hooters and Oh La Latte, but other cases around the US will be included. 2. Purpose: My rationale for this project is that certain establishments find ways around typical hiring practices and employment laws. I will examine these methods and draw conclusions regarding any potential for discrimination that takes place. 3. Methods: To carry out this project, I have researched employment law on both federal and state levels. I have met with the Equal Opportunity director at UM to discuss employment law and analyze past cases. I will also include insight into the hiring process of Hooters and Oh La Latte here in Missoula through an examination of their job applications. 4. Although the controversy surrounding establishments like Hooters is not new, my research will take a more "big picture" approach to employment law and also will examine how the economic downturn affects hiring practices. 5. The contribution of this project to my field of study as well as society lies in its exposure of unconventional hiring practices and the debate surrounding whether it is legal, or more importantly, ethical to practice such methods. Job hunters-particularly during a recession-rely on companies to offer them a fair and equitable chance of obtaining a position, thus examining possible discrimination in hiring practices is essential.

Mentor: Lynda Brown, Business Management

Anonymity Unmasked: Rethinking Biography in Literary Criticism

Constance J. Shepardson

UC 332 ~ 9:20

In the wide world of literary criticism, scholars frequently disagree on what aspects of a text are important and what aspects are not. When analyzing a piece of art, the critic must decide on one important question in particular: how much of the author's biography should I take into consideration? While some schools of criticism aim to make blanket statements about analyzing all forms of art, I want to emphasize the importance of this question in one genre specifically, English language Gothic Literature. There are few American Gothic authors who could claim a more colorful background than Mr. Edgar Allan Poe. Also, Mr. Poe's work has been widely accepted as archetypal examples for psychological criticism, making his work ideal for analyzing the value of author biography based criticism in Gothic Literature, given Gothic literature's deeply psychological attributes. Using a dual reading technique, I have done a comparison reading of the short story "The Fall of the House of Usher." The dual reading includes a first reading of the story void of author information in the analysis. The second reading is a deeply biographic reading with the author's history, personal life, and possible influence of other works from the period taken into consideration. In comparing and contrasting the two readings, as well as assessing the current scholarly dialogue on what New Critics call the "intentional fallacy," my work aims to find a balance between debating schools of thought on the value of biography in critiquing Gothic literature.

Mentor: Jill Bergman, English

The Poverello Center's Homeless Outreach Team (HOT): Looking Between the Cracks

Allyson Talaska, Maria Newbold, & Christopher Cadotte

UC 327 ~ 9:00am

The Poverello Center provides important services such as emergency shelter, food and clothing to people experiencing homelessness. Yet many people fall between the cracks and are resistant or unable to use the shelter leaving them resigned to life on the streets. The Homeless Outreach Team (HOT), composed of several staff and volunteers, extends the Poverello's services to people experiencing homelessness on the streets and providing businesses with nonemergency mediation in lieu of police intervention. Using ethnographic field notes describing 60 hours of volunteer service, we analyze how HOT fills an important gap in services for the homeless and business communities of downtown Missoula. Our findings include reasons some people are resistant or unable to use the shelter, the needs of people experiencing street homelessness, and how HOT can be an effective mediator for downtown businesses.

Mentor: Daisy Rooks, Sociology

Enrollment in Academic Minors: The Role of Self-Efficacy, Behavior Models and Recollection of Conversations in Determining Academic Decisions

Elizabeth O. Vigeland

UC 327 ~ 4:00pm

In this study, we examine if University of Montana students enroll in the Wilderness and Civilization program because they have seen their peers rewarded for enrolling in the program. This research offers greater understanding about the reasons behind students' academic decisions. Education is not the filling of a pail, but the lighting of a fire (Yeats quoted by Taylor, 2008). Higher education curriculum developers agree on the need to create academic programs “bridging between existing disciplines” and “moving towards a transversal, interdisciplinary curriculum” (Taylor, 2008. p. 6). The Wilderness and Civilization program at the University of Montana aims to fulfill these academic objectives. The program engages students in a year long program, exploring “wild land conservation and the human-nature relationship through an undergraduate field and campus program” (UM College of Forestry and Conservation website, 2012). Specifically, we hypothesize that enrollment in academic minors is a function of social interactions with academic models who enhance the appeal of enrolling. This research draws on the work of Social Cognitive Theory researchers and responses gathered from 20 past or current students in the Wilderness and Civilization program. We sent the survey to 68 students but only got 20 completed surveys back. Though our low response rate of 30% limits our ability to generalize our findings, comparatively few researchers have closely examined the effect personal communications can exert on academic decision making. The information from this descriptive study can be applied to enhance understanding of academic decisions, in general, and enrollment in interdisciplinary programs like the Wilderness and Civilization program, specifically.

Mentor: Stephen Yoshimura, Communication Studies

The Value of Foreign Language Study Within the U.S. Labor Market

Travis P. Vincent

UC 326 ~ 10:20am

The U.S. now faces new challenges in educating its citizenry to be competitive in an increasingly globalized economy and world. One facet of the U.S. education system that deserves particular attention is foreign language training. While all but two nations in the EU mandate foreign language education, in the U.S., fewer than half of all students are enrolled in language classes (Eurydice 2005). This study estimates the economic returns to language study within the U.S. labor market to give us a clearer measure of how the discipline is valued in American society. Although a few earlier studies touch on the value of language courses in high school, the majority of literature on the subject focuses on the returns to other subjects, namely mathematics and hard sciences. In contrast, my analysis focuses directly on foreign language study and draws on a more recent dataset, the National Educational Longitudinal Study of 1988, which follows a national cohort of eighth graders through high school to 2000, when most have settled into careers. In my model, the individual's income in 1999 serves as the key dependent variable, while the number of years studying high school foreign language serves as the primary independent variable. I employ controls for the student's family background and socioeconomic status, the characteristics of the high school, and the student's private and professional circumstances at the end of the survey. Depending on the version of the model, I limit the sample to include only those with at least a bachelor's degree and then add new variables in an attempt to account for each student's prior ability. When faced with which educational programs to fund and support, it is important that policy makers and the public alike understand and not ignore the benefits of foreign language study.

Mentor: Ranjan Shrestha, Economics

Harsh Truths: The Struggle with the Myth of the Caucasus in Russian Literature

Travis P. Vincent

UC 330 ~ 4:00pm

Since the often turbulent relationship between Russia and the Caucasus began around 1817, the Russian perception of the land and peoples living between the Caspian and Black Seas has been shrouded in myth. Throughout the artistic dialogue on the Caucasus, starting at the beginning of the 19th century, authors, artists, musicians, screenwriters and directors have grappled with the idea of the Caucasus as a cultural place. By the time Pushkin writes his first verse on the topic in 1820, the “myth” of the Caucasus, akin to the European myth of the Noble Savage, is already well-established. The Byronic myth both draws and repels Russians and Russian artists to the Caucasus. By focusing on Pushkin’s “Captive of the Caucasus” (1820), Lermontov’s *A Hero of our Time* (1839), and Mikhalkov’s 2007 film, *12*, this paper explores the Russian artistic position on the Caucasus region and how it has evolved up to now. In each storyline, the authors and filmmakers use Russian characters to explore their own generation’s myths and conceptions of the Caucasus. The paper specifically analyzes how each artist struggles with the stereotypes about the region’s inherently “wild” and romantic character. It also examines the contrasting images of captivity and freedom that permeate each of these stories and many other artistic pieces relating to the Caucasus.

Mentor: Clint Walker, Modern and Classical Languages and Literature

UMCUR ABSTRACTS: POSTER SESSIONS

(in alphabetical order by presenter's last name)

One More Round: The Best Materials for Cooling the Face in 60 Seconds or Less

Tyler Beauregard, Jade Vale, & Lucas Whitney
UC Ballroom ~ 3:00pm

Facial swelling is a common cause for the termination of boxing and mixed martial arts contests. Currently, facial swelling is treated between rounds by applying pressure with a piece of steel, which has been kept on ice, for approximately 45 seconds. Many studies have been conducted to determine the most effective application of cold to reduce swelling in a clinical setting but there has been little if any research that has studied cold application for less than a minute or explored metal as a delivery method. In this study, 11 college aged males had a thermometer attached to their left cheek. A baseline skin temperature was recorded and eight different substances (Ice pack, stainless steel, commercial cold pack, copper, aluminum, brass, salt-ice pack and an ice cube) were chilled on ice and then applied to their skin, in a randomly selected order, for 60 seconds. After 60 seconds, skin temperature was recorded again and the material was removed. When the skin returned to its baseline temperature the study was repeated with the next material. Ice, with its relatively high melting point, can take advantage of its relatively high heat of fusion to draw the most thermal energy out of tissues in 60 seconds. Based on this study, an ice pack should be used exclusively between rounds of combat sports to minimize the swelling of facial injuries.

Mentor: Valerie Moody, Health and Human Performance

Noise-Induced Hearing Loss and the use of Personal Music Devices

Emily Berendts & Allix Linrude
UC Ballroom ~ 11:00am

Popularity in multimedia usage, specifically personal music devices such as the iPod, has been rising ever since the new technologies became available. The use of these personal music devices has changed our music listening habits. We are now able to listen with earphones or earbuds, for long periods of time at high levels of volume. Recent research has shown that 1 in 5 adolescents are now experiencing a hearing loss, presumably from personal music devices. This research was designed as an educational experience for high school students to understand the lifelong consequences of hearing damage from listening to personal music devices. This research project had four phases; 1) class presentation given in Health Classes in Missoula High Schools including pre and post assessment of knowledge of hearing loss from listening devices; 2) after school testing of hearing of each student; 3) after school testing of levels produced by an individual student iPod and 4) a student survey of the multimedia listening habits for each participating student. The results from each of the phases of this research project will be discussed.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

The Trade off between Smoking and Obesity

Erica Birk

UC Ballroom ~ 3:00pm

Obesity in the US has risen by 11% since 1995. At the same time, smoking prevalence in the United States has decreased by 8%--a reduction which can be contributed, at least partially, to the increase in the excise tax placed on cigarettes. Because cigarettes act as both an appetite suppressant and a metabolic stimulant, a reduction in smoking could be a contributing factor to an increase in the US obesity rate. This study looks at the relationship between the cost of cigarettes and obesity levels in the US by asking the question, "Has an increase in the price of cigarettes through an excise tax contributed to the rise in obesity in the US?" Previous literature on this topic has resulted in conflicting conclusions, i.e., finding both positive and negative relationships. This study uses a regression model that isolates the effect of cigarette costs on smokers versus non-smokers with lagged-time effects to determine the effect of an increase in cigarette cost in the previous period. Preliminary results show a statistically significant positive relationship between the cost of cigarettes and the average smoker's individual body mass index. This implies that raising the cost of cigarettes may increase health care costs related to obesity - which brings into question the effectiveness of tax policy in the sense that although an increase in taxes curbs smoking rates in the US, health care costs may be partially transferred rather than fully absorbed.

Mentor: Helen Naughton, Economics

Reasons Heterosexual Youth do not join GSAs

Christopher Brennan & Brandon Stewart

UC Ballroom ~ 11:00am

Sexual minority youth in high schools often experience victimization at significantly higher rates than their heterosexual peers (Bontempo & D'Augelli, 2002). The purpose of this study is to assess the reasons why heterosexual youth do not join gay-straight alliances (GSAs), which are student led groups for lesbian, gay, bisexual, and transgender (LGBT) individuals. If a GSA is to be a successful program it must have support from many areas such as teachers, LGBT students, and heterosexual allies. By identifying themes of reasoning as to why heterosexual youth do not join these groups, one can determine whether certain aspects of GSAs or the school environment might discourage inclusion into such organizations. The current study utilizes a subset of data obtained as part of a larger study involving heterosexual youth and homophobic attitudes and behaviors. Participants were recruited from introductory psychology courses, and eighty-five of the participant's answers will be thematically coded and analyzed by the primary investigators and research lab peers. Participants were eighteen or nineteen years of age with an average age of 18.60 years. Of the eighty-five participants, thirty-seven were male and forty-eight were female. It is expected that particular themes will be present in reasons heterosexual youth provide for not joining GSAs. By identifying the common themes present in the data, one can see the factors that impact the decision to join, and with that knowledge we can improve the appeal for membership into GSA programs. This in turn may help to create a more cohesive school environment.

Mentor: Bryan Cochran, Psychology

A tangled web: The effects of an invasive plant on the Montana native *Dictyna* spider, their prey items, and the parasitoid wasp that feeds on them.

Mary Bruen

UC Ballroom ~ 3:00pm

A continuing challenge in assessing the role of invasive species is determining their long-term effect on an ecosystem. In this study, I look at the effect of an invasive plant on insect community assemblage to better understand consequences of non-native species on biodiversity. Recent increases in the abundance of the Montana-native *Dictyna* spider can be attributed to the invasion of Spotted Knapweed, *Centurea maculosa*. The rigid stalk and woody stems of knapweed plants offer *Dictyna* spiders an ideal substrate for web building. Although the effect of knapweed on *Dictyna* spider populations has been well investigated, no studies to date have examined the effect on the diversity and abundance of *Dictyna* prey species—insects. During the summer of 2011, I sampled the relative diversity and abundance of *Dictyna* prey in three paired sites in western Montana. I explored how prey species varied in knapweed-invaded and native regions. This project may help managers gain insight into how insect community assemblage has changed, or not changed, in response to knapweed invasion and *Dictyna* proliferation. This study also examines the abundance of a parasitoid wasp, *Catolaccus* (family Pteromalidae), in the insect community assemblage. This wasp has been known to parasitize *Dictyna* spider egg sacs, reducing the number of *Dictyna* spiderlings dramatically. In evaluating the number of parasitoid wasps in both invaded and native grasslands, the effect of parasitism on *Dictyna* proliferation and knapweed invasion may be better understood. This project provides insight into a unique type of trophic cascade where knapweed, a primary producer, causes significant alterations in higher-level trophic organisms.

Mentor: Doug Emien, Biological Sciences

Investigating the paleodelta type of the Ferron Sandstone in the Willow Spring Wash,
East-Central Utah

Jean Bullock, Martin Lang, Tetsuro Nagase, & Swiad Worms

UC Ballroom ~ 11:00am

The Upper Cretaceous Ferron Sandstone of east-central Utah is an important source of coal and contains sandstone bodies that serve as good quality petroleum reservoirs. The Ferron represents a wide range of paleo-environments ranging from alluvial plain to offshore marine. Meandering rivers transported sediment southward and eastward from the coastal plain to the shoreline, where deltaic sedimentation predominated. Previously published facies analyses of the Ferron Sandstone delta range from generally wave-dominated to fluvial-dominated. We examined a well exposed section of Ferron Sandstone in the Willow Spring Wash on the western flank of San Rafael Swell to differentiate between these two end members. We hypothesize that these end-member scenarios can be distinguished through analysis of outcrop and core of the Ferron. In the case of a fluvial dominated delta, isolated mouth bar deposits are encased in finer grained interdistributary bay deposits, whereas more interconnected, amalgamated sandstones are characteristic of a wave dominated system. Further, case studies showed that bioturbation is limited due to the fluctuating salinity levels in fluvially-dominated systems, whereas more extensive bioturbation with a diverse suite of trace fossils are present in a wave-dominated system. To distinguish between these two possibilities, we conducted photomosaic work, measured stratigraphic sections through key exposures, analysed paleoflow indicators, and investigated bioturbation indices in outcrop and core. Our results will have important implications for accessing the viability of the Ferron Sandstone as a reservoir for hydrocarbons.

Mentor: Michael Hofmann, Geosciences

Linguistic Analysis of Intimate Partner Violence

Mara Burmeister

UC Ballroom ~ 3:00pm

Intimate partner violence (IPV) is the occurrence or threat of emotional, sexual, or physical abuse between persons in a close relationship. IPV often has devastating effects on women, and, if present, their children. Many studies have examined the effects of violence on women and children, but very few assess the effects for mothers. The present study sought to measure and describe outcomes of IPV through the use of linguistic analysis. Using the Linguistic Inquiry and Word Count (LIWC) program, 180 transcribed interviews of women who had been victims of abuse across a range of severities were analyzed. The LIWC variables examined were social words, which included family, friends, and humans and affective processes which included positive emotions, and negative emotions consisting of anxiety, anger, and sadness. It was hypothesized that women who have children will have experienced increased shame and guilt as the as a result of the abusive relationship and will have a higher occurrence of social words and negative emotion words than women who do not have children. The contribution of mothers and children having witnessed, or played a part in their abusive relationships will be explored. LIWC was used to help determine a possible correlation between the use of negative emotion words and the presence of children in the relationship. The implications for the future investigation of linguistic analysis of abuse victims as well as for the examination of mothers in abusive relationships are discussed.

Mentor: Zed Kramer, Psychology

Students Misuse Adderall & Concerta at the University of Montana

Erin Burt

UC Ballroom ~ 11:00am

Objective: This study was conducted to examine subjects' use and misuse of Adderall and Concerta by assessing their understanding of potential physiologic adverse effects. **Methods:** Data was collected by administering a survey to students between the ages of 18-32, currently enrolled at the University of Montana. A total of 115 students completed the survey and their participation was voluntary. The research was conducted on campus in the University Center. The survey consisted of 15 multiple-choice questions evaluating the frequency of use and occurrence of drug side effects. Follow up education about the side effects was provided upon survey completion. **Results:** Twenty-nine (25%) utilized Adderall and Concerta during their college experience. Twenty-one (72% of users) consumed these drugs without a physician's prescription. Of the users without a prescription, 57% were unable to identify their medication dosage. 25% of the users with a prescription could correctly identify a majority of the drugs' common side effects; however, only 10% of users without prescription could execute the same task. **Conclusion:** From our preliminary study, there is an apparent trend for students within their college years to illicitly use Adderall or Concerta. This trend is accompanied by a lack of understanding of the medications' physiologic effects. There is a strong need for better education and awareness regarding the effects and risks associated with prescription stimulants. Due to the severity of these medications' adverse effects, further investigation is justified.

Mentor: Laurie Minns, Biological Sciences

Heads Up! How Nuthatches Communicate Danger

Nora Carlson

UC Ballroom ~ 3:00pm

Predators are a major source of mortality for many species of birds. Many bird species produce alarm calls to warn conspecifics about predator presence, and these calls can also be interpreted by other animals sharing the environment. Alarm calls can encode information about predators such as size and threat level. One type of alarm call, a mobbing call, is produced in response to perched predators; they recruit other birds to assist in driving the predator away. In Montana there are three species of nuthatches (red-breasted, white-breasted, and pygmy). During winter they occur in mixed flocks with chickadees. Studies have shown that red-breasted nuthatches respond appropriately to threat levels encoded in chickadee mobbing calls, which is interesting because of the very different acoustic structure of chickadee and nuthatch calls. There is little information about whether nuthatches also encode such information in their own mobbing calls. I am in the process of examining the following questions: 1. What are the acoustic features of a nuthatch alarm call? 2. Is information about predator threat level/size encoded in their alarm calls? If so, then 3. How is information about predator threat level/size encoded in their alarm calls? To explore these questions I am experimentally presenting wild red-breasted nuthatches with live perched predators, playbacks of predator calls and chickadee mobbing calls given in response to known predators. I am recording the alarm calls with extremely sensitive microphones and analyzing the calls with bioacoustical software. If nuthatches do encode this specific type of information in their mobbing calls it would not only further support the idea that many bird calls encode much more information than previously thought, but it would give us a greater understanding of both eavesdropping and communication in bird communities.

Mentor: Erick Greene, Biological Sciences

Can the motivation of child abusers to "fake good" be negated through an interview?

Tawna Chapieski, Ka Wun Chan, Kassandra Gahagan, Maria spire, & Nona Stoker

UC Ballroom ~ 11:00am

A structured interview assessment, the Child Guidance Interview (CGI) (Infant/Preschool Form), is being developed to distinguish child abusers from nonabusers. The CGI includes features intended to counteract abusive parents' motivation to "fake good." One such feature is to increase the stress participants experience during the interview in follow-up questions, thereby overcoming some parents' "fake good" presentation. Because previous research establishes that parental stress is a risk factor for child abuse, we anticipate that stress during the interview may elicit an emotional state that provokes maladaptive responses from abusers. Using archival data, 55 transcribed CGI interviews (with abusive and nonabusive parents) were coded to produce adaptive and maladaptive response scores. The parents were given a hypothetical situation in which their child was misbehaving and were asked how they would react. The interviewer then asked twice more what the parent would do if his/her initial proposed response failed. It was hypothesized that all parents would produce more maladaptive and fewer adaptive proposals on their third response than on the first response. Also, nonabusive parents would demonstrate less of an increase in maladaptive responses across questions than would abusive parents. Further, abusive parents were expected to produce more maladaptive responses in general. Support for these hypotheses would indicate that repeating questions to reduce the likelihood of fake-good responses is a useful technique in identifying risk of child abuse.

Mentor: Paul Silverman, Psychology

Vaccination Practices and Barriers In Anchorage Pharmacies
Christopher Chong, Katherine Hale, Jean Carter, & Sherrill Brown
UC Ballroom ~ 11:00am

Vaccinations have played a vital role in furthering public health by preventing potential life-threatening diseases, and the influenza vaccine is no exception. Administration of vaccines by pharmacists is common throughout the United States and is both an important and convenient service to patients. However, pharmacists often view these services as burdensome due to their time-consuming process and workflow interruption. The study objective was to evaluate current practices and identify specific barriers that pharmacists face regarding influenza vaccine administration in Anchorage, Alaska community pharmacies. Upon approval from campus IRB, a survey questionnaire was delivered to 32 pharmacy managers specifically asking about perceived barriers to influenza vaccine administration. Thirty questionnaires were returned, achieving a 94% response rate. Three respondents were hospital outpatient pharmacies; 27 were retail stores. Twenty-three pharmacies administered the influenza vaccine to an average of 567 (\pm 520) patients during the 2010-11 influenza season. Of those not administering vaccines, all seven indicated no plans to implement vaccination services. Almost half (48%) of the 23 pharmacies which provided vaccinations and 57% of the seven which did not stated that the two greatest barriers were time constraints and workflow interruption. Lack of approval of collaborative practice agreements with physicians, lack of reimbursement, and corporate policy were also cited. In spite of these barriers, most Anchorage community pharmacies are providing influenza vaccinations. Future research could look to identify methods for overcoming these barriers. Long term, tying this study to national vaccination practices may help identify methods to improve efficiency and further advance the pharmacy profession.

Mentor: Katherine Hale, Pharmacy

Blood flow in skeletal muscle as it relates to force production during dynamic muscle contraction

Lauren Christian & Christopher Sundberg
UC Ballroom ~ 11:00am

Rhythmical sequential muscular contractions cause oscillations of blood flow in the vessels perfusing the muscle tissue. During the contractile phase of the muscle duty cycle (i.e. muscle force production phase), the rise in intramuscular pressure compresses the vessels and impedes the arterial flow and distribution of blood to the working muscle. In the relaxation phase of the muscle duty cycle, compression of the vessels is released and arterial flow is restored. Surprisingly, the relationship between blood flow and muscle force production during sequential dynamic muscle contractions has yet to be established. My research aims to ascertain this relationship, and determine the effects that different levels of muscle force production during dynamic contractions have on skeletal muscle blood flow. I hypothesize that as muscle force production increases, blood flow will decrease until a critical point by which the intramuscular pressure will rise to a level that completely occludes the supplying arterial vessel. Further increases in muscle force production above this critical point will no longer result in a decrease in blood flow. To test this hypothesis we have constructed a single leg knee extension device, which allows subjects to perform all-out efforts of knee extension at different desired force outputs. During each session blood flow through the femoral artery will be measured using an echocardiogram coupled with a Doppler ultrasound machine.

Mentor: Matthew Bundle, Health and Human Performance

Healthy Roads, Healthy Schools: A Look into the Effects of Public Transportation

Christopher Cordingley

UC Ballroom ~ 11:00am

This study examines the correlation between development of public transportation and increased access to health care as well as increased secondary graduation rates and increased workforce health and productivity. The study explores whether increased investments in public transportation in rural and urban areas will provide greater access to available local health care. If access to health care is improved, will school attendance and productivity also increase? Through an analysis of extant research and publication, this study looks to correlate better access to health care, increased graduation rates and higher job productivity.

Mentor: Jeffrey Greene, Political Science

Impulsivity Measures in an ADHD Population

Elizabeth Corrigan

UC Ballroom ~ 3:00pm

This study serves to examine the discrepancies between a self-report and an objective measure of impulsivity in adults with a diagnosis of Attention Deficit/Hyperactivity Disorder (ADHD). Participants were given the Barkley Adult ADHD Rating Scale 4th edition (BAARS-IV), a self-report measure in which individuals rate how frequently they experience symptoms of impulsivity (i.e., interrupting others) on a four point scale. Participants then completed the objective computerized Continuous Performance Test (CPT) which asks them to press the space bar after every letter except X. The CPT measures the impulsivity of a participant as indicated by recording the number of times they hit the space bar after the letter X (when they should not). It is expected that participants who report high levels of impulsivity will also display poor performance on the CPT. In comparing the self-report data to the CPT data, it is expected that the self-reports will indicate a higher level of impulsivity than suggested by the CPT. This research should help the field to better understand the nature of self-report versus objective measures when looking at ADHD. Data collection is ongoing.

Mentor: Stuart Hall, Psychology

Dissolution of Young Super Star Clusters in NGC 1569

JohnPaul Crawford, J. Graham, & W. Vacca

UC Ballroom ~ 3:00pm

The galaxy NGC 1569 contains two young (~10 Million years) massive (~1 Million Solar Masses) star clusters (YMCs) formed during a recent burst of star formation. Theory suggests that YMCs are disrupted by numerous dynamical processes and are dissolved into the stellar population of their host galaxy. We explore the boundaries of the YMCs by examining the relation between the young cluster stars and the ambient field population in high resolution adaptive optics images from the Keck Observatory. Preliminary results indicate the presence of evolved high mass stars with the age of the clusters out to distances much larger than the radii of long-lived clusters in our own galaxy. This implies the clusters are observed actively dissolving into the galactic population, providing observational constraint on models of cluster dissipation.

Mentor: Nate McCrady, Physics & Astronomy

Induction of system xc- in mouse bone marrow-derived macrophages by bacterial ligands

Kristina Finsaas

UC Ballroom ~ 11:00am

The two main types of inflammatory bowel disease (IBD), Crohn's Disease (CD) and Ulcerative Colitis (UC), affect millions of people worldwide. Expression of the amino acid antiporter, system xc-, is elevated on macrophages in the inflamed mucosa of UC and CD patients, as well as in mouse models of IBD. The goal of this project was to determine the differential regulation of system xc- by macrophages in response to bacterial ligands in vitro. We hypothesized that interaction between intestinal bacterial flora and macrophages via toll like receptor (TLR) activation results in enhanced system xc- expression and macrophage activation. To test this hypothesis, we quantified the expression of system xc- in bone marrow macrophages in response to the model bacterial TLR ligand, LPS, acting through TLR4. We measured system xc- mRNA using RT-PCR and system xc- protein expression using flow cytometry and immunoblotting. We defined the potency of this TLR ligand to upregulate system xc- activity using radioactive amino acids. Finally, we examined molecular mechanisms that regulate system xc- expression on macrophages using recombinant mouse interleukin 10 and the NF-kappa B signaling inhibitor, SN-50. The results from this study will broaden our understanding of system xc- in intestinal homeostasis and disease.

Mentor: Celine Beamer, Biomedical and Pharmaceutical Sciences

Using GIS to Construct an Archaeological Predictive Model

Jared Fischer

UC Ballroom ~ 3:00pm

Geographic Information Systems (GIS) are an essential tool for government agencies managing archaeological sites. GIS is also being used more frequently as a research tool within academic archaeology, especially in landscape analyses that identify significant cultural features across large areas. In this project, GIS was used to construct a predictive model for the Black Hills of South Dakota to determine specific locations likely to contain prehistoric sites. Measurements for slope, aspect, and distance to water for 232 known prehistoric sites were collected. The model was constructed based upon trends in site location which were identified from these measurements. Model outputs were converted to vector layers and resultant polygons were ranked as high, medium, or low probability according to the identified environmental parameters. Finally, the three layers were merged to produce the final map. The model needs to be revised so it is more restrictive; it currently classifies nearly everywhere as high or medium probability. After that, it needs to be validated to assess its accuracy either by comparing it with locations of other recorded prehistoric sites, field survey, or both. Including other environmental variables, such as soil type, may increase the predictive power as well. As the first of its kind to be constructed for this area, the model can be useful in increasing the number of archaeological sites available for study. Since it quantifies trends in site location, after revision and validation it can be utilized to direct surveys for new sites. With more sites recorded, more robust archaeological analyses can be conducted in the future, which will lead to a better understanding of the use of the Black Hills throughout prehistory.

Mentor: Jim Riddering, College of Forestry & Conservation

Metacognition and allocation of study time following a traumatic brain injury

Sarah Flanary

UC Ballroom ~ 11:00am

Prior research has shown that patients who have experienced traumatic brain injuries often have a more difficult time studying and learning after the injury, due to changes in their metacognition. My purpose with this project was to design and implement a study to learn more about these differences and compare them to non-injured individuals. I will be focusing on the metacognitive skills of adults who have experienced TBI's and how these skills affect their allocation of study time and subsequent learning experiences. My study will give information on various aspects of their personal studying and learning habits. These include personal judgments of learning, how they allocate their study time, and how well they do learning with a time limit. I will be comparing their results to the Region of Proximal Learning Model (Metcalf and Kendall, 2005), which is used to describe non-injured individuals study habits. I am hoping to gather information to assist in the development of more effective studying strategies for individuals who have experienced traumatic brain injuries.

Mentor: Laurie Slovarp, Communicative Sciences & Disorders

Exploring the Effects of Moist Heat Pack on Vertical Jump Performance

Alyssa Frei & Rebekah Truitt

UC Ballroom ~ 3:00pm

Purpose: Studies have shown that active and passive warm-up are both beneficial in increasing muscle temperature and therefore increasing performance. Active warm-up is increasing body temperature through movement, such as running or jogging. Passive warm-up is increasing body temperature through outside means, such as massage or hot pack. The purpose of our study was to provide further insight on passive warm-up and whether using a heat pack prior to performance is beneficial for an athlete when the goal is to improve performance. **Originality:** Currently, there is little research regarding the effects of the heat pack on sport performance, specifically the vertical jump. **Methods:** We had 23 subjects volunteer for this study. These subjects did not have an injury to the lower extremity in the past year and were randomly assigned into the control group or heat pack group. With no warm up, subjects completed three trials of a single leg vertical jump on the Just Jump Mat using their dominant leg. Afterwards, subjects received heat pack for 20 minutes on both their calves or rested on a treatment table for 20 minutes. Three jumps of single leg vertical jump with dominant leg were performed again after the treatment. Averages of both pre and post vertical jump performances were taken. **Significance:** Results showed about an inch decrease in vertical jump performance from pre to post for the subjects that did the hot pack treatment. Those who were in the control group had no change in performance. The use of superficial heat may not be recommended when the goal is to improve performance because it may create a sedation effect on the patient because according to Draper, heat provides an analgesic effect to the muscles, which causes relaxation. The point of warm-up is to increase performance, not decrease it.

Mentor: Valerie Moody, Health and Human Performance

Hearing loss and iPod use among adults in Missoula, Montana

Laura Fullerton

UC Ballroom ~ 11:00am

Hearing Loss and iPod use among adults in Missoula, Montana Laura Fullerton The purpose of this study is to determine the incidence and prevalence of hearing loss among a sample of adults in Missoula, Montana. There were two purposes to obtaining this data. First, this study will measure the amount of sound produced by the personal listening device (PLD). The study will survey the levels of sound that an individual's PLD produces using a specially designed computer program written by Dr. Yonovitz, as well as a mannequin equipped with an ear coupler that will collect a 60 second sample of the participants PLD loudness. Dr. Yonovitz a licensed Audiologist in the state of Montana, will accomplish a hearing screening of each participant in a portable sound treated room. Each participant will be provided with the results of their screening test. The results as will be presented to the University of Montana Undergraduate Research Symposium (UMCUR).

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Causal factors that contribute to the low graduation rate of Native American students at The University of Montana

Myron Gardipee & Eagle-Heart Thomas

UC Ballroom ~ 3:00pm

In today's higher education system, there is a broad and diverse population of students who attend college. In the Montana University System 2009 Diversity Report, only 9% of incoming freshman identified as Native American (NA) has graduated within 6 years with a Baccalaureate degree. These statistics demonstrate that 1 out of 10 Native American students who began at The University of Montana will graduate with a Baccalaureate degree within six years. The purpose of this study is to look for related causal factors associated with low graduation rates. The aim of the study is not to find a solution for the dropout problem, but to answer the question: Why would an individual make such a big commitment both in terms of time and money, only to quit before they graduate? A 25 question survey will be administered 50 American Indian students and to 50 psychology 100 students. Significant differences between groups are expected. The results that are expected may show that the NA sample will experience higher levels of stress, discrimination, and lower levels of social support.

Mentor: Gyda Swaney, Psychology

Effect of salt diapirism and salt withdrawal on deposition of the Chinle Formation, Paradox Basin, Utah

**Matthew Gilbert, Theodore Becker, Dylan Inskeep, Patrick Moffitt,
& Robert Rader**

UC Ballroom ~ 3:00pm

The Middle and Upper Triassic Chinle Formation overlies Pennsylvanian age salt deposits of the Paradox Formation, which has an original depositional thickness of about 2,500 meters. During deposition of the Chinle Formation, passive diapirism of the Pennsylvanian salt caused uplift of the ground surface, whereas salt withdrawal caused subsidence of the ground surface and the formation of depositional “minibasins” that controlled overall sedimentary style. The Chinle Formation in the Paradox Basin of southeastern Utah consists of an upper and lower sequence. The lower sequence is characterized by interconnected single and multi-story sandstone bodies sharply overlain by alternating sandstone and mudstone deposits. The upper sequence is characterized by alternating sandstone-filled single-story and multi-story channel complexes and thick overbank-mudrocks. We hypothesize that increased accommodation space in the center (axis) of the basin formed by salt withdrawal led to sand-rich deposits with the potential to serve as petroleum reservoirs. We hypothesize that the Moab Valley minibasin near Moab, Utah will be expressed through a major change in sedimentary architectural style whereby basin flanks are characterized by mud-dominated sections and mature paleosols and the basin center will be characterized by an interconnected network of channel sandstones and immature paleosols. We will test this hypothesis through photomosaics of well-exposed canyon walls of the Chinle within the Big Bend minibasin, augmented with measured stratigraphic sections through accessible portions of the Chinle stratigraphy.

Mentor: Marc Hendrix, Geosciences

Consonant perception with reverberant monaural and binaural presentation

Jennifer Ginn & Aericka Dunn

UC Ballroom ~ 3:00pm

Consonant Perception with Reverberant Monaural and Binaural Presentation Consonant perception significantly influences an individual’s ability to effectively participate and learn in a classroom environment. Research has found that speech intelligibility decreases greatly with increased reverberation times (Moncur and Dirks, 1967), while binaural hearing provides a hearing advantage (i.e. via consonant perception) compared to monaural hearing in reverberant and noisy conditions (Helfer, 1994). This research investigation determined consonant perception for reverberant and binaural presentation for different consonants as well as the improvements from two ear listening. Participants were Communicative Sciences and Disorders undergraduate and graduate students experienced in phonetic transcription. Subjects were presented 21 consonant-vowel (CV) syllables each randomly repeated 10 times each. The stimuli were presented via a computer. Each subject listened with headphones at a level of 65 dB HL (average conversational level). Participants responded by entering a response on a keyboard. Four reverberation times were tested. These included, 0, 0.6, 1.2, and 2.4 sec. Both in-phase and out-of-phase signals were presented in noise at 0 and 2.4 sec in order to test for the combined effect of noise interference, reverberation and a binaural advantage. Results were analyzed by computing errors for each consonant as well as using distinctive features to summarize consonant type. The different types of perceptual processes influencing this enhancement have not completely identified and the impact of the binaural effect on consonant error patterns has not been determined. It is important that these issues are investigated in order to enhance the listening conditions of the classroom environment.

Mentor: AL Yonovitz, Communicative Sciences and Disorders

Relationship between target selection and speech adaptability

Ashley Glover & Sarah Waarvik

UC Ballroom ~ 11:00am

This retrospective study assesses the relationship between target selection and speech adaptability during speech intervention for children with speech sound disorder. Speech sound disorder occurs when a child uses incorrect sounds for his or her age. Speech-language pathologists use many assessments to identify speech sound difficulties; however, current practices may not provide optimal results to inform clinical decision making. Many clinicians use static assessments to judge skill levels and to determine targets for treatment; however, dynamic assessment may be more informative for understanding the child's speech adaptability and for selecting targets. In the current study, the Dynamic Assessment of Phonology (GDAP) (Glaspey, 2012), was used to measure children's ability to correctly produce sounds when given a systematic presentation of assistance. The participants included two three-year old girls with speech sound disorder. Both subjects were assessed using two measures: (1) GDAP to determine speech adaptability levels across error sounds, and (2) a probe of independent single-word production across speech sounds. Using these measures, the clinician selected target sounds based on prior clinical expertise and clinical judgment. The two measures were administered four times across treatment. The results will include an analysis of the GDAP and probe scores. Relationships between scores and targets will be presented and evaluation of adaptability levels will be considered. It is hypothesized that slightly adaptable targets will show greater progression during treatment. The results will better guide clinicians in choosing the most efficient targets for treatment of speech sound disorder in children.

Mentor: Amy M. Glaspey, Communicative Sciences and Disorders

Investigation of cm-scale heterogeneity and relationships among organic carbon, mineralogy and rock fabric in mudstone and siltstone of the Permian

Phosphoria Formation

Chris Gold

UC Ballroom ~ 11:00am

The purpose of this project is to investigate, document, and correlate physical, mineralogical, and geochemical heterogeneity in organic-rich rocks of the Permian Phosphoria Formation. The hypothesis that I seek to test is that changes in organic carbon and mineralogy vary with macroscopically distinct variations in rock fabric at the centimeter scale. Forty-nine samples of organic rich mudstones and siltstones from the Meade Peak and Retort members of the Permian Phosphoria formation were collected from over 25 locations in southwest Montana, western Idaho, eastern Wyoming, northeastern Utah and northwestern Colorado. These samples are to be cut, polished, and then described in terms of physical rock fabric. Macroscopically distinct changes in rock fabric will be then sub-sampled and analyzed for total organic carbon content and mineralogy. Through comparison of these parameters in the lamina of the rocks, I expect to test my hypothesis that a correlation exists between macroscopic physical rock fabric, organic carbon, and mineralogy. This project is important because total organic carbon and mineralogical analyses commonly are reported as a single number with no accompanying context regarding physical rock fabric. If cm-scale variations in these parameters are found to exist, that would suggest that bias may be introduced when organic carbon and mineralogy are reported by laboratories without accompanying information regarding sedimentary fabric. Preliminary analysis of Phosphoria samples suggests that mudrocks fall into two broad categories: 1) massive samples with no apparent heterogeneity on the cm-scale; and 2) samples that do contain cm-scale heterogeneity. In the latter case, heterogeneity at the cm-scale appears to be defined by alternations between phosphatic peloid-bearing microfacies and peloid-free laminae microfacies.

Mentor: Marc Hendrix, Geosciences

The effect of protein stability on the dynamics of an electron transfer protein

Matthew Goldes

UC Ballroom ~ 3:00pm

Proteins are oligomeric macromolecules composed of amino acid monomers. Mutating specific amino residues within a protein can alter its stability, which can be compared to the wild-type conformation. Cytochrome c (cytc) plays a key role in the electron transport chain of living organisms and is involved in the intrinsic pathway of apoptosis. The active site of cytc contains a heme group; the surrounding protein matrix is referred to as the heme crevice. My project is an investigative comparison of the effects of stability on the dynamics of human and spider monkey cytc. I have sequentially mutated human cytc to the spider monkey sequence using site-directed mutagenesis. I completed experiments measuring the global stability of each variant using circular dichroism spectrophotometry. The results from these experiments indicate no significant difference in stability between the human and spider monkey cytc variants. I have also completed pH titrations on each variant to observe changes in the local stability of the heme crevice. I expected the local stability of the spider monkey variant to be lower than that of the other variants, however the results indicate that interactions between other mutated residues stabilize the heme crevice of the spider monkey variant. The results of this project will aid in understanding which residues within the primary cytc sequence have the greatest effect on the observed changes in protein stability. This information will contribute to the study of protein folding and stability, and may help determine why proteins misfold in diseases such as Alzheimers.

Mentor: Bruce Bowler, Chemistry

Brain activity preceding speech initiation

Jenna Griffin & Aubrie Beard

UC Ballroom ~ 11:00am

The purpose of this research is to find a consistent brain derived morphological waveform that represents the electrical signal responsible for the initiation of a speech gesture. It is hypothesized that there is a repeatable waveform that can be measured when the brain sends a neural signal to the speech mechanism. Given successful results within this research investigation, there are many possible clinical implications, including the treatment and increased knowledge of apraxia, stuttering, and other speech disorders. The subject group consists of three females and three males from the Communicative Sciences and Disorders department. Electrodes will be placed on the subject's scalp and connected to an EEG, which measures and records electrical activity from the brain. Additionally, electrodes on the upper lip provide electromyographic (EMG) signals, which measures electrical activity of muscles. Respiratory measurements as well as a measurement of the subject's eye movement will also take place to eliminate artifact. The EMG measures at the lip will be the reference point for the initiation of the speech gesture. A comparison will also be made from the EMG to the use of the speech signal as the reference point. The subject will be asked to repeat a VCV (Vowel, Consonant, Vowel) word such as /apa/ and the contraction of the muscle at the /p/ will be considered the commencement of the speech gesture. Averaging these waveforms allow a specific pattern within the data to emerge. If the pattern is present across multiple subjects, then the hypothesis is supported.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

"Water is for fighting"

Hannah Grover

UC Ballroom ~ 11:00

As the southwestern United States copes with growth, cities such as Las Vegas are on a constant search for water sources. The Southern Nevada Water Authority (SNWA) has proposed a pipeline to take water from rural Nevada and bring it to Las Vegas. How will this effect the communities loosing the water?

Mentor: Dennis Swibold, Journalism

Emotive responses to naturally occurring auditory stimuli: EEG bases in lateralized function, physiological and behavioral self-report

Bailee Guisti & Alexandra Reiner

UC Ballroom ~ 3:00pm

As an individual navigates through their environment, they are presented with a number of different auditory stimuli, which can affect emotions. These emotions are important as they have implications across physiological, behavioral and cognitive domains. This study examined emotions in response to naturally occurring auditory stimuli ranging from neutral, to negative or positive. During the presentation of these sounds, physiological changes were acquired to observe pulse rate and skin potential responses, which view the sweat gland activity to measure changes to the autonomic nervous system. Cognitive measures were taken using an electroencephalogram (EEG) to determine left and right hemispherical changes from the brain potentials. Self-reported measures looked at the differences in emotional valance, from highly pleasant to highly unpleasant, and arousal, from strongly elicited emotion to weakly elicited emotion, for each sound presented. Throughout a 30 minute time period, 60 sound stimuli, selected from the International Affective Digitized Sounds (IADS), were presented to the participant. After the sound presentation self-reported affective valance and arousal was measured using the Self-Assessment Manikin (SAM), a nine-point likert scale. Visceral measures of skin potential responses, pulse rate and brain potentials from the left and right hemispheres were taken before, during and after the presentation of the stimuli. The results of the study indicated that these physiological and behavioral domains were modulated by the affective valance of the sounds. Electrical brain potentials were also related to the types of sounds being presented. The unpleasant sounds were found to elicit the greatest response in each of the physiological measures. The results of this study supported the biological significance of emotions as prescribed by dimensional theorist. The practical and theoretical implications of the results are discussed in terms of the link between emotions and psychophysiology.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Extremophilic microbes from acidic mine waste lake produce novel anticancer compounds

Sarah Hamblock & Teri Girtsman

UC Ballroom ~ 11:00am

Berkeley Pit Lake in Butte, Montana is part of the largest superfund site in the United States. This abandoned open pit copper mine is filled with acidic water (pH 2.5) and high levels of heavy metals. In 1995, the Stierle Lab discovered life in the form of fungi and bacteria in the Pit and has since found over sixty other extremophiles in the lake water and basal sediment. My project in the Stierle Lab focuses on the isolation, structural characterization, and bioactivity assessment of metabolites produced by the actinomycete PS-45A-4, a branching bacterium found in the sediment of the Pit. Metabolites from the broth culture of this microbe are isolated by size exclusion and silica gel column chromatography guided by specific signal transduction enzyme inhibition assays. Up-regulation of the signal transduction enzymes matrix metalloproteinase-3 (MMP-3) and caspase-1 has been associated with inflammation as well as the onset and metastasis of cancer cells; therefore, inhibition of these enzymes could have therapeutic value. Metabolites isolated from broth cultures of PS-45A-4 that demonstrate significant inhibition of MMP-3 or caspase-1 will be evaluated in the National Cancer Institute human cancer cell line screen and in the intact inflammasome assay. Research has shown strong correlations between MMP-3 inhibition and reduced cancer cell activities including tumor initiation and metastasis. Caspase-1 inhibition has been shown to mitigate production of pro-inflammatory cytokines in the inflammasome and to target inflammation-associated cancers. Once anti-cancer activity of a compound is confirmed, the structure of the novel, bioactive metabolites will be determined. 1D and 2D proton NMR and mass spectrometry are used to determine the exact structure of the compound. Discovering novel anti-cancer compounds from biological sources is important to the continuing search for safe and effective cancer treatments.

Mentor: Andrea Stierle, Biomedical and Pharmaceutical Sciences

Correlating stacking patterns between fluvial and marginal marine environments of the Castlegate sandstone

Evan Hanson, Rebecca Keeley, Katie Monaco, & Friedrich Volkmer

UC Ballroom ~ 11:00am

The Castlegate is part of an upper-Campanian clastic wedge deposited in the Cretaceous Western Interior Seaway during the late Sevier Orogeny, approximately 79 million years ago. Studies have shown that controls on the sequence stratigraphic architecture are multifold, but they are most commonly interpreted to be driven by tectonics and eustatic changes in sea level. We hypothesize that eustatically-driven sequence stratigraphic changes will separate rock packages that express in-phase relative base level changes between proximal and distal positions. This also suggests that relatively small changes in depositional environment will be observed across sequence boundaries. In contrast, we hypothesize that tectonically-driven sequence boundaries will be expressed by out-of-phase changes in relative base level between proximal and distal positions and that large changes in depositional environment will be observed across sequence boundaries. To test these hypotheses, we will compare the outcrop expressions, stratigraphy, and sedimentology of deposits near Price, Utah with deposits near Green River, Utah. Amalgamated sheet sandstones characterize the fluvial environment (Price locality), while marginal marine- and tidally-influenced deposits characterize the coastal environment (Green River locality). We will compare the architecture of the fluvial environments to that of the coastal environments using photomosaics and measured stratigraphic sections, and we will use these techniques to attempt to relate stacking patterns between sequence boundaries in the two areas. We will use previously established sequence stratigraphic boundaries to compare the degree of amalgamation in the fluvial environment with the facies shifts in the marginal marine environment.

Mentor: Marc Hendrix, Geosciences

The role of ClpP protease in gene regulation of the Lyme disease bacterium

Megan Hatcher

UC Ballroom ~ 3:00pm

As *Borrelia burgdorferi*, the bacterium that causes Lyme disease, cycles between its tick vector and its mammalian host, various outer surface lipoproteins (Osps) are produced. The outer surface lipoprotein OspC is required for transmission from the tick to the mammal and is produced once the tick begins feeding, but must be turned off following establishment of the mammalian infection. RpoS, a sigma factor, is required for OspC to be expressed during transmission. In *B. burgdorferi*, RpoS is activated to transcribe genes that are required for transmission and mammalian infection. In the model bacterium *Escherichia coli*, RpoS is degraded by the protease ClpP. *B. burgdorferi* has a homolog of ClpP, which we were able to artificially induce using the hybrid flac promoter. The flac promoter is a fusion of the *E. coli* lac operator, the binding site for Lac repressor, to the flgB promoter, a constitutive, strong promoter in *B. burgdorferi*. We determined that the induction of ClpP during early transmission conditions in vitro led to a decrease in OspC expression. Also, we observed that overexpression of ClpP led to a growth phenotype in vitro: the cells grew slower than normal; they were also longer than normal. We speculate the phenotype is a result of difficulty in dividing due to the stress of having excessive ClpP in the cell. Therefore, we hypothesize that ClpP is involved in degrading RpoS in *B. burgdorferi*; we predict that OspC and RpoS expression levels directly correlate to the levels of ClpP. Determining ClpP's involvement in RpoS degradation will advance our understanding of the molecular mechanism of regulation of RpoS and OspC during the enzootic cycle of *B. burgdorferi* and the pathogenesis of Lyme disease.

Mentor: Scott Samuels, Biological Sciences

Comparison of articulation intervention in children using iPad technology

Kelly Heard, Kelsey Johns, & Katelyn Riordan

UC Ballroom ~ 11:00am

Over the past decade, technology has played a large role in the field of speech and language pathology. In more recent years, the Apple iPad has become a staple in many speech therapy settings. Many professionals have implemented the iPad into their therapy strategies but there is a lack of research and information about how beneficial the iPad and its features can be. The iPad is appealing because it is equipped with built in capabilities and when combined with appropriate applications it becomes an influential tool for many different clients and their therapy goals. In addition, the iPad is affordable, easy to manipulate, engaging, and portable. In a speech therapy setting, the iPad has been used for intervention, assessment, assistive technology, reinforcement and data collection. In this study we will be comparing articulation intervention using an iPad and traditional articulation intervention strategies. We will assess the improvement in the child's articulation of target sounds when an iPad intervention is used in comparison to traditional intervention. By comparing articulation intervention using the iPad to traditional articulation intervention in children three to six years of age, this study will provide evidence that the use of the iPad in speech therapy is valid. Pre and post speech sounds are compared using the Goldman Fristoe Test of Articulation. From this evidence, the iPad could be utilized by speech and language pathologists across the nation in all work settings. The multifunctional features and available apps make the iPad a valuable tool for speech and language pathologists. The iPad will help individuals receive the innovative services they need to meet their speech and language goals.

Mentor: Christine Merriman, Communicative Sciences & Disorders

Assessment of fluvial vs. wave-dominated processes in the formation of the lobate geometry of ancient Panther Tongue delta deposits, east-central Utah

**Adam Hessenkemper, Katie Quinn, Katrina Zigan, Maximillian Frick,
& Stephen McLaughlin**

UC Ballroom ~ 3:00pm

The Cretaceous Panther Tongue of the Star Point formation in the Book Cliffs, Central Utah displays both a thickening and coarsening upward pattern and is interpreted as fluvial-dominated delta with significant gravity underflows forming the delta front. The facies associations suggest terminal distributary channel, channel mouth, and proximal delta-front and distal delta-front depositional environments. The Panther Tongue deposits range from a siltstone base to an overlying alternation of siltstone and sandstone beds to an amalgamation of thick sandstones at the top of the section. The sedimentary parasequences of the Panther Tongue sandstones suggest deposition from unidirectional currents, seaward-dipping clinoforms, and an overall lobate geometry. All of these observations are consistent with the Panther Tongue having been deposited in a river dominated delta. However, it has been observed that the sandstone beds thin to a greater degree in a dip direction than along strike, indicating a relatively strike-elongate geometry of the delta lobes. These characteristics are not typical of a fluvial-dominated delta lobe but rather are more suggestive of a wave-dominated delta. We hypothesize that analysis of sedimentary facies and paleocurrent indicators will provide a basis for interpreting the relative influence of fluvial vs. wave processes on the Panther Tongue. Specifically, in the case of a fluvial-dominated system we would expect to observe evidence of unidirectional currents, offshore-directed cross bedding and multiple distributary channels. In the case of a wave-dominated system we would expect to see evidence of wave ripples, hummocky-cross stratification and more amalgamation of sand bodies. In our field analysis both strike (lateral) parallel and dip parallel outcrops are examined. This will be assessed through measurements of vertical stratigraphic sections to document facies stacking patterns, and measurements of paleocurrent indicator directions with a geological Brunton compass. These observations are crucial in identifying potential hydrocarbon reservoirs in deltaic environments.

Mentor: Marc Hendrix, Geosciences

Some Risk Factors for Child Abuse

**Lindsey Jackson, Kylene Caquelin, Amanda Powers, Christopher Ruby,
& Kristy Kees**

UC Ballroom ~ 11:00am

Previous research has identified several risk factors that predict child abuse perpetration. Particular factors that will be examined in this study are: parent's age at first child, gender of parent, history of parent abuse as a child, and responses to one question on the Child Guidance Interview (CGI). The CGI was designed to give parents hypothetical situations in which their child misbehaves, and the parents must describe their likely reactions. The sample for this study will be 76 parents extracted from a population of parents who underwent psychological and parental competence evaluations. Some of these parents were suspected of child abuse. As part of these evaluations, the parents completed the CGI, and will be identified as abusers or non-abusers using the Child Maltreatment Certainty Scale (developed by this research team). A discriminant analysis will be used to examine whether the above factors predict child abuse. Previous research shows that parent primiparous age and gender predict child abuse perpetration. However, it is not clear whether these factors also act in combination with parents' own abuse histories to increase abuse risk. Examining the combination of these factors may provide helpful information on reducing child abuse in the future.

Mentor: Paul Silverman, Psychology

Testing Transport and Flow Generation in a Linear Plasma Model

Lucas Jones, M. Gilmore, & E. Schuster

UC Ballroom ~ 3:00pm

Improvements in understanding how plasma flows interact with turbulence is needed in order to increase plasma confinement within plasma devices. Efficient plasma confinement is essential in processes that require prolonged high plasma density regions, such as those that are needed in fusion experiments. This basic research into understanding the

mechanisms towards controlling turbulence is beneficial to future plasma research and also furthers our knowledge of the plasma state of matter. Numerical modeling of transport and flow generation in a linear plasma device using a 1-D transport code is presented. Work presented here was done as part of undergraduate plasma physics research conducted at the Department of Physics and Astronomy of the University of Montana. We present model comparisons to radial plasma densities from the HELCAT experiment – a helicon-cathode sourced cylindrical plasma experiment at the University of New Mexico. The model is used to analyze the diffusive transport of plasma particle density, energy, and momentum driven by both collisions and turbulence. Testing the use of voltage-biased concentric rings as control elements for the plasma radial electric field in the HELCAT transport model is a main topic of the presentation. The biased rings are modeled in the transport code as a Gaussian source of azimuthal momentum input. Ring configurations that may not always be possible in HELCAT can be tested within the model to understand the contributors of turbulence suppression. In the model we have shown that by varying voltage of the biased rings, a sheared radial electric field can be generated to suppress turbulent particle and heat transport.

Mentor: Andrew Ware, Physics & Astronomy

Investigating the post-Mazama sedimentary record in lakes of western Montana

Ryan Kadlik

UC Ballroom ~ 11:00am

Mount Mazama was a volcano located at current day Crater Lake in southwestern Oregon. It erupted 7,630 +/- 80 cal yr BP. The eruption was enormous and forced large volumes of ash into the atmosphere where it subsequently settled out to become part of the sedimentary record in lake basins across much of the Pacific Northwest, including in northwestern Montana. The purpose of this project is to examine the post- Mazama record of sedimentation from two lakes in western Montana. The two lakes are Lake Mary Ronan and Flathead Lake. The Mazama tephra is very well preserved and little disturbed in both of these lakes. The hypothesis that I seek to test is that the massive eruption of Mount Mazama produced a sustained period of drought in northwestern Montana immediately following the eruption. Independent analyses from Flathead Lake suggest that this drought resulted in a drawdown that was sufficient enough to produce and develop a soil in Lake Mary Ronan. High resolution imaging of the cores, sedimentary grain size changes analysis, total inorganic carbon content (TIC analysis), to test this hypothesis. The grain size analysis should show an increase in the size of the sediment grains and the TIC analysis should show an increase in total inorganic carbon after the Mazama tephra was deposited. Preliminary X-ray analysis of Lake Mary Ronan sediment records suggest that soil profile fabrics developed shortly after the deposition of the ash. This topic is of interest because it investigates the effects that large volcanic eruptions can have on climate.

Mentor: Marc Hendrix, Geosciences

Measuring vocal jitter: Continuous speech vs. sustained vowels

Julianne Lally & Elizabeth Gianotti

UC Ballroom ~ 3:00pm

Jitter is commonly known as the cycle-to-cycle variation in the periodic signal generated at the larynx, more commonly known as the voice box. Jitter can be measured using a number of techniques; however, the most common uses a voice

recording that is analyzed by measuring each period of the vocal cycle. Measuring jitter is significant in the practice of Speech-Language Pathology because it can be a determining factor in diagnosing vocal pathologies. When measuring vocal jitter, sustained vowel phonation has been the most common way to obtain values. To obtain sustained vowel phonations, clinicians would have a patient maintain a specific vowel for a sustained length of time. This investigation considers an alternative approach which would have the patient perform continuous speech while being recorded, this, in turn, would allow a more natural depiction of the cycle-to-cycle variation in speech. The voiced phonemes would then be removed and jitter values would be derived. Continuous speech may offer a different perspective to the way vocal jitter is determined because of its more natural depiction of speech. Using a throat microphone, directly on the throat and/or the larynx, will eliminate potential errors. The throat microphone should allow extraction of jitter, from continuous speech, by only extracting voiced phonemes. This research study uses speech output and throat vibrational output (throat microphone and standard microphone, respectively) to determine jitter values for sustained vowels and continuous speech. Eight subjects (ages 8-30) produced nine sustained vowel sounds and, additionally, read a standard passage. The data were recorded with a sample rate of 44,100 samples per sec (resolution of 16 bits). Jitter values were obtained for sustained vowels and continuous speech. The results will be discussed for both methods using jitter values in normal speakers.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Processing of ribosomal RNA in *Borrelia burgdorferi*

Richard LeCoulre & Melissa Hargreaves

UC Ballroom ~ 11:00am

Processing of ribosomal RNA in *Borrelia burgdorferi* *Borrelia burgdorferi*, the microorganism that causes Lyme disease, has a unique organization of the genes encoding the ribosomal RNAs in its genome. Ribosomes catalyze translation, the synthesis of proteins, which is an essential process in all cells and the target of many antibiotics. Ribosomes are composed of both ribosomal RNA (rRNA) and ribosomal proteins. rRNA is responsible for most of the crucial activities in translation. The rRNA is generated by transcription, processed by ribonucleases (RNases), and then assembled into ribosomes. My project focuses on an effort to obtain an understanding of the mechanism by which ribosomes are produced in *B. burgdorferi*. I hypothesize that RNase III processes the largest rRNA, based on precedence in other bacteria, and I have used a biochemical approach to study the role of RNase III. I have produced recombinant RNase III and an artificial RNA substrate to perform binding, cleavage, and kinetics assays. In addition, I have determined the rRNA processing sites using 5' Rapid Amplification of cDNA Ends (RACE) on the small subunit rRNA. These analyses enable me to determine whether and how processing of these subunits is taking place. A significant outcome of this data is to contribute to knowledge of ribosome biogenesis in an organism with an unusual rRNA gene organization. Furthermore, my results could provide insight for new antimicrobial therapies against Lyme disease.

Mentor: Scott Samuels, Biological Sciences

Spectroscopic design for analysis of sunscreen

Daniel Lehman, Peter Burns, JohnPaul Crawford, Arian Titchbourne, Jonathan Wagner, & Allison Mueller

UC Ballroom ~ 3:00pm

We present the design of our solar spectrograph as part of the 2012 National Student Solar Spectrograph Competition. Our device will operate over the wavelength range from 280 to 400 nm with a resolution of 0.1 nm, sufficient to resolve Fraunhofer lines. This covers the ultraviolet A and B ranges, exposure to which is commonly associated with health risks. Our goal is to analyze the transmission of UV through various sunscreens to compare their efficacy. Our completed spectrograph will be used to take data at the national competition in Bozeman, Montana on May 16-19, 2012.

Mentor: Nate McCrady, Physics & Astronomy

Cancer Pharmacogenetics in the Salish-Kootenai Tribe

Bradley Lerud

UC Ballroom ~ 3:00pm

Over the past two decades, a growing focus on the relationship between the CYP1A1 locus and cancer has allowed significant progress in understanding how to better treat cancer patients. Cytochrome P450 is a large group of enzymes that catalyze the oxidation of substances within the body, and CYP1A1 is one of these many enzymes. Through the use of pharmacogenetics, the process of determining more effective treatment drugs to use based on the genetic make-up of an individual, we have analyzed the CYP1A1 enzyme and determined if it would be predicted to work properly in metabolizing a certain cancer treatment in a Montana native population. It is understood that the CYP1A1 enzyme activates the drug Erlotinib (ERL), which is used to slow cancerous cellular growth throughout the body, but with polymorphisms in the coding sequence for this enzyme, the drug likely is unable to do its intended job. Previous research has determined the frequencies of variant DNA sequences on the CYP1A1 locus for many ethnic populations so far, but never for the Salish-Kootenai tribal population of Montana. Through the use of polymerase chain reaction (PCR) and gel electrophoresis, we have determined the frequency of a certain variant on the CYP1A1 locus, specifically the ?m1? variant, to be 50%. Comparing the frequency of this variant to the previously known Caucasian population will allow us to assess the risk of using Erlotinib in this population versus the clinical experience in other ethnic groups. This will aid physicians in choosing an appropriate dose and perhaps alternative drugs for many cancer patients.

Mentor: Mark Pershouse, Biomedical and Pharmaceutical Sciences

Serially recorded otoscopy and tympanometry in children in day care

Meredith Levinson & Braden Warehime

UC Ballroom ~ 11:00am

Otitis Media (OM), known commonly as an “ear infection,” is one of the most prevalent childhood diseases in children under two years of age in the U.S. By the age of five years, nearly all children will experience at least one episode of OM. It is crucial that physicians and audiologists be able to accurately diagnose OM so that a child may receive a referral to an Ear, Nose and Throat (ENT) physician and receive proper treatment. At the present moment, the gold standard in OM

diagnosis uses measurements of middle ear pressure obtained from tympanometry along with visual inspection of the eardrum using a hand-held otoscope. A hand-held otoscope provides a subjective evaluation of the state of the ear drum. In this study, we will analyze video otoscopy and tympanometric data from 200 children obtained every two weeks over a four month period. Measurements will be obtained from otoscopic images quantified by image analysis techniques using colorimetric data from the eardrum. An inflamed eardrum will appear redder in color compared to a normal eardrum. We will compare eardrum metrics with the type of tympanogram obtained for each child. Children with OM will have smaller gradients and flatter tympanograms possibly indicating fluid in the middle ear. This research project is unique in that we will be analyzing the otoscopic results objectively with quantitative data to indicate the ear drum's redness, rather than measuring the color solely through subjective observation. Through these methods a more accurate basis for ENT referral for OM can occur.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Mapping male aggression and courtship circuitry: Characterizing octopamine and GABA neurons in the *Drosophila* brain

Genevieve Lind & Jonathan Andrews

UC Ballroom ~ 11:00am

All animals, including humans, must respond to environmental and social cues in order to survive. Behavioral responses to the environment typically involve extensive neural networks and complex genetic interactions. I am using the fruit fly, *Drosophila melanogaster*, as a model organism to examine the neural networks involved in aggression and reproductive/courtship responses to social cues. Recent studies indicate that courtship is the default behavior for a male fly. In response to a second male fly, courtship must be inhibited in order for aggressive behavior to be initiated. Gamma-aminobutyric acid (GABA) is the predominant inhibitory neurotransmitter in many organisms including *Drosophila* as well as humans, and could be a potential mechanism through which courtship is inhibited and the transition to aggressive behavior is made. In addition, previous studies have established the octopamine (OA) neuromodulatory system as an important component of the choice between aggression and courtship behavior. Male flies with altered OA levels display elevated levels of male-male courtship and reduced levels of aggressive behavior. Using several genetic expression techniques and confocal microscopy, I identified a subset of OA neurons that also express GABA. Furthermore, I determined this octopamine-GABA neuronal subset also expresses male forms of Fruitless (FruM), a gene necessary for the establishment of sex-specific behaviors. This distinct subset of neurons expressing a neuromodulator (OA), an inhibitory neurotransmitter (GABA), and male specific proteins (FruM), could play a critical role in regulating behavioral transitions between courtship and aggression. We are currently examining the effects of manipulating the activity of these neurons in courtship and aggression assays. Understanding the neural networks involved in behavioral responses to the environment in *Drosophila* could lead to our understanding of behavior in higher organisms, including humans.

Mentor: Sarah Certel, Biological Sciences

Resin duct density and flow as a function of fire damage in Ponderosa pine

Daithi Martin

UC Ballroom ~ 11:00am

Fire has shaped the ecosystems of the intermountain west for centuries. The effects of fire on *Pinus ponderosa* stand structure and soil nutrient cycling have been extensively studied. However, the effect of fire on the physiological defenses of *P. ponderosa* is not thoroughly understood. One function of these defenses is to repel attacks from biotic disturbance agents such as bark beetles. The primary mechanism by which *P. ponderosa* repels a bark beetle attack is the secretion of

resin through ducts located in the sapwood. There has been no study to date that examines whether resin duct density and flow are a function of fire damage. The goal of my project is to elucidate whether fire injury level influences resin duct density and resin flow. Core samples were collected from *P. ponderosa* stands in the Blue Mountain Recreational Area outside of Missoula, MT where a fire occurred in 2003. The sample size consisted of 27 trees with two cores taken from each tree. The control group consisted of 8 trees that had not been burned by the 2003 fire. For each individual tree, core samples were collected from different geographical aspects. The cores samples provided data on resin duct density as well as tree age and growth rate. These data sets were compared to the fire injury level among the samples to find any correlations. Fire injury data was assessed based on crown scorch percentage and cambial kill percentage. The findings of this study will aid in the understanding of how fire affects the physiological defenses of *P. ponderosa* and help better inform forest managers working to strengthen stands against bark beetle attacks.

Mentor: Ray Callaway, Biological Sciences

Using iPods: "If I can hear it, it is too loud!"
Laurell McAlpine & Megan Breckenridge
UC Ballroom ~ 3:00pm

Today we live in a society that thrives on technology, especially in listening to music through personal music devices such as iPods. Recently, a major study was published that indicated that one in five adolescents is experiencing noise induced hearing loss from the use of personal music devices. To supplement the studies that have been done on the safest types of earphones/buds to use, the almost common statement that parents often make to their children, "If I can hear it, it is too loud!" was investigated. This research explored the acoustic leakage coming from the different types of earphones under high levels of sound produced in the ear canal. This type of data could then be related to the possible dangerous levels that could be detrimental to a person's hearing. To explore this concept, an iPod and many different earphones were measured on a specially made mannequin fitted with simulated ears and a type 2 sound level meter microphone at the point of the eardrum. Both pure tones (.5Hz to 8KHz in octaves and a contemporary song were utilized as the source material. Recordings of sound levels were obtained in the ear canal (personal exposure) and at a distance of .5 m from the ear. The direct sound and recorded sound levels were obtained for a two minute period. The data was analyzed, and the predicted results are that the acoustic leakage from different earphones/buds is an accurate way to measure if a personal music device is set at a hazardous level.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Forensic Soil Effects and Chemistry of a Corpse Burning Site
Megan McCallum
UC Ballroom ~ 3:00pm

The chemical by-products of combustion of wood are well characterized and are therefore identifiable in a forensic fire investigation. Sledzik et al. (2009) describe the recovery of human remains from the 9/11 World Trade Center disaster, the nearly simultaneous attack on the Pentagon, and the related airliner crash in Pennsylvania. Many human remains associated with these events were fragmentary and burned. It has long been suspected that in these types of scenarios that some human remains are not identified or recovered because they have been entirely consumed in high temperature fires.

It might be possible to identify the location where a human body or body part is suspected to have been burned by analysis of the soil or other substrate at the location. In forensic taphonomy, a pig is often used as a proxy for a human body due to their size, diet, and lack of hair. In this study, a 130 lb. pig carcass was burned in an outdoor wood fire to ash and bone fragments. A similar control fire using the same fuels was also conducted. The ashes for each fire were sampled and analyzed for total carbon, nitrogen, and sulfur with a LECO CNS analyzer, and an array of 20 other elements by acid digestion, and inductively coupled plasma spectrometer (ICP). The pig carcass fire contained higher levels of sulfur and nitrogen. The results of this experiment provide some insight as to what forensic information can be obtained from the site of a body burning.

Mentor: Randall Skelton, Anthropology

Description of the "noise notch" in noise-induced hearing loss

Raquel Moes

UC Ballroom ~ 11:00am

Noise-induced hearing loss (NIHL) is the second most common form of sensorineural hearing deficit, after presbycusis (age-related hearing loss). Many Americans are exposed to potentially harmful sound levels in their work places and also during recreational activity that they may pursue. Hearing loss caused by exposure to recreational and occupational noise results in devastating disability that is virtually 100 percent preventable. NIHL is easily determined by a specific loss in hearing at 3000, 4000 or 6000 Hz. The pattern of the loss produces a decrement of hearing at one of those frequencies and improves in adjacent frequencies. This has been described from a diagnostic perspective as a "noise notch." In hearing testing usually only octave frequencies of 250- 8000 Hz are tested, the precise frequency and the decibel loss at the frequency of the notch is not known. This research determined the nearly exact frequency of the noise notch and the notch depth in terms of the decibel loss. Subjects were presented tonal signals and responded behaviorally. A computer presented each pure tone at the octave frequencies and determined a decrement at the noise notch. A binary search procedure was then utilized to further divide the frequency spectrum to determine the parameters of the noise notch. This process was repeated to a resolution of 10Hz. This will be significant information that will aid in our understanding of this disorder of the auditory system and will be of benefit in providing audiological rehabilitation such as providing hearing aids.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Characterization of multiple lipophilic binding pockets on the L-cystine/L-glutamate antiporter System xc-

Jayne Newell

UC Ballroom ~ 3:00pm

The system xc- (Sxc-) antiporter is a member of the heteromeric amino acid transporter (HAT) family, which mediates the obligate exchange of extracellular L-cystine for intracellular L-glutamate. Interestingly, both sides of this exchange reaction are important in the function of the central nervous system, as the import of L-cystine is needed for the synthesis of glutathione (GSH) and oxidative protection, while the exported L-glutamate can contribute to neuronal communication, as well as neuropathology. More specifically, excessive system xc- function has been implicated in brain tumor growth and concurrent cell death of surrounding tissue. To study the various roles of Sxc-, our group, in coordination with the

Natale and Diaz labs, have been developing small molecules that selectively inhibit the transporter. The inhibitory activity of these analogues was assessed by quantifying their ability to block the uptake of [3H]-L-glutamate into SNB-19 human glioblastoma cells under conditions that were selective for Sxc--mediated uptake. Previous studies carried out by our lab have demonstrated the use of lipophilic isoxazole-hydrazone analogues of AMPA as inhibitors of Sxc-. In the current study we use analogues containing multiple substitutions to further define the interactions of isoxazole-hydrazone derivatives with the Sxc- transporter, especially as related to the relative positioning of two distinct lipophilic pockets predicted to be adjacent to the substrate binding site. We also hypothesize that a subset of these compounds may be acting via a mixed inhibition mechanism. The results are important for defining the size and orientation of the lipophilic binding pockets that seem to strongly influence the binding specificity, as well as the kinetics, of Sxc-; therefore allowing more efficient drug design.

Mentor: Rich Bridges, Biomedical and Pharmaceutical Sciences

Empathy and Narcissism as Predictors of Child Abuse

Bridget O'Connell & Peter Kowalski

UC Ballroom ~ 3:00pm

Research indicates that parents who were themselves abused as children are at increased risk of abusing their own children. However, not all of those abused as children go on to abuse their own children. Perhaps retaining a capacity for empathy and avoiding narcissism function as protective factors. This study proposes that (a) parents abused as children are more likely to exhibit low levels of child-directed empathy and high levels of narcissism than do non-abused parents, and (b) parents abused as children who, do not exhibit low levels of empathy and high levels of narcissism are less likely to engage in child abuse. Archival evaluation records of at-risk parents' psychological functioning and parental competence will be examined and coded for parent's abuse history and parent perpetration of child abuse. A sample of 25-30 parents who report their own childhood abuse and 25-30 parents who report no childhood abuse will be identified for this study. Capacity for empathy will be assessed using the Personality Assessment Inventory (PAI). The PAI was designed to provide information about psychopathology. Narcissism will be measured using Minnesota Multiphasic Personality Inventory-2. The MMPI-2 is used by professionals to assess and diagnose mental illness. Using analyses of variance, on both the PAI and MMPI-2 will be used to compare parents with abuse histories to those without abuse histories. If the hypotheses are supported, this suggests that we may be able to assist families by offering services that promote increased empathy in abusive parents, and, using these criteria to better assess people at risk of perpetration.

Mentor: Paul Silverman, Psychology

The Effect of State-funded Scholarship Programs on the Price of Higher Education

Megan Ormseth

UC Ballroom ~ 3:00pm

The price of higher education in the United States has increased in excess of the inflation rate since the 1970s. Decreased affordability and access to higher education can incur detrimental impacts on an individual's future and the future of the American labor market, in addition to widening income disparity. Numerous integrative factors contribute to the trend in soaring prices. Of the many factors pushing prices higher, one controversial hypothesis is that increasing amounts of governmental aid to students have contributed to higher prices. This study tests that hypothesis. The Bennett Hypothesis posits that universities have raised their prices in response to increased governmental aid, as the government acts as a third-party payer. Long (2004) suggests a model in which colleges aim to maximize revenue subject to downward pressure due to students' budget constraints and competition from other colleges. To increase affordability and keep bright

students in their home states, a select number of Southern states have implemented state-funded scholarship programs. The programs provide full or partial scholarships to in-state universities for high school seniors graduating with a certain GPA. These scholarship states provide a natural experiment, allowing this study to follow Long, using regression analysis to construct a difference-in-differences model. This project uses a different state, a different time period, and a slightly different model in order to examine whether Long's results hold. The change in tuition and fees, and room and board for public and private four-year institutions in the scholarship state will be compared to the change in nonscholarship states.

Mentor: Douglas Dalenberg, Economics

Measuring the influence of spin-orbit coupling on the ultrafast magnetic response

Briana Peck & Michael Schneider

UC Ballroom ~ 3:00pm

The invention of ultrafast lasers, which emit pulses of light that are as short as a few femtoseconds (10^{-15} seconds), has led to significant discoveries in the properties of materials, including the ultrafast reaction of ferromagnetic metals. When ultrafast laser pulses interact with a ferromagnetic material, it has been shown that the magnetization of the material can be influenced on the femtosecond (fs) time scale. This is interesting because changing the orientation of the magnetic moment of a ferromagnetic material has been classically determined to occur on the much longer picosecond (10^{-12} seconds) time scale. The physical mechanisms responsible for this ultrafast response are not well understood, but current research suggests that it likely occurs because of an interaction between the laser pulse and the atomic spin system in a process called spin-orbit coupling. The goal of this research is to add to the fundamental understanding of this effect by directly measuring the influence of the spin-orbit coupling strength on the ultrafast magnetic response. This will be accomplished by measuring a series of ferromagnetic nickel-iron alloys with an ultrafast laser that has pulse durations of about 60 femtoseconds. The samples have varying ratios of nickel and iron, which varies the spin-orbit coupling strength without significantly changing other properties among the samples. With these methods, the ultrafast magnetic response from a NiFe sample was observed. This research could provide fundamental knowledge on the ultrafast magnetic response, and could have future applications for ultrafast data storage.

Mentor: Nate McCrady, Physics & Astronomy

Sustainable Computing Through Desktop Virtualization

Lance Pellerin

UC Ballroom ~ 3:00pm

Green IT involves implementing sustainable practices in computing and information technology and centers around four core concepts; virtualization, workforce mobility, e-waste recycling and energy efficiency. The University of Montana's Climate Action Plan outlines strategies for achieving campus-wide carbon neutrality by 2020. Desktop computers in a university environment are significant overall contributors to the university's carbon footprint. Energy-wise IT is presented in the Climate Action Plan as a strategy for achieving greater energy efficiency and conservation. Our study implemented the four core concepts of Green IT by using a virtualized Windows desktop (operating system was housed on a server and distributed to user via network connection), remote VPN (Virtualized Private Network), repurposing and re-commissioning of legacy hardware and the use of energy efficient thin-client devices. Our study focused on

information workers at The University of Montana. Three categories of the information worker were defined as; faculty, staff and kiosk users. Our study had two users from each group. The energy output of each user's normal workstation was measured for approximately one week and compared with energy output of the virtual desktop environment including the client and server. The first client consisted of a re-commissioned legacy desktop computer that was stripped of the internal components and booted from solid state media. The second client was an energy efficient thin-client computing device that was completely dependent on the server to perform. The data was gathered and extrapolated to the larger university system to measure the reduction in carbon footprint that could be achieved through energy efficient thin-client devices and the repurposed workstation model.

Mentor: Tom Gallagher, Applied Computing and Electronics

Prey responses to raptor calls

Maggie Raboin

UC Ballroom ~ 3:00pm

Predators are a major source of mortality for many small birds and mammals. Most species of small birds and mammals communicate with each other about predators (especially birds of prey) with sophisticated vocal alarm calls. Some recent studies have shown that the alarm calls of some small birds contain a surprising amount of information about raptors, such as the threat level, type, behavior, and location of predators. Most studies have presented models or live raptors to bird prey species and recorded the responses of the prey. These experiments have shown that prey species can be very good at visually discriminating among different kinds of raptors. We know very little about whether birds are also able to discriminate raptors based solely on the raptor's vocalizations. I am experimentally testing the idea that small birds can distinguish the calls of different raptors. Using hidden speakers, I am playing the calls of different raptors to many different species of birds of different body sizes, and recording their behavioral and acoustical responses. I am specifically testing the allometric risk hypothesis, which suggests that the behavioral responses of prey species varies inversely with the relative size of the raptor. My preliminary behavioral and acoustical analyses indicate that birds recognize the calls of potential predators, and that their behavioral responses do depend on the relative size of the raptor.

Mentor: Erick Greene, Biological Sciences

Determining the hydraulic conductivity of river beds using slug test techniques

Zackary Rambo

UC Ballroom ~ 3:00pm

Protecting, remediating and restoring endangered fish habitat in the northern Rocky Mountains requires knowledge of how water in a stream channel and regional groundwater interface at the bed of gravel dominated rivers. Ground water and stream water interactions are important for nutrient levels and the temperature of fish spawning sites. Field methods to determine the overall transmission properties of spawning bed material often rely on grain size characterization and the use of in-channel slug tests and temperature techniques. Unfortunately, applying standard hydraulic slug tests to determine bed hydraulic conductivity is believed to yield poor representations of bed transmission properties. This work attempts to use a laboratory approach to testing the applicability of standard testing techniques as applied to small diameter piezometers often used in field studies. Lab tests used three different kinds of perforations in sand, gravel and water in a 68.5 cm tall and 25.1 cm radius barrel. Slugs of air with an air compressor were used and slugs of water were used in

some tests as well. Water over the sediments in the sand and gravel barrels aimed to simulate a stream bed. Oscillatory responses that have been observed during testing have been noted in the literature. These responses need additional analyses to determine hydraulic conductivity, especially when derived from small diameter wells. Lab tanks containing a gravel of about 5 mm radius were used to examine how well diameter, well design, stream water depth and the magnitude of slug displacement impact estimates of shallow riverbed sediment hydraulic conductivity. Study results will be used to modify standard slug test techniques so that more representative hydraulic conductivities of river bed sediments can be obtained.

Mentor: William Woessner, Geosciences

The microstructure of auditory sensitivity in the audiometric frequencies

Melissa Reamer

UC Ballroom ~ 3:00pm

This research was designed to provide new information regarding the cochlear sensitivities that occur in the octave intervals for the audiometric frequencies between 250-8000 Hz. Common clinical procedures in audiology utilize behavioral testing with pure tones at the octave frequencies between 250-8000 Hz. In many clinical assessments the speech discrimination performance of patients is poorer than would be expected from the pure tone results. Recent electrophysiological studies have shown “dead regions” of the cochlea across the entire audibility range. Both speech discrimination performance and “dead regions” may be related to variations in audiometric thresholds between standard audiometric test frequencies. We are now able to generate calibrated tonal signals at various frequencies between octaves. We have selected 24 logarithmically spaced frequencies between octaves for a total of 121 discrete frequencies between 250 and 8000 Hz. These tonal signals were presented to listeners with various types of hearing loss. A computer controlled the presentation of signals and a button press by the patient recorded the response. Based upon the patient response a testing algorithm was designed to minimize the test time. The pattern of this threshold audiogram and clinical implications will be discussed.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

The interaction between anastellin and beta-strands ABC, ABCD, and ABCDE from the 3rd type 3 domain of fibronectin.

Domnita-Valeria Rusnac

UC Ballroom ~ 11:00am

Every living organism contains thousands of proteins. It is known that there is tremendous variation in the forms and functions of proteins and almost all of them are essential for the proper functioning of the organism. Fibronectin is an extracellular matrix protein found in vertebrates including humans. It plays key roles in wound healing and embryonic development. Fibronectin forms thread like structures, termed fibrils, and the mechanism of this process is unknown. Anastellin, which is a fragment of fibronectin, interacts with fibronectin and triggers fibrogenesis in laboratory conditions. This model system has been developed to study the interactions between fibrils that could elucidate the mechanism of fibril formation. Fibronectin is composed of multiple structurally and functionally independent units: type I (FN1), type II (FN2) and type III (FN3) domains. Briknarova lab determined that the third type III domain of fibronectin (3FN3) and its truncated variants interact and form complexes with anastellin by using Gel Filtration. Some of these complexes adopt a

well-defined three-dimensional structure, while others fluctuate among multiple conformations. In order to find out more about the interactions between anastellin and 3FN3 fragments, I cloned, expressed in *E. coli*, and purified by affinity chromatography different recombinant 3FN3 fragments (beta-strands ABC, ABCD, and ABCDE). The complexes with anastellin were analyzed by nuclear magnetic resonance (NMR) spectroscopy in order to obtain insight into the structure and dynamics of the complexes.

Mentor: Klara Briknarova, Chemistry

Learning the Room
Lindsey Schwickert
UC Ballroom ~ 11:00am

Learning the room: Perceptual adaptation to poor room acoustics Proper listening conditions are essential in any learning environment. In general, however, most classrooms listening conditions are simply not suitable for teaching or learning to occur effectively. Learning the Room is a research project analyzing the effect of exposure to reverberation and noise in children. Acoustic variables such as reverberation, background noise and even the material from which the walls of a classroom are constructed can play a major role in a student's understanding of their teacher's voice. Poor acoustics can be the cause of significant gaps and delays in the education of children with normal hearing and are especially detrimental for children with hearing loss. The most significant benefit to hearing well in a classroom will be to reduce the deleterious effects of reverberation and background noise. Unfortunately, improving classroom acoustics may not be economically feasible in many schools. From a practical and a theoretical perspective this research is able to answer questions of how speech is understood in acoustically distorted environments. This research was undertaken to understand the perceptual adaptation of room acoustics on speech perception. A closed set children's test of speech recognition (WIPI) was presented to children 6-12 years of age using two conditions. In the first condition children were pre-exposed to a 2-minute exemplar of a children's television program (Sponge Bob Square Pants) without acoustic distortion. In the second condition, the same exemplar was shown and heard with high-level reverberation and background noise. All children were tested with the WIPI speech discrimination task with all words processed with reverberation and background noise.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

The use of the acoustic stapedial reflex as an indicator of high level noise exposure
Jennifer Silvernale & Mandy Ralston
UC Ballroom ~ 3:00pm

The middle ear primarily provides an impedance matching of air-borne sounds to the fluid medium of the inner ear by providing an amplification factor. It also acts as a system to protect the inner from loud sounds by invoking the action of the stapedius muscle. The stapedius muscle is a middle ear muscle that is part of the stapedius reflex. Whenever a sound reaches a level between 75-85 dB the stapedius muscle contracts with minimal latency (<1 msec) between the onset of the sound stimulus and the stapedial response. Both stapedius muscles will contract when a single ear is stimulated. Previous investigations of the stapedius reflex have always used pure tones or broadband noise as the source stimulus. Recording the reflex in the contralateral ear is readily accomplished by measuring the amplitude changes of a probe tone in that ear. This research has implemented a digital means for detecting the amplitude modulation of the probe tone to stimuli in the opposite ear. The very novel feature of this research is to measure the contraction of the stapedius muscle using a digital

amplitude demodulation technique as a function of a varying stimulus. The stimulus in for this research was a popular music song played through an iPod. Subjects passively listened while recordings of stapedius contractions were obtained. Measures of the duration of the stapedius contraction and time histograms were obtained and will be discussed.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Aspects of Fundamental Religiosity and Stereotype Acceptance

Emily Steinberg

UC Ballroom ~ 11:00am

Baseless stereotypes in our everyday interactions are persistent and troubling, especially when directed against economically disadvantaged groups. Past research has identified a relationship between fundamental and or conservative religious beliefs and the acceptance of stereotypes. The research community does not know however what practices or aspects of these types of religions correlate with stereotype acceptance. This study was designed to look at three dimensions of fundamental religiosity: frequency of prayer, political orientation, and an individual's perception of their own spirituality to find out if there is any relationship between these different dimensions and the acceptance of stereotypes towards one such group, Native Americans. College students from the University of Montana took part in a study in which they were asked to give personal information about themselves regarding their religiosity and religious background. After working on a cooperative task with a (fictitious) Native American partner, participants were asked questions about their perceptions of Native Americans, including commonly held stereotypes, perceptions of economic inequalities, and guilt over inequality. I found that frequency of prayer had a weak negative relationship to perceptions of stereotypes. Political orientation and self-perception of spirituality had negligible relationships with stereotype acceptance. I suggest that prayer and spirituality measure very different aspects of religious beliefs. This is the first known sociological study to examine the relationship between religiosity and perceptions of Native Americans. Not only are the results valuable to sociologists interested in combating stereotypes, but also to religious groups striving to teach acceptance and diversity.

Mentor: Kathy Kuipers, Sociology

Population and Poverty in Academic Literature

Gina Stewart

UC Ballroom ~ 11:00am

While many nonprofit groups focus on poverty alleviation as a the best way to reduce human suffering, many fail to recognize a major contributor to poverty worldwide – unsustainable population levels. As average family size grows, resources within that family and within the geographical region they inhabit must be spread amongst more people, leaving less for each individual. In addition, if a region's carrying capacity is exceeded, earth's support systems become degraded, reducing the total support they can provide and the rate at which available resources replenish. With high fertility rates, these changes can increase exponentially with each generation. This study examined the scholarly literature to determine how relationships between poverty and high fertility rates have been addressed. Credible sources (peer-reviewed journal articles, scholarly books, and government research agency reports) in fields such as human ecology, demography,

economics, and anthropology were examined. Many sources found strong correlations between fertility rates and various measures of poverty and indicators of human well being. The areas of consensus and conflict are discussed, as are the key information gaps and the sorts of studies that could better examine the relationship between poverty and fertility rates. The importance of using this information to shape public policy is also explained.

Mentor: Vicki Watson, Environmental Studies

SPARC and extracellular matrix production after asbestos exposure

Cicily Tatsey-Bull Calf

UC Ballroom ~ 11:00am

Exposures to asbestos fibers by inhalation cause multiple asbestos-related diseases including asbestosis, lung cancer and mesothelioma. In asbestosis, the major consequence of asbestos exposure is increased extracellular matrix (ECM) production, primarily the deposition of collagen in the lungs. Previously our lab has shown that RNA expression of secreted protein acidic and rich in cysteine (SPARC) was increased in mouse lungs exposed to several types of asbestos fibers. SPARC is a matricellular protein involved in the regulation of ECM-cell interactions through modulation of growth factor activity. The central hypothesis to be tested in our studies is that the expression of SPARC is a significant step in the development of lung fibrosis through the modulation of ECM production. To test our hypothesis, we used expression of small interfering RNA (siRNA) to decrease SPARC production by facilitating the degradation of Sparc RNA. This was tested both in vitro with primary lung fibroblast cultures, as well as in vivo in a mouse model. Primary lung fibroblast cultures were established from C57Bl/6 mice and exposed to crocidolite asbestos to induce increased ECM production. Subsequently, the cultures were exposed to lentivirus containing siRNA sequences specifically designed to inhibit SPARC. Western blots will be performed to analyze SPARC and collagen production. Experiments are ongoing and current results will be presented. The ultimate goal of this project is to determine if control of SPARC expression has potential as a treatment for the fibrosis caused by asbestos exposure. This project was supported by Project TRAIN (DBI-0602746), Project STEER (NIEHS R25ES016247-04) and RR017670.

Mentor: Elizabeth Putnam, Biomedical and Pharmaceutical Sciences

The use of personal listening devices and multimedia by students in Great Falls, Montana

Cassandra VandenBos

UC Ballroom ~ 11:00am

Due to the development of technology, along with increasing opportunities and the convenience, we are now able to listen to personal listening devices at louder levels and for longer periods of time. In addition, researchers are finding an increase in the prevalence of noise-induced sensorineural hearing loss in teens and preteens. Through the use of an extensive survey instrument in two different middle schools and two different high schools throughout Great Falls, Montana, this research will determine the amount of time and volume levels teens and preteens listen to their personal listening devices. There are many possible causes for the increase of sensorineural hearing loss, but the results of this study will specifically examine the relationship and risk levels that students expose themselves to through the use of their personal listening device. The results will also help to determine the type of educational intervention that would be beneficial to students of this age.

Mentor: Al Yonovitz, Communicative Sciences and Disorders

Attention Deficit Hyperactivity Disorder: Age of Diagnosis, Medication Efficacy, and Performance on the Stroop Color-Word Interference Test

Hannah Wadsworth

UC Ballroom ~ 11:00am

ADHD is a commonly diagnosed childhood disorder that begins early in life (3%-7% before age 7). It can be a diagnosis that perseveres throughout the lifespan. Early diagnosis is important because it leads to early interventions that help the individual adapt to ADHD. Though efficacy of pharmacological approaches can be variable, they remain the primary and most effective treatment for ADHD. Two key variables in the treatment are age of diagnosis and medication effects. Currently, the most common techniques used to diagnose ADHD are rating scales and cognitive testing. Our labs recent data suggests that the Stroop Color-Word test (Stroop) is particularly effective in identifying individuals with ADHD. The Stroop is a task where color words are printed in different colored ink. The participant is asked to name the color of the ink rather than read the word. The research will examine the relationship between age of diagnosis and subjective rating of medication efficacy on performance on the Stroop. Students identified as having a diagnosis of ADHD will complete questionnaires regarding their age of diagnosis and how effective their medication is at improving their attention. They will then complete a brief battery of tests including the Stroop. When comparing age of diagnosis and medication effectiveness the expected result is that the earlier the age of diagnosis, the better the participant's rating of medication efficacy. Another expected result is that an earlier age of diagnosis will be associated with increased scores on the Stroop. It is expected that higher ratings of medication efficacy will be associated with better performance on the Stroop. Data collection is ongoing. This research is important because it will give further evidence supporting an early diagnosis in order to implement an early treatment and give the individual the time and skills to adapt to their diagnosis.

Mentor: Stuart Hall, Psychology

Catching Abusers When They Lie

Julie Walsh

UC Ballroom ~ 11:00am

In trying to detect adult child abusers, psychologists use various measures, whose validities are unfortunately limited by the social desirability bias. Respondents are motivated to appear better parents than they really are, especially in child abuse cases. This bias threatens the validity of a widely-used measure, the Child Abuse Potential Inventory (CAP), and another measure, the Parenting as Social Context Questionnaire (PASCQ). Faking good on both the CAP and the PASCQ is quite feasible because of high face validity (it is obvious what each question is measuring). To address this weakness, the Child Guidance Inventory (CGInv) presents specific child guidance scenarios whose most desirable response is ambiguous. To compare the strength of the CGInv against both existing measures, 160 psychology students were administered the measures and given instructions on how to respond, either to answer honestly or to fake good. Half of the sample completed existing measures and the other half completed the CGInv. The analysis compared differences in scores between instruction conditions. It was hypothesized that, despite the instruction condition, participants administered the

CGInv would generate more similar scores than would participants administered the existing measures. Groups instructed to fake good on the CAP and PASCQ produced lower maladaptive scores than groups who answer honestly. In contrast, both groups generated similar scores on the CGInv. Given the success of the CGInv to prevent successfully faking good, research should be conducted to further develop this instrument. It may be useful in clinical settings as a convenient, yet valid, self-report measure.

Mentor: Paul Silverman, Psychology

Assessment of Skill Acquisition and Athletic Training Student Satisfaction in Clinical Education

Kiri Weeks

UC Ballroom ~ 11:00am

Athletic training education programs strive to provide valuable and successful clinical experiences to athletic training students (ATS). Clinical experiences are designed with the goal of hands-on learning, allowing students to integrate and practice the skills they learn in the classroom into clinical/real-life situations. Few studies have evaluated the number of authentic experiences that ATS receive in clinical education and related this to overall student satisfaction. The purpose of this study was two-fold: To determine how ATS spend their time on clinical rotations and to determine if ATS are satisfied with their clinical experiences. Four athletic training education programs in the Northwest Athletic Trainers' Association agreed to participate. A total of 77 ATS completed a paper survey containing 3 parts: 1) demographic/background information; 2) athletic training skill log to be filled out daily for one month; 3) clinical experience satisfaction survey. Statistical analysis shows there is a positive weak correlation between total number of skills performed and daily satisfaction ($r = 0.275$, $p = 0.01$), and total number of skills performed and overall satisfaction for the month ($r = 0.246$, $p = 0.03$). Of skills performed, 44% were modalities, 32% taping/wrapping, 14% rehab, 7% evaluation, and 3% acute care. Athletic training students who were allowed to integrate the skills they learn into clinical practice tended to be more satisfied with their clinical experiences. It appears that ATS are not receiving as many opportunities with injury evaluation, rehabilitation, or acute care in their clinical rotations as compared to applying modalities or taping. Program directors and clinical instructors should be aware of this and try to create more opportunities for students to gain experience in these areas.

Mentor: Valerie Moody, Health and Human Performance

Microscopic structure and significance of male Japanese Rhinoceros Beetle horns

Paul Weingarden

UC Ballroom ~ 11:00am

Male Japanese Rhinoceros Beetles (*Allomyrina dichotoma*) possess remarkable horns on their head and thorax used for prying rival males off females and for more direct male-male competition. While they play a critical role in the life history of these insects, the micro-topography of these horns has remained largely unexplored. Understanding horn structure on a microscopic scale may lead to insights into combat behavior among males. I performed scanning electron microscopy (SEM) on the horns of *A. dichotoma* in order to understand how the topography changes on different regions of the horn surface. In addition, I analyzed videos of male combat to discover which areas of the horns made contact more frequently during use. These areas were then specifically targeted for SEM. Video analysis showed the importance of the prothorax horn tines in stabilization as a beetle lifts a rival male with the head horn. In addition, it was found that the middle tine valley of the head horn is used to disable movement of the rival's horn. SEM images revealed particular areas of the horn with greater hair density, as well as three unique types of micro-topography: smooth, stepped & smooth, and stepped &

rough. Certain areas of the horns are likely to create more friction than others due to their microscopic structure. Thus, better understanding of these horns on a microscopic scale may provide new insight into why males fight in the matter they do.

Mentor: Doug Emlen, Biological Sciences

Variation of Mood States in Athletic Training Students in an Accredited Athletic Training Education Program

Kara Wesen

UC Ballroom ~ 11:00am

Variation of Mood States in Athletic Training Students in an Accredited Athletic Training Education Program Health and Human Performance Athletic Training Education Programs (ATEPs) are rigorous and demanding programs. Being a student in an ATEP is thought to be a stressful period due to factors such as long hours, challenging rotations, course work, and limited time for personal pursuits which may lead to burn out, depression, alcohol abuse. Gaining a better understanding of how ATS handle these life stresses should be examined and made a priority to provide the necessary support to students during these times. More specifically, understanding the mood states of ATS during these high times of stress may allow us to develop coping strategies. This study examined changes in mood states among ATS while completing a professional ATEP. The Profile of Mood States (POMS) is a 65-item questionnaire that measures mood states on a 5-level adjectival scale: not at all, a little, moderately, quite a bit, and extremely. The POMS measures scores along 6 mood states: tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, confusion-bewilderment, and vigor-activity. University of Montana athletic training students (n=13) completed the POMS during the first week of September, October, December, February, and March. A one way repeated measures ANOVA was completed for each mood state and total mood disturbance score. Mean scores over the time points for each factor reflect an increase in tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, confusion-bewilderment and total mood disturbance. Our results suggest that as students progress in the semester, vigor gives way to anger, depression and fatigue which can not only affect the ATS personally, but also affect the care they provide professionally. ATEP faculty and clinical instructors should work with students to develop better coping strategies for handling the demands of the ATEP.

Mentor: Valerie Moody, Health and Human Performance

Breast Cancer Enzyme CYP1B1 Polymorphisms in Salish Kootenai Ethnicities

Alex Willoughby

UC Ballroom ~ 3:00pm

Metabolic enzymes are important in determining the effectiveness of a medication because they can either activate or deactivate the drug. However, enzymatic activity varies amongst individuals due to differences in genetic makeup. Pharmacogenetics, a branch of research that investigates how effective a drug is based on an individual's genetic makeup, has been applied to some but not all ethnicities. The Salish Kootenai tribe of western Montana is one such group. My study focuses on establishing the variant frequencies in a specific DNA segment that codes for an enzyme (cytochrome P450-CYP1B1), which hydroxylates chemicals correlated to breast cancer. Salish Kootenai blood samples were tested in a three-step procedure consisting of polymerase chain reaction (PCR), a digest using the *AclI* enzyme, and gel electrophoresis. The results of this analysis showed the frequencies at which homozygous wild type, heterozygous, and homozygous variants occurred across the population. This data will determine the proportion of the Salish Kootenai population with an active CYP1B1 enzyme and non-active CYP1B1 enzyme. Clinically applied, physicians will be able to

tailor prescriptions with the highest chance of success to individual breast cancer patients based on that patient's particular CYP1B1 activity.

Mentor: Mark Pershouse, Biomedical and Pharmaceutical Sciences

THANK YOU!

TO EVERYONE WHO WAS A PART OF THE

11TH ANNUAL
UM CONFERENCE ON
UNDERGRADUATE RESEARCH