6th Annual Undergraduate Research & Scholarship Conference 2009

Student Union Building
April 20, 2009
1:00 p.m. – 4:00 p.m.

Schedule of Events

Poster Session 1:00 – 4:00 p.m. Jordan and Hatch Ballrooms
Art Display 1:00 – 4:00 p.m.
Podium and Media Presentations 1:00 – 3:30 p.m. Barnwell, Boyington, Brink, Farnsworth and the Grand Ballroom Conference Rooms
Performing Arts 1:30 – 3:30 p.m. Jordan Ballroom
Closing Program 3:30 – 4:00 p.m. Jordan Ballroom

Sona K. Andrews, Provost & Vice President for Academic Affairs
Mark Rudin, Vice President for Research
Sharon McGuire, Associate Vice President for Undergraduate Studies
Welcome to Boise State University’s 6th Annual Undergraduate Research and Scholarship Conference. This conference provides undergraduate students at Boise State an opportunity to share their research projects and be recognized for their exceptional work.

Congratulations to those students who have been selected to present their projects at this important event. Boise State has been a place where students come first, with award-winning faculty dedicated to excellent teaching. Faculty sponsors who assist and support these students with their research should be commended for their commitment to learning and their dedication to the personal success of our students. The projects being presented span an extensive range of subjects. Each project reflects the effort of our students through academic research and exploration.

As President, I am committed to supporting the process of discovery and research. The University is transforming itself into a metropolitan university dedicated not only to an outstanding undergraduate experience, but also to the pursuit of groundbreaking research and technology. I will continue to encourage growth in research opportunities and activities as part of the undergraduate educational experience at Boise State University.

I hope you enjoy the conference and thank you for your support of this annual event.

Warm regards,
Bob Kustra, President

Welcome to the Sixth Annual Undergraduate Research and Scholarship Conference. With every passing year we see greater student participation and a continuation of the outstanding quality of their work. Our institutional strategic plan, Charting the Course, has defined student involvement in research as one of the hallmarks of Boise State University defining itself as a Metropolitan Research University of Distinction. This conference is a tangible example of progress on achieving this goal.

Our students participating in today’s conference represent the diverse range of academic disciplines at Boise State University. They have each demonstrated a drive and determination that exceeds that of the average student. Through their hard work, they have gained research and presentation skills that will prepare them for the world beyond academia. It is with great pride and enthusiasm that I congratulate these exceptional students and honor them for their outstanding work.

I would also like to extend my appreciation to our faculty sponsors. Their dedication to enriching the learning environment at Boise State University is another testament to our vibrancy and growth. We know they have countless demands on their time and we thank them for their commitment to our students and for creating opportunities for scholarly achievement.

For those of you joining us today, I encourage you to visit all of the venues represented and meet with our students to learn about the research and work they have conducted. You will not be disappointed. On behalf of Boise State University, I thank you for your support and hope that you enjoy this year’s conference.

Sona Karentz Andrews
Provost and Vice President for Academic Affairs
Program Cover Design
Undergraduate Research and Scholarship Conference

Stephanie Billings, Jeremy Billups, Chris Brown, Anna Burks, Gabe Carnell, Mary Donalson, Jenny Flint, Ashley Durand (Honors College), Akiko Fry, Tracie Hopper, John Howe, Jenn Jackson, T.J. Jakush, Bobby Kasper, Landon Larsen, Sara Love, Alyson McCrink, Tony Montaño, Erin Northrop, Jeremy Oliver, Oscar Pére, C.W. Reed, Kelci Richardson, Lana Roth, Jackie Salyer, Sean Severud, Rebecca Stich, Amanda Velasco, Katie Vermillion, Thomas Walsh, and Jin You.
College of Arts & Sciences, Department of Art
Faculty Sponsor: Jennifer Wood

Students in Art 204, Graphic Design Studio II were presented with a unique opportunity to design the program cover for the 2009 Undergraduate Research and Scholarship Conference. This is an example of a research project for a graphic designer. The student designers prepare themselves by researching the university colleges and many programs that are represented in the conference. Class instruction includes subjects in representation, semiotics and denotation of images as a way to present the concept for communication. Through use of peer and instructor review, each student developed their own design as a way to visually represent the conference. Some designers used metaphoric principles, others by use of a visual pun while some tried to capture the essence of the undergraduate research experience. This year’s cover design was selected by a jury of senior graphic design students, conference planning committee members, faculty, and staff. All cover design submissions are displayed in the Student Union Building for the duration of the conference.

Congratulations to Tony Montaño, first place winner, and Akiko Fry, Graphic Design Studio IV Students’ Choice winner.

Three Cups of Tea: Making a Difference Where You Are

The 2008 - 2009 First Year Read selection is Greg Mortenon’s “Three Cups of Tea: One Man’s Mission to Promote Peace . . . One School at a Time.”

Were you inspired by reading Three Cups of Tea and/or hearing Greg Mortensen speak on campus? Do you strive to make a difference in your community? Would you like to gather with like minded students to explore ways to make a difference? Join the conversation with students who are “making a difference where they are.” During the session at 2:30 p.m. in the Barnwell Conference Room you will have the opportunity to 1) hear from students about how they were inspired by the First Year Read book, Three Cups of Tea; 2) learn about opportunities to serve the community, and 3) develop your own ideas about ways to make a difference. In the Poster Session, students will also be presenting examples of how this year’s First Year Read book was incorporated into their courses, examples of how the book inspired them to serve, and examples of student service to the community.
Performing Arts Presentations

**JORDAN BALLROOM**
1:45 PM - 2:15 PM  
2:45 PM - 3:15 PM

**“The Beauty in You”**

_Alisa Thompson_  
*Department of Theatre Arts*  
*Faculty Sponsor: Dr. Marla Hansen*

I am performing a four minute long lyrical dance to an acoustic song, “Beautiful” by Bethany Dillon. The purpose of my dance is to portray the insecurities and feelings of inadequacy that as a society we feel on a daily basis, to different extents. I find it very challenging to choreograph a solo piece because it makes me, as a dancer, very vulnerable and that is the essence of my style. Dance is a way for me to speak and express emotions a hundred times more powerfully than I could with spoken words. I hope the audience will be able to relate to my piece, whether it is a personal experience or if they are able to empathize with the message of my dance. I have been dancing since I was four years old and I only hope to further my dancing ability because it truly is the joy in my life.

**“Bite the Bullet”**

_Casee Hogg_  
*College of Arts & Sciences*  
*Department of Theatre Arts*  
*Faculty Sponsor: Dr. Marla Hansen*

The purpose of performing my piece of choreography is to expand awareness in the arts. By experimenting with intricate movement phrases, varying tempos, and playing with dynamics I hope to accomplish an innovative project. My goal is to stretch my personal limits as a professional dancer and choreographer. The theme of this work is, “When you feel you have nothing left to work with, you dig down and find your inner passion and move on.”

**“Cupid’s Laughter”**

_Kaelen O’Shea_  
*College of Arts & Sciences*  
*Department of Theatre Arts*  
*Faculty Sponsor: Dr. Marla Hansen*

The current state of work is in the early development stages. Music has been picked and in the process of being edited. Dancers are chosen and understand the idea behind the piece...the nature of simply loving and being loved. Dance is difficult to put methodology behind. It’s such an interactive process that right now the structure of the piece is purely determined by the musical selections. The movement will be contemporary in nature using the dancers’ physicality, ballet technique and partnering skills. Many level changes will be used, and the overall effect of the movement will have a “rebound” feel. The music itself is something that just makes one want to “groove,” so therefore the movement will be natural and organic...just like love.
BOYINGTON ROOM
2:00 PM - 2:15 PM

Each media presentation will be approximately 10 - 15 minutes.

SPECIAL OLYMPICS: HUMANITY AND HEART IN BOISE COUNTY, IDAHO

Saandra Steinfelt (Honors College)
College of Social Sciences and Public Affairs
Department of Communication
Faculty Sponsor: Dr. Peter Wollheim

The purpose is to document the Special Olympics and its interactions with rural Idaho; the town of Horseshoe Bend. I will highlight the torch and runners coming down Highway 55 and the gathering in the high school gym afterwards. I will show clips of the Special Olympians in competition on the slopes of Bogus Basin Ski Resort, and their interactions with the spectators. I will also highlight the awards ceremony. This film will act as a means to show the general public how the Special Olympians touch our hearts.

BRINK ROOM
3:00 PM - 3:15 PM

Each media presentation will be approximately 10 - 15 minutes.

SUSTAINABLE BUILDING: LEARNING FROM THE PAST IN ORDER TO BUILD A SUSTAINABLE FUTURE

William Howe
College of Social Sciences and Public Affairs
Department of Anthropology and Geosciences
Faculty Sponsor: Dr. Christopher L. Hill

Currently humanity is living in their environment instead of with their environment. Archaeology is commonly used to study the past but it could also be used to lead humanity into a future of greener building by learning from this past. This is accomplished through the study of archaeotecture and combines important principles from economic social theory. This theory states that humans living with their environment will always try to maximize resources, minimize costs, and use the least amount of effort possible. In the fifth century B.C. Greek city planners, using this thought process, designed their cities so that houses received an equal amount of sunlight and oriented all of their buildings around the sun. They, and others, also used building materials that required no secondary insulation or large amounts of energy to produce. These building materials were green, sustainable, and very efficient unlike the materials we use today. In fact, many were so green that it made finding these ancient living spaces difficult because they became part of the environment again. Our building practices have only changed in the last minute of the eleventh hour and forty to fifty percent of the population still lives in housing made from earth based materials. If humans started building and planning using the old ways I think we could reduce the amount of energy consumed by houses by at least fifty percent using the methods suggested by the ancients.
PODIUM PRESENTATIONS

BRINK ROOM
1:00 PM - 2:00 PM

Each podium presentation will be 10 - 15 minutes with a 5 minute transition between presentations.

CRITICAL LITERACY: CHANGING THE WORLD THROUGH THE WORD

Martha Mendoza (McNair Scholar)
College of Education
Department of Bilingual Education
Faculty Sponsor: David Hall

Critical literacy is a pedagogical tool to empower and encourage students from oppressed backgrounds into believing in their own power and voice. Using guidelines outlined by critical literacy standards and scholarly research, the purpose of this study was to evaluate an assortment of children’s books in Spanish in order to create a critical literacy curriculum resource for bilingual educators. By providing this select reading material, educators can encourage dialogue and analysis of issues of social injustice and oppression. Further considerations for this study will consist on case studies and action research, where the selected critical literacy curriculum resource is used in classroom settings.

INTERNATIONAL STUDENTS’ AWARENESS AND USE OF COUNSELING SERVICES

Anile Nina (McNair Scholar and Honors College)
College of Social Sciences and Public Affairs
Department of Psychology
Faculty Sponsor: Dr. Mary Pritchard

Although differences between domestic and international students’ sources of academic stress, awareness and use of counseling services have been studied extensively, less attention has been devoted to the impact of unawareness and underutilization of counseling services on international students’ academic stress. In addition, little is known about the relation between academic stress and psychological adaptation in international students. Data was collected from 62 international students at a large public university in the Rocky Mountain region. Academic stress was measured by stressful life events. Psychological adaptation measured tension, depression, anger, vigor, confusion, and fatigue. Use of counseling services measured awareness, use, and willingness to see a counselor. As predicted, results showed a significant difference in academic stress between international students who are aware of counseling services and those who are not aware. In addition, international students who reported higher levels of academic stress also reported poorer psychological adaptation.

INTIMATE PARTNER VIOLENCE AMONG LATINO PREGNANT TEENS AND THEIR PARTNERS: TESTING A PREVENTION PROGRAM

Alberto Varela (McNair Scholar)
College of Social Sciences and Public Affairs
Department of Psychology
Faculty Sponsors: Dr. Eric Landrum, Boise State University; and Dr. Paul Florsheim, University of Utah

Throughout the literature, intimate partner violence (IPV) is defined as physical violence, threats of physical or sexual violence, psychological and emotional violence, and sexual violence; and in some cases stalking is included as part of the definition (Center for Disease Control, 2006). The purpose of the current study was to examine intimate partner violence among adolescent pregnant teens and their partners. Specifically, this study examined physical and non-physical violence, jealousy, and positive conflict resolution. The intention was to test a preventive intervention among adolescent relationships. We were interested in examining the intervention effect on the Latino adolescent couples. Forty-one Latino couples were recruited through public health clinics and high schools. Couples were randomly selected to intervention or control groups; twenty-four couples participated in the intervention and seventeen couples participated in the control. Female partners ranged in age from fourteen to eighteen. Male partners ranged in age from fourteen to twenty-four. Participants took part in multiple interviews.
Audio information was collected and used from the interviews. Couples were independently interviewed at Time 1 (pre-intervention, before the baby was born) and Time 2 (8-12 weeks post-birth). An original scoring template was created to measure Intimate Partner Violence within the relationship. We expected a decrease in violence over time, both physical and non-physical, among couples who participated in the intervention and couples who were not part of the intervention. Additionally, we expected that higher rates of jealousy at Time 1 would predict higher rates of IPV at Time 2. Results indicated that couples who participated in the intervention had significantly less IPV than couples who did not. Results also indicated that jealousy was significantly related to IPV; however, this outcome was not expected. This study shows that the preventive intervention being tested may have an effect on the participants who were involved.

BRINK ROOM
2:00 PM - 3:00 PM

Each podium presentation will be 10 - 15 minutes with a 5 minute transition between presentations.

KYOTO TO COPENHAGEN: THE POLITICAL ECONOMICS OF US AND CHINESE PARTICIPATION IN INTERNATIONAL MARKET-BASED GREENHOUSE GAS REDUCTION SCHEMES

Brandon Megorden
College of Business and Economics
Department of Economics
Faculty Sponsor: Dr. Siân Mooney

The United States and China are key actors in the international effort to address global climate change. As the world’s largest emitters of greenhouse gasses (GHGs), they together account for over 40% of global GHG emissions from fossil fuels. Both countries now stand at a critical juncture on climate change policy with the upcoming COP15 conference in Copenhagen in December 2009, where critical agreements following the Kyoto Protocol will be finalized. To be effective, any future GHG reduction scheme must have commitment from both countries and move them towards substantial long-term reductions in emissions. Experts agree that a global mechanism that ensures comprehensive emissions pricing is the most economically efficient way of achieving emissions targets; however, various political, economic and structural obstacles stand in the way of implementing ideal systems. This paper examines the implications and acceptability of proposed market-based mechanisms within the current Chinese and US political economy context, including the ability of hybrid and regional schemes to encourage participation among diverse stakeholders, with heterogeneous emissions reduction capabilities.

IDAHO CITY AND A HISTORIC CHINESE PLACER SITE: BELIEFS AND LAND USE

Amber Thompson (McNair Scholar)
College of Social Sciences and Public Affairs
Department of History
Faculty Sponsor: Dr. Lisa Brady

The need for regional and local histories describing land use strategies are essential for understanding past and future initiatives related to environmental and economic sustainability. The Granite Creek placer site is a historic Chinese placer mining camp located in Idaho City, Idaho. Deemed significant to our national heritage by NHPA legislation, this site provides archaeological and documentary evidence of Chinese impacts upon Idaho City’s developing economy and local environment. Such a study is necessitated by the fact that previous studies of the Chinese have centered on urban settings, with little consideration given to the majority of the population, who lived in rural, work-oriented communities such as Idaho City. This study suggests that: 1) The Chinese population at Granite Creek contributed greatly to the environmental history of Idaho City, and 2) “Practical” Chinese notions of environment better equipped them as laborers and landscape architects.
Democratic Elitism in the Name of Participatory Democracy: A Critical-Theoretical Analysis of State Supported “Publics” in Brazil

Christian Belden (McNair Scholar)
College of Social Sciences and Public Affairs
Department of Communication
Faculty Sponsor: Dr. Ed McLuskie

The discourse of participation in and about Brazil has contributed to the wider discourse of the public sphere. As an occasion to revise the general concept of the public sphere, it carries its own limitations as well. The public sphere is an arena where citizens come together to discuss matters of general interest and through this discussion are then able to influence the state. The concept public sphere is a challenged concept and is often called exclusive and “unrealistic.” One scholar revises this challenged concept, Leonardo Avritzer, author of Democracy and the Public Space in Latin America. Avritzer’s revision claims to take the revision further in the direction of participatory, democratic publics. Yet it adds an administrative dimension to the public sphere that is problematic both conceptually and practically. It allows for state control of the public sphere in the name of “accountability” and “democratic elitism.” The paper offers a critique of such a revision by showing that accountability means elite governance through a reduction of participation to administered publics as a false “necessity.”

Barnwell Room
1:00 PM - 2:15 PM

Each podium presentation will be 10 - 15 minutes with a 5 minute transition between presentations.

The Erosive Effects and Titratability of Popular Energy Drinks

Kevin Mangelson and Nathan Tenney
College of Health Sciences
Department of Community & Environmental Health
Faculty Sponsor: Dr. Elaine Long

The purpose of this study was to evaluate, through titration, the acidity and erosive potential of four popular energy drink brands. The four energy drinks used for this experiment were Red Bull, Monster, Full Throttle, and Rockstar. The initial pH measurement was taken for each drink by using a pH electrode. Each drink was titrated while constantly monitoring the pH of the beverage until it reached the final assessment of 12.0 pH. Human third molars that were non-flawed, erosion free, and free of caries or restorations were then submerged in the energy drinks for a period of 350 hours or 14 days to simulate the wear of 14 years of energy drink consumption. The energy drink was replaced every 24-hours with freshly opened beverage and the weight recorded of each tooth specimen. This weight was compared to the initial weight of each specimen to determine the total erosion that occurred over the test period. The primary research question in this study was which of the popular energy drinks could lead to the most amount of dental erosion. This study attempted to quantify the amount of harmful erosion that each energy drink caused.
Using Patients to Guide Care: Continuing Results of a Patient Satisfaction Survey

W. Garrett Reynolds  
College of Health Sciences  
Department of Community & Environmental Health  
Faculty Sponsor: Dr. Lee Hannah, DVM, MS, MPH

This study examined patient satisfaction at St. Benedict’s Family Medical Center (SBFMC), comprised of one hospital and three clinics. SBFMC staff administered a patient satisfaction survey from December 2005 – August 2006, and again from October 2006 – August 2007. Every patient was asked to complete the 18-question survey regarding his/her current visit. Satisfaction questions utilized a Likert scale, with a range from 1 (Not at all satisfied) to 6 (Highly satisfied). Out of 673 completed surveys from December 2005 – August 2006, SBFMC scored a mean satisfaction rating of 5.48, and out of the 228 completed surveys from October 2006 – August 2007, SBFMC scored a mean satisfaction rating of 5.27, an overall drop in score of -0.21 (p<.05). Between the two survey periods, patients reported an overall drop in two items, “The staff treated me with dignity and respect” (5.57 – 5.42 [p = .05]) and “My friends and family could talk with my doctor” (5.43 – 5.29 [p<.05]). Data were also examined to evaluate patient satisfaction by location of service and the type of service received, but these results were statistically insignificant. Data were also collected regarding reason for going to SBFMC, whether it was the patient’s first visit, and date of visit. Results of this study will assist SBFMC in better understanding their current patient satisfaction and will provide information regarding which areas are producing high satisfaction among users and which have room for improvement.

The Bio-politics of Drugs in U.S. Political Discourse

Jennifer Kopp  
College of Social Sciences and Public Affairs  
Department of Sociology  
Faculty Sponsor: Dr. Michael Blain

This paper has two goals. First this paper examines the historical and theoretical relationship between bio-power and drugs as a modern form of political power. Secondly, it describes how people in modern society are subjected to bio-political mechanisms in terms of public health. Three dominant types of drug discourses result from the analysis: crime, health, and commerce. As the modern bio-politics has taken hold and increased in its reach, the frequency of drug discourses in Presidential speeches has also increased. The data set includes 220 speeches from 1790 to 2007 collected from “The American Presidency Project.” They were indexed using a text retrieval program called Word Cruncher 6.0. Results conclude that drugs and crime discourse is the most prevalent followed by health and commodity. The modern era of drug use in 1968 split presented these discourses before and after. The use of bio politics as a mechanism is displayed through its connection of different discourses mentioned earlier in a table which I have completed and displays the year of the first presidential speech to the present. Different examples from the actual state of the union addresses are utilized to reflect the analysis. To also highlight the conclusion section of this analysis, it seems to be that the regulation of drug policies, concerning crime as well as utilizing the health sector, bio-power seems to be a force in the care, management, regulation and maintenance of the nation state’s population.
THE NORMIE USER GUIDE

Rochelle Cunningham
College of Social Sciences and Public Affairs
Department of Communication
Faculty Sponsor: Dr. Laurel Traynowicz

I am interested in the phenomenon of negotiating communication between individuals with addictive and non-addictive personalities. A communication standpoint provides a necessary social filter that illuminates how to navigate through and negotiate these difficult relationships. The addict socially represents himself or herself in specific and knowable ways; more importantly, their behavior serves as a social barometer by which they are recognized as addicts. In this paper, however, my focus is not on the addict but rather on those affected by the behaviors of addicts. I created a user guide for “Normies” (a colloquial term used among AA members as an individual who does not suffer from addiction). My intention is to offer the Normie reader a greater tolerance for her or his situation with the addict. It does not necessarily provide solutions, but rather is a starting point for a plethora of communicative directions Normies may choose from. Interviews, communication research, and personal experience resulted in this user guide for non-addictive individuals seeking to better their communication with the addicts in their lives.

BOYINGTON ROOM
1:00 PM - 2:00 PM

Each podium presentation will be 10 - 15 minutes with a 5 minute transition between presentations.

LEGITIMIZING TORTURE: HOW SIMILAR IDEOLOGIES OF THE UNITED STATES IN THE WAR ON TERROR AND THE FRENCH IN ALGERIA LED TO TORTURE

Brian Lawatch (McNair Scholar)
College of Social Sciences and Public Affairs
Department of History
Faculty Sponsor: Dr. David Walker

The United States’ effort to win the war on terrorism by spreading democracy served to legitimize torture by circumventing international and domestic laws, creating ambiguity and confusion among members of the United States military. France too, in the French-Algerian War of 1954-1962 used torture in the name of spreading the benefits of French civilization. This study discusses the role of ideology by comparing similarities between France and the United States in terms of each nation’s world views. Ideology is discussed in the creation of laws legitimizing torture and how government officials came to decisions that allowed for abuses to happen. Winning these wars was considered so important that both the French and U.S. governments either created or interpreted laws in a way that allowed for torture. Government investigations are examined, revealing the role of ideology in the reports and how that affected recommendations for punishment for those culpable in torture acts. French bias is revealed, showing a strong desire to promote the torture activities, believing the methods to be effective. U.S. reports reveal a desire to fix the problem but do not investigate the roots of the abuse, for fear of losing the moral ideological authority of carrying out its wars. Ideology affected the judgment of individual soldiers in both conflicts. Confusion among the soldiers and their sense of duty to their nation affected the decision to engage in torture.

BARNWELL ROOM
2:30 - 3:00

THREE CUPS OF TEA - FIRST YEAR READ PRESENTATION

Were you inspired by reading the First Year Read book Three Cups of Tea and/or hearing Greg Mortensen speak on campus? Do you strive to make a difference in your community? Would you like to gather with like minded students to explore ways to make a difference? Join the conversation with students who are “making a difference where they are.” Hear from students about how they were inspired by Three Cups of Tea, learn about opportunities to serve the community, and develop your own ideas about ways to make a difference.
sometimes believing it to be government policy to abuse prisoners in order to stop future attacks. Lastly, public perception of torture has affected how these wars are remembered. Thus, the experience of France in the Algerian War of 1954-1962 and its use of torture should have been a warning to the United States of how a well-meaning ideology can deny people the values those ideologies are said to promote.

**Firearm Policies: On the Mark or Off Target?**

*Christina Perry (Honors College)*  
*College of Social Sciences and Public Affairs*  
*Department of Political Science*  
*Faculty Sponsor: Dr. Elizabeth Fredericksen*

One of the basic tenants of government is the protection of its citizens from harm. At the federal level, protection is often focused on attacks on a national scale from a foreign threat. Often, at the state and local level of government, the quest is to protect law abiding citizens from their criminal peers. The policy often imposed in major metropolitan areas is the placement of firearm restrictions on citizens in the hope of lowering violent crime rates within the community, thus creating a safer living environment and fulfilling government’s protection objective. The purpose of this research paper is to determine whether the current firearm policies related to the protection of citizens are “on the mark.” Do they truly meet the intended result of lowering violent crime rates? Or, are they “off target?” Rather than protect their citizens, do these policies place the public at a greater risk of harm by disarming citizens and leaving them defenseless against an armed foe? This project will apply multiple regression analysis to determine if current firearm policies in major metropolitan areas produce the intended results - to lower violent crime rates and create safer cities. The intent is to look at a broad, national view by comparing cities of approximately equal size and stature across the United States that employ similar firearm restrictions against crime rates from cities of like stature which do not have comparable firearm restrictions. The hypothesis states current policies do NOT produce the intended results. Rather than produce lower violent crime rates, the policies allow violent offenders to continue to prey upon defenseless citizens.

**Sacrificios Para La Familia: The Context of Mexican Farm Worker Narratives.**

*Carolina Valderrama (McNair Scholar)*  
*College of Social Sciences and Public Affairs*  
*Department of Sociology*  
*Faculty Sponsor: Dr. Robert McCarl*

Among the school age population in Idaho, the populations most at risk for not graduating and/or dropping out from high school are the children of migrant farm workers. According to data from the 2000 CPS, the dropout rate is 44.2% for Hispanics 16 through 24 who are born outside the United States. Previous research has focused on several contributing factors to the drop out rate such as, socioeconomic status, recent immigration, and linguistic differences, few studies however, have focused on the role of generational context as a possible factor. This study explores the role of generation as a factor influencing the drop out rate of migrant farm working children. It draws on narratives and life history accounts from 22 interviews of migrant workers, a project from the Hispanic Oral History Project conducted in 1991 for the Idaho State Historical Society. It concludes that the dropout rate among farm workers should be seen more accurately as a conflict between the collectivist cultural orientations of Latino farm worker students that clash with an educational system that emphasizes individual competition over cooperation.
PODIUM PRESENTATIONS

BOYINGTON ROOM
2:30 PM - 3:00 PM

Each reading will be 5 to 7 minutes.

PRESIDENT’S WRITING AWARDS

Winning students will read sections of their entries.
Faculty Sponsor: Carrie Seymour

The President’s Writing Awards is celebrating its twenty-fifth anniversary of recognizing excellence in student writing. During this time, the contest has awarded prizes for a diverse selection of student essays in a number of different categories. The contest is funded by the President’s office and submissions are encouraged from academic departments across the curriculum. Categories are carefully chosen each year to include many types of academic writing, including critical analysis, research reporting, and creative nonfiction. We have also had specialized categories sponsored by various departments including Spanish, Business, and Education. This year we added a new category specifically for writing in Science, Math, and Engineering, and we are commemorating the twenty-fifth anniversary by publishing an anthology that highlights some of the best winning essays available, including several of those chosen for this year’s awards. Ultimately, the contest gives students a chance to highlight the work, both creative and research-based, that they have produced during their academic careers.

FARNSWORTH ROOM
1:00 PM - 2:15 PM

Each podium presentation will be 10 - 15 minutes with a 5 minute transition between presentations.

RIDING THE DRAGON: ARGENTINA, BRAZIL AND THE CHINESE COMMODITY MARKET

Nicolas Diaz (Honors College)
College of Social Sciences and Public Affairs
Department of Political Science
Faculty Sponsors: Dr. Brian Wampler and Dr. Craig Hemmens

Latin America has abundant supplies of many highly demanded raw materials. The presence of these natural resources provides a great opportunity for the continent to become self reliant and, potentially, a major power in the world economy. With the rise of China’s economic power in the past two decades, there is now a substantial trading relationship between Latin America and China. This connection can be analyzed by looking at the MERCOSUR, focusing on its two leading economies, Brazil and Argentina. How is Latin America being affected by Chinese investment? The following article will examine the economic impact the rise of China has had on Latin America. To narrow the scope of analysis, this article will focus on how agricultural production and exports to China have changed in Brazil and Argentina since 1996. The production and sale of soy and beef of these South American nations can be traced to the increasing demand in China. The purpose of the article is to show how these new economic relationships are transforming agricultural sectors in Brazil and Argentina. An independent variable that may affect this relationship is the industrialization and globalization process the Chinese market is experiencing. With the new trading opportunities, Brazil and Argentina may now have the chance to develop their society and improve their political and economic performance.

ARMS TRANSFERS AND STABILITY IN THE DEVELOPING WORLD: A CAUSAL MODEL

Bryce Reeder (McNair Scholar)
College of Social Sciences and Public Affairs
Department of Political Science
Faculty Sponsor: Dr. Ross E. Burkhart

In recent years, several studies have emerged that seek to understand the nature, scope, and significance of arms transfers in the post-Cold War period. A common theme throughout this literature is the assertion that the collapse of the Soviet Union gave birth to a globalized, commercialized US arms industry dependent upon exports to the developing world in order to survive. Using pooled time-series data, this study tests this assertion via Prais-Winsten panel-corrected standard errors regression. The relationship between such transfers and stability
lin the developing world is also explored. Using a
nonrecursive simultaneous equation model, a new
measure of stability is constructed accounting for
political, economic, and social indicators of stability.
The study concludes that the global arms trade has
been commercialized, and that US producers are
increasingly targeting countries in the developing
world. Arms transfers are also seen to have a negative
relationship to stability, as well as lead to lower levels
of democracy in the importing state. These results are
discussed with reference to US national security and
the stated goals of American foreign policy.

The Turbulent Political History
of the Democratic Republic of Congo

Johali Muzaliwa (Honors College)
College of Social Sciences and Public Affairs
Department of Political Science
Faculty Sponsor: Dr. Peter Buhler

On June 30th, 1960 the Congo erupted in joy as it
gained its independence from Belgium. The cruel
and unimaginable horrors of King Leopold’s regime
were over. The unjust and patronizing rule of Belgium
had ended. The new nation looked forward to a
future of peace and prosperity as it began to set up
its own government and handle its own rich and
vast natural resources. Fast forward 49 years. The
Democratic Republic of Congo is front page news
all over the world. Why? Because there’s fighting
going on in Goma. Yet more people have been killed,
adding to the 5.4 million that have died as a result
of war in the Congo over the past decade, not to
mention the hundreds of thousands that were killed
and tortured under Mobutu’s 32 year dictatorship.
The breakout in Goma is now threatening to shatter
the weak but hopeful peace in the Congo. What
happened to the peace and prosperity that the
Congolese looked forward to so expectantly in
1960? How is it that their own government left the
Congolese as destitute and hopeless as they had been
under Belgium? Why is it that neither the tortures
nor the horrors nor the injustice ceased? I propose to
do my honor’s project on the political history of the
Congo from when it gained its independence in 1960
until the present. I intend to discuss such political
figures as Lumumba, Kabila, Mobutu and his regime,
and the causes of the civil war that began in 1997
and devastated so many lives. I also want to discuss
the situation that is going on in Goma. Finally, I
would like to discuss some of the solutions offered
by political scientists on what the Congo needs to
do in order to finally make the dream of peace and
prosperity a reality.

Policy Implementation: Focusing
on Idaho Legislation Regarding
the Sale of Pseudoephedrine

Kate Henry (Honors College)
College of Social Sciences and Public Affairs
Department of Political Science
Faculty Sponsor: Dr. Elizabeth Fredericksen

What happens to a piece of legislation that has
battled its way through committee and finally gets
passed? Some make a huge difference. Some have
an impact through the change of one word. The rest
are forgotten as shelf after shelf of legislation is not
being enforced. Implementation is often left to the
discretion of an end agency and may not be given
enough attention. More focus may rest on the fiscal
impact and what the major parties think about the
premise behind the legislation. The six step policy
process is a way to evaluate the success of specific
legislation. After defining the issue, can a piece of
legislation actually fix the outlined problem? Through
support for the solution and implementation, the
feedback loop allows the observer to see if the
problem has been adequately addressed. In Idaho,
the issue of selling pseudoephedrine is one that
affects many individuals due to its use in making
methamphetamine, unfortunately prevalent in
Idaho. The sale of pseudoephedrine was addressed
in a piece of legislation during both the 2005 and
2006 Idaho legislative sessions. This research project
follows the path of the pseudoephedrine legislation
through the six step process with particular attention
to problem definition and implementation. Have the
agencies been enforcing this piece of legislation?
What has changed for individual pharmacies since the
issue was initially raised? Although much scholarly
research has been done on implementing legislation,
this project employs B. Guy Peters as a foundation to
considering local implementation of this state-level
policy.
Lunar Rover Traction Concepts in Reduced Gravity

Dan Isla, Ryan Bedell, Alex Miller, Mallory Yates, Matt McCrink, and Kyle Knori
College of Engineering
Department of Electrical & Computer Engineering
Faculty Sponsor: Dr. Jim Browning

Future exploration of the moon and Mars will require systems capable of transporting both humans and cargo in reduced gravity environments. The combination of lunar regolith and reduced gravity creates issues for vehicular traction. NASA is interested in testing transportation systems in lunar environments to establish the relationship between the weight of a vehicle and its traction abilities on the lunar surface. The greater the mass of a vehicle, the better traction it will have in reduced gravity. However, a heavier vehicle requires more fuel to deliver the payload from the Earth to lunar orbit to the lunar surface and results in a costlier mission. NASA is especially interested in investigating ways to lower the weight of lunar exploration vehicles without compromising their traction. This experiment will observe how different wheel geometries interact with lunar regolith simulant under variable loads in lunar gravity. The project includes building a test apparatus with digital data acquisition, designing a test matrix, performing the experiment in lunar gravity, and sharing the experience with the community. Key components include a DC motor providing enough torque to overcome the static friction of the lunar regolith, software to control the motor, and an enclosure that houses the regolith and the wheel test apparatus. This project is a preliminary step for future research and experiments.

Counting Walks From Distinct Vertices on Directed and Undirected Graphs

Justin Chown
College of Arts and Sciences
Department of Mathematics
Faculty Sponsor: Dr. Uwe Kaiser

In this talk we will explore the idea of counting subgraphs with special properties of a given graph. The subgraphs we will focus on are trees with specified leaves, and we will look into algorithms well understood in the literature, as well as some we will build, to convert the trees of our interest into algebraic objects like sequences. In the case of only two leaves we study simple paths between two given vertices. We will then be able to distinguish particular patterns in the Adjacency Matrix, and other useful matrices, given from the graphs we study, which will allow us to produce counting procedures, similar to the Matrix Tree Theorem, to count the trees we are interested in. First we will look into undirected graphs and use Prufer’s method as a guide to developing our own method for assigning the trees of our interest to sequences that are special to them. Next, we will use the Matrix Tree Theorem as a guide to develop a counting scheme to determine the number of trees of our interest that exist in a connected and undirected graph. Lastly we will expand our research to directed graphs, counting trees with our desired properties in those graphs. Applications of this research include but are not limited to determining the number of different driving directions a GPS navigator can use to guide drivers to their destinations, and with the use of weighting functions give optimizations for fuel economy, driving time, distance, et cetera. If time allows we will explore the effect of these weighting functions and use Kruskal’s Algorithm as a guide to determining the optimal walk along our trees in the newly weighted graphs.
GRAND BALLROOM A
1:40 PM - 2:40 PM

Each podium presentation will be 10 - 15 minutes with a 5 minute transition between presentations. These presentations will be in Spanish.

UN ANÁLISIS DEL TESTIMONIO EN THE LITTLE SCHOOL: TALES OF DISAPPEARANCE AND SURVIVAL DE ALICIA PARTNOY

AN ANALYSIS OF THE TESTIMONIO IN ALICIA PARTNOY’S THE LITTLE SCHOOL: TALES OF DISAPPEARANCE AND SURVIVAL

Jessica Verbanac (Honors College)
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Alicia Garza

El testimonio, como género en la literatura latinoamericana, es muy único. El punto de vista del autor es distinto ya que se deriva del sufrimiento vivido directamente por el testigo. Lo que hace especial al testimonio es la razón principal por la cual se escribe. El testimonio es un acto político que se basa en la fuerza del espíritu de un autor o autora para sobrevivir. El proceso de pensamiento muy único al testigo pues es lo que le ayuda a sobrevivir la tortura física y psicológica. El escribir acerca de este proceso es una característica sobresaliente del testimonio. The Little School: Tales of Disappearance and Survival de Alicia Partnoy provee un ejemplo útil del testimonio con el que se puede analizar tal género literario. A través de la obra de Partnoy, este trabajo de investigación identifica las características de la autora como superviviente y explica su urgencia por escribir un testimonio.

The testimonio, as a genre of Latin American literature, is very unique. The point of view of the author is distinct because it is derived from the suffering experienced directly by the writer. What makes a testimonio special is the principal reason for which it is written. A testimonio is rooted in the need for authors to make themselves heard. It is a political act based on survival of the spirit. The thought processes which help the author-witness to survive government-sponsored physical and psychological torture are a strong characteristic of a testimonio. The Little School: Tales of Disappearance and Survival, by Alicia Partnoy, provides a useful example of testimony with which to analyze the genre. Using Partnoy’s work, this research paper identifies the characteristics of the author as a survivor and discusses her urgency for writing a testimonio.

LA REPRESENTACIÓN DE LA SOLIDARIDAD EN ME LLAMO RIGOBERTA MENCHÚ Y ASÍ ME NACÍ LA CONCIENCIA

THE REPRESENTATION OF SOLIDARITY IN ME LLAMO RIGOBERTA MENCHÚ Y ASÍ ME NACÍ LA CONCIENCIA

Maria Barroso
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Maria Alicia Garza

El testimonio de Rigoberta Menchú, en Me llamo Rigoberta Menchú y así me nací la conciencia de Elizabeth Burgos, retrata la lucha de supervivencia de los pueblos indígenas en Guatemala. Menchú describe con franqueza cómo la tortura y la opresión, que los grupos indígenas enfrentaron durante la guerra civil en Guatemala, resultó en silenciar sus voces y en un temor de luchar por sus derechos humanos. Esta unidad entre los miembros indígenas de la comunidad de Guatemala, es claramente una herramienta esencial para su supervivencia, se demuestra en Me llamo Rigoberta Menchú y así me nací la conciencia. Este trabajo examina cómo se crea la unidad entre las comunidades indígenas con el fin de avanzar en una época de tortura y sufrimiento, y de cómo la solidaridad es esencial para la supervivencia de grupos indígenas en Guatemala.

The testimonio of Rigoberta Menchú, as told to Elizabeth Burgos, in Me llamo Rigoberta Menchú y así me nací la conciencia, portrays the struggle of survival of the indigenous people in Guatemala. Menchú describes candidly how torture and oppression that indigenous groups faced during the civil war in Guatemala resulted in silencing their voices and fearing to fight for their human rights. This unity between the indigenous members of the community of Guatemala, which is clearly an essential tool for their survival, is evidently demonstrated in Me llamo Rigoberta Menchú y así me nací la conciencia. This paper examines the role in which unity is created, between indigenous communities in order to advance during a time of torture and hardship, and how solidarity is essential for the group’s survival in Guatemala.
El cuerpo como testimonio en *Me llamo Rigoberta Menchú y así me nací la conciencia* de Elizabeth Burgos y *The Little School: Tales of Disappearance and Survival* de Alicia Partnoy

The body as a testimonio in *Me llamo Rigoberta Menchú y así me nací la conciencia* by Elizabeth Burgos and *The Little School: Tales of Disappearance and Survival* by Alicia Partnoy

Martha Mendoza (McNair Scholar)  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Alicia Garza

El cuerpo humano es la fotografía de la brutalidad que se vive en un régimen opresor, inhumano y violento. La descripción del cuerpo humano en un testimonio confirma los acontecimientos de violencia que han dejado huella en los cuerpos de miles y quitado la vida a muchos más. A través del análisis de las obras de *Me llamo Rigoberta Menchú y así me nací la conciencia* de Elizabeth Burgos y *The Little School: Tales of Disappearance and Survival* de Alicia Partnoy, se estudia el uso de la descripción del cuerpo humano como representación gráfica y evidencia física en la narración de la literatura testimonial.

The description of the human body in testimonial literature portrays and corroborates the violent events that have marked and scarred the lives of subordinated communities in Latin America. The human body is a photograph of the brutality that people experience under an oppressive, inhumane and violent regime. Through the analysis of *Me llamo Rigoberta Menchú y así me nací la conciencia* by Elizabeth Burgos and Alicia Partnoy’s *The Little School: Tales of Disappearance and Survival*, this essay explores the descriptions of the human body within the narrative as a graphic representation and physical evidence of testimonial literature.

Grand Ballroom B  
1:00 PM - 2:30 PM

Each podium presentation will be approximately 5 minutes and will be in Chinese.

Chinese Speech Contest

My trip to China (Chinese 102 level)

Alexander King  
College of Arts and Sciences  
Department of Modern Languages and Literatures  
Faculty Sponsor: Dr. Sharon Wei

I had the opportunity to spend about 3 months in China and was able to travel to many different cities. I will discuss some of my experiences there as well as where I would want to go if I am able to visit there again.

My Chinese Friend and I (Chinese 102 level)

Zeb Wladyka  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

My Chinese friend and I is about a pen pal of mine that lives in Shanghai and our correspondence.

My Life as a Chinese Student at BSU (Chinese 102 level)

Adele Nyqvist  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

This speech will be an overview of my life as a Chinese student at BSU.
**Little Jimmy Buffett** *(Chinese 102 Level)*

Paris Gaudin  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

I will be talking about my dog, Jimmy Buffett Gaudin. I named him after my favorite musician. He is three years old and is so cute. He is very small and I often take him places in his bag. He has a lot of energy but he is pretty quiet. He loves the summer time and hates when there is snow on the ground. He has a little bit of an attitude and he’ll let you know when he’s not pleased with you. He is such a great friend and I don’t know what I’d do without him. When I leave for China my younger sister will have to take care of him.

**My Family** *(Chinese 102 Level)*

Melina White  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

I will talk about my family, how old they are and what they do.

**My Time in China** *(Chinese 102 Level)*

Trista Gorringe  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

This presentation will be about the five months I spent in China and my experience studying abroad. I’ll talk about the friends I made and the places I went, along with my opinions about the things I experienced.

**The Fichtner Family** *(Chinese 102 Level)*

Benjamin Fichtner  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

I will present a brief introduction of my immediate family which lives in Rock Island, Washington.

**My Family** *(Chinese 102 Level)*

Karina Bashir  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

My topic will be my family, our hobbies, occupations, etc.

**My Date Last Night** *(Chinese 102 Level)*

Michael Nielsen  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

I will describe a few events that are typical on a date: agreeing on an activity to do, finding a time to meet, a place to go, meeting her parents at the door, bumping into a friend of mine, how expensive the food was, going to another restaurant, the taste of the food, and other events that might have taken place.

**My Chinese Friend** *(Chinese 202 Level)*

Jared Sanders  
College of Arts and Sciences  
Department of Modern Languages & Literatures  
Faculty Sponsor: Dr. Sharon Wei

I will write and memorize a description of a fictitious Chinese friend.
**Why I Study Chinese** (Chinese 202 Level)

Russell Menth  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Dr. Sharon Wei*

This will be an oral presentation explaining the reasons I study the Chinese language. I will describe my experiences which caused my interest in Chinese culture, and consequently my interest in learning the language.

**Summer Time in Boise** (Chinese 202 Level)

Lesley Yang  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Dr. Sharon Wei*

An oral presentation given in Mandarin Chinese about the recreational summer activities available in Boise.

**My Family** (Chinese 202 Level)

Dayna Anderson  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Dr. Sharon Wei*

Presenting entirely in Mandarin Chinese, I will describe my family and individual family members. I will also speak about how their love and support has helped me finish college since they are my largest support system in accomplishing my goals.

**Why I Enjoy Eating Chinese Food** (Chinese 202 Level)

Will Anderson  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Dr. Sharon Wei*

The presentation will consist of why I enjoy eating Chinese food and what types of food I enjoy.

**My Life at Boise State University** (Chinese 202 Level)

Hilary Dovey (Honors College)  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Dr. Sharon Wei*

I will be presenting a three minute speech on my life experiences here at Boise State University, including my classes, what I do with friends during my free time, and what I hope to do in the future.

**Grand Ballroom B**  
2:40 PM - 3:30 PM

Each podium presentation will be approximately 5 to 10 minutes and will be in Japanese.

**Japanese Speech Contest**

**The Things I Want to Learn in Japan**

Andre Barroso  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Mr. Tetsuya Ehara*

The Japanese way of life and adapting to their culture.

**“Watashi to Nihongo”**

Jenny Fothergill  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Mr. Tetsuya Ehara*

I will be presenting about my experience with learning Japanese: reasons I chose to study Japanese, difficulties I have had, things I have learned from studying Japanese, and how studying Japanese has affected my life and my plans for the future.
Japanese and Me

Nicole Sonia Castro (Honors College)
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Mr. Tetsuya Ehara

Learning the Japanese language has taught me many valuable lessons. My study habits and whatever abilities I have in speaking the language are greatly due to the teachings methods that my mentors implemented. Truly learning the language requires immersing one’s self in the culture--which is still an ongoing process for me.

“Watashi to Nihongo”

Charlotte Dolecheck
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Mr. Tetsuya Ehara

I will talk about my experience in learning Japanese up to now, including: why I choose to study Japanese, the difficulties I have met, and it’s influence in my life. I will also talk about what my future plans are concerning Japanese, such as further education in the language, usage in real life situations, and sharing this knowledge with others.

Japanese In My Life

Jeffrey Galbraith
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Mr. Tetsuya Ehara

My presentation will detail my first interests in Japanese, study habits, and experiences with the Japanese language.
GRAND BALLROOM C
1:40 PM - 2:40 PM

Each podium presentation will be 10 - 15 minutes with a 5 minute transition between presentations. These presentations will be in French.

VIES EN CONTEXTE: AU CARREFOUR DE LA SOCIÉTÉ, DE LA FAMILLE ET DE L’INDIVIDU DANS LA CHAMBRE INTERDITE D’ÉVELYNE TROUILLOT”

LIVES IN CONTEXT: THE INTERSECTION OF SOCIETY, FAMILY, AND THE INDIVIDUAL IN LA CHAMBRE INTERDITE BY ÉVELYNE TROUILLOT

Brittany Bogue
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Jason Herbeck

Cet exposé analyse le recueil La Chambre interdite par Évelyne Trouillot afin de divulguer la réalité quotidienne des femmes en Haïti contemporaine. Dans chaque histoire, l’enfermement et le silence se présentent comme thèmes unifiants. En vue de mieux apprécier la signification de ces thèmes, nous nous proposons d’examiner en détail trois des six contes du recueil; chaque conte étudié nous permettra de souligner un des trois types d’enfermement se trouvant dans l’œuvre, et que nous avons identifiés comme individuel, politique et social. Nous démontrerons à cet effet que les angoisses des personnages féminins s’enracinent souvent dans le silence même qui les enferme. Puisque ce silence sanctionne alors en quelque sorte les problèmes d’enfermement, parler des défis qui confrontent l’Haïti d’aujourd’hui pourra ouvrir les avenues de discours nécessaires pour que des changements sociaux et politiques se réalisent.

This paper uses Évelyne Trouillot’s short story collection La Chambre interdite as an avenue to uncover the everyday realities of women living in contemporary Haiti. In each story, entrapment and silence present themselves as unifying themes. In order to better appreciate the significance of these themes in the collection, I will examine three of the six stories in detail; each story studied will serve to underline one of three types of entrapment found in Trouillot’s work that I have identified as individual, political, and social. In fact, as I will demonstrate, most of the women’s anguish stems from their silence with respect to the challenges and barriers that surround them. Because this silence, in a sense, sanctions these problems, speaking about the challenges that Haitians face today could open avenues of discourse where political and social change can occur.

LUTTES INTIMES: LA NARRATION D’ANÉANTISSEMENT DANS AMOUR, COLÈRE ET FOLIE DE MARIE CHAUVET

QUIET STRUGGLES: THE NARRATION OF SUPPRESSION IN MARIE CHAUVET’S AMOUR, COLÈRE ET FOLIE

Carl Kitchen
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Jason Herbeck

Supprimée après sa publication en 1968, la trilogie-roman, Amour, Colère et Folie, de la romancière haïtienne Marie Chauvet est restée épuisée et presque introuvable pendant des décennies. À travers les trois romans qui constituent la trilogie, le lecteur rencontre des personnages séparés par le temps et les classes sociales, mais qui sont tous confrontés à l’indifférence de la société et à la brutalité du régime militaire (allusion à peine voilée au règne de terreur du dictateur François Duvalier). Malgré leurs milieux différents, ces personnages sont réunis dans l’angoisse et luttent en silence contre cette réalité dure. Pour eux, il existe un conflit entre leur mondes intérieur et extérieur. Au fur et à mesure que l’on se penche sur la progression du cadre et de la structure narratrice de la trilogie, se révèle une transformation graduelle de l’espace personnel (soit physique ou mental) de refuge sûr en prison étouffante, où la
lutte devient inutile et la réalité sombre dans la folie.

Suppressed after its publication in 1968, the trilogy-novel, *Amour, Colère et Folie*, by Haitian novelist Marie Chauvet remained out-of-print and almost impossible to find for decades. In the three novels that form the trilogy, the reader encounters characters separated by time and social class, but who are all faced with society’s indifference and the brutality of the military regime (a thinly veiled allusion to the dictator François Duvalier’s reign of terror). Despite their disparate backgrounds, these characters are linked through their anguish, struggling in silence against this harsh reality. For them, there exists a conflict between their interior and exterior worlds. A look into the progression of the trilogy’s setting and narrative structure reveals a gradual transformation of personal space (be it physical or mental) from a safe refuge into a suffocating prison where struggle is rendered useless, and reality dissolves into madness.

**UN APPEL À ROMPRE LE SILENCE : UNE ÉTUDE DE LA FONCTION D’UN HÉROS BERGSONIEN DANS *UN ALLIGATOR NOMMÉ ROSA* PAR MARIE-CÉLIE AGNANT**

A CALL TO BREAK THE SILENCE: A STUDY OF A BERGSONIAN HERO’S ROLE IN *AN ALLIGATOR NAMED ROSA* BY MARIE-CÉLIE AGNANT

Kelly Mower  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Dr. Jason Herbeck*

Dans cette étude, on examinera des éléments du roman de Marie-Célie Agnant qui fonctionnent à la fois comme un appel à rompre le silence des victimes torturées sous le régime Duvalier en Haïti et comme une tentative de guérir une nation ravagée par ce régime brutal. On démontrera dans cette analyse la manière dont le texte souligne l’importance de parler des atrocités commises par ce régime, de ne pas tout pardonner à ces bourreaux, et de les tenir responsables de leurs crimes. Antoine, le personnage principal du roman, est présenté comme un héros bergsonien qui sert de catalyseur possédant à lui seul les caractéristiques nécessaires pour réaliser toutes ces aspirations.

In this study, we will examine some of the key elements in Marie-Célie Agnant’s novel and how they function both as a call to break the silence of the victims tortured by the Duvalier regime in Haiti and as an attempt to mend a nation devastated by this torturous regime. This analysis will show how the text highlights the importance of speaking out about the atrocities committed by those working for the regime, not forgiving them of these crimes, and holding them responsible for their actions. Antoine, the novel’s protagonist, functions as a Bergsonian Hero, a catalyst who manifests the characteristics necessary to accomplish these aspirations.

**GRAND BALLROOM D**

1:40 PM - 2:40 PM

Each podium presentation will be 5 to 10 minutes. The presentations will be in Basque.

**BASQUE POETRY READING**

Cody Beaudreau  
*College of Arts and Sciences*  
*Department of Modern Languages & Literatures*  
*Faculty Sponsor: Dr. Nere Lete*

Franco’s dictatorship and its anti-Basque stance impacted the themes of Basque poetry during the dictatorship. Social justice and political protest were often the focus. After 1975, now in democratic context, Basque poets were able to broaden their topics, presenting the challenge of re-inventing Basque poetry. In addition to reading selected Basque classics and one original composition, audience participation will be sought in interpreting texts.

FROM WHERE WILL THE NEW BERTSOLARI Come?

NONDIK ETORRIKO DA GAURKO BILINTX?

Christopher Bieter
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Nere Lete

The essence of Basque identity is the language, Euskera. One of the means by which the Basque language has been maintained is the tradition of extemporaneous singing or Bertsolaritza. The tradition may have prehistoric origins and has continued into the modern era, with formalized competitions and recordings. An interesting resurgence among young people has also occurred and teenagers, male and female, have begun to study the process and take part.


GETTING TO KNOW EUROPE’S MYSTERY PEOPLE

Itxaso Cayero
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Nere Lete

The Basque Country with a population of less than 3 million survives in a globalizing world by adapting its ancestral culture to modern ways. Basques in the diaspora also preserve their culture by treasuring traditions their parents and grandparents passed along and by creating their own to live in today’s society.

Mundua globalizatuz badoa ere, Euskal Herrian eta diasporan euskal kulturak aurrera dirau tradizioi eutsiz, modernitatean murgilduz eta etorkizunari begiratuz.

BASQUE MYTHOLOGY

Jon Criswell
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Nere Lete

After explaining the importance of mythology in Basque Culture, this presentation will introduce mythological characters, creatures and figures popular in Basque mythology. For example, lamia is a beautiful woman with long hair that she combs and who lives at the water’s edge and has duck feet.

Euskal kulturan mitologiarik eduki duen garrantzia azaldu ondoren, zenbait izakiren aurkezpena egingo da.

EUSKERA SONGS

John Cortabitarte
College of Arts and Sciences
Department of Modern Languages & Literatures
Faculty Sponsor: Dr. Nere Lete

Basque people have a long history of oral tradition and song. At any occasion it is custom to sing in honor of the situation. I will sing 4 songs from the Basque country in Euskera, and I will explain to the audience their meaning and the symbolism used.

Euskal kulturari estuki agertzen da lotuta ahozko tradizioa eta abesgintza. Lau euskal abesti abestearaz gain haien esanahia azalduko diot entzulegoari.
**Basque DNA: An Investigation and Comparison of 17 Y-Chromosome Microsatellite Loci of the Local Basque Population - Euskal Herriko Eta Euskal**

Josu Zubizarreta  
*Department of Biological Sciences*  
*Faculty and Staff Sponsors: Dr. Greg Hampikian and Mike Davis*

DNA was processed from cotton oral swab samples, taken from volunteers of the Boise area Basque population. In order to determine genealogy and mode of Basque ancestry, questionnaires were collected along with the swabs. In total, thirty samples reported a paternal Basque lineage and were used in the investigation. Seventeen microsatellite loci of Y-chromosome DNA were analyzed and the allele frequency data was compared to published data on individuals living in the Spanish part of the Basque Country. Similar to a twin study, the purpose of this comparison is to measure the genetic connection between the immigrated Basque population and that of the source Basque population. By using techniques such as polymerase chain reaction (PCR), quantitative PCR, and the 310 Genetic Analyzer capillary electrophoresis, the specific alleles at each microsatellite loci were tabulated. The genetic diversity was compared within and between immigrant and source populations. An analysis of molecular variance (AMOVA) was performed using the ARLEQUIN Version 3.1 program.

**Enhancing PCR Amplification from Diluted DNA Samples Using Experimental Formulas from Biomatrica**

Abby Siebert  
*Department of Biological Sciences*  
*Faculty and Staff Sponsors: Dr. Greg Hampikian and Mike Davis*

Very dilute DNA samples present problem for forensic analysts. These samples often degrade, and their low concentration makes DNA amplification difficult or impossible. Recently a new compound was produced (PCRboost, Biomatrica) based on molecules found in water bears (tardigrades, see image). These tiny remarkable animals can live up to 120 years without water, survive temperatures from close to absolute zero to 151°C (303°F), and recover after being exposed to the vacuum of outer space. Dr. Hampikian’s laboratory at Boise State University is working with Biomatrica to assess new formulations of their product aimed at enhancing forensic DNA analysis. In this study, I show the results of DNA tests done on my own diluted DNA with several experimental formulations from Biomatrica. DNA was extracted using the QIAmp DNA Mini kit (QIAGEN), from cheek swabs and then amplified by PCR (polymerase chain reaction). Using quantitative real-time PCR the amount of quantifiable human DNA was accurately determined. The quantified DNA was then diluted down to 1.0 picogram/microliter. The diluted DNA was then used to test amplification effectiveness using ABgene standard Taq polymerase with and without the experimental products (Biomatrica) added to the reaction mixture. The amount of DNA amplified with and without each of three experimental products was compared by first measuring the amount of PCR product, and then evaluating the quality of sequencing reactions for each experimental compound.
**LC/ESI-MS Identification of Tyrosine O-Sulfation Sites Within Collagen α1 Proteins**

Benjamin Davis  
Department of Biological Sciences  
Faculty Sponsor: Dr. Julia Thom Oxford

Sulfation is among the most common post-translational modifications to eukaryotic proteins. It has functional implications in a wide variety of biological processes including inflammation, clotting, and angiogenesis through facilitation of protein-protein interactions. A number of extracellular matrix (ECM) proteins are sulfated yet the functional significance of sulfation in the ECM is not known. Mass spectrometry is a robust and widely used platform for determining the location of post-translational modifications, however the labile nature of sulfation makes it difficult to detect directly. Specific sites can be determined using a subtractive approach in which unmodified tyrosines are blocked using a treatment of sulfosuccinimidal acetate (S-NHSAc). Detection of non-S-NHSAc modified tyrosines by tandem LC/ESI MS reveals potential native sites of sulfation. Collagen (XI) is an ECM protein whose α1 chain isoforms regulate collagen fibril diameter through protein-protein interactions. Determination of tyrosine sulfation sites on Collagen (XI) is a preliminary step in characterization of the functional implications of sulfation on ECM protein-protein interactions, and by extension ECM organization.

**Analysis of Sulfated Glycosaminoglycan Binding Sites Within Type XI Collagen**

Luke Woodbury  
Departments of Biological Sciences and Chemistry and Biochemistry  
Faculty Sponsor: Dr. Julia Thom Oxford

Sulfated glycosaminoglycans such as chondroitin sulfate are unbranched polysaccharides. Chondroitin sulfate contains repeating disaccharide subunits composed of D-glucuronate and N-acetyl-D-glalactosamine sulfate, whereas heparin sulfate consists of repeating disaccharide subunits of L-idurionate-2-sulfate and N-sulfo-D-glucosamine-6-sulfate. Chondroitin sulfate and heparin sulfate are located primarily in the extracellular matrix of cells. The functions of chondroitin sulfate and heparin sulfate are not well understood. Chondroitin sulfate and heparin sulfate are found to interact with proteins, and may play structural roles within the body. Type XI Collagen is a minor constituent of the extracellular matrix of cartilage and is essential in the regulation of collagen fibril assembly and diameter. The alpha 1 chain of Collagen XI (Collagen α1(XI) ) contains a variable region that is modulated by alternative splicing in a tissue-specific and developmental manner. Preliminary data suggests that some Collagen XI isoforms bind glycosaminoglycans. Biochemical and biophysical methods will be used to assess the interactions between Collagen α1(XI) and the glycosaminoglycans heparin sulfate and chondroitin sulfate. Collagen α1(XI) isoforms will be expressed in *Escherichia coli* and then purified using affinity chromatography. Circular dichroism spectropolarimetry will be used to monitor protein secondary structure. Solid phase binding data and surface plasmon resonance spectroscopy will be used to evaluate the kinetics of interactions between the Collagen α1(XI) isoforms and the glycosaminoglycans. Analytical ultracentrifugation and multi angle laser light scattering will be used to assess the hydrodynamic and physical properties of the protein glycosaminoglycan complex. Information gained from this study will help us to understand how Collagen α1(XI) isoforms interact with glycosaminoglycans and contribute to cell-matrix interactions as well as matrix-matrix interactions important in development and in the progression of disease.

**The Role of Collagen α1(XI) in Mineralization**

Anthony Hafez (Honors College)  
Department of Biological Sciences  
Faculty Sponsor: Dr. Julia Thom Oxford

Collagen type XI is a quantitatively minor yet essential component of the collagen fibrils within cartilage. It functions in the assembly of embryonic cartilage collagen fibrils as the diameter of cartilage collagen fibrils is dependent on the relative ratio
and microfibril structure of collagen types II and XI. However, very little is known about the role of collagen type XI in the formation of mineralized tissue. In this study, skeletal mineralization was evaluated in the absence and presence of collagen α1(XI) using the chondrodysplasia (cho) mouse. Skeletal deformities in the cho mouse indicate that collagen type XI acts in skeletal development distinct from its function in nucleating the formation and limiting the diameter of cartilage collagen fibrils. In this study, we quantified the differences in craniofacial bones between the cho and the wildtype mice to better understand the role of collagen type XI in mineralization. High-resolution three-dimensional models were created from x-ray microcomputed tomography images of the mandible, parietal, frontal, basioccipital, and exocciptal bones of cho and wildtype mice. Analysis revealed differences in bone density, size and microarchitecture. The differences in skeletal properties between these mice were quantified using geometric measurements and three-dimensional calculations of microarchitecture. Bone mineral density was increased in the absence of collagen α1(XI) in the parietal and frontal craniofacial bones, of the cho mouse. The increase in bone density correlated with observed differences in trabecular thickness, trabecular number, and trabecular separation. The craniofacial deformities observed include a shortened snout, abnormal frontal sinuses and decreased or absent mineralization in the mandible, parietal and frontal bones. These findings indicate a new function for collagen type XI in bone mineralization.

HEAT-SHOCK PROTEINS AS A TOOL FOR MEASURING STRESS IN AMERICAN KESTRELS (FALCO SPARVERIUS) NESTING ALONG A HUMAN DISTURBANCE GRADIENT

Christine Hayes and Erin Strasser
Department of Biological Sciences
Faculty Sponsor: Dr. Julie Heath and Dr. Juliette Tinker

Heat-shock proteins (HSPs, also known as stress proteins) are intracellular proteins that prevent cell and protein damage during periods of stress. HSPs have been employed as a measure of stress in a variety of organisms since their discovery in 1962, but their usefulness in field ornithology has only just recently begun to be explored. Human activity impact on wildlife (specifically stress caused by human disturbance) has become an increasingly relevant issue in conservation as human populations expand world-wide. We examined relationships among HSP concentration in blood cells (as a measure of stress), fitness measures (reproduction and physical condition), and human disturbance in American Kestrels. The study was conducted in southwest Idaho during the spring and summer of 2008. We collected blood from adult birds after eggs were laid and from nestlings just about to leave the nest (~23-25 days old). We also recorded measures of size and mass and the number of young produced per pair. Habitat for each nest was given one of three disturbance scores: high, medium, or low (based on human activity near the nest). Blood cells were assayed for total protein content per µl and HSPs per µl were measured by western blot analysis and Kodak Molecular Imaging Software. Results from this study have implications on whether human activities evoke a physiological stress response in breeding adult birds or developing young chicks.

ANTIBIOTIC RESISTANCE AND THE PENTAPEPTIDES: NOVEL ANTIBACTERIAL AGENTS FOR METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS

Matt Wolter
Department of Biological Sciences
Faculty Sponsor: Dr. Ken Cornell

Methicillin-resistant Staphylococcus aureus (MRSA) are strains of Staphylococcus aureus that are resistant to a large family of antibiotics called beta-lactams that include penicillins (e.g. oxacillin) and the cephalosporins. A 2007 report estimated that between 1995-2005 MRSA related hospitalizations more than doubled from 128,000 to 278,000. The purpose of this study was to examine the effectiveness of novel anti-Staphylococcal pentapeptides at inhibiting the growth of both S. aureus and MRSA through a standard growth assay, IC50 study, and Kirby-bauer testing. The results of this experiment demonstrated that certain pentapeptides showed antibacterial activity and increased the effectiveness of oxacillin for MRSA.
Purification of Novel Shiga Toxin Based Vaccine

Herbert Pollard IV
Department of Biological Sciences
Faculty Sponsor: Dr. Juliette Tinker

Many parts of the world go without effective vaccination programs because they lack the medical infrastructure to provide sterile environments for intravenous administration of vaccines. The construction and development of stable oral vaccines would greatly increase vaccination rates in parts of the world where sterile environments are not available, and would also represent a significant improvement in developed countries. However, mucosal vaccines require the presence of a “helper” substance, or adjuvant. The protein toxins expressed by a number of gram negative bacteria, including Shiga toxin (Stx) produced by enterohemorrhagic E. coli (EHEC) represent promising mucosal vaccine adjuvants. The purpose of this experiment is to purify a detoxified derivative of Shiga toxin that is a fusion, or chimera, of the toxin with a vaccine antigen of interest. These experiments have focused on the successful cloning of a 6x histidine tag to a plasmid containing the genes for the Stx A2/B genes. This construct will allow for rapid purification of novel toxin chimeras on nickel columns. We have used molecular techniques to successfully insert a 6x His tag into the Stx plasmid. The LcrV antigen from Yersinia pestis as well as a red fluorescent protein (RFP) will be cloned into this novel expression vector, creating chimeras of the StxA2/B subunits that can be purified using the 6x His tag and characterized as potential oral vaccines.

The Role of OSM in Breast Cancer Cell-Promoted Osteoclastogenesis

Farhad Mangal (Honors College)
Department of Biological Sciences
Faculty Sponsor: Dr. Cheryl Jorcyk

Oncostatin M (OSM) is a pleiotropic cytokine in the interleukin (IL)-6 superfamily that functions in the immune system cascade, inflammation, cell proliferation, and cell mobility. OSM has been shown to inhibit the proliferation of breast cancer cells in vitro and was previously evaluated as a potential cancer therapy. Evidence from the literature and our preliminary data; however, suggest that OSM may promote metastasis of breast cancer cells and stimulate the formation of bone metastases. We have shown that OSM induces expression of several proteins known to participate in bone metastasis including proteinases, cyclooxygenase-2 (COX2), and vascular endothelial growth factor (VEGF) in human breast cancer cell lines. OSM has been shown to be a signaling molecule for osteoblast-mediated osteoclast differentiation, or osteoclastogenesis. To test whether OSM is also important in breast tumor cell-mediated osteoclastogenesis, we will utilize 66c14 and 4T1.2 mouse mammary tumor cells in a coculture system. The tumor cells will be cocultured with mouse bone marrow cells containing osteoclast progenitor cells for 9 days. The cocultures will be stained for osteoclasts with tartrate resistant acid phosphatase (TRAP), and TRAP+ cells will be counted. We predict that OSM will stimulate the formation of osteoclasts and that inhibiting OSM may have a positive effect on osteolytic breast cancer metastases. To date there have been no therapies developed that inhibit OSM to reduce osteolytic burden.

Primary and Secondary Dormancy in Lomatium Dissectum Seeds

Jacklyn Donahue and Michelle Perez
Department of Biological Sciences
Faculty Sponsor: Dr. Marcelo Serpe

Lomatium dissectum (Apiaceae) is a perennial, herbaceous plant of wide distribution in Western North America. At the time of dispersal, L. dissectum seeds are dormant and have underdeveloped embryos. We investigated the environmental requirements for dormancy break and embryo growth. The embryos elongated between five and seven fold inside the seeds over several weeks of cold stratification. Embryo growth prior to and during germination occurred at temperatures between 3 and 6°C and was negligible at stratification temperatures of 0.5 and 9.1°C. Comparison of the cold stratification requirements of different seed populations indicates that seeds collected from moist habitats have longer cold stratification requirements than those from semiarid environments. Interruption of the cold stratification period by eight weeks of
dehydration decreased seed viability by about 30% and induced secondary dormancy in the remaining seeds. The requirements for dormancy break and germination reflect an adaptation to trigger germination in late winter.

**Influence of Biological Soil Crust and Litter on Bromus Tectorum Establishment Under Natural Conditions**

Tyler Osgood  
Department of Biological Sciences  
Faculty Sponsor: Dr. Marcelo Serpe

Previous experiments under growth chamber conditions indicated that a biological soil crust dominated by the moss *Bryum argenteum* decreased the establishment of the invasive weed *Bromus tectorum* (cheatgrass). We are presently studying whether a similar phenomenon occurs in a natural setting. For this purpose, we prepared trays with bare soil and soil covered with biological soil and distributed *B. tectorum* seeds over these surfaces. Furthermore, we covered half of the trays with *B. tectorum* litter to investigate the effect of the litter on seed germination and on the photosynthetic performance of the biological soil crust. The trays were placed at the Idaho Botanical Gardens during the summer of 2008. Shoot biomass of *B. tectorum* and chlorophyll fluorescence parameters of the biological soil crust were determined on samples collected on October 2008 and February 2009. Shoot biomass was about half on biological soil crust than on bare soil. In contrast, the presence of litter led to an increase in the biomass of *B. tectorum*. For the samples collected on October 2008, the Fv/Fm ratio of the crust determined by chlorophyll fluorescence was not affected by the presence of litter. However, prolonged exposure to litter lowered the photosynthetic efficiency of the crust. On February of 2009, the average Fv/Fm values of crust covered with litter and control crust were 0.36 and 0.76, respectively. We plan to make more measurements on May and July 2009 to ascertain the results observed and to analyze the effects of the treatments on the yield of *B. tectorum* seeds.

**Effect of Change in Precipitation Due to Climate Change on Soil Microbial Community Structure and Function**

Dollie Thompson, Patrick Sorensen, Matt Germino, and Lachy Ingram  
Department of Biological Sciences  
Faculty Sponsor: Dr. Kevin Feris

Global climate change has drawn the attention of the public and professionals, alike, due to a host of human health and environmental implications. Researchers have studied, and continue to study, a wide variety of environmental implications, including effects on ecosystems and biodiversity, sea level rise, agriculture, and precipitation. How microbial life on earth is affected by global climate change is not well understood. The following research proposal represents an attempt to better understand the affects of global climate change, particularly precipitation changes, on microbial diversity. The Idaho National Laboratory (INL) has maintained soil plots of variable soil types, precipitation conditions, and vegetation cover for more than 15 years. We sampled a subset of these plots that encompassed three different precipitation regimes (ambient, 2X summer, and 2X fall/spring), across two different plant communities (native sagebrush mix consisting of a variety of shrubs, grasses, and forbs and crested wheat grass monoculture), and at two different depths, 15-20 cm and 95-100 cm deep, all within the same soil type. Replicate samples were obtained from separate plots for each treatment to ensure sampling was representative of the microbial life present. We are utilizing terminal restriction fragment length polymorphism analysis (TRFLP) to analyze the soil microbial community composition to obtain insight into how global climate change, particularly altered precipitation patterns, impacts microbial diversity and plant-microbe interactions. This work is on-going and we expect to observe significant precipitation treatment effects in the shallow (i.e. 15-20 cm) samples and differences with respect to plant community type. These data will be evaluated along with a suite of other measures to assess how long-term alteration in precipitation patterns affects soil microbial community structure and function.
**Effects of TCDD on Proliferation of the UMR-106 Osteoblast Cell Line**

Shawna Dingillo  
Department of Biological Sciences  
Faculty Sponsor: Dr. Kristen Mitchell

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is an environmental toxicant that is produced as a byproduct of chemical manufacturing processes and the incineration of medical and municipal waste. TCDD exerts toxicity by binding to the aryl hydrocarbon receptor (AhR), which is a soluble, ligand activated transcription factor. Recent studies indicate that AhR activation modulates cell cycle progression in numerous cell types, including primary osteoblast cultures. The exact mechanism is unknown, but it is proposed that AhR activation alters gene transcription that leads to increased expression of p27Kip1, a protein that suppresses proliferation by inhibiting progression to S-phase of the cell cycle. We tested the hypothesis that exposure to TCDD suppresses proliferation of the rat osteosarcoma cell line, UMR-106, through upregulation of p27Kip1 protein. UMR-106 cells were plated and serum-starved for 24 hr to synchronize cells in G0/G1 phase of the cell cycle. Cells were then serum-released in the presence of 6 nM TCDD or DMSO control. Cells were collected after 24, 48, and 72 hours. Protein expression was analyzed by western blot, and cell viability was evaluated by alamar blue staining. Results indicate that neither proliferation nor p27Kip1 protein expression was altered by exposure to TCDD. This study suggests that the proliferation of this immortalized osteoblast cell line is not affected by TCDD. Moreover, the use of UMR-106 cells does not appear to be a suitable model system for studying mechanisms of AhR-mediated cell cycle control.

**Development of Bioluminescent Mammary Cancer Cells with Knocked Down Expression of OSM for Detection of Bone Metastasis IN VIVO**

Caleb Sutherland (McNair Scholar), Jeff Redshaw, and Ken Tawara  
Department of Biological Sciences  
Faculty Sponsor: Dr. Cheryl Jorcyk

Oncostatin M (OSM) is a multifunctional cytokine belonging to the interleukin (IL)-6 subfamily. OSM was originally recognized by its ability to decrease breast and other tumor cell proliferation in vitro. Based on data from our lab, we hypothesize that OSM is a mediator of breast cancer metastasis to bone. For our model system, we are utilizing two cell lines, 4T1.2 and 66c14, which were derived from the mammary carcinoma of a Balb/c mouse. 4T1.2 cells express medium levels of OSM and are highly metastatic to bone, lymph nodes, and lungs when injected into the mammary fat pad of Balb/c mice. 66c14 cells express low levels of OSM and demonstrate low levels of metastasis that is restricted to the lymph nodes and lungs. A small hairpin RNA (shRNA) to OSM was designed and stably transfected into the cells in order to decrease or ‘knock down’ OSM expression. Enzyme-linked immunosorbent assay (ELISA) was used to quantify levels of secreted OSM protein in both cell lines and confirm knocked down OSM expression. Normal 4T1.2 and 66c14 cells, as well as knockdown 4T1.2 and 66c14 cells, will be injected into the mammary fat pad of female Balb/c mice. To visualize metastasis to bone in vivo, the cell lines are currently being transfected with pGL4, a vector containing a bioluminescence maker called luciferase. The luciferase gene was isolated from the firefly and encodes an enzyme, which along with its substrate luciferin, can be used to image the cells expressing luciferase in vivo. Our aim is to determine whether tumor cell-produced OSM is necessary for breast cancer metastasis to bone by measuring metastasis in cells that have knocked...
down expression of OSM. If our results confirm our hypothesis, inhibiting OSM and its signaling may be a new target for treating breast cancer metastasis to bone.

**2,3,7,8-Tetrachlorodibenzo-p-dioxin Alters Interferon-Gamma Receptor and STAT-1 Levels in Mice**

Cheri Lamb  
Department of Biological Sciences  
Faculty Sponsor: Dr. Kristen Mitchell

The aryl hydrocarbon receptor (AhR) is a cytosolic ligand-activated transcription factor involved in developmental and physiological processes, including regulation of cell cycle progression. Exposure to the potent exogenous AhR agonist, 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), has been shown to inhibit hepatocyte proliferation in a mouse model of liver regeneration. AhR-mediated suppression of proliferation is attributed to the Cip/Kip family of proteins, which negatively regulate progression to S-phase of the cell cycle. One of these proteins, p21Cip1, appears to be required for the suppression of liver regeneration in mice treated with TCDD. P21Cip1 is a transcriptional target of signal transducers and activators of transcription (STAT)-1 activation, which is activated by interferon (IFN)-gamma, a cytokine that has been linked with attenuation of liver regeneration. The goal of this project was to test the hypothesis that AhR activation increases STAT-1 activation through the IFN-gamma receptor. Mice were pretreated with TCDD (20 ug/kg) or vehicle control (peanut oil) 24 hours prior to surgical partial hepatectomy (PH), in which 70% of the liver was surgically resected. Mice were euthanized 0, 12, 24, 36, 48 and 96 hours post-surgery. Livers were homogenized, immunoprecipitated with an anti-cyclin E antibody, and probed for ubiquitin by western blot. Whereas results from initial experiments proved inconclusive, additional studies are in progress using a modified protocol to detect ubiquitination. Enhanced ubiquitination of cyclin E in liver homogenates from TCDD-treated mice would support the hypothesis that TCDD increases cyclin E protein degradation in vivo. This would direct future studies toward examining mechanisms by which exposure to TCDD influences the ubiquitin-proteasome pathway during cell cycle progression.
**Ion-selective Electrode for the Voltammetric Determination of Trace, Aqueous Uranium Concentrations**

*Richard Cox*
Department of Chemistry and Biochemistry
Faculty Sponsor: Dr. Dale Russell

Current analytical techniques for the determination of uranium groundwater concentration require laboratory based methods or large, bulky, high-voltage equipment. A lightweight, inexpensive, rapid response method is desirable for applications that would include deployment in remote, hazardous, or inaccessible regions, and could include clandestine measurement. Described is a sensor that can be incorporated into a hand-held device with a sub-ppb detection limit and a four orders of magnitude dynamic range. The uranium selective macro-ligand, 4-sulfonic calix[6]arene, has been incorporated into a semi-conducting, poly(thiophene) film that has been electrochemically deposited on a conductive substrate. Voltammetric response was observed to be linearly proportional to the logarithm of the uranium concentration, and an increase in sensitivity for uranium was observed in the modified electrode compared to the unmodified platinum electrode. Furthermore, response to chemical interferences such as potassium ferricyanide and thorium(IV) was markedly decreased, while sensitivity remained consistent over a wide range of pHs. The detection limit was determined to be 0.1 ppb (3σ) with a linear dynamic range of 0.1-2000 ppb.

**Synthesis of Quinone-Substituted Aziridinomitosenes to Further Investigate the DNA-Binding Mechanism of Potential Anticancer Drugs**

*Thomas Oswald*
Department of Chemistry and Biochemistry
Faculty Sponsor: Dr. Don L. Warner

Aziridinomitosenes (AZMs) are compounds related to the clinically used anticancer agent mitomycin C (MC). MC elicits its cancer fighting properties by cross-linking DNA under reductive conditions. Cross-linking inhibits DNA replication which, in turn, prevents the proliferation of rapidly dividing cancer cells. While MC has a role in the treatment of certain cancers, its clinical use is limited due to significant host toxicity. Previously, we have shown that AZM analogs can form DNA adducts under non-reductive conditions. More specifically, quinone-unsubstituted AZMs can induce interstand cross-links (ICLs) and DNA/protein cross-links (DPCLs) via a novel and currently unknown mechanism. We propose a mechanism by which these cross-links occur, and where substitution at the quinone carbons plays an important role. If our proposed mechanism is correct, ICLs and DPCLs cannot form with quinone-substituted AZMs. We aim to further evaluate our proposed mechanism by preparing quinone-substituted AZMs via diastereoselective enolate alkylation of a chiral β-methyl ester or β-methyl lactone. We believe these quinone-substituted AZM analogs will be unable to form DNA cross-links. The results of these and related studies will serve to increase understanding of the DNA-binding mechanism by synthetic AZMs. This will, in turn, potentially lead to the development of compounds that are more potent and less toxic.

**Field Portable Sensor for Direct Detection of Mercury in Aqueous Media and in Crude Oil**

*Meagan Hecket*
Department of Chemistry and Biochemistry
Faculty Sponsor: Dr. Dale Russell

Field portable sensors are of increasing interest for a number of applications. We report an electrochemical sensor based on a semi conductive polymer derivatized to have selective binding sites for mercury. Covalent attachment of 1, 4, 10-trioxa-7, 13-diaza-cyclopentadecane, a ligand with high affinity for mercury, promotes coordination of mercury on the sensor surface thus preconcentrating it prior to detection by its redox signature. This sensor gives real time mercury concentrations with low detection limits and high selectivity. A detection limit of 10 parts per trillion with a dynamic range of four orders of magnitude has been demonstrated for aqueous mercury using this method. Preliminary results for direct detection of mercury in crude oil and in gas phase emissions will be reported.
**Synthesis of Fluorescently Labeled Aziridinomitosenes to Study the Cellular Fate of Potential Cancer Therapy Agents**

Matt Haga  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Don L. Warner*

Mitomycin C (MC) is a clinically administered cancer therapy agent that forms interstrand crosslinks with DNA, arresting cell replication. However, the utility of MC is limited by adverse side effects present in the course of treatment. Incentive towards an alternative drug with reduced side effects and increased potency has led to the synthesis of many analogous compounds. Among these analogs are a group of compounds called Aziridinomitosenes (AZMs) that are structurally similar to MC and may potentially offer significant improvements. We have proposed that AZMs possess a mechanistic advantage over MC which involves a nucleophilic attack to activate the molecule prior to DNA alkylation, whereas MC requires reductive activation. It is within the aims of this research to investigate the cytotoxicity of relevant AZMs in cancer cell lines. This includes experiments that investigate the cellular fate of AZMs using optical microscopy and fluorescent labels, explicitly focusing on DNA as the target. Synthesis of appropriate AZMs labeled with fluorescent tags is currently underway. The results of these studies will help clarify the mechanism for AZM DNA alkylation and the interactions of AZMs within human cancer cells.

**Investigation of the C10 Electrophilic Site in DNA Interstrand Cross-Linking by Synthetic Aziridinomitosenes**

Emma McInturff (Honors College) and Katherine McHail  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Don L. Warner*

Mitomycin C (MC), a quinone-containing cancer therapy agent, is biologically active by alkylating DNA. The crosslinks prevent translation and replication, therein destroying cancer cells. While useful for treating cancer, MC’s clinical utility is limited by its high toxicity. Synthetic aziridinomitosenes, compounds structurally similar to MC, have comparable effects on cancer cells, but by an unknown mechanism. A series of aziridinomitosenene analogs have been prepared to study role of the potential active sites on the molecule. Previously, significant differences in the efficacy of the aziridinomitosenes have been observed with a subtle addition of a methyl group to the C6 or C7 position. Two more analogs have been synthesized to complete the examination of active sites on the molecule, now with variation at the C10 position. DNA binding studies of these final analogs should contribute insight to the mechanism for crosslink formation.

**Initial Investigations into the Synthesis and Electrochemical Polymerization of Thiophene-Based Molecular-Imprinted Polymers for use as Benzene Sensor Electrodes**

Lisa Young (Honors College)  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Don L. Warner*

Benzene is a toxic and carcinogenic environmental pollutant that is a common product of industrial waste. Possible chemical sensors for such contaminants include molecular imprinted polymers (MIPs). These are formed by the electro-polymerization of monomers onto a metal surface, creating shape- and electrostatic-specific chemical pockets that attract the molecule of interest. When an electric potential is applied to the MIP in the presence of that molecule, a current is induced that correlates to pollutant concentration. The goal of this project is to synthesize and optimize an MIP that can detect and quantify benzene in natural samples. Various thiophene-based monomers containing a benzene template are being or have been synthesized, each corresponding to a separate future MIP that will differ in terms of conjugation and the size and electrostatic characteristics of the binding site. The sensitivity/selectivity of these MIPs will determine the best monomer and, ultimately, the optimal sensor design.
**Preparation of Zn(II) Complexes Containing N2S Donor Atom Sets**

*Christopher Aaron, Nicholas Spiropolus and Mallory Sullivan*

*Department of Chemistry and Biochemistry*

*Faculty Sponsor: Dr. Eric Brown*

The function of the metalloenzyme peptide deformylase (PDF) is to deformylate proteins that contain N-formylated methionine. Since this deformylation sequence is unique to prokaryotes, understanding the detailed mechanism of PDF may be important in the development of new antibiotics. In addition, further motivation for studying the mechanism comes from the unusual finding that the most active form of PDF is not a zinc-containing enzyme but instead an iron-containing enzyme. In order to explain the unusual metal dependency, we have prepared three new N2S ligands, which have been shown by X-ray crystallography to form mononuclear Zn(II) complexes. These N2S ligands model the cysteine and two histidine binding motif present in the active site of PDF but have unique features that are expected to result in mononuclear iron complexes. Details of the synthetic procedures, characterization data and reactivity of our Zn(II) complexes will be presented.

**Determining the Ability of Resveratrol to Inhibit HCBR Activity**

*Autumn White and Christopher K. Ewing*

*Department of Chemistry and Biochemistry*

*Faculty Sponsor: Dr. Henry A. Charlier*

HCBR1 is a NADPH dependent enzyme that catalyzes the reduction of carbonyl compounds to alcohol metabolite products. Anthracyclines drugs have been used since the 1960’s to treat aggressive cancers. They are known substrates of HCBR1 and when reduced cytotoxicity is significantly decreased and the alcohol metabolite products contribute to cardiotoxic side effects. Current research focuses on designing inhibitors to mediate these side effects and include research on biphenyl compounds. Resveratrol is a naturally occurring compound that is found in everyday foods such as berries and wine. Resveratrol is a biphenyl compound and has been found to inhibit HCBR1. We found resveratrol to have an IC50 value of 7 µM and a Kd value of 4 µM. These values suggest that this compound can bind HCBR1 with enough affinity to lead to enzyme inhibition and prevent carbonyl reduction of substrates by HCBR1. The fact that Resveratrol is a naturally occurring compound found in everyday foods may lead to an effect inhibitor without introducing further side effects during cancer treatments. (NIH Grant # P20 RR016454)

**Development of a Recombinant Protein Expression System for the Homogenous Production of Human Carbonyl Reductase**

*Eric Baggs*

*Department of Chemistry and Biochemistry*

*Faculty Sponsor: Dr. Henry A. Charlier*

Anthracyclines are a common and potent chemotherapy treatment for cancers of the lung, breast, uterus, and ovaries, as well as lymphomas and leukemias. One of the major side effects of anthracycline treatment however is the cumulative dose dependent cardiotoxicity. Studies suggest this cardiotoxicity is linked to the reduction of the side chain carbonyl found on this molecule. Human carbonyl reductase catalyzes the reduction of the carbonyl side chain of these molecules. This reduction leads to an anthracycline metabolite that has been linked to the development of the cardiotoxicity. Important to the ongoing studies is the development of a readily available source of human carbonyl enzyme. A clone of the gene that encodes for HCBR was used to create a gene construct that when expressed would lead to human carbonyl reductase with a 29 amino acid polyhistidine peptide attached. This poly histidine tail has a strong affinity for Ni2+ and as such provides a convenient means of purification using a single chromatography step. The resulting HCBR isolated by this method showed a decrease in catalytic activity from the native enzyme. It is believed that this interference is caused by the addition of this amino acid tail. The focus of my research currently is the shortening of this amino acid tail to include only a 6 amino acid polyhistidine peptide. It is believed that such a short peptide will not impair enzyme function. (NIH Grant # P20 RR016454)
**Improving Anthracycline Therapy Through Carbonyl Reductase Inhibition**

William Loome  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Henry A. Charlier*

Human Carbonyl Reductase (HCBR) is an enzyme responsible for converting a chemotherapeutic class of drugs known as anthracyclines into cardiotoxic metabolites while simultaneously reducing their chemotherapeutic efficacy. My research goal is to identify inhibitors of HCBR that may be of pharmacologic value by maintaining the chemotherapeutic properties of these drugs while reducing their cardiotoxicity; outcomes that may lead to dosage reductions during chemotherapy. The methodology involves evaluating chemical compounds for HCBR inhibition potential using a standard assay containing Menadione, NADPH, and HCBR in a phosphate buffer. All test experiments use UV spectrophotometry to determine reaction activity compared against controls. One HCBR inhibitor was identified which initially appeared promising particularly because of its appealing molecular structure that suggested it may be well received in humans. Subsequent IC-50 studies to determine effective inhibitory concentrations revealed questionable pharmacologic value. My research will continue to test other chemical compounds for possible HCBR inhibition. My research endeavors have provided a wonderful outlet for my curiosity and have helped solidify my understanding of bench research and its contribution in the learning process of disease and biological systems. (NIH Grant # P20 RR016454)

**Investigation of the Coenzyme Binding Mechanism of Carbonyl Reductase Using Fluorescence**

Konrad Billetz (Honors College)  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Henry A. Charlier*

Carbonyl reductase (CR) is a biological enzyme that may play a key role in mediating the cytotoxicity and cardiotoxicity of common anticancer drugs currently being administered. CR’s role in the human body is to reduce carbonyl-containing molecules to their respective alcohol in the presence of the coenzyme NADPH. One such group commonly used in treating cancer is the anthracyclines. Unfortunately, administering anthracyclines to patients is limited due to the cardiotoxic effects of its metabolites once processed by CR. A further understanding of CR could lead to drug development that minimizes the activity of CR thus increasing anthracycline-dependent cytotoxicity and limiting cardiotoxicity. Understanding the kinetic mechanism of CR is essential in this process. While previous research has focused on the kinetic mechanism as a whole, little work has been done to measure enzyme-coenzyme binding. Being so, determining the quantitative kinetic mechanism of CR binding NADP is of interest and can be done using a technique involving fluorescence. (NIH Grant # P20 RR016454)
**Prediction of the Structure of an Unknown Collagen Type IX-like Protein Using Homologous Computational Chemical Calculations**

*Christopher Hondros (Honors College)*  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Jeffrey Peloquin*

A functional homologue of the NC4 domain of Collagen type IX, referred to as Col11a1NTD, has been isolated and subjected to initial characterization. While a crystal structure of the NC4 domain is available, no such structure is available for Col11a1NTD. In order to determine if Col11a1NTD has a structure similar to that of the NC4 domain, we are using the computational chemical program AMBER to predict the structure of Col11a1NTD via a molecular dynamics calculation. Initial biochemical analysis of Col11a1NTD has predicted a number of amino acids forming two distinct zinc cation binding sites. These two putative binding sites will be evaluated to determine which site most likely represents the true binding site, functional under the physiological conditions of the cell surface. The results of this computational study will serve to refine the predictions from the biochemical studies and allow us to make hypotheses regarding structure and function that can be tested experimentally.

**Evaluation of MTA/SAH Nucleosidase Inhibitors as Potential Antibiotics for Lyme Disease**

*Jorge Martinez*  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Ken Cornell*

Drug development against bacterial pathogens lags behind the emergence of antibiotic resistance, creating an urgent need for the identification of physiological and metabolic target unique to pathogens. One such class of molecules is the MTA/SAH nucleosidases involved in purine and methionine salvage, polyamine synthesis and production of quorum sensing autoinducers. Nucleosidase inhibition should cause an accumulation of intracellular MTA and SAH that can selectively kill microbes or significantly diminish their growth within a host. Lyme disease causing Borrelia burgdorferi is a prevalent pathogen that produces three MTA/SAH nucleosidases; Pfs, Bgp and MtnN. We have determined the potency of four MTA/SAH nucleosidase inhibitors on Pfs and Bgp activity. We further employed structure-based modeling to evaluate the molecular basis of the functional activities of these inhibitors on Bgp and Pfs nucleosidases.

**Bithionol Sulfone as Potential Carbonyl Reductase Inhibitor**

*Landon Grange (Honors College)*  
*Department of Chemistry and Biochemistry*  
*Faculty Sponsor: Dr. Mike McCormick*

Carbonyl reductase catalyzes the NADPH-dependent reduction of a wide range of carbonyls. CR has been connected to several important processes including quinone detoxification, neuroprotection, prostaglandin metabolism, and anthracycline metabolism. CR reduction of anthracyclines negatively impacts their use in the treatment of cancer in two important ways: drug resistance and cardiotoxicity. Inhibition of CR in conjunction with anthracycline therapy offers the potential to increase the effectiveness of the drugs at lower doses, and to decrease the risk of cardiotoxicity. The goal is to better understand how CR recognizes the molecules to which it binds, be they substrates or inhibitors. With this information, drugs could be designed to control CR with the intention of reducing the risk of cardiotoxicity during anthracycline cancer treatment. Also, as the role of CR is better understood, it may have applications to other drug pathways as well. Currently the lab is testing out analogs of 4-benzoyl pyridine as potential carbonyl reductase inhibitors. The objective is to synthesize bithionol sulfone and then test this compound as a CR inhibitor. The results will further define the binding properties of the enzyme as well as investige new classes of molecules that potentially can serve as inhibitors.
FROM ATOMS TO MEMORY: CHARACTERIZATION OF CHALCOGENIDE GLASSES FOR USE IN ZERO-FIELD-SPLITTING BASED NON-VOLATILE MEMORY DEVICES

George Lyons (Honors College), Cliff Csizmar (Honors College), and Jamie Minick (Honors College)
Department of Chemistry and Biochemistry and Electrical and Computer Engineering
Faculty Sponsor: Dr. Jeff Peloquin and Dr. Kris Campbell

One of the problems with current computer memory DRAM devices is that when the power is removed the devices lose their information. Non-volatile memory devices based on FLASH technology are slow relative to DRAM and are therefore not suitable for use as a main memory. We have synthesized a number of transition metal doped chalcogenide glasses with the unique property their electronic transitions are split in the absence of a magnetic field. This splitting is called the Zero-Field-Splitting (ZFS). If the coordination environment or redox state of the transition metal is perturbed then its ZFS properties will also be perturbed. In this study, we report the results of electron paramagnetic resonance spectroscopic, Raman spectroscopic and differential scanning calorimetry experiments that characterize the magnetic, vibrational and thermal properties of the new glasses.

IDENTIFYING MARKERS OF HEAVY METAL CONTAMINATION IN IDAHO STREAMS: A SERVICE-LEARNING PROJECT IN BIOCHEMISTRY LAB

Daniel Quapp, Yesenia Hernandez, Emily Schmid, and Bryan Diebels
Department of Chemistry and Biochemistry
Faculty Sponsor: Dr. Ken Cornell and Dr. DeeAnn Force

The presence of heavy-metal resistance genes in stream bacteria is an indicator of environmental contamination. The mercuric reductase gene involved in conferring heavy metal resistance was found on a large plasmid isolated from organisms living in a Northern Idaho stream. The gene was identified using bioinformatics, and its function being proven in Biochemistry lab through a series of experiments to clone and express the gene, and characterize its enzyme activity. Additional outreach activities are designed to introduce this project to High School students through a series of demonstrations, and to underscore the problem of water pollution in Idaho streams.

EVIDENCE OF ANTIBIOTIC CONTAMINATION IN AN IDAHO STREAM: A SERVICE-LEARNING PROJECT IN BIOCHEMISTRY LAB

Emma McInturff (Honors College), Matt Haga, Caleb Southerland (McNair Scholar), and Brian Martin
Department of Chemistry and Biochemistry
Faculty Sponsor: Dr. Ken Cornell and Dr. DeeAnn Force

Bacteria isolated from a stream near Moscow, Idaho exhibited unexpected antibiotic resistance, indicating that the water was contaminated with agricultural waste. A plasmid isolated from the bacteria was sequenced and bioinformatic analysis of open reading frames (ORFs) suggested the presence of broad spectrum beta-lactamases, genes conveying antibiotic resistance. These genes of interest are being isolated, amplified, and over expressed to characterize their substrate specificity and activity. The presence of the plasmid may testify to the environmental impact of antibiotic overuse in industries, such as feedlots and fish hatcheries. Outreach presentations to High School students that emphasize the role of human activity on water quality are planned.
GOING GREEN AT BOISE STATE UNIVERSITY

Aubrey Johnston  
Department of Chemistry and Biochemistry  
Faculty Sponsor: Dr. Owen McDougal

The Idaho State Board of Education has sponsored Boise State University in their attempt to establish a “Green Team” with the mission of promoting sustainability on campus and throughout the greater community through stewardship, teaching, and outreach. The Department of Chemistry and Biochemistry implemented an organic laboratory curriculum, with financial support provided by the Technology Incentive Grant program, that minimizes exposure to and generation of chemical hazards, while at the same time, maximizing the use of state-of-the-art instrumentation. Four new laboratory experiments have been introduced into the organic curriculum that emphasize a “green theme” with several others incorporating state-of-the-art instrumentation including a chemical microwave, IR with ATR device, GC, GC-MS, and $^1$H/$^1$C NMR. The curriculum evolution to date includes the greening of traditional experiments to address the fundamental topics of chromatography, computational chemistry, distillation, and microscale setup.

AFFORDABLE ALTERNATIVE ENERGY AT THE COMMUNITY LEVEL

Mark Swartz  
Department of Chemistry and Biochemistry  
Faculty Sponsor: Dr. Owen McDougal

Biomass fuel briquettes offer an affordable, efficient, and renewable source of energy for home use. Shredded waste paper and biomaterials, which do not require the destruction of natural resources, serve as an excellent fuel source due to their availability, low cost, and favorable combustion properties. Chemical testing of briquettes for carcinogenic and hazardous emissions involves gaseous entrainment followed by soxlet extraction, gas chromatography separation, and polycyclic aromatic hydrocarbon (PAH) qualitative and quantitative analysis by mass spectrometry. Current studies are focused on optimizing the shape of the fuel briquettes to maximize heat output during combustion. The heat output of the briquettes is being compared to conventional fuel sources of firewood, wood pellets, and charcoal. Initial findings suggest that the biobriquettes have a comparable energy output versus conventional fuel sources and they have the potential to be molded in such a way that they produce safe levels of gaseous emissions.

RESISTANCE IS NOT FUTILE: COMPUTATIONAL DIRECTED DESIGN OF COMBATANT PENTAPEPTIDES

Reed Jacob and Matt Walters  
Department of Chemistry and Biochemistry  
Faculty Sponsor: Dr. Owen McDougal and Dr. Ken Cornell

The objective is to design novel antibiotics effective against methicillin-resistant Staphylococcus aureus (MRSA) using computer modeling and computational algorithms. Pentapeptide 128 when administered with oxacillin showed increase inhibition of penicillin binding protein 2a (PBP2a). Computer modeling was incited to explore the mechanism of action of the peptide. Autodock 4, a computer program that uses a Lamarckian Genetic Algorithm (LGA), was employed to predict free energy of binding between viable pentapeptides and PBP2a of MRSA. Pymol, a protein database (PDB) viewer, was used to visually record the results. Oxacillin, an antibiotic with a known binding affinity for MRSA, was used as a control for computational studies. Experimental evidence generated in the Cornell lab identified several pentapeptides that inhibited MRSA with efficacies ranges from 64.2 to 95.7%. Docking analysis of pentapeptide 128 (amino acid sequence: WCWKW) to PBP2a gave similar binding as oxacillin. An alternate binding site was discovered for oxacillin upon computer simulation of oxacillin and pentapeptide 128 concurrent binding. Pentapeptide 128 by itself is an inhibitor of MRSA to the same level of efficacy as oxacillin. Combined, oxacillin and peptide 128 seem to exhibit a synergistic mode of inhibition based on our in silico studies that can now be explored experimentally. The mechanism and a proposed role of pentapeptide 128 will be presented.
Numerical Methods for Thermal Convection with Applications to the Earth’s Mantle

Gregory Barnett
Department of Mathematics
Faculty Sponsor: Dr. Grady Wright

Thermal convection is a universal phenomenon in nature and has many geophysical applications such as cloud formation in the atmosphere, solar convection, and motion in the Earth’s mantle. In its simplest form, thermal convection consists of heating a layer of fluid from below, which makes the fluid “top heavy”. If the buoyancy force induced by this heating overcomes the viscous force of the fluid then instability occurs and convective motion of the fluid begins. This type of instability often produces interesting patterns as anyone who has seen a Lava Lamp™ knows. In this poster, we restrict our attention to a thermal convection model for the Earth’s mantle, which is commonly called mantle convection. We discuss two numerical methods that can be used for simulating mantle convection in a 2D rectangular box. The first is a finite-difference method based on classical second-order finite differences. The second can also be classified as a finite difference method, but is based on radial basis function approximations and is the first known application of this technique to simulating mantle convection. We also compare and contrast the stability, accuracy, and efficiency of the two techniques.

Dendrochronology and Climate Response in the Coral Pink Sand Dunes

Christiane Campbell
Department of Geosciences
Faculty Sponsor: Dr. David Wilkins

Because they record a tree’s response to climate variables, tree rings are useful in establishing and determining climate patterns beyond what is noted in historic records. Stands of ponderosa pine (Pinus ponderosa) are present in and around the Coral Pink Sand Dunes on the Colorado Plateau in southern Utah. Cores were collected from five trees on the cliffs overlooking the dunes, and the tree-rings were counted and visually cross-dated. Patterns visible in these cores are compared to the master tree-ring chronology from nearby Jacob Lake, Arizona and the reconstructed Palmer Drought Severity Index (PDSI) from the same region to determine if the dune field trees could be dated using the master chronology, or if a new chronology must be created. Most of the narrow rings on the cores correspond to narrow rings on the master chronology, within one or two years, suggesting a moderate regional correlation. Periods of drought (indicated by low PDSI values) in the mid-1500s, late-1660s, and 1880s are visible as segments of decreased ring width in the dune field cores. Measurements of the cores quantify the climate response correlation between trees in the Coral Pink and the Jacob Lake areas.

Soil Water Repellency and Ground Cover Effects on Runoff and Erosion in Response to Prescribed Burning of a Steeply Sloped Sagebrush Hill Slope

Andrew Weigel
Department of Geosciences
Faculty Sponsor: Dr. Jennifer Pierce

Rangeland managers and scientists are in need of predictive tools to accurately simulate post-fire hydrologic responses and provide hydrologic risk assessment. Rangeland hydrologic modeling has advanced in recent years; however, model advancements have largely been associated with data from gently-sloping sites and have not included the effects of soil water repellency on runoff generation. This study seeks to enhance current understanding of post-fire hydrologic responses on steeply-sloped sagebrush rangelands, specifically addressing the influences of soil water repellency and ground cover. The Northwest Watershed Research Center conducted small plot rainfall simulations on a sagebrush-dominated mountainous site in the Reynolds Creek Experimental Watershed in Southwest Idaho. Experiments were conducted immediately prior to and one year following prescribed burning of the site (2007 and 2008 respectively). Results indicate that soil water repellency was unaffected by burning. Burning resulted in increased runoff from shrub coppice microsites and decreased runoff from interspace microsites. Erosion increased dramatically on both microsites after burning.
INVESTIGATION OF LEAD ISOTOPE RATIO IN MINERALS FORM THE LEMHI PASS DISTRICT, IDAHO

Michelle Gordon  
Department of Geosciences  
Faculty Sponsor: Dr. Mark Schmitz

Lead (Pb) isotopic analysis was used to investigate the relationship between Early Paleozoic intrusive rocks and mineralized veins at the Lemhi Pass District, Idaho. The Lemhi Pass mineral district of the central Beaverhead Mountains (Idaho) comprises both early quartz-copper-gold vein mineralization and later thorium-rare earth element (REE) mineralization in the form of quartz-thorite-hematite veins, monazite-thorite-apatite-bearing shears and replacements with specularite, biotite and alkali feldspar. Little is known about the timing or provenance of ore mineralization, and thus there remain many untested hypotheses regarding the relationships between mineralization and regional deformation, magmatism and metamorphism. My objective was to test whether Early Paleozoic magmatic intrusives provided the source of mineralizing fluids, using the Pb isotopic ratios of the magmatic intrusive, mineralized veins, and associated wall-rock alteration minerals. Genetic associations between the intrusive and mineralized samples within certain suites are supported by some of the overlapping Pb signatures. Early Paleozoic magmatic intrusives show a linear trend of in $^{206}\text{Pb}/^{204}\text{Pb}$ versus $^{207}\text{Pb}/^{204}\text{Pb}$ isotope space, with a primary magma range of 17.6 to 19.6 $^{206}\text{Pb}/^{204}\text{Pb}$ and 15.6 to 15.9 $^{207}\text{Pb}/^{204}\text{Pb}$. Pristine magmatic compositions fall at the low end of this range, while syenites and granites with hematite vein and disseminated alteration fall at the high end. The sulfides follow a similar range of chemical compositions and tend to concentrate at the lower end near the primary magma range; however some sulfides extend to more radiogenic compositions. The lead isotope compositions of minerals associated with Th-REE-hematite veins extended to more radiogenic compositions ranging from 19.9 to 22.5 $^{206}\text{Pb}/^{204}\text{Pb}$ and 15.6 to 15.8 $^{207}\text{Pb}/^{204}\text{Pb}$. These observations are consistent with a model whereby Cu-Au sulfide mineralization is genetically associated with Early Paleozoic magmatism. Subsequent Th-REE mineralizing fluids with a radiogenic crustal Pb isotopic composition were responsible for alteration of hosting granitoids and remobilization of earlier Cu-Au sulfide mineralization.

SCANNING PROBE MICROSCOPY OF INTERFACIAL WATER CONFINED BETWEEN SILICA SURFACES

Edward Kim, Thanh Tran, and Luke Smith  
Department of Physics  
Faculty Sponsor: Dr. Byung Kim

Scanning probe microscope (SPM) techniques are employed to study the structure and mechanical properties of water confined between two silica surfaces. Water molecules adjacent to other materials, such as in the vicinity of biological cell membranes, rearrange to form “interfacial water.” The interfacial water behaves differently from bulk water to a substantial degree in its structure and mechanical properties. Probing the structure of interfacial water and its mechanical properties is crucial from understanding of the biomolecular functions to the micro-machine development. Even with such importance, however, the interfacial water is difficult to observe with ordinary analytic techniques because of its delicate nature near the surface. The SPM’s excellent distance and force control capability allows for investigating the interfacial water near the sample surface. A cantilever based optical interfacial force microscope (COIFM), a newly developed SPM technique at Boise State University, was used to probe the ordered structure of the interfacial water in the direction perpendicular to the surface. A Non-Contact (NC) AFM was used to image the arrangement of the interfacial water in the direction parallel to the surface. The COIFM and NC-AFM measurements were performed on silica surfaces, the most abundant substance on the earth’s crust, for various relative humidity. The COIFM data show periodic features as the tip approaches the surface, showing single water-layer ordering effect of the interfacial water. In each layered region, the force decreases nonlinearly as the gap decreases. The NC-AFM images show that some water bundles lay down and some stand up, supporting the COIFM data. The humidity dependent data shows how the structure of water evolves as the thickness of the water film.
changes from droplets to monolayers to multilayers on the silica surface. The origin of the observed structure of the interfacial water is discussed with a simple two-dimensional self-assembly theory.

**Intercalation Process of Acidic Ions into Graphite Atomic Steps Studied by Electrochemical-Scanning Tunneling Microscopy**

*Joey Hanson and Travis Reynolds*  
*Department of Physics*  
*Faculty Sponsor: Dr. Byung Kim*

Highly oriented pyrolitic graphite (HOPG) and perchloric acid (HClO₄) were adopted as a model host and a model guest, respectively, in graphite intercalation compounds. In this type of compound, the graphite layers of HOPG remain largely intact and the guest molecules of perchloric acid are located in between. We investigate the electrochemical anion intercalation process in the graphite layer by using cyclic voltammetry and electrochemical scanning tunneling microscopy (EC-STM) to understand the interaction between the host and the guest. The cyclic voltammetry data shows four peaks at the potentials of working electrode between 0V and 1.0 V with respect to the silver quasi reference electrode (Ag-Qref) in a 2M solution. The data suggests that the intercalation process has four different stages in which each stage compound has different ratio between the host layer and the guest ions. Every host layer is not necessarily occupied by guest ions between two graphite layers in the graphite intercalation compound. EC-STM was performed subsequently in the same electrochemical cell to obtain topographic information for each stage. The change of step height between two terraces of the HOPG surface supports this intercalation process. Further cyclic voltammetry measurements were performed over several potential scan cycles on the graphite surface as a function of the acid concentration from 0.1 M to 6 M with varying scan rates from 10 mV/s to 1000 mV/s to see the concentration dependence and the response time for the intercalation reaction. The cyclo-voltammetry and EC-STM data of gold (Au) sample in 0.05 M solution of sulfuric acid (H₂SO₄) will be discussed as a comparison system.

**Ultraviolet Raman Spectroscopy of Ferroelectric Thin Films and Superlattices**

*Paul Turner*  
*Department of Physics*  
*Faculty Sponsor: Dr. Dmitri A. Tenne*

Ferroelectrics are materials possessing a spontaneous and switchable electrical polarization, which are exploited for various electronic devices, such as non-volatile memories or tunable microwave devices. In recent years science and technology of ferroelectricity has been moving toward ferroelectrics at the nanoscale. Ultraviolet Raman spectroscopy is a useful tool for the study of wide-bandgap materials such as ferroelectric oxides. We have applied this technique to study nanoscale ferroelectric materials including BaTiO₃ ultrathin films and BaTiO₃/SrTiO₃ superlattice structures. We studied the effects of strain on the lattice vibrations and phase diagram of these materials. Using UV excitation we were able to study the effects of strain on a series of ultrathin BaTiO₃ films with layer thicknesses varied from 4 to 25 unit cells. We found that the ferroelectric phase transition varied as a function of film thickness in a very broad temperature range, from ~70 to over 900K. We have also studied the strain effect on phase diagram of BaTiO₃/SrTiO₃ superlattices that were grown on high quality rare earth scandate (GdScO₃, DyScO₃, SmScO₃, NdScO₃) substrates. Our Raman data indicated the presence of different ferroelectric phases with out-of-plane and in-plane components of polarization in superlattices, depending on strain and temperature.
**Using the Thickness of Pedogenic Carbonate Coatings as a Proxy for Ages of Alluvial Fan Abandonment in the Lost River Range of Eastern Idaho**

**Nick Sutfin, Warren Sharp, and Ken Pierce**  
*Department of Geosciences*  
*Faculty Sponsor: Dr. Jennifer Pierce*

Determining the age of abandonment of alluvial fan surfaces is crucial in relating fan development to past climate change or using fans as strain markers for neotectonic deformation. Cosmogenic surface exposure dating is not readily applicable to fan surfaces of the Lost River Range where large quartz-rich boulders are scarce, and loess has been deposited and eroded. Prior studies have shown, however, that the thickness of dense, laminated pedogenic carbonate pebble coats is useful for relative age and correlation of alluvial fans and moraines. Tributaries Northwest of Mackay, Idaho deliver limestone rich sediment from the Lost River Mountains to the Big Lost River before joining the Snake River south of Arco, Idaho. Numerical 230Th/U ages of pedogenic carbonate samples from trenches on abandoned and incised sheetflood dominated alluvial fans will date the time of fan-surface abandonment. Calcium carbonate coat thicknesses are most developed in the upper-most B-horizon but depositional periods mixed with longer periods of temporary abandonment may complicate the depth of maximum accumulation. Coating thicknesses as a function of depth were measured in soil profiles developed on Ramshorn and Upper Cedar Creek fan consisting of coarse sand to cobble size clasts overlain by loess. The CaCO3 coating thicknesses measured from six distinct zones within the subdivided B-horizon can be used to illustrate the zone of maximum calcium carbonate accumulation and the downward thinning of coats there after. Sites judged most stable will compare numerical ages with pedogenic carbonate coating thicknesses to create a soil chronosequence for the Lost River fans.

**Drainage Basin Influences on Alluvial Fan Processes in the Lost River Range, Idaho**

**Michael Poulos**  
*Department of Geosciences*  
*Faculty Sponsor: Dr. Jennifer Pierce*

The Lost River Range in central Idaho is characterized by many large (radius > 5 km) low angle (2-3 degree) alluvial fans developed across and beyond the ~140 km active Lost River normal fault (Crone et al., 1987). Stratigraphic exposures of fan sediments reveal these large fans are sheetflood-dominated (Patterson, 2006). Preliminary field observations indicate ~20-30 cm thick couplets of alternating ~5-15 cm and ~2-5 cm sub-angular, imbricated limestone-dominated clasts. Extensive sheetflood deposition on fan surfaces, however, is not occurring in modern times, and these fans are largely relict features. Optically Stimulated Luminescence (OSL) dating of fan deposits and U-series dating of pedogenic carbonates on fan surfaces is under way: preliminary and previous work suggests major intervals of sheetflood deposition ~15-180 ka. More recent debris-flow deposition on small-radius (<1 km), steep (8-17 degree), fans is confined to the mountain front (Patterson, 2006; Pierce and Scott, 1982). A fundamental question concerning alluvial fan evolution is determining what factors control depositional processes (e.g. sheetfloods or debris flows) on fan surfaces. While basin characteristics and fault activity (e.g. basin area and ruggedness) play a large role in fan development, preliminary observations suggest that Quaternary climate change punctuates the timing of depositional process through controls on sediment production, storage, and transport. We investigate the influence of basin characteristics on depositional processes in the Lost River Range through stratigraphic analysis of fan sediments and quantification of basin and fan characteristics including drainage basin area, fan slope, basin ruggedness, and sediment volumes. The results will be calibrated with ongoing geochronological studies (OSL and U-series) to assess how depositional processes have changed over time.


**Relationships Between the Timing of Snowmelt and Crop Production in Camas County, Idaho**

*Travis Kramer and Mel Kunkel*

*Department of Geosciences*

*Faculty Sponsor: Dr. Jennifer Pierce*

Snowmelt runoff is an important source of water for many snowmelt-dominated basins of the western United States. In the last several decades, warming temperatures in the western U.S. have lead to earlier spring runoff in snowmelt-driven watersheds. While earlier spring runoff has important implications for agriculture, the relationships between the timing of snowmelt and agricultural production have received little study. In Camas County of southwestern Idaho, snowmelt provides water needed for the initial germination of barley seed and for further barley growth. The specific timing for planting spring barley is critical. Early snowmelt requires earlier planting of seeds, but cool spring temperatures inhibit seed germination. When seeds do germinate, soils are dry which prevents or slows barley growth. This study uses dry-land barley yields from the Camas Prairie in Idaho due to the county's reliance on runoff (vs. irrigation), for agricultural use. In the mid-1960's in Camas county, the type of barley planted was switched between winter barley (planted ~1930 -1964) and spring barley (1965-2008). Barley yields in bushels per acre show a strong correlation with the timing of peak streamflow reconstructed from snowmelt records (Kunkel and Pierce in review). After 1965 (spring barley) early snowmelt is negatively correlated with bushels per acre of barley (Spearman's correlation r=0.5806, n=41, P<0.0001). Prior to 1965 (winter barley) early snowmelt is positively correlated with bushels per acre of barley. This study has important implications for how barley production and seed type may need to be modified in a warmer and possibly drier future.

**Mapping of the Bull Lake and Pinedale Glaciations in the Lost River Range, Idaho, Based on Carbonate Coat Thicknesses of Geomorphic Features**

*Benjamin McVeigh, Kenneth Pierce, and Warren Sharp*

*Department of Geosciences*

*Faculty Sponsor: Dr. Jennifer Pierce*

We are studying the relationship between climate change and pulses of alluvial fan aggradation during the Late Pleistocene in the northern Basin and Range. The Lost River Range and Valley are separated by the active Lost River normal fault, site of the 1983 Borah Peak earthquake, magnitude Ms7.3. The western front of the Lost River Range in eastern Idaho is marked by glaciated and non-glaciated valleys that drain onto mostly relict alluvial fan surfaces. Both glaciated and non-glaciated drainage basins of comparable size appear to produce similar large alluvial fan deposits during the last (late Pleistocene?) fan-depositing episode. Gaining a better understanding of the relationship between glacial advances and fan aggradation requires determining the extent and timing of glacial advances in the region. Carbonate coats on the underside of stones increase in thickness with stratigraphic age of fans and moraines, providing a tool for relative age determination and correlation. Ultimately, U/Th dating, generally of the innermost carbonate laminations will be carried out to provide numerical ages for coatings, thereby estimating the ages of landforms. Pinedale and Bull Lake(?) moraines have been identified, and carbonate coats have been sampled and measured, in the drainages of Willow Creek and Cedar Creek. Results from Willow Creek revealed mean thicknesses of 0.57 ± 0.31 mm for the possible Pinedale moraine, Cedar Creek revealed mean coat thicknesses for the Pinedale and Bull Lake(?) moraines to be 1.56 ± 0.24 mm and 3.83 ± 1.99 mm respectively. A third moraine was identified at Cedar Creek suggesting a possible intermediate glacial advancement between Pinedale and Bull Lake. Despite geographic proximity, the higher elevation forested site at Willow Creek may account for the thinner Pinedale carbonate coat thicknesses at this site as compared to Cedar Creek.
The purpose of the study is to identify the differentials that exist among salaries of tenure/tenure track faculty. We will show that there is little evidence of gender or racial bias and that the differentials are “explained” by comparison of rank and department. We will use the statistical tool of regression analysis to derive our results. This will involve extensive and imaginative use of dummy variables. No information will be shown that would reveal individual salaries.

**Turn Up the Heat: Integrating Boise State University into Boise’s Geothermal System**

Matthew Wiggs, Aaron Rueff, Zach Wilson, Jody Hilliard, and Meghann Harrod  
Department of Economics  
Faculty Sponsor: Dr. Samia Islam and Dr. Scott E. Lowe

The recent growth in the Treasure Valley has lead to a substantial increase in both residential and commercial construction. As a consequence, related heating and energy costs in the valley have also been rising. Concerns over global warming, together with the increases in fuel and energy costs, have sparked an interest in alternative energy sources. The Treasure Valley is unique in being naturally endowed with geothermal energy potential. Up until 2007, the city’s system was host to 58 customers heating almost 4 million square feet of space throughout downtown Boise. In 2007 the city of Boise completed its geothermal re-injection loop, which meant that an additional 50 million gallons of spent geothermal water will be recharging the aquifer system leading to the potential for more extensive use of geothermal technology. Our research will focus on the expansion of geothermal heating to Boise State University, a program for which federal funding was approved in 2007. Our analysis will include the initial construction, implementation and operation costs of geothermal pipes and furnaces necessary to expand the use of the resource. This analysis will draw on state energy programs, Idaho national laboratory studies, federal agency reports and studies to gather historical data and forecasts, as well as direct interviews with experienced professionals and users in the field. We believe that the study will provide further evidence of the potential for long term use of geothermal energy as an affordable heating alternative for our area.

**Rush-Hour Congestion: Are HOV Lanes the Answer?**

Chris Day, Edwin Ball, Robert Brannock, Colby Collins, and Robert Swajkoski  
Department of Economics  
Faculty Sponsor: Dr. Samia Islam

Rapid population growth in the Boise area tends to stretch the existing capacity of our roadways – especially, certain corridors - during rush hour. The section of highway on I-84 between Broadway and Caldwell sees increased amounts of traffic during peak driving hours. Our research will identify the causes of congestion and the subsequent impact of using HOV lanes during peak hours. Included in the analysis will be considerations such as the number of passengers required to access the HOV lane, times of operation of the HOV lane, and whether it would be beneficial to also use it as a toll lane. Data will be collected from previously published ACHD and Idaho Transportation Department reports and studies as well as other federal transportation agencies. We will also present data from comparable cities that have implemented HOV lanes. The expected outcome of this research is to show that HOV lanes could decrease travel time between the aforementioned Broadway and Caldwell exits during peak hours. A predicted decrease in negative externalities such as pollution, automobile accidents, and noise is also expected.
BOWN CROSSING: A CASE FOR MIXED-USE, HIGH DENSITY DEVELOPMENT IN BOISE

Justin French, Tom Wilcox, Allison Storck and Matt Vook
Department of Economics
Faculty Sponsor: Dr. Samia Islam

The city of Boise is rapidly growing and we believe that Boise can better accommodate this growth by utilizing mixed-use zoning. Our research will focus on the mixed-use community of Bown Crossing. Using this development as a template, we will conduct an analysis of the economic costs and benefits for the local residents and businesses. Due to the rising popularity of smart growth developments, we will examine the successes and failures of mixed-use developments in Boise. We will compare and contrast low density developments with high density mixed-use developments by focusing on factors such as traffic congestion, commute times, transportation and parking costs, tax revenue through increased or decreased consumer spending, as well as agglomeration effects. We expect to show that the benefits of mixed-use zoning outweigh the associated implementation costs.

POPULATION GROWTH AND CRIME RATES: THE CASE OF BOISE

Chris Robison, Joanna St. Clair, Kody Frederick, and Trevor Stebbins
Department of Economics
Faculty Sponsor: Dr. Samia Islam

As the global population continues to grow, more and more people are moving into urban areas. This rise in urban density is leading to rising crime rates in many of the world's metropolitan areas, although research shows that there is a high degree of cross-city variance of crime rates across U.S. urban areas. The Boise City-Nampa area has been one of the fastest growing metropolitan areas in the United States given the high quality of life and business opportunities that the Treasure Valley has to offer. Even with substantial population growth, the Boise area has seen a decline in crime rates over the past ten years. Our group will be examining the infrastructure and resources that Boise has utilized over the past ten years, compared to cities of similar size that have not had as positive an experience to determine the factors that have led to the decline in Boise’s crime rate. We will also be analyzing future needs and demands of the Boise area that could be crucial in maintaining Boise’s low crime profile.

LEARNING OUTCOMES AND ELECTRONIC TEXTBOOKS

Amanda Morrison
Department of Economics
Faculty Sponsor: Dr. Scott Lowe

The increased availability of distance learning and of electronic media in the classroom has increased the presence of electronic textbooks (e-texts) on the market. These textbooks are often offered at a reduced rate to the student and offer additional functionality, including advanced search features, practice problems and on-line tutorials. The additional functionality provided by many e-texts may allow e-text users to spend less time in achieving similar learning outcomes than their hard-bound textbook-using cohort. In answering this hypothesis, we hope to address the following questions: Do students make use of the additional e-text options, above and beyond what students with a hard-copy text would? Does the availability of an e-text increase the time that students spend studying course material and preparing for exams? If not, are students able to achieve the outcomes while spending less time preparing? Does the use of an e-text improve student recognition and comprehension of the key theories and tools in microeconomics? Does the use of an e-text improve the students’ ability to apply and synthesize microeconomic theory and to apply it to problems not directly addressed in the class? Does prior experience with e-texts aid the potential improvement in learning outcomes?
COLLEGE OF BUSINESS AND ECONOMICS POSTER PRESENTATIONS

IMPACT OF AIR QUALITY REGULATIONS ON ENTREPRENEURIAL ACTIVITY

Kyler James
Department of Economics
Faculty Sponsor: Dr. Scott Lowe and Dr. Samia Islam

The objective of this research is to examine the impact of Federal National Ambient Air Quality Standards (NAAQS) non-attainment status on the entrepreneurial activity in a metropolitan statistical area (MSA). Most of the existing research on the relationship between non-attainment and the financial robustness of areas focuses on the big polluters (e.g., plastics, organic chemicals, steel smelting and refining, etc.), and examines how many of the big polluters failed or relocated, measured by the change in the number of plants/firms when an area moved from attainment to non-attainment. Our paper will use a 317 MSA panel data set over the 1989-2003 timeframe, to address the question more comprehensively by looking at all industries, not just a targeted few polluters. Controlling for other time-variant confounding effects, such as population growth, per-capita income, tax rate changes, minimum wage rates, energy costs, regional inflation measures, and spatial phenomena (such as, natural disasters) we isolate the effect of non-attainment status on large polluters as well as the linkage industries. We show that if an area is designated non-attainment status in a particular year, it leads to a decline in the total number of business starts in the MSA in the following year. We also determine whether the impact of non-attainment varies across businesses of different sizes.

CLIMATE VARIABILITY AND WATER INFRASTRUCTURE: HISTORICAL EXPERIENCE IN THE WESTERN UNITED STATES

Craig Marley
Department of Economics
Faculty Sponsor: Dr. Scott Lowe and Dr. Zeynep Hansen

Greater historical perspective will enlighten current debate about future human responses to higher temperatures and increased precipitation variation. Agriculture is particularly vulnerable. In the literature on climate change and agriculture the empirical results are often mixed, with estimates of nonlinearities in key commodity yields beyond threshold temperatures; findings of higher profitability for US agriculture; and reports of high adjustment costs. These studies generally rely upon contemporary data. Yet, the expansion of agriculture across North America in the 19th and 20th centuries encountered greater climatic variation than is predicted from current climate change models. Accordingly, analysis of how those conditions were addressed and the impact on crop mixes and production can provide valuable information for addressing current climate variability. This study adds to the literature on adaption to climate shocks.

AN EXAMINATION OF BOISE’S RELATIVE COST OF LIVING

Brian Wood, Ben Stoddard, Kai Applequist, John Taitingfong, and Chris Dolye
Department of Economics
Faculty Sponsor: Dr. Samia Islam

It is a commonly held belief of many Idahoans that the cost of living in Boise is much lower than in other metropolitan areas in the country. Our purpose is to test this hypothesis and evaluate its accuracy. In addition to the analysis of the cost of living in Boise compared to other metropolitan areas, we will reconcile the differences in the costs of living with quality of life measures to ascertain the effect of local area amenities. We will compare Boise to several cities across the United States based on the ACCRA cost of living index which measures differences in expenditures on grocery items, housing, utilities, transportation, health care, and miscellaneous goods and services. We will also use additional data obtained from the most recent U.S. census, U.S. Bureau of Labor and Statistics and American Statistical Association, among other sources. With a simple econometric model, we will show that cost of living is correlated with quality of life indicators. We also expect to find that the cost of living in Boise is lower than larger cities, but may not be lower than cities of a similar size.
**Relationship Building with Students at the Elementary and Intermediate Levels**

Holly Tuft  
*Department of Curriculum, Instruction and Foundational Studies*  
*Faculty Sponsor: Dr. Jennifer Snow*

By doing this study I am interested in finding out how teachers build positive, successful relationships with their students at the elementary and junior high levels and the similarities and differences between how relationships are built at those levels. I would also like to find out what effects positive, successful relationships have on the students. I plan on finding out this information by observing teachers at both levels in their classrooms interacting with their students and interviewing the teachers I observe. I also plan to do this by distributing a survey to the teachers on how they build relationships with their students. To find out how these relationships affect students I will read several professional journals. I will then collect the data, organize and analyze it and report my final findings at the undergraduate fair.

**“How Can Parents Help to Reinforce What Their Child is Learning in School?”**

Angela Bond  
*Department of Curriculum, Instruction and Foundational Studies*  
*Faculty Sponsor: Dr. Jennifer Snow*

The purpose of this study is to discover and share multiple ways that parents can reinforce what their child is learning in school. This study will include three anonymous surveys, one for the parents, one for the students, and one for the teachers. The surveys will ask the participant to answer questions pertaining to ways to help students at home with subjects and skills learned in school.

**How Does Television Affect Student Achievement?**

Michelle LaRocque  
*Department of Curriculum, Instruction and Foundational Studies*  
*Faculty Sponsor: Dr. Jennifer Snow*

The purpose of this research project is to find how television influences student achievement, specifically overall grades. I will be noting how long students watch television and the types of shows they prefer to watch. This study will include a television log and an interview of a child. The television log will be done at home. Each day, the students will be expected to record what television shows they watch and for how long. This log will take one week to complete. After logs have been turned in, I will be interviewing students about their television rules and habits. I will then analyze the data collected and compare it to each child’s overall grade in the classroom. This will allow me to see if there is a correlation between television (how much and the types of shows being watched) and achievement.

**How Does Classroom Seating Affect Elementary Classroom Learning Environment?**

Tara Harsin  
*Department of Curriculum, Instruction and Foundational Studies*  
*Faculty Sponsor: Dr. Jennifer Snow*

The purpose of the research is to gain an understanding of classroom seating arrangements and how they affect the learning environment for students. The research I will conduct will include an anonymous survey asking intermediate grade students to either explain or illustrate their preferred seating arrangement as well as the style of learner they believe they are. From this information teachers can consider effective seating arrangements for all students to help maximize learning in the classroom.
GEOMETRY IN FIRST GRADE: BUILDING A RESEARCH-BASED UNIT

Charlotte Smith  
Department of Curriculum, Instruction and Foundational Studies  
Faculty Sponsor: Dr. Jonathon Brendefur

My research project was to design a research based unit for a first grade class, teach it, and compare the pretests with the posttests. When I started designing the unit, I chose to focus on the geometric figures performance standards from the Meridian School District standard-based report card for first grade. The standards are:

- Recognize and name 2D and 3D shapes (triangle, rectangle, square, circle, cone, cube, cylinder)
- Compare and describe attributes of 2D and 3D shapes (e.g. angles, number of faces, 2D, 3D)
- Sort and classify 2D and 3D shapes by more than one attribute, then describe the attribute used (“How are they the same? How are they different?”)
- Build and draw 2D and 3D shapes (triangle, rectangle, square, circle, cone, cube, cylinder)

This unit focused on the four 2D figures specified. I designed an introductory lesson, a lesson focused on each shape and a concluding lesson. In my lessons, I planned on having the students do all the things mentioned in the standards. My pretest and posttest were designed to assess the standards. The research suggests that “Children exhibit various types of misconceptions, such as undergeneralization, which can occur because they include irrelevant characteristics; overgeneralization, which can occur because some key properties are omitted; and language-related misconceptions” (Fuys and Liebov, 1997, p. 248). All of these misconceptions are related; essentially students do not fully understand a concept and the vocabulary that goes with it. One important idea I found is that it is important to use multiple examples and non-examples of concepts in many contexts. I tried to do this throughout the unit.

My main objective was for the students to be able to identify, build, draw, and describe our four basic shapes. To do this, we talked about the attributes of each shape, often informally, and how they compared to other shapes. We then used the attributes we had found to identify, build and draw them. Research has also found that students go through different levels of understanding of shapes. Most of the students in the first grade class were likely at the visual level—they identify shapes according to their appearance (Clements and Sarama, 2000, p. 482). I was trying to push them to a more descriptive level—they recognize and can characterize shapes by their properties (Ibid.). I found that the majority of the students in the class increased their scores from the pretest to the posttest. They clearly had a better understanding of geometric shapes and were able to analyze shapes for similarities and differences.

TECHNOLOGY IN THE CLASSROOM: THE FUTURE IS NOW!

Cory Gaskell  
Department of Curriculum, Instruction and Foundational Studies  
Faculty Sponsor: Dr. Jennifer Snow

With the 21st century upon us, technology is at the forefront of almost every aspect of the way we live. Today’s technology means the future is now for classroom teachers! More and more schools are becoming equipped with the latest in teaching technologies. My goal is to research the kinds of technologies teachers are using in their own classrooms on a day to day basis. I want to learn what kind of technology has been the best teaching tool for them and how they learned how to use it. I also want to look at any negative aspects of classroom technology the teachers have experienced. Lastly, my research is going to measure any need or interest in further educational technology education for today’s teacher.
HOW SHOULD A FIRST YEAR TEACHER DEVELOP A HOMEWORK POLICY?

Danielle Byrne  
Department of Curriculum, Instruction and Foundational Studies  
Faculty Sponsor: Dr. Jennifer Snow

The purpose of this research is to survey a group of teachers in one elementary school to see how they have come to develop a homework policy when none exists within the district. Since there currently is research in the field of education that both supports giving homework and not giving homework, this research will provide essential information to future first year teachers when faced with this dilemma.

ENERGY DRINK CONSUMPTION AMONG BOISE STATE UNIVERSITY STUDENTS

Koree Hawkes, Jen Ambrose, Liz Burlo, and Danielle Roskelley  
Departments of Kinesiology and Community and Environmental Health  
Faculty Sponsor: Dr. Elaine Long

The purpose of this exploratory study was to study energy drink consumption among Boise State University students. A convenience sample of 106 participants was recruited from the Boise State University student population. Surveys were administered in a classroom setting during October 2008 with instructor permission. Participation was voluntary, and each participant was given the option to decline or withdraw from the survey. After agreeing to participate in the survey, students were given a paper questionnaire. An incentive was offered for participation. Students were instructed to complete the survey to the best of their abilities, leaving any questions blank they did not feel comfortable answering. Once the surveys were complete, the survey administrator collected the surveys and placed them in an envelope for submission and data analysis. Students were able to select from the five top reasons found in the literature for energy drink consumption in this age group. The primary reason that college students reported consuming energy drinks was to mix with alcohol, with 37.7% of respondents noting this reason. The second most common reason was to stay awake while studying (35.8% of participants). 36.8% of participants reported drinking at least one energy drink per month. 26.4% of participants reported never drinking energy drinks. 2.8% reported drinking at least one energy drink per day. The most commonly perceived side effect reported by energy drink consumers was the “jolt” (increased energy or alertness) with 53.8% of participants noting this effect. All other effects, mostly considered negative (crash, jitters, racing heart), were reported by over 20% of participants.

This study was approved by the Boise State Human Subjects Research and Institutional Review Board #193-09-021.

INGREDIENTS IN ENERGY DRINKS: A DESCRIPTIVE STUDY

Shay Yost, Whitney Crum, Katie Derden, Jessica Holland, Darcy Jensen, Rebecca Mckelvey, and Juli Scott  
Departments of Kinesiology and Community and Environmental Health  
Faculty Sponsor: Dr. Elaine Long

In the year 2006 over 500 new energy drink brands were put on the market and over 7 million adolescents reported consuming energy drinks (Meadows-Oliver & Ryan-Krause 2007). Estimates of consumer spending on energy drinks in 2008 exceeded $744 million dollars (International Food Information Council). Consumers often perceive energy drinks as healthy without knowledge of the amounts of ingredients in these beverages. Caffeine and sugar are the prominent ingredients found in many energy drinks but other substances such as riboflavin, pyridoxine, nicotinamide, taurine, and various herbal derivatives are also present (Aranda & Morlock, 2006). Due to the growing popularity of energy drinks, we investigated the ingredients found in popular energy drinks sold in the Treasure Valley. Our methodology included on-site data collection at grocery and convenience stores during October and November 2008. Ingredient data was also obtained from manufacturers’ websites. Our research breaks down the ingredients, calories, and vitamins found in energy drinks, therefore helping consumers make an educated decision before consuming these popular beverages.
Energy Drink Consumption by Boise State University Students: An Exploratory Study to Determine Reasons and Patterns of Intake

Chelsea Stone, Daesha Crowley, Kimberly Matulonis, Chalese Riley, and Tegan Rawlings (Honors College)  
Department of Kinesiology and Community and Environmental Health  
Faculty Sponsor: Dr. Elaine Long

Energy drinks are defined as beverages which typically contain caffeine, taurine and vitamin(s) and may contain an energy source (e.g. carbohydrate) and/or other substance(s), marketed for the specific purpose of providing real or perceived enhanced physiological and/or performance effects (Finnegan). The consumption of these drinks to stimulate and arouse the mind is increasing among individuals in the 18-25 year age group. More than 200 new energy drinks were introduced between July 2006 and August 2007, with many of them endorsed or formulated specifically for certain populations, including athletes. Hooters and NASCAR are two examples of the partnerships that have been created to boost energy drink sales (Zegler 2007). Published studies have reported that a significant number of college students consume energy drinks. Some of the more common reasons for consuming energy drinks in this age group include: to stay awake when studying, working or driving; to mix with alcohol; as a refreshing beverage; and for athletic performance (Malinauskas et al 2007 & Fierra 2006). This study was undertaken to compare reasons for intake of energy drinks by Boise State University students to published studies. In addition, this study explored the relationships between intake of energy drinks, gender, age, credit load taken, and activities, such as exercise, work, studying or consumption of alcohol to determine if there were significant consumption patterns.

This study was approved by the Boise State Human Subjects Research and Institutional Review Board #193-09-023.
Eagle Interchange Improvements

Mallory Miller, Noah Hornsby, Brad Williams, Thomas Brannan, Davey Jensen, and Rajesh Shrestha
Department of Civil Engineering
Faculty Sponsor: Dr. Molly Gribb

This is a senior design project for the Eagle interchange located along I-84 in Meridian, Idaho. Currently, it is one of the most heavily used interchanges in the state with average daily traffic volume of 17,000 vehicles. The traffic flow along this interchange is expected to grow to 25,000 vehicles per day by 2030. To satisfy this increase in volume, an innovative diverging diamond interchange has been selected to meet Idaho Transportation Department design standards for safety and minimal delay. Our project consists of components from each of the following areas of Civil Engineering: geotechnical (foundation design), environmental (permitting and storm water drainage), transportation (road design to meet Level-of-Service D and safe passage of bicyclists and pedestrians), and structural (bridge renovation). Upon completion, the design of Eagle Road will be capable of accommodating 2030 traffic volumes at an appropriate level of service.

Meridian Interchange

Jason Klose, Jake Hassard, Brandon Anderson, Mitch Aiton, Sarah Klevmoen, and Amber Kenneda
Department of Civil Engineering
Faculty Sponsor: Dr. Molly Gribb

Interchanges from Five Mile Road in Boise to the Karcher Interchange in Nampa are being redesigned to help meet the area’s growing population and reduce congestion on the interstate. This senior design project is for the redesign of the I-84 Interchange at Meridian Road. Meridian Road will be expanded to six lanes and the Interstate will be expanded to eight lanes. A Single-Point Urban Interchange (SPUI) was determined to be the most feasible option available that will be able to handle the current and future levels of traffic through the year 2050. The project will include turning lanes, bike lanes across the overpass, and breakdown lanes on the highway designed to meet existing and future traffic needs. Our project also included analysis of geotechnical engineering reports, an environmental assessment, evaluation of existing and future traffic volumes, management of storm water drainage for the site and a preliminary cost analysis.

Calibration and Field Sample Collection Using an Ion Mobility Spectrometer for Detection and Analysis of Subsurface Volatile Organic Compounds

Ashley Zumwalt
Department of Civil Engineering
Faculty Sponsor: Dr. Molly Gribb

An ion mobility spectrometer (IMS) is capable of detecting gaseous volatile organic compounds (VOCs) from a chemically composite environment. An IMS system measures the drift time of ions traveling against a counter-flowing neutral drift gas within an electric field and at ambient pressure. IMS has been successfully implemented in airports and government projects for real-time detection of drugs, explosives, and chemical warfare agents. The focus of our research is to apply ion mobility spectrometry to identifying and quantifying harmful VOCs that contaminate subsurface soils. An IMS probe system designed for real-time, subsurface soil-gas sampling applications is presented. The system is encased in a 51-mm outside diameter stainless steel probe housing which includes a compact IMS sensor (at the heart of the probe), a sampling module, a signal amplifier, and high voltage system to sustain IMS performance. A heated gas chromatography (GC) column has been added to the IMS system for additional separation of compounds during the extraction of complex samples. To ensure accurate VOC detection and quantification, calibration curves were created for the BTEX compounds (benzene, toluene, ethyl benzene, xylene) of known concentrations in the laboratory. These curves were used to quantify results from IMS sample spectra collected from a BTEX contaminated site. The results indicate that the IMS can be successfully used for the identification and quantification of BTEX under field conditions.
**DESIGN OF FRANKLIN BOULEVARD INTERCHANGE**

*Cory Wills, Ben Seely, Judy Scheurman, David Montgomery, and Patrick Swann*

*Department of Civil Engineering*

*Faculty Sponsor: Dr. Molly Gribb*

Our team, W3SM Engineering, is a group of senior-level civil engineering students tasked with the design of the Franklin Boulevard Interchange in Canyon County, Idaho. Population growth in the Treasure Valley has begun to stress traffic flow conditions for I-84 and its interchanges, creating need for new interchange design. Our efforts will be directed to increase capacity and make driving conditions safer, while remaining environmentally and commercially friendly. Current ramp traffic flow peaks at 630 vehicles per hour (vph), and is expected to rise to 1,892 vph by the year 2030. Additionally, the overpass span must be lengthened to support six total interstate lanes, increased from four. Using principles of transportation, structural, geotechnical and environmental engineering, we will redesign the interchange on/off ramps, bridge, and traffic control to accommodate our community’s growing needs.

**NORTHSIDE BOULEVARD INTERCHANGE IMPROVEMENTS, NAMPA, IDAHO**

*Mike Russell, Herb McDowell, Jake Timmons, Lionel Starchman, and Chris Barker*

*Department of Civil Engineering*

*Faculty Sponsor: Dr. Molly Gribb*

The Northside Boulevard Interchange serves the western Treasure Valley by providing interstate access to downtown Nampa, various agricultural and industrial zones, and a growing volume of commuter traffic. Interstate 84 is undergoing lane expansion projects to facilitate future traffic demands throughout the greater Treasure Valley. The expansion of the interstate corridor necessitates the following improvements to the Northside Boulevard Interchange: 1) the redesign and rebuilding of existing interstate overpass bridges to accommodate the interstate expansion, 2) the realignment and addition of lanes to existing on-ramps and off-ramps, 3) the addition of one lane to Northside Boulevard, for a total of six lanes, and 4) the redesign of existing intersections of Northside Boulevard and the interstate on-ramps and off-ramps. To meet the required levels of service D for design year 2030, capacity analyses were performed for all components of the interchange. A system was designed to collect and store stormwater resulting from these interchange improvements. The new bridges and appurtenant foundation and subsurface design were designed to adequately service the interchange and interchange components through 2030.

**PRAIRIE SUN SUBDIVISION**

*Andy Elliott, Cory Brown, Nihan Darnall, Mohamed Oudrhiri, and Derrick Suarez*

*Department of Civil Engineering*

*Faculty Sponsor: Dr. Molly Gribb*

This senior design project is for the design of the Prairie Sun Subdivision, located in rural Elmore County, Idaho, to the northeast of Mountain Home near the intersection of Ditto Creek Road and Squaw Creek Road. The project site covers an area of 181 acres and consists of nearly 80 residential lots ranging from 1.5 to 2.5 acres. The twenty-six acres of common area includes a two-story clubhouse with full amenities as well as an area for social gatherings, a pool and an exercise room. The subdivision is accessible by a network of on-street and off-street bicycle pathways and horse trails that border the subdivision boundary, meander through the common lots, and provide access to adjacent Bureau of Land Management lands. Since public water and sewer utilities do not exist in close proximity to the subdivision, the design includes a public well, an emergency water storage tank for fire protection and domestic supply, and individual, lot-specific septic systems. Prairie Sun Subdivision provides a picturesque setting of hills and open spaces while the long, curving, landscaped parkway sets a pleasant and memorable tone for the residents and guests entering and leaving the community.
Idaho State Highway 21 Five Mile Creek Fish Passage Project

Kira Christensen, Geo Engberson, Lucas Glauser, Waymon Ho, Ben Taylor, and Ryan Van Leuven
Department of Civil Engineering
Faculty Sponsor: Dr. Molly Gribb

This senior design project is the evaluation and design of a replacement for a culvert on Five Mile Creek, near Lowman in central Idaho, which has been identified as a barrier to safe passage of endangered fish. Near the confluence of Five Mile Creek and the South Fork of the Payette River, the 72” diameter culvert has been identified as a barrier to fish passage, specifically for bull trout and red branded trout, by the Federal Fish Passage Coordination Group (FFPCG). The culvert has an excessive gradient which creates a velocity too large for fish to swim against. Design includes consideration of a bridge or larger culvert, costs, environmental impact analysis, structural and geotechnical design parameters, traffic control planning and hydraulic analysis of the creek. Structural and geotechnical considerations include a bridge design to span the creek, meeting the Association of State Highway and Transportation Officials (ASHTO) loading requirements, and foundation design that does not exceed soil bearing capacity. Plans will also be provided for rehabilitating the creek bed below the new passage structure to simulate natural conditions.

Long Term Water Quality in a Commercial Office Building

Laura McNinch, Jesse Dillon, and Ashley Zumwalt
Department of Civil Engineering
Faculty Sponsor: Dr. Sondra M. Miller

Reuse of urban wastewater has been recognized as a means to potentially alleviate water shortage problems. Despite the high potential for the reclamation of urban wastewater, few countries have implemented processes to utilize this resource. The Banner Bank Building in downtown Boise, Idaho is an eleven-story commercial office building which has been awarded platinum status by the U.S. Green Building Council under its Leadership in Energy and Environmental Design (LEED) Green Building Rating System. A key reason for this recognition is the innovative implementation of an on-site water reuse system, which treats storm water and grey water for reuse in lavatories in lieu of potable drinking water. This water reuse system has aided in reducing the building’s consumption of treated potable water by 60% to 80% compared to office buildings of similar size and use. We have been granted access to the reuse system, its plans and schematics, system design, and points-of-use for the purpose of sampling and analyzing water quality within the reuse system. The goal was to evaluate water quality of the reuse system in comparison to U.S. Environmental Protection Agency (U.S. EPA) primary and secondary drinking water standards. For example, turbidity met primary drinking standards in 88.6% of the samples analyzed. Here, we discuss the results of our nine month sampling and recommend possible system upgrades to provide further utility of urban wastewater reuse.

Assessing Streamflows in the Big Wood River Watershed

Benjamin Seely
Department of Civil Engineering
Faculty Sponsor: Dr. Venkataramana Sridhar

The Big Wood River is located in south central Idaho. This river is also a tributary to the Snake River and vital to the local tourism industry, attracting hundreds of anglers each year. Also, the flows in the watershed is important for maintaining the ecosystem and agriculture. Due to natural climate variability and human-induced changes, the watershed response to runoff generation is also undergoing changes. It is also critical to know the available water in order for us to implement a comprehensive aquifer management in the basin. Streamflows at many locations are being collected by USGS. This study will implement a hydrology model to quantify the flows under current conditions using the existing data sources including soils, vegetation and weather information. We will also validate the simulated streamflows with USGS observed streamflows.
Energy Balance Modeling in the Snake River Basin

Manojoya Khanal and David Hoekema  
Department of Civil Engineering  
Faculty Sponsor: Dr. Venkataramana Sridhar

Partitioning of the energy balance components into net radiation, latent, sensible and ground heat fluxes is useful for quantifying water and energy fluxes which in turn is valuable for the water management studies. However, it is difficult to measure or model these components over vast areas continuously. The Snake River basin is a heavily managed system where quantification of the primary sink component of the energy balance, evapotranspiration or latent heat flux, will provide first-hand information on the demand side of the water budget. In this study, we will process and present the seasonality and interannual variability in the weather variables collected from AgriMet stations operated and maintained by Bureau of Reclamation from three stations, namely Malta, Rupert and Twin Falls, located in the Snake River Basin for a two year period, 2006-07. The variables that will be analyzed include air temperature, solar radiation, precipitation, relative humidity and wind speed for the period between 2004 and 2007. This study will quantify the energy balance fluxes using these weather variables and verify them with a land surface model and available remote-sensing-based energy balance estimates.

Stream Computing Research and Practical Cartesian Meshing for Complex Urban Environments

Matthew Caylor  
Departments of Computer Science and Mechanical & Biomedical Engineering  
Faculty Sponsor: Dr. Inanc Senocak

The motivation for our research is to accelerate the simulation of contaminant dispersion in urban environments. Computational turn-around time for every stage of the simulation task needs to be fast because of emergency response requirements. To address this issue, we’ve shortened the pre-processing stage of the simulations by developing a practical semi-automated approach to extract the building domains from Geographical Information Systems databases. Additionally, we investigate the stream computing paradigm to accelerate numerical computations of partial differential equations on the modern graphics hardware. In particular, we assess the computational performance of the Brook+ programming language on AMD’s FireStream boards with 320 streaming cores relative to a conventional processor. Brook+ is a high level language that handles all the memory copying and allocation on both the central processing unit (CPU) and graphics processing unit (GPU).

Experimental Evidence for Polaron Hopping Conduction in HfO₂ – A Cryogenic Study

Justin Reed, Richard G. Southwick, Ross Butler, and Chris Buu (Honors College)  
Departments of Electrical & Computer Engineering and Materials Science & Engineering  
Faculty Sponsor: Dr. Bill Knowlton

Metal-oxide-semiconductor field effect transistors (MOSFETs) are used in nearly all electronic devices including computers and cell phones. The pursuit to create faster lighter electronics manifests subsequent decreases in MOSFET size and thus oxide thickness. Silicon dioxide (SiO₂) has traditionally been used as the dielectric material due to its ease of formation and adequate dielectric properties. SiO₂ in a current MOSFET is now 1.2 nm thick which is only several monolayers of Si-O. At this thickness, SiO₂ is losing its insulative properties allowing electrons to transport (i.e., leakage current) through which results in high power consumption and significant heat dissipation in electronic devices. New insulative materials, called high K dielectrics, are being investigated to replace SiO₂. The high K dielectric material hafnium oxide (HfO₂) is a primary candidate to replace SiO₂ as it can be grown thicker to minimize leakage current but maintain the necessary capacitance for high performance MOSFETs. However, leakage current analysis techniques fail to fully explain electron transport mechanisms in HfO₂ at low electric fields over an extended temperature range. Sir Neville Mott suggested electron transport in highly disordered materials (e.g., SiO₂ and HfO₂) can be attributed to three transport mechanisms: 1) localized to extended state excitation (tunneling), 2) polaron nearest
neighbor hopping conduction (NNH), and 3) variable range hopping conduction (VRH).\[1,2\] To investigate these transport mechanisms, the leakage current through HfO$_2$ was measured over a variety of voltages and a temperature range from 5-300K. We present data analysis and a subsequent model that incorporates Mott’s mechanisms to describe electron transport in HfO$_2$.


**Initial Investigations of Sub-RF AC Methods for Metal-Oxide-Semiconductor Devices and Trap-Based Flash Nonvolatile Memory**

*Chris Buu (Honors College), Justin C. Reed, Richard G. Southwick III, and Bernard Yurke*

Department of Electrical & Computer Engineering and Materials Science & Engineering

**Faculty Sponsor: Dr. Bill Knowlton and Dr. Bernard Yurke**

Presently, nearly $10^9$ metal-oxide-semiconductor-field-effect-transistors (MOSFETs) are used in a single computer microprocessor or memory chip. A MOSFET is comprised of a conductor, semiconductor and nonconductor or insulator materials in a layered configuration consisting of metal-SiO$_2$-Si. High dielectric constant ($k$) insulators, such as HfO$_2$, are being used as alternatives to the traditional SiO$_2$ insulating layer. The number of MOSFETs in microprocessors and memory continue to rise, but the microprocessor and memory chip size essentially remains constant. Hence, MOSFET dimensions are continuously downscaled and the thickness of SiO$_2$ has decreased to less than 10 monolayers which severely degrades its insulative properties. As the number of charged carriers (i.e., electrons) increases through the thin SiO$_2$, the leakage current (electrons/second) increases rapidly and power consumption and heat increases by the square of the current. Because of their dielectric properties, thicker high $k$ insulators can replace the thinner SiO$_2$, thereby decreasing the leakage current and power consumption without compromising MOSFET performance. However, a thorough investigation of high $k$ insulators in MOS devices is in need. This work seeks to investigate high $k$ insulators via two areas of investigation. The first involves the investigation of several sub-radio frequency (RF) alternating current (AC) methods to examine carrier transport mechanisms in HfO$_2$. The sub-RF AC methods include using impedance methods and a lock-in amplifier to examine the AC conductance in dielectric layers. The second area of investigation involves a new area of MOS non-volatile memory (NVM) called charge trap-based flash (TBF) memory. Currently, the NVM that is used has a layered configuration consisting of metal-SiO$_2$-Si-SiO$_2$-Si. As the SiO$_2$ thickness decreases and leakage current increases, alternative layered configurations that incorporate high $k$ insulators are required. In collaboration with Oregon State University and Penn State University, metal-Al$_2$O$_3$-Ta$_2$O$_5$-Al$_2$O$_3$-Si devices will be examined and characterized as a potential NVM replacement.

**Lissajous Patterns**

*Arlene Fausnaugh and Prativa Bhattacharighimire*

Department of Electrical & Computer Engineering

**Faculty Sponsor: Dr. Elisa Barney Smith**

The Discovery Center of Idaho (DCI) is always looking for new displays. The display needs to teach as well as entertain. This display needs to be able to withstand a lot of use by kids of all ages so it needs to be durable yet easy to use. DCI decided they would like to have a display showing and describing Lissajous patterns. Lissajous patterns are created by combining two sine waves. Two sine waves are created using two signal generators. These sine waves will have frequencies that are integer multiples of each other. One sine wave will be on the horizontal axis and the other on the vertical axis and when combined a Lissajous pattern can be displayed on an oscilloscope. These patterns have traditionally been used to identify an unknown frequency by comparing it to a known one and observing the pattern that is produced. Frequency counters will display the frequencies of the two sine waves. The user will be able to control the frequency of each sine wave independently. They will also be able to choose to display either of the two sine waves individually or the lissajous pattern that was produced.
**Statistical Scanner Model Validation**

*CJ Stanger, Greg Ilk, Robbie Scott, and Bryce Simpson*

*Department of Electrical & Computer Engineering*

*Faculty Sponsor: Dr. Elisa Barney Smith*

The process of scanning inherently introduces degradations to an image. These degradations affect the overall quality of the scanned image. Models have been derived to characterize the image degradations created by the optical system in a scanner. These models can be used to create the synthetic images. If the models accurately reflect the process of the scanner, the output of the model should match real scans. Through statistical analysis of these images, the models can be validated for accuracy. Experiments are conducted to compare the similarity of the real and synthetic images. These images are compared using several difference metrics: Hamming distance, moment features, and RST-invariant moment features, and several image description features.

**Development of a Smart Crossed-Field Amplifier**

*Sonya Shawver, Tyler Rowe (Honors College), Brandon Wells, and Geoff Groff*

*Department of Electrical & Computer Engineering*

*Faculty Sponsor: Dr. Jim Browning*

A Crossed-Field Amplifier (CFA) is a vacuum device that uses electrons to amplify a radio-frequency (rf) wave. These types of devices are used in radar systems and satellites. An experimental CFA apparatus, operating around 1 GHz, is being built to study the dynamic control of the device in order to improve performance (e.g., efficiency). The major components of the CFA include an rf slow wave circuit (SWC), an electromagnet, and a cathode. The cathode and SWC are fabricated using a Low Temperature Co-Fired Ceramic and thick film metal electrodes. The cathode consists of an array of gated field emitters that inject electrons between the SWC and the cathode. These electrons give energy to the rf signal traveling on the SWC. The electromagnet consists of two coils in a Helmholtz configuration that produces a 450 G field in the region where the cathode and SWC will interact.

The methods of fabrication and measurements of the performance of these major components will be presented. The SWC performance is analyzed by measuring the characteristic impedance and attenuation versus frequency. The electromagnets generate a magnetic field proportional to the applied current, so the magnetic field strength and uniformity will be measured using a Tesla meter. The cathode structure requires fabrication of several thin ceramic layers with slits that allow injection of the electrons. The design, fabrication, and testing of this cathode structure will be presented.

**Surface Acoustic Wave Device Fabrication Using Zinc Oxide and Chalcogenide Thin Films**

*Hiwot Kassaye*

*Department of Electrical & Computer Engineering*

*Faculty Sponsor: Dr. Kris Campbell*

Surface acoustic wave (SAW) devices were fabricated on Si to demonstrate functionality. Device design was laid out and masks produced for fabrication on 100 mm wafers. Device configurations to be made include zinc oxide or chalcogenide piezoelectric thin film (PTF) on interdigitated (IDT) transducers on Si (PTF/IDT/Si), and the alternate IDT/PTF/Si. Initial devices used zinc oxide PTF Rf-magnetron sputter deposited on the IDT transducers for the PTF/IDT/Si configuration, and simultaneously on Si wafers for subsequent tungsten deposition and etching to produce the IDT/PTF/Si configuration. The devices will be electrically tested for detection of the propagated signal through the piezoelectric film. A second phase of the project will involve post-processing of CMOS chips to deposit piezoelectric thin films to produce smaller scale SAW devices.

**Robotics: Robotic Arm**

*Amrita Jashnani, Omar Benitez, and Orlando Trejo*

*Department of Electrical & Computer Engineering*

*Faculty Sponsor: Dr. Robert Hay*

Robotic arms are extremely useful because they can carry out specific tasks with precision and efficiency. They come in many different sizes and can be used in areas such as clean room environments where they
aid in the manufacturing process of semiconductors. A company known as Applied Materials bought a robotic arm that was manufactured by a Japanese company – Yaskawa. After finding an issue with the robotic arm and doing some cost-benefit analysis, the decision of donating the robot arm to the College of Engineering was made. Our goal is to get the robotic arm to function and effectively document the process involved (basic setup, operating procedure, and programming). We will accomplish this by using the manuals that came with the robotic arm and apply our engineering skills in debugging whatever problem there is to make the robotic arm functional once again. The purpose of the documentation is to make it easier for future students or engineers to effectively operate the robotic arm. This should prevent them from having to spend large amounts of time going through the same process we are going through now. If time permits, a library of applications will be created so that the end user can operate the robotic arm even with a limited knowledge in programming. The robotic arm will solely be used for educational purposes. It can be a very good aid for a Control Systems’ class in the College of Engineering.

**Variable Gain Amplifiers Using Chalcogenide-Based Variable Resistors**

Hiwot Kassaye Betre and Stephanie Cobbley  
Department of Electrical & Computer Engineering  
Faculty Sponsor: Dr. Kris Campbell

A variable gain amplifier traditionally uses discrete component variable resistors, (e.g., potentiometer), on the output of a fixed gain operational amplifier circuit to control the gain. In class AB amplifiers the volume can be adjusted by varying this resistance, but due to the noise level in the output, the quality of the sound and efficiency of the amplifier is low. Chalcogenide based variable resistance devices are integrated circuit devices that have a wide variety of potential applications due to their low power consumption, ability to withstand radiation in harsh environments, high digital capacity, that is, the ability to retrieve data, and scaling. Due to these properties they have potential application in many consumer products (e.g., cell phones, computers, digital recorders), national defense, health and medicine, outer space, weather forecasting and so on. In our project, chalcogenide variable resistors (CVRs) are used to control the gain of a simple amplifier. These resistors are independently programmable. The advantage of the CVR in a circuit such as this variable gain amplifier is that the resistor can be fabricated in with the integrated circuit, thus creating a much smaller, lower power, and lower noise amplifier.

**USDA Wireless Tracking Device**

David Smith, Jean Margulieux and David Glen  
Department of Electrical & Computer Engineering  
and Materials Science & Engineering  
Faculty Sponsor: Dr. Scott Smith

The USDA currently uses GPS tracking systems to tag and track wildlife, but because the GPS systems can fail or be imprecise in certain environmental conditions, they are eager to invest in a backup tracking system. This project researches and designs a wireless tracking system that will allow tracking of wildlife through RF transmissions. Current RF transmitting tracking devices can be obtain off the shelf, but are not user configurable. The USDA is looking for a transmitter that can be configured to utilize different frequencies and to transmit data in different patterns. The tracking device for this project transmits on a specific, yet user configurable, frequency which will be picked up by a receiver that can be used to locate the animal wearing the tracking collar. The transmitted signal is user configurable as well, so that the user can determine the length and distance apart that the transmitter sends a pulse. Any user configuration is done through the onboard microcontroller. The tracking device has a low power consumption design which allows the battery to last for at least a year, which will minimize the need to locate the animal for replacement. The device also includes an accelerometer, which will sense an animal fatality if the animal remains stationary for a certain period of time. Additional features that could be added to the tracking device include communication with the GPS tracking system to transmit GPS data through the RF transmitter. Adding a receiver to the tracking device would allow updates of the GPS tracking system as well.
The Development of a Power System Protection Lab at Boise State University

Cameron Wiseman, Jeremy Lake, Jonothan Robinson, and Eric Higer
Department of Electrical & Computer Engineering
Faculty Sponsor: Dr. Said Ahmed-Zaid

Power system protection is concerned with protecting electrical power systems from faults within the network by isolating the faulted components so as to leave as much of the remaining electrical network operational as possible. Moreover, by properly protecting the system components from overloading, the probability of fires and other catastrophic and expensive system failures can be minimized. In understanding power protection, it is necessary to understand what is actually being protected. Providing superior protection is essential in mitigating the effects of disruptions on system stability. As such, it is essential for power engineers to understand the concepts and practices underlying power protection. The creation of a Power System Protection Lab at Boise State University gives students the opportunity to gain some real world experience in protection. Moreover, a lab of this type facilitates educational opportunities. It also provides numerous additional benefits such as research and industry cooperation. The overall objective of this project is to determine the design requirements and parameters for a Power System Protection Lab at Boise State University. Some design considerations for the lab include cyber protection, power quality, and future interchangeability studies. Moreover, in the interest of efficiency and cost effectiveness, we avoided acquiring redundant or unnecessary equipment. We have provided a list of the equipment to establish the power protection lab along with sources and overall cost. The lab model includes the lab’s overall structure, testing software and equipment, and research capabilities.

Wind Farm Protection Scheme Design

CW Franz, Khan Hammond, and Jason Clack
Department of Electrical & Computer Engineering
Faculty Sponsor: Dr. Said A. Zaid

POWER Engineers is a leading consulting firm that provides engineering services for the design of various types of electrical power projects across the United States with some internationally. A typical project conducted by POWER is the electrical design of a Wind Generating Facility (also called a Wind Farm). Part of this design involves the engineering of a relay protection scheme that provides protection against abnormalities that can be damaging to the system and create safety hazards for personnel. Such abnormalities include fault conditions, under/over voltage conditions, under/over frequency conditions, and equipment malfunction. Under the guidance of POWER and our faculty advisor, the goal of the project was to design a protection scheme for a typical wind farm. The requirements of the protective relaying scheme were to integrate with substation monitoring and control systems and meet the basic objectives of protective relaying. The system was first modeled using the ASPEN One-liner software package and short-circuit analysis was conducted to simulate possible fault conditions. Based on the results from the analysis, relay setting were developed for the protection scheme. The settings were then downloaded onto microprocessor-based protective relays donated by Schweitzer Engineering Laboratories, Inc. and tested to ensure proper functionality.

Wind Farm SCADA Integration

Tyler Kent, Josh Johnson, and Noe Loera
Department of Electrical & Computer Engineering
Faculty Sponsor: Dr. Said Ahmed-Zaid

Supervisory Control and Data Acquisition Systems (SCADA) have been adopted as a solution to deliver reliable energy from renewable sources with real-time management and monitoring without constant on-site supervision from personnel. SCADA systems provide power system automation of data collection, data logging, alarm monitoring and system control, while maintaining the ability of human control.
through networked equipment. We will provide a SCADA solution comprising of the design and testing of an integrated network. The network will continually monitor and provide control to off-site networks for all aspects of a wind farm comprised of fifty-six wind turbines that supply eighty-one megawatts of clean renewable energy to a utility power grid. Research of the best available modern microprocessor-based system components has been performed and specification of desired equipment has been submitted. Through research and analysis of donated industry equipment we will complete all configurations of the necessary components. The configuration of these components will be performed to allow automation of monitoring and data logging. Human control will be provided through a Human-Machine Interface (HMI), an interactive computer application that allows a human operator real-time monitoring and control. Once the configuration of the components is complete we will build the network and design testing procedures to ensure all applications perform as described. At the completion of all testing we will construct a procedural document providing complete step-by-step installation and field testing that will be used in commissioning the SCADA system in a field application.

**PAID: PMON Alarm Indication Device**

*Michael Pook, Derek Klein, and Joe Taylor*

*Department of Electrical & Computer Engineering*

*Faculty Sponsor: Dr. Sin Ming Loo*

The Hartman Systems Integration Lab at Boise State University is currently maintaining and improving a wireless environmental sensor network for use in various applications by the FAA and Boeing. The devices which make up the network, called Personal Monitors (PMON), use various sensors to monitor and record data about the environment in which they are placed. The recorded data is currently stored on flash memory card (secured digital) and can be viewed in various formats by using computer software. This solution works well for analysis of data after it has been recorded. However, a system that can monitor incoming data (in real-time), as it is taken, would be desirable in order to alert a user to hazardous conditions. Our research has led us to design the solution known as the Personal Monitor Alarm Indication Device (PMON AID, or PAID). PAID is a compact device that will wirelessly monitor all active PMON units within its range and indicate if a hazard exists in the current environmental conditions. As it receives data, the PAID will compare the incoming value to a preset limit. If the incoming value is above this limit, the PAID will alert the wearer using an LED and an audible alarm. As an additional feature, the PAID will record the data from all units onto a micro secured digital memory card for off-line processing. Other features include the ability to turn off or silence the audible alarm, a rechargeable battery via USB, and an LED to indicate the operational status of the PAID.

**Embedded Strobe Board Tester for Electronics Controls Company**

*Vikram Patel and Travis Kent*

*Department of Electrical & Computer Engineering*

*Faculty Sponsor: Dr. Robert Hay*

The ECCO strobe tester is a specialized bed of nails tester for LED strobe boards. This tester can handle a variety of products and functions using only a PIC microcontroller. The bed of nails allows for multiple tests locations on the various boards, but is modular enough to incorporate new board designs. This tester reduces product testing time, provides instantaneous test results, and data logging for test result analysis. The user interface is designed to be as simple as possible through the use of an LCD and menu controls. The housing has built in safety latches and a flash capacitor discharger to prevent accidental shock. This tester is fast, safe, modular, and accurate.
Surface Plasmon Enhanced Optical Transmission through Periodically Modified Metallic Membrane

Alex English, Wan Kuang, Jeunghoon Lee, William L. Hughes, William B. Knowlton and Bernard Yurke from Boise State University; Zi-Chang Chang from National Tsing-Hua University, Taiwan, ROC; and Min-Hsiung Shih from Academia Sinica, Taiwan, ROC

Department of Electrical & Computer Engineering
Faculty Sponsor: Dr. Wan Kuang

Surface plasmon-polariton resonance (SPR) is a phenomenon where valence electrons of the metal resonantly interact with incident light. In the case of a sub-wavelength periodically modified metallic membrane, it is shown that an enhanced optical transmission can be achieved. The SPR condition depends on the lattice constant, incident angle, wavelength as well as dielectric constant of the material interfacing the membrane. The presence of a high refractive index chemical on the metal membrane will cause a spectral shift in the transmission peaks. This is the basis for SPR chemical sensing. SPR based chemical sensors offer an improved sensitivity with a small device footprint. This work studied the relationship between the resonant conditions and lattice geometries of the metal membrane. The optical transmittance of a triangular lattice Ag membrane under varying incident angle and polarization has confirmed that the peak optical transmissions experience a spectral shift as a function of the aforementioned factors. The dispersion relation obtained for this membrane shows promising resemblance to what was predicted by an empty lattice approximation of a theoretical construct. The results indicate that the enhanced optical transmission is due to both the traveling surface plasmon-polariton mode on Ag-silica flat interface and the localized cylindrical mode around the nanoholes. Further studies explore the resonant dependence for devices with square lattices.

SPR Based Integrated Chemical Sensor

Tanya Lalicker, Alex English, and James Hartwell
Department of Electrical & Computer Engineering
Faculty Sponsor: Dr. Wan Kuang

Chemical sensors are used in many industries; from medical to homeland security. These industries demand sensors to be high sensitivity, low cost, and small size. Surface plasmon resonance (SPR) chemical sensor provides a promising solution to this problem. SPR is a phenomenon that causes extraordinary transmission in periodically textured metal membranes. These periodically modified metal membranes are called photonic crystals. The presence of a high refractive index chemical on the metal membrane will cause a spectral shift in the transmission peaks. Each chemical has a unique dielectric constant that can be detected from a photodiode's electronic signal. An array of nanoholes is fabricated on a 100 nm Ag membrane deposited on top of a pn photodiode. By varying the lattice constants in the array the dielectric constant of a chemical contaminant can be identified by observing which crystal is experiencing enhanced transmission. Different lattice constants will be tested to find the optimal settings which produce the largest and most sensitive electronic signal. The electronic signal is proportional to the photocurrent and displayed on a LCD monitor. The LCD monitor is onboard along with the photonic crystal arrays and power supply. This allows the sensor to be portable. The processing of that electronic signal to the LCD monitor must be engineered in a size and power efficient manner while maintaining high sensitivity. The prototyping of such a device includes optical testing, board design, as well as device assembly and programming to interface with a microcontroller. The fabrication of SPR chemical sensors is mostly compatible with the CMOS process. As the cost and the critical dimension of CMOS processing continue to decrease, the proposed method offers a pathway to a lower cost, more portable, more functional, and even personalized sensor chip.
**Evaluation of a Weldable Zipper System for AIRE/Outcast Boats Inc.**

**Kaci Bloxham, Wade Lanning (Honors College), and Sharla Hopkins**  
*Department of Materials Science & Engineering*  
*Faculty Sponsor: Dr. Amy Moll*

AIRE/Outcast Boats, Inc., located in Meridian, ID, manufactures high quality inflatable watercraft used for industrial, government, and sporting purposes. The watercraft shells are made of a polyvinyl chloride (PVC) coated 1670 denier polyester base fabric. As part of the assembly process, AIRE uses a polymer thermal welding process to create stitchless PVC – PVC seams capable of withstanding pressures in excess of 500 psi. To allow access to the interior air cells, the final closure consists of two #10 zippers stitched in tandem, then double stitched to the body of the watercraft. Stitching the closing zipper system is a time and labor intensive step in the manufacturing process. AIRE would like to explore the concept of a thermally weldable zipper to improve manufacturing speed and efficiency. The objective of our Senior Design project is to research and test various means of thermally welding a single #20 zipper as the closing mechanism for AIRE rafts. Options evaluated were: 1) implementing a coating process that can be applied to existing zippers, 2) finding a company that is capable of supplying a coating, or 3) coiling a zipper directly to the PVC material in-house. This poster presents the most promising solution based on results of mechanical testing, effectiveness of method, and processing efficiency.

**Design of Experiments to Maximize Production Throughput of ZnO Varistors**

**Ellen Rabenberg, Alex Miller, and Cory Sparks**  
*Department of Materials Science & Engineering*  
*Faculty Sponsor: Chad Watson*

Varistors are critical components of many electrical circuits due to their electrical current shunting capabilities. Sandia National Laboratories’ (SNL) Ceramics and Glass Processing Department fabricates ZnO varistors for high voltage applications. These varistors are core drilled from a uni-axially pressed ceramic billet. Because ceramics can be easily damaged, the drilling process is time-intensive. Damage to the core while drilling can cause the completed varistor to fail catastrophically. The goal for this project is to maximize the drilling rate while minimizing defects introduced from drilling. The SNL drilling setup was replicated using the PCNC 1100 milling machine located at Boise State University’s (BSU) New Product Development Laboratory. Design of Experiments (DOE) was used to evaluate and characterize factors affecting the core drilling process. The characterization techniques utilized included optical and electron microscopy along with optical profilometry. Initial screening determined the factors statistically significant to the experiment and a full factorial was conducted. From the DOE model, the optimal factors were chosen to produce acceptable varistor cores at the fastest possible rate.

**A Study of the Effects of Mechanical Alloying NiAl**

**Shilo McCrory, Justin Knowles, Brian Jaques**  
*Department of Materials Science & Engineering*  
*Faculty Sponsor: Dr. Darryl Butt*

Nickel aluminides are of interest in applications that involve high thermal stresses at elevated temperatures due to attributes such as their high melting temperatures and high thermal conductivities. This study investigates the effects of mechanically alloying nickel aluminate with minor amounts of metal constituents on the thermal lattice expansion and the average lattice parameter. The mechanical alloying is completed in a high-energy ball mill by adding minor amounts (0 – 2%) of metals including cerium, tungsten, dysprosium, and manganese. X-ray diffraction is used to characterize and quantify the expansion that takes place within the material’s microstructure before and after it is alloyed.
INITIAL RESULTS ON THE FABRICATION OF A DIELECTROPHORETIC TRAP FOR DNA ORIGAMI

Jason Brotherton, Stephanie Barnes (Honors College), Austin Johnson, and Mallory Yates,
Department of Materials Science & Engineering
Faculty Sponsors: Dr. Bernard Yurke, Dr. Will Hughes, Dr. Won Kuang, Dr. Jeunghoon Lee and Dr. Bill Knowlton

The self-assembly properties and small size of DNA suggests that it is an ideal candidate for bottom-up fabrication of nanoscale structures. DNA origami is synthesized when a single strand of DNA is folded and “stapled” into a desired shape via short DNA strands, known as staple strands. One challenge of using DNA as a nanometer scale building material is the controlled positioning of DNA on a substrate. Dielectrophoresis is a method for positioning a polarizable particle in a nonuniform electric field. It has been used to manipulate DNA in specific locations onto a substrate with electron-beam fabricated electrodes.[1] We present ongoing work in which electrodes are being fabricated by a combination of shadow-masked physical vapor deposition (PVD) and electron-beam lithography (EBL) processes. Chromium/gold electrodes are deposited on a silicon wafer through a ceramic shadow mask using PVD. PMMA, an electron-sensitive polymer, is spun-on over the electrodes followed by another deposition of chromium to create a circular electrode on the surface of the PMMA. This electrode is the field forming electrode for the dielectrophoresis process. Finally, EBL is performed to expose small windows over the sites for DNA origami trapping.


INVESTIGATION OF RESIDUAL STRESS INDUCED CRACKING IN THICK TiOx COATINGS

Arturo Gutierrez (McNair Scholar), Terry Hickenlooper, Pat Andersen, and T.J. Anderson
Department of Materials Science & Engineering
Faculty Sponsor: Dr. Peter Müllner

NxEdge remanufactures titanium oxide (TiOx) cylindrical sputter targets (C-Mag) for the architectural glass industry. TiOx is sputtered onto glass substrates to reduce UV transmission and resist scratching. The rotating C-Mag target is advantageous to glass manufacturers because it allows for longer deposition times. Remanufacture is accomplished by thermally spraying new TiOx onto used target substrates; unfortunately, a significant number of NxEdge’s TiOx targets crack after manufacture. Axial cracking of the TiOx indicates residual stress between the structural stainless steel substrate and the TiOx coating. As part of this work, hardness and porosity were evaluated for TiOx samples exposed to different processing histories in an attempt to correlate change in properties and microstructure to component reliability. Additionally, a battery operated strain gauge capable of in-situ measurements of strain has been developed. The design and preliminary testing of the strain gauge is presented.

INVESTIGATION OF ACCELERATED CORROSION IN A FRESH WATER IRRIGATION SYSTEM

Adriel Apter
Department of Materials Science & Engineering
Faculty Sponsor: Dr. Darryl Butt

The Idaho agriculture industry relies on extensive fresh water irrigation systems to help sustain favorable crop cultivation conditions during the growing season. Modern irrigation systems not only transport and distribute fresh water from a source but also regulate pH and fertilizer concentrations to maximize harvest yields. Accelerated corrosion was observed in an irrigation system with recently replaced galvanized steel pipes. The new pipes had
experienced more significant corrosion in 3 years than had been observed on older pipes in service for 17 years. A series of electrochemical experiments were conducted to investigate the causes of the accelerated corrosion. These experiments focused on the effect of various concentrations of fertilizer and water mixtures on the corrosion rate of the pipe material. Tests were performed on both the zinc and steel surfaces on the inside of the galvanized steel pipes to simulate corrosion effects before and after the protective zinc layer had been corroded. The pH level of these mixtures was intended to simulate possible environments in the irrigation water. The corroded pipes were examined with scanning electron microscopy (SEM) and optical microscopy for clues of the possible cause of the accelerated corrosion. The images obtained resemble a type of corrosion attack that has been found in other fresh water systems known as microbiologically influenced corrosion (MIC). This evidence, along with the results of the corrosion measurements performed suggests MIC is likely present within the irrigation system.

**Time Dependence of the Synthesis of Dysprosium Nitride Using a Reactive Milling Technique**

*Cole Smith*
**Department of Materials Science & Engineering**
**Faculty Sponsor: Dr. Darryl Butt**

Currently oxides, materials such as silicon or aluminum bonded with oxygen, are used for a variety of high temperature processes. Nitrides, similar materials bonded with nitrogen, are stable at much higher temperatures and conduct heat up to ten times more efficiently. Synthesizing nitrides can be difficult; requiring many processing steps and high temperature devices. Materials with high vapor pressures may evaporate and contaminate furnace equipment when subjected to these processing routes. A closed-system, room temperature process for synthesizing such materials was explored by the Advanced Materials Laboratory in the Materials Science and Engineering Department. Dysprosium nitride (DyN) was produced by a reactive milling method. 99.9% pure dysprosium metal flake was milled in a high energy planetary ball mill in a high purity nitrogen atmosphere. The influence of milling time on the extent of the reaction was explored by milling dysprosium metal for various times. Phase analysis was performed using x-ray diffraction techniques. It is demonstrated that phase pure DyN can be produced at near room temperature.

**Co-Nitriding Uranium and Dysprosium Metals by Reactive Milling**

*Daniel Osterberg*
**Department of Materials Science & Engineering**
**Faculty Sponsor: Dr. Darryl Butt**

Nitride materials such as uranium nitride are currently being explored for use in next generation fast-spectrum nuclear reactors. Nitrides are feasible candidates due to their high actinide densities, low coefficient of thermal expansions, and high melting temperatures. In order for nitrides to be viable fuel candidates, synthesis routes must be developed to economically produce large quantities of high purity powders. Previous research on uranium nitride synthesis has focused primarily on the carbothermic reduction of uranium dioxide (UO2) which requires high reaction temperatures and long synthesis times. However, the novel reactive milling synthesis technique presented in this study is used to complete the nitride reaction at room temperature in a relatively short amount of time. The focus of this study is to determine the effects of the addition of dysprosium metal (as a surrogate for americium) to the uranium reactive ball milling process. The reactive milling characteristics were studied from 0 - 100% Dy. Pure uranium and dysprosium metals along with milling media were placed in a milling vessel which was then pressurized with purified nitrogen gas. The vessel was then placed in a high energy planetary ball mill for milling. The resultant powder was analyzed for phases using x-ray diffraction and energy dispersive x-ray spectroscopy. The particle size distribution was analyzed using a laser scattering particle size analyzer as well as scanning electron microscopy.
Exploration of Dynamic Recrystallization in Metals Using the Finite Element Modeling Program OOF2

Wade Lanning
Department of Materials Science & Engineering
Faculty Sponsor: Dr. Megan Frary

Dynamic recrystallization (DRX) is a process of new grain nucleation and grain refinement which occurs in many metals such as aluminum, copper, and nickel when they are deformed to high strains at elevated temperatures. During DRX, new grains preferentially nucleate at triple junctions (TJs) due to a buildup of stress created by the inhibition of the grain boundary sliding (GBS). TJs containing one or more “special” low-energy boundaries are less likely to nucleate new grains, possibly because special boundaries are relatively resistant to GBS. For this project, a novel method of simulating GBS in the OOF2 finite element modeling program was developed. It has shown that GBS will redistribute stresses in a microstructure to varying degrees depending on microstructure geometry and the susceptibility of differing grain boundaries to GBS. This study is primarily a comparison of different finite element models, but it will soon be applied to the analysis of experimentally developed microstructures. This knowledge could help researchers and manufacturers predict microstructural changes that take place in some metals during processing.

The Distribution of Secondary-Phase Precipitates During Creep of Alloy 617

Sharla Hopkins, Evan Young, and Scott Schlegel
Department of Materials Science & Engineering
Faculty Sponsor: Dr. Megan Frary

Inconel 617 is a nickel-based superalloy commonly selected for its high strength and oxidation resistance, particularly at high temperatures. Carbides may increase creep strength by inhibiting grain boundary motion; however, during creep the carbides dissolve and re-precipitate on boundaries in tension. In order to quantify the distribution of the carbides, electron backscatter diffraction and energy dispersive spectroscopy were used to analyze the microstructure. Analysis was done to determine the location of carbides (e.g., in the grains or on grain boundaries), grain boundary character, and precipitate type (i.e., Cr- or Mo-rich). We find that the major factor in carbide distribution is the character of the grain boundaries. In addition, both Mo- and Cr-rich carbides precipitate at grain boundary triple junctions with two special boundaries (i.e., J2 junctions). If the role of grain boundary character on redistribution can be determined, materials could be engineered to have microstructures resistant to carbide redistribution.

The Use of Magnetic Shape Memory Alloys in Power Generation Devices

Kimo Wilson and Adrian Rothenbuhler
Department of Materials Science & Engineering
Faculty Sponsors: Dr. Peter Müllner and Dr. Paul Lindquist

Magnetic shape memory alloys (MSMA), once deformed, can recover to their “memory” shape through an applied magnetic field. Deformation can occur through an applied stress, which is inverse magnetoplasticity (IMP), or by applying the magnetic field in a different direction. For the IMP, the applied stress results in plastic deformation, as well as a change of magnetization, both carried via the motion of twin boundaries. The MSMA can be cyclically stressed within a static bias field inside a helical electromagnetic coil where a voltage is induced due to the variation of the magnetization. With the application of a static bias magnetic field, as well as the removal of the applied stress, the twin boundaries re-orient themselves and restore the MSMA’s initial geometry. This process can be repeated via a periodic force applied with a variable speed motor. The induced voltage depends strongly on the actuation rate. A Ni-Mn-Ga MSMA single crystal with approximate dimensions 5.4 x 3.9 x 3.1 mm³ served as a magneto-mechanical transducer. Actuator frequencies up to 2.25 Hz are what we investigated, what we saw was an output voltage of up to 3.8 mV. We interpreted the results to be a power output of up to 80 nW. From the investigation we found an improvement of the MSMA material
properties, a new transducer-driven motor and an improved pickup coil could help produce much higher frequencies, induced voltages and higher power production.

**Lorentz Force Microscopy of Magnetic Domains in Ni-Mn-Ga**

Steven Letourneau  
Department of Materials Science & Engineering  
Faculty Sponsor: Dr. Peter Müllner and Dr. Rick Ubic

The magnetic shape memory alloy Ni-Mn-Ga is of great interest for its properties of large magnetic-field-induced strain. This induced strain is a result of twin boundary movement caused by magnetic anisotropy energy. Magnetic shape memory alloys have magnetic and crystallographic domains. While crystallographic domains can be imaged by conventional diffraction contrast, magnetic domains are invisible by standard microscopy. The Boise State Center for Materials Characterization (BSCMC) is equipped with a JEOL JEM 2100 HR transmission electron microscope with a magnetic field cancellation system unique in the USA. This instrument is one of only a few in the world that is capable of imaging magnetic domains. Initial results show worm-like magnetic domains within twin crystallographic domains. The size of the magnetic domains is typically 150 nm.

**Transmission Electron Microscopy (TEM) Study of Twinning in Ni$_2$MnGa**

Rebecca Ahern  
Department of Materials Science & Engineering  
Faculty Sponsor: Dr. Peter Müllner and Dr. Rick Ubic

Ni$_2$MnGa is a ferromagnetic shape memory alloy (FSMA). FSMA$_2$s exhibit a shape memory effect which is induced through either the application of a magnetic field or mechanical stress. This shape change is reversible through the rotation of the magnetic field or stress. It has been shown that the mechanism for the shape memory response is twin boundary motion; thus, the shape memory response is dictated by the size and orientation of twins within the material. The purpose of this investigation is to study common twinning modes of Ni$_2$MnGa martensite with the 14M structure. Transmission electron microscopy (TEM) samples were made using an electrochemical etching process, and light- and dark-field imaging in combination with selected area electron diffraction was used to identify the type and orientation of twin variants and their interfaces.

**Magnetic-Field Liquid-Phase Sintering**

Nikki Kucza and Adrian Rothenbuhler  
Department of Materials Science & Engineering  
Faculty Sponsor: Dr. Peter Müllner

Processing magnetic materials to tailor microstructures with specific crystallographic textures can be accomplished using the magnetic field liquid phase sintering method (MFLPS), which is currently being developed at Boise State University. This process allows us to align the individual grains and modify the magnetic, mechanical, and other properties of the material. The MFLPS method is achieved by applying a magnetic field to a pressed pellet of two materials, one with a high melting point and one with a low melting point, during a two-step heat treatment. During the first heating step below the Curie temperature, the applied magnetic field creates a torque on the high-melting ferromagnetic component that aligns the grains of the magnetic phase while the second component is in its liquid phase. The sintering then occurs during the second heating step at higher temperature without magnetic field. For this research steel shot and gallium were compacted together to create a composite pellet. This was done in a series of compositions, until we found a suitable ratio to hold the pellet together. This ratio is 70 weight percent steel shot and 30 weight percent gallium. We found at 60 weight percent steel shot and 40 weight percent gallium, there is an excess of gallium material that seeps out of the die during compression. Below 30 weight percent gallium, the pellet did not retain its desired shape. Similar experiments will be performed with cobalt-gallium, steel shot-aluminum, and cobalt-aluminum systems.
MAGNETIC CHARACTERIZATION OF Ni-Mn-Ga in the MARTENSITE AND AUSTENITE PHASE

Matthew Reinhold (McNair Scholar) and Dave Schenker
Department of Materials Science & Engineering
Faculty Sponsor: Dr. Peter Müllner, Dr. Bill Knowlton, and Dr. Paul Lindquist

Ni-Mn-Ga is a magnetic shape memory alloy (MSMA) that deforms via twin boundary motion. The magneto-mechanical properties depend strongly on the twin-microstructure. It has been shown that the combination of atomic force microscopy (AFM) for analyzing the surface relief caused by twinning and magnetic force microscopy (MFM) for identifying the direction of easy magnetization (which coincides with the crystallographic c direction) provides a non-destructive characterization of the twin-microstructure in the martensite phase. The magnetic characterization of austenitic Ni-Mn-Ga has proven difficult due to the weak anisotropy of the cubic austenite phase, which causes the magnetic moments to align parallel to the surface. This study aims to characterize the magnetic domain structure of Ni-Mn-Ga in the austenite phase using two MFM approaches: standard MFM on a single crystal and MFM on a single crystal that is subjected to a magnetic bias field. While preliminary results with standard MFM are not satisfactory, first results obtained with MFM and a bias magnetic field show a magnetic signature, which presumably is due to the austenite phase.

CRYSTALLOGRAPHIC CHARACTERIZATION OF RARE-EARTH HAFNATES

Thomas Anderson
Department of Materials Science & Engineering
Faculty Sponsor: Dr. Rick Ubic

The nature and degree of disorder in the Ln$_2$Hf$_2$O$_7$ (Ln = La → Lu) series has never been fully quantified. The purpose of this study is to investigate the structure of such pyrohafnates and specifically to determine the degree of both cation and anion disorder, both of which have implications for ionic conductivity. Towards that end, several lanthanide pyrohafnate compounds, Ln$_2$Hf$_2$O$_7$ (Ln = La, Pr, Nd, Tb, Dy, Yb, and Lu), have been synthesized via a solid-state reaction mechanism. The crystal structures were determined by electron diffraction, and Rietveld structural refinements were conducted using neutron diffraction data collected at the Los Alamos Neutron Science Center. As expected, low-Z lanthanides result in pyrochloic compounds whereas high-Z lanthanides form fully fluoritic ones. Intermediate lanthanides form partially disordered pyrochlores, and some show anionic disorder unconnected to cation disorder. As expected, the fluorite-equivalent cubic lattice constant was found to decrease as Z increases.

UTILIZING A FLUIDIZED BED AND CO-FIRE TECHNIQUE TO APPLY GLASS PASSIVATION COATING TO THERMISTORS

Rebecca Hodkin, Shilo McCrory, and Cole Smith
Department of Materials Science & Engineering
Faculty Sponsor: Dr. Sean Donovan

Quality Thermistor Incorporated (QTI) is an industry leader in the design and fabrication of high quality surface mount thermistors. Thermistors are solid-state electronic devices that detect changes in temperature. These devices have a broad field of use ranging from aerospace applications to consumer electronics. Current thermistor manufacturing involves a labor-intensive glass passivation coating process, which is a bottleneck to the thermistor throughput. In an effort to increase manufacturing efficiency, a coupled process involving a fluidized bed and co-fire termination process is being developed by a Senior Project Team. Optimization of the fluidized bed and co-fire processes were investigated using a design of experiments (DOE) approach. The DOE was used to evaluate the main factor effects of the binder, glass frit, and temperatures associated with the process. Through the use of various characterization techniques including optical and scanning electron microscopy, as well as melting point studies, the effectiveness of the newly implemented passivation coating was evaluated.
**Stereolithography Apparatus (SLA) Prototype Part Tolerance Improvement**

Chris McFarland, Rebecca Ahern, Vuong Nguyen, and Ricardo Ayllon  
*Department of Materials Science & Engineering*  
*Faculty Sponsor: Dr. William L. Hughes*

Stereolithography (SL) is a three-dimensional (3D) computer controlled, manufacturing process that rasters an ultraviolet (UV) laser onto a photocurable resin during the fabrication of pre-defined polymeric prototypes. Ugobe, an Idaho-based company located within the Treasure Valley, has enlisted the New Product Development (NPD) Lab at Boise State University, to fabricate polymer prototypes via SL technology. Although part tolerances within one-thousandth of an inch are required for Ugobe, the SL manufacturing process is not producing parts at the specified/desired tolerances. Upon fabrication, the prototyped parts are assembled into intelligent robotic life-forms; such as PLEO the dinosaur. The objective of this project is to create a Standard Operating Procedure (SOP) for the NPD Lab that will: 1) reduce manufacturing variability, and 2) increase tolerance specification during the fabrication of Ugobe prototyped parts. Thus far, experiments have been conducted to determine how primary tolerance factors such as SLA dimensional accuracy, resolution mode, and post-processing techniques, affect part tolerances during prototype production. Calipers and an optical comparator were used to gather prototype part dimensions for this project. Conclusions resulting from data analysis will identify sources of error within the current NPD Lab prototype production SOP, as well as provide suggestions on how to improve their manufacturing process via the reduction of manufacturing variability and increased prototype part tolerance predictability.

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**Torsional Harmonic Imaging: Expanding the Biological Nano-Mechanical Characterization Techniques at Boise State University**

Jonathan Henderson, Amber Cox and Chad Watson  
*Department of Mechanical & Biomedical Engineering*  
*Department of Biological Sciences*  
*Faculty Sponsors: Dr. Bill Knowlton and Dr. Julia Thom Oxford*

In the biomaterials field, there has been a growing need to increase the spatial resolution and decrease the data acquisition time when characterizing the nano-mechanical properties of a sample surface. A newly developed technique called torsional harmonic imaging is a nondestructive nano-mechanical characterization method that addresses these needs. It is a rapid procedure that quantitatively determines and maps the nano-mechanical properties of biomaterials such as collagen. This new technique drives a cantilevered atomic force microscope (AFM) tip near the flexural resonance frequency of the cantilever causing the tip to tap along the surface of the material. The torsional frequency of the cantilever is recorded along with the harmonic modes that are simultaneously used to calculate the stiffness, adhesion, and other tip-sample force interactions. To evaluate the ability of torsional harmonic imaging to characterize biomaterials, the biomaterial rat tail collagen I was investigated because of its nanometer scale structure. Additionally, several polymers were included in the study as a comparative standard. Torsional harmonic imaging was compared to typical nano-mechanical techniques including cantilever-based nanoindentation and vertical probe nanoindentation. A comparative analysis showed that the reduced elastic modulus for collagen I obtained using torsional harmonic imaging and cantilever-based nanoindentation ranged from 1.1 to 2.4 GPa and 2.88 ± 1.45 GPa, respectively. The vertical probe nanoindentation was used with the polymers and compared to torsional harmonic imaging. Torsional harmonic imaging provided similar values for reduced elastic modulus for the collagen and the polymers as compared to the other two nanoindentation methods but with much higher spatial resolution and in significantly less time.
**Human Powered Vehicle Competition**

*Melissa Casteneda, Cody Montgomery, Benjamin Leake, James Saculles, and Haley Adams*

*Department of Mechanical & Biomedical Engineering*

*Faculty Sponsor: Dr. Steve Tennyson*

Every year the American Society of Mechanical Engineers hosts a Human Powered Vehicle competition. A Human Powered Vehicle is a highly engineered and aerodynamic vehicle that can be used for racing or everyday travel using no outside power source. The team of students from Boise State University are responsible for vehicle design, build, testing, and competing. The competition has strict safety rules that must be followed and consists of sprint and endurance events. Submissions are scored on design, ingenuity, and race results.

**Development of a Continuous Flow Polymerase Chain Reaction Device in Low Temperature Co-Fired Ceramics**

*Andrew Vissotski (McNair Scholar)*

*Department of Mechanical & Biomedical Engineering*

*Faculty Sponsor: Dr. Don Plumlee*

Polymerase Chain Reaction (PCR) is a method of Deoxyribonucleic Acid (DNA) amplification involving a sample experiencing three precisely controlled temperature zones for a certain amount of time; the temperatures and dwell times of each zone varies with species. A Continuous Flow PCR device has been designed and fabricated using Low Temperature Co-Fired Ceramics (LTCC). LTCC is desirable due to its non-reactive properties, ability to create internal three dimensional structures, low cost and compatibility with embedded heaters. This work will focus on the development of a device that contains a single continuous internal channel and three separate temperature zones. The initial internal channel geometry and heater sizing were determined using an analytical and heat transfer model. The first zone was fabricated with the model results and tested with water to develop a control system capable of precise thermal management. Results from the first zone were applied to the design of one complete cycle (3 zones) and then to a multi-loop (8 cycles) device. The multiple cycle design utilizes a simple, radially inward channel configuration which allows for the sample to flow continuously. Embedded temperature sensors, whose impedance is a function of temperature, have been developed to monitor each zone. The data is plotted and shows the control system’s ability to maintain minimal temperature variation and the time to reach steady state. Additionally, thermal images of LTCC surface indicate the device’s ability to thermally isolate each zone.

**Towards Integrated Visualization and Computation of Fluid Flows on Modern Graphics Hardware**

*Dillon Cower*

*Departments of Mechanical & Biomedical Engineering and Computer Science*

*Faculty Sponsor: Dr. Inanc Senocak*

Modern graphics hardware has emerged as a low-cost massively parallel computing platform, allowing scientists and engineers to tackle computationally “big” problems on desktop computers. NVIDIA has introduced the Compute Unified Device Architecture (CUDA) to ease the programming of massively parallel graphics cards. CUDA provides orders of magnitude acceleration of numerical calculations on the graphics processing units (GPU). Our research is motivated by these recent breakthroughs and focuses on integrating computation and visualization of fluid flow simulations on modern GPUs. In particular, we adopt the CUDA programming model for fast numerical computations and the Open Graphics Library (OpenGL) for visualization of the time-dependent flow physics. Numerical simulations enable one to quickly explore structures and patterns in fluid flow systems and make predictions for design improvements in engineering systems. Our integrated simulation approach on the GPU has the potential to shorten engineering analysis of fluid flow systems substantially.
Solar Thermal Test Stand Apparatus

Steve Arndt, Don DeMichele, Derek Jackson, Alex Mwawuganga, Peter Bibikov, and Eric Nutsch
Department of Mechanical & Biomedical Engineering
Faculty Sponsor: Dr. Paul Dawson

Heating of water for domestic use is often the largest single point of energy consumption in modern homes. By augmenting conventional water heating systems with a solar thermal heat system, the consumption of conventional fuels is reduced. This saves the customer money over time and reduces the use of non-renewable resources. Solar energy is free and renewable. It makes sense to utilize solar energy for these reasons. The collector panel is the component that absorbs solar thermal energy and transfers it to a working fluid. The performance of the collector panel is an important factor in the overall solar system design and is worthy of analyzing and comparing. The purpose of the Solar Thermal Test Stand design project is to design and build a modular solar collector panel test stand to be used by the engineering students and faculty at Boise State University. Energy conservation and the study of renewable energy are more important now than ever before. The Solar Thermal Test Stand will deliver a number of benefits to Boise State. First, it will serve to engage Boise State engineering students in the study of renewable solar energy. Second, it will allow students to get involved in a hands-on way with solar energy systems. Finally, the solar energy laboratory will provide an opportunity for the students and faculty at Boise State University to engage with those involved in the solar thermal industry. This could lead to other opportunities for growth at Boise State in this area of research.

Design of a Tracking Collar Enclosure for Use in the Wild by the USDA

Tyler Brown, Emily Perri, and Brad Vawter
Department of Mechanical & Biomedical Engineering
Faculty Sponsor: Dr. Steve Tennyson

The purpose of this engineering design project is to design a more efficient enclosure to house animal tracking equipment for the USDA, making it fit for smaller animals. The USDA currently uses various tracking devices on animals, both domestic and wild. The enclosure that houses the electronic equipment is a standard box attached to a collar. The current collars are sized appropriately for cattle-sized animals; however USDA researchers want to use the same devices for smaller animals, such as wolves. In order to track these smaller animals without interfering with their day-to-day activities, the current standard box needs to be redesigned.

20 MW Solar Power Plant

Kristen McGovert, Zachary Parker, Jerid Hayward, and Tim Ross
Department of Mechanical & Biomedical Engineering
Faculty Sponsor: Dr. James Ferguson

PowerWorks LLC, a privately-owned renewable energy development company, has asked a student team at Boise State University to design a 20 MW solar power plant. Various technologies have been researched and the three kilowatt dish-stirling Infinia Solar System has been selected as the most efficient and cost effective technology. A parametric solid model has been used to determine the closest allowable array spacing. A mathematical model of the project has been developed to simulate various input levels and conversion efficiencies. An electrical flow diagram was created to develop a balanced plant layout. An economic analysis was formulated to determine the initial project cost, operation and maintenance costs over the 25 year life of the project, and the internal rate of return for the project. The results of our analysis led to the selection of a three by three array configuration and wide array spacing.
WIND TURBINE REPLACEMENT BLADES

Justin Hunter and Stephanie Lively
Department of Mechanical & Biomedical Engineering
Faculty Sponsor: Dr. James Ferguson

Our goal in this project is to design a replacement blade for the 100kW Kenetech wind turbines. These turbines have a 30 meter rotor and are on 60 foot or 80 foot lattice towers. The originally designed blades are composed of Glass-Reinforces Plastic (fiberglass) with balsa wood supports. The majority of these 900 turbines have been installed for 20 years in the Altamont pass near Tracy, California. While these blades are reaching the end of their useful life, the turbines continue to perform extraordinarily well. To replace the blades with new blades using the original design would be costly and unreasonable due to the lessened life of the current turbines. By designing a less expensive and lower maintenance blade we can restore the feasibility of blade replacement and increase the overall lifetime of these turbines. Research shows the shell of the airfoil of a hybrid design turbine blade made with currently used fiberglass intertwined with plastic materials at points of blade with lower stresses. Sections of turbine blade with plastic lower cost in materials and reduce production time due to quicker manufacturing processes of those parts of the blade. Finite analysis and air turbine blade software WT_Perf were used as methods of final design. Though prototyping and testing are not within the scope of the project, Preliminary testing devices for stress and strain will be considered.

COLLAPSIBLE STORAGE TANK

Nathan Kerns, Blake Young, Jeremy Cutler, and Julie Freeman
Department of Mechanical & Biomedical Engineering
Faculty Sponsor: Dr. Joe Guarino

The team designed a collapsible water tank to be used for emergency activities such as fire fighting. The goal was to design a light-weight circular frame which quickly and easily sets up and packs up to a manageable size and weight. The most important design requirements included: fast and easy set up, competitive weight, modular design, and circular in shape. The concept design was tested in a computer simulation to ensure that it would work. Data from the simulation was used to optimize part sizes and choose materials. A prototype was built and tested. The test results were used to produce the final design specifications for the collapsible storage tank.

PRESCRIBED BURN APPARATUS

Brett Alspach, Xander Harmon, Kyle Vogel, and Matt Murdock
Department of Mechanical & Biomedical Engineering
Faculty Sponsor: Dr. Don Plumlee

The National Interagency Fire Center (NIFC) is the support center for wild land firefighting in the US located in Boise, ID. One of the many activities that the NIFC coordinates is prescribed burns. Prescribed burns are one of NIFC’s management tools to help prevent major forest fires by burning undergrowth and they also help with maintaining and improving habitat. Recently, NIFC has decommissioned their prescribed burn apparatus due to lack of safety specifications, the Terra-Torch, produced by Firecon, based out of Ontario, Oregon. Last year, Boise State University produced a burn apparatus prototype for NIFC to replace the Terra-Torch. Although last construct the final design. The rider’s theoretical acceleration and g-forces at various points along the curve have been calculated. A scale model of the curve has been created and the actual accelerations will be measured. Design refinements will be made from the test results.
year’s prototype was better than the Terra-Torch, NIFC wants Boise State University to re-engineer the apparatus utilizing standard parts with certain safety ratings such as the Underwriters Laboratories (UL) rating. Our group has focused on re-engineering the ergonomics and robustness of last year’s apparatus using standardized parts. We have focused our attention to the apparatus’s front handle and igniter bracket. So far, we have developed a front handle design that will include two switches: one that will control the igniter switch and the other will control both the pump’s clutch and mapp gas solenoid. With this design, we will have a fail-safe system that will protect the operator and others around. The fail-safe system will shut down the apparatus in case the operator would happen to fall and or drop the apparatus. This would include extinguishing the flame and disengaging the clutch to the pump. Our design for the igniter bracket include: two hose clamps and a curved flame tip. The two hose clamps and curved flame tip will provide easy adjustability for any weather condition to ensure proper ignition of the gelled fuel. In near future, we plan on relocating the sparker ignition box, and mapp gas solenoid. Once these items are completed, we will have a working prototype. We will first test our prototype with water to ensure that the apparatus is sealed properly. If the water test is a success then by mid March, we plan on testing our prototype with NIFC using the actual gelled fuel. The exact date is unknown at this time due to weather conditions and NIFC’s schedule. Once we have the form of our apparatus finalized, we also plan on having the entire apparatus powder coated Boise State blue and orange.

LOG CUTTING APPARATUS DESIGN ANALYSIS

John Katzenberger, Travis Steele, Robert Cox, and Mark Montgomery
Department of Mechanical & Biomedical Engineering
Faculty Sponsor: Dr. Rudy Eggert

Our senior design team from the College of Engineering has been selected to design and build a tool that will assist in producing window notches in pre-manufactured logs. Currently, to make a notch, three cuts are made freehand using a chainsaw. Two of these cuts are short cross cuts, which are relatively easy to make. The third is a long rip-cut, and is much more difficult. The current process is not accurate and has several safety issues. Our team designed an apparatus which provides a guide so that the difficult rip-cut is not made freehand. This solves the primary customer issues, resulting in a safer, quicker, more accurate cut. Our team has fabricated a full scale prototype from this design. We have determined the most catastrophic mode of failure to be yielding of the axle for the chainsaw attachment. Due to the complexity of the design we are unable to analytically determine the amount of force on the axle. Our current research will consist of physically verifying the strength of this pin. This will be accomplished by suspending the apparatus, with a chainsaw attached but not running. We will then add successive amounts of weight to the end of the chainsaw. Since the maximum force that the chainsaw can undergo without binding is 11 pounds, weight will be added from 11 to 33 pounds, demonstrating a safety factor of three for the strength of the axle. After each amount weight has been applied, a visual inspection will be done to look for localized yielding. We will also be analyzing the design to see if there are any areas that can be improved upon. This will be accomplished by actually using the prototype and confirming that it acts as predicted. We will also compare the accuracy of cuts made with the apparatus to freehand cuts.
AVAILABILITY OF ENERGY DRINKS ON A COLLEGE CAMPUS: A DESCRIPTIVE STUDY

Nathan Tenney, Britney Duke, Brenda Janot, Kevin Mangelson, and Michelle Strottmann
Department of Community & Environmental Health
Faculty Sponsor: Dr. Elaine Long

Energy drinks have continued to gain popularity since the introduction of Red Bull in 1997 (Boyle, M., Castillo, VD. 2006). In one self-report survey, 51% of college students reported consuming more than one energy drink per month (Malinauskas, B., Aeby, V., Overton, R., Carpenter-Aeby, T., Barber-Heidal, K. 2007). College students use energy drinks for many reasons including as a study aid, to enhance athletic performance, and as a mental stimulant (Bichler 2006; Froiland, Koszewski, Hingst, Kopecky 2004). The growing trend of energy drink consumption by college students prompted the research question: Where are energy drinks sold on the Boise State campus? Five Boise State University Health Science Students were responsible for collecting the surveillance data. Every building on campus was accounted for and a map was created to visually see where energy drinks could be purchased. The results were surprising in the fact that not many buildings had vending machines that sold energy drinks. This study prompted additional questions for future research such as: policies for sale of energy drinks on campus; volume of energy drink sales by location; and changes in energy drink sales over time.

HEALTHY FOOD SLIDE RULE EVALUATION PROJECT

Chalese Riley and Aledia Mermerian
Department of Community & Environmental Health
Faculty Sponsor: Dr. Elaine M. Long

The purpose of this project was to conduct an evaluation of the Healthy Food Slide Rule and an accompanying lesson plan with children ages 9-12. The Healthy Food Slide Rule is a new educational tool based on the USDA’s My Pyramid and Dietary Guidelines for Americans. Student researchers taught the sample lessons to 40 students at a local elementary school during December 2008 and January 2009. The unique aspect of the Healthy Food Slide rule is children are able to enter their age, gender and activity level and manipulate the slide rule to determine amounts of foods they need from each of the five food groups. To evaluate each lesson, students filled out worksheets and sample menus. Knowledge gains by students were compared by evaluating difference in worksheet data from lesson 1 to lesson 2. Specific foods and activities identified by students on their worksheets was also evaluated in order to provide data for revising information on the slide rule and in the lesson plans. This project was supported by the Idaho Dairy Council and the Idaho Beef Council.

This study was approved by the Boise State Human Subjects Research and Institutional Review Board #193-09-035.

EXAMINING THE PRESENT DAY USE OF TRADITIONAL NATIVE AMERICAN MEDICINE IN TRIBES OF THE NORTHWEST

Hailey Wilson (Honors College)
Department of Community & Environmental Health
Faculty Sponsor: Margaret (Marty) Downey, PhD, RN; and Dr. Ed Baker

Background: A study done in Brazil investigated the local traditional medicines and found that many were being used in conventional medicines. According to the World Health Organization (WHO) some of the primary concerns regarding traditional Native medicines, including Native American medicines, are retaining the knowledge for future use and the sustainability of the plant resources that are chiefly grown in the wild.

Purpose: The purpose of this study is to better understand the uses of traditional medicine in Native American communities, the barriers faced with traditional medicine use, and the issues regarding the preservation of these medicines.

Methods: Community-identified Native American traditional medicine users will be interviewed and findings compared.

Conclusion: It will be found how the practice of traditional use of medicines are passed on to the next generation in the Northwest, as well
as challenges faced by those that use traditional medicines. Methods to improve the retention and sustainability of these practices is also expected.

A Statewide Assessment: The Prevalence of Mental Health and Substance Abuse Problems Among Detained Juveniles in Idaho

Emily VanNess
Department of Community & Environmental Health
Faculty Sponsor: Dr. Tedd McDonald

Research in the past several decades has revealed the startling prevalence of mental health and substance abuse problems among individuals in incarcerated populations. In this study, we examined the prevalence rates of mental health and substance abuse problems among detained juveniles. We also assessed gender differences and rates of comorbidity. Data were collected by clinicians from 11 juvenile detention centers throughout Idaho during 2008. Clinicians administered the Alaska Screening Tool (AST) to 2,060 detained juveniles to determine if they met the diagnostic criteria for a mental health and/or substance abuse problem. More than 68% met the diagnostic criteria for a mental health problem. Girls (at over 76%) were statistically significantly more likely to meet the AST criteria for a mental health problem than were boys (65%). Nearly 55% of all juveniles met the diagnostic criteria for having a substance abuse problem. Comorbid mental health and substance abuse problems were documented in 41% of the juveniles. These findings suggest that mental health and substance abuse problems are highly prevalent among juveniles detained in Idaho; in fact, having at least one of these problems seems to be the norm. This knowledge adds to the current body of research and supports the need for juvenile justice systems to intervene and aid in treatment of mental health and substance abuse problems to prevent future recidivism and related social costs.

Testing Thermal Properties of Clothing

Aledia Mermerian
Department of Community & Environmental Health
Faculty Sponsor: Dr. Uwe Reischl

Information about the thermal properties of clothing is needed to estimate the potential health and safety risks associated with living and working in hot or cold environments. Assessment of these factors has always been difficult and expensive. However, a new system has been developed at BSU that now permits measurement of these parameters accurately and inexpensively. The overall goal of the project was to evaluate the performance of the new system. The investigation consisted of two parts: 1) system calibration, and 2) determining the thermal properties of selected garment combinations. To calibrate the system, the inflatable mannequin was placed in a temperature controlled room where heat input was varied from 0 to 300 watts in 50 watt increments. The input and output air temperatures of the inflatable thermal mannequin were monitored using digital temperature sensors. Several clothing combinations were tested including a “semi-nude” configuration which served as the “control” for all experiments. The mannequin wore long pants, a long-sleeved shirt, and a jacket. Whole-body sweating was assessed for both static (standing) and dynamic (running) conditions. System calibration measurements showed a linear relationship for both input and output air over the 300 watt input range. Heat insulation characteristics for the combination of pants, shirt, and jacket showed incremental and proportional increases in body insulation. The measurements of cooling through sweat evaporation showed heat loss exceeding the combined insulation capacity of the clothing. The tests demonstrated that the thermal mannequin system can be used effectively to determine whole body insulation for various clothing systems. The results also suggest that the impact of clothing insulation on whole body heat exchange must be determined for both static and dynamic conditions.
EMERGENCY PREPAREDNESS: ARE YOU READY?

Lauren Jones  
Department of Radiological Sciences  
Faculty Sponsor: Dr. Sarah Toevs

The purpose of this study was to assess the level of awareness of emergency preparedness recommendations among a convenience sample (n= 107) of participants attending the Boise State University REACH Health Fair. The average age of the participants was 41 years-old, predominately female (63.6%) and not students (67.3%). The survey was distributed from a booth sponsored by the Idaho Public Health Association designed to provide information on the Get Ready Campaign. The Get Ready Campaign, initiated by the American Public Health Association (APHA), is focused on encouraging people to be prepared in the event of an emergency. Preliminary results indicate that 39% of those surveyed reported that they were “aware” or “very aware” of the supplies and food one should have in their home in the event of an emergency. In addition, 34% reported that their households were “prepared” or “very prepared” in the event of an emergency and 76% indicated that the internet was a major source for information on how to make their household safer. The findings from this survey will be shared with the staff at BSU Health, Wellness and Counseling, members of the Idaho Public Health Association, and the Central District Health Department for use in program planning and implementation related to emergency preparedness.

GROWTH AND DEVELOPMENT AMONG TODDLERS AND PRESCHOOLERS IN THE FOSTER CARE SYSTEM

Jessica Nelson  
Department of Nursing  
Faculty Sponsor: Dr. Jeri L. Bigbee

Purpose/Aims: The purpose of this study was to evaluate growth and development among toddlers and preschoolers in the foster care system. 
Background: Toddlers and preschoolers in the foster care system are at high risk for growth problems and developmental delays. Healthcare providers assessing and treating these children may not have the specialized knowledge and/or background for identifying problems, so children may not be identified early and may not receive necessary interventions. The Ellen Marie Pediatric Unit (EMPu), established by the Boise State University Department of Nursing in collaboration with the Idaho Department of Health and Welfare District 3, is a screening clinic providing health assessments for foster children entering the foster care system in southwest Idaho. 
Methods: A retrospective study was implemented as part of a larger evaluation study, using chart reviews of all toddlers and preschoolers (defined as age 12-60 months) seen at the EMpU between March and September, 2008. This analysis focused on the following variables: height, weight, and body mass index (BMI) percentiles, development assessment results, ethnicity, age, and gender. 
Results: A total of 12 records were reviewed. The clients ranged in age from 12-56 months with a mean of 31 months. There were 7 (58%) females and 5 (42%) males. The ethnic distribution was as follows: 75% Caucasian, 8% African American, 8% Native American, and 8% Hispanic. One third of the sample were developmentally delayed, based on the developmental assessment results. The most common developmental delays were language delays (67%), and gross motor delays (33%). Growth assessment results indicated that the average BMI was in the 32nd percentile, the average height was in the 40th percentile, and the average weight was in the 29th percentile. Seventeen percent of the sample fell below the third percentile and 8% were above the 95th percentile for weight and/or height. 
Implications: These findings support previous research indicating that toddlers and preschoolers in the foster care system are at high risk for growth and development delays. Early identification and treatment are key to healthy outcomes. Limitations of this study included the small sample size and limited data particularly related to BMI’s. Continued utilization of specialized programs focusing on the assessment and management of the health of this high risk population is needed. 
Funding provided by the Jody DeMeyer Endowment and the Boise State University Department of Nursing.
Nursing Students and Technology: Is Virtual Simulation Feasible?

Craig Stevens
Department of Nursing
Faculty Sponsor: Kelley Connor, MS, RNC and Maximilian Veltman, PNP, MSN

Purpose: Simulation learning scenarios are increasingly utilized in nursing education as a way for students to gain experience taking care of patients. Virtual reality is a developing technology where students can participate in nursing simulation scenarios. Student accessibility to virtual reality technology is a potential barrier for implementing this teaching-learning tool. This project will assess the technology needed for virtual reality nursing simulations and the technology available to students enrolled in nursing classes at Boise State University.

Background: There are several virtual reality platforms currently available for instructor-student use, however, Second Life is currently the largest and most well developed. Simulation scenarios can be developed for a traditional lab setting and modified to be used in Second Life. The learning objectives, scenario flow, and debriefing questions remain the same; it is the environment that students participate in that is different.

Description: Based on Second Life technology requirements, a survey was developed to measure students’ technology resources, their experience with Second Life, their computer comfort level, and some basic demographical information. Third semester nursing students will be asked to complete an anonymous paper copy of this survey. All other students will be able to complete an anonymous online survey from the department website. Third semester students were selected to complete a paper survey because they will be invited to participate in a Second Life nursing simulation pilot project in the fourth semester.

Importance: Virtual reality simulation scenarios allow for the creation of learning opportunities for students that are not possible in a lab setting. In addition, virtual reality simulations are not limited to students and faculty located in close geographic proximity to each other. In order to utilize virtual reality simulations, faculty must be aware of students’ access to technology and their experience with this type of environment. The results of this survey will allow faculty to better understand how the availability of technology will affect the potential use of a virtual reality simulation related to nursing education.

Funding provided by the Jody DeMeyer Endowment and the Boise State University Department of Nursing.

Descriptive Comparative Secondary Analysis of the Somali Bantu Population in Africa vs. Boise

Vanessa Grote
Department of Nursing
Faculty Sponsor: Kim Martz, MSN, RN

Background: In the early eighteenth and nineteenth centuries, the Bantu were brought as slaves from Tanzania and Mozambique to Somalia. In 1991, a civil war in Somalia displaced the Bantu to Kenyan refugee camps. In 1999, the Bantu people were considered “persecuted” due to the dangers and mistreatments of the camps as well as the violence that they faced in their homeland. They are now in the process of migration to the US, and into Boise. There are an estimated 40,000 Somali refugees within the US, and Boise is home to approximately 261 individuals.

Purpose: The purpose of this descriptive secondary analysis is to provide insight to this population that currently resides in Boise, ID. This review will support evidence of the lives and culture of the Somali Bantu in Africa compared to their transitions into life in Boise, ID.

Methodology: The descriptive analysis will be completed through a literature review, and a comparative secondary analysis of the data that the Boise State Research team has regarding this population here in Boise.

Implications: This comparative analysis will illuminate the similarities and differences of the Somali Bantu, and will promote a greater understanding of the transitions and adaptations they have had to make to their own culture, and how that may effect this population. The information will be disseminated in hopes of promoting more effective care of the Somali Bantu people.
**Transitioning Rural Graduate Nurses Into Practice**

*E’Raina Hatch, Mary (Mim) Randall, Helen Ryan, Heather Taylor*

*Department of Nursing*

*Faculty Sponsor: Dr. Cynthia Clark*

**Purposes/Aims:** With no end in sight for the nation’s nursing shortage, hospitals are directing greater attention toward recruitment and retention of graduate nurses. Qualified nurses are needed in health care facilities throughout the country, including rural hospitals. A lack of qualified nurses and geographical disparities in rural health care play a major role in the delivery of quality patient care.

**Rationale:** Recruitment and retention of qualified nurses in rural areas is essential. This project poses recommendations for a transition model for graduate nurses entering practice in rural Idaho hospitals.

**Methods:** Following a review of the literature, Chief Nursing Officers (CNO) from four rural Idaho hospitals and two community consultants were interviewed to identify the unique issues related to recruiting, transitioning, and retaining new graduate nurses into rural settings.

**Results:** The authors present a home grown transition model designed to prepare clinically autonomous and competent graduate nurses into rural settings. A home grown transition model with comprehensive preceptorships and mentorships with seasoned nurses will increase patient safety, quality patient care, and graduate nurse retention.

**Implications:** Recruiting new nurses from the communities where they reside will enhance recruitment and retention and will promote a new direction for clinical practice for graduate nurses in the rural settings. Creating transition programs that mentor new graduates will bring new opportunities for nursing practice in rural settings.

**Principle Investigator:** Dr. Cynthia Clark

**Title:** Transitioning Rural Graduate Nurses into Practice

**IRB Approval Number:** EX 187-09-074

**Federal Wide Assurance Number:** 0000097

**Review:** Exempt

**Protocol Annual Expiration Date:** February 18, 2010
2008 Archaeological Excavations at Three Island Crossing

Juli Walker and Dianna Bentley
Department of Anthropology
Faculty Sponsor: Dr. Mark Plew

Three Island Crossing (190EL0294) is located along the Snake River near Glenns Ferry, Idaho. It is situated near the Three Island Crossing on the Oregon Trail. Boise State University conducted excavations at the site in 1986 and 1987. These excavations documented three Late Archaic occupations dating during the past 1500 years. Evidence of multiple occupations/uses of the site is documented by the recovery of more than 1400 prehistoric artifacts, and the excavation of a structure and storage pits. The site produced the largest assemblage of fish remains (salmon) from any Snake River site. In 2008 the site was revisited in an effort to assess the extent to which the site area extended to the east along the Snake River. Analysis of the material culture remains indicate that the area studied in 2008 is likely on the periphery of the greater site area.

Violent Death in Northern Siberia: Application of Evolutionary Hypotheses

Alex Blake and Betsy Venard
Department of Anthropology
Faculty Sponsor: Dr. John P. Ziker

Evolutionary adaptations are traits which persist because they effectively increase the fitness, reproductive success, of the individual over a lasting period of time, under a given set of environmental conditions. Certain behaviors in humans may be linked to such fitness-related adaptations. One trajectory of evolutionary behavioral theory seeks to understand the role of violent behaviors in mating relationships among humans (Daly and Wilson, 1993). It has been proposed that coercive violence represents an evolved trait in males which in past times may have effectively increased the likelihood of fidelity, and thus certainty of parentage. Avoiding cuckoldry, the unwitting investment in offspring that are not one's own, is one possible fitness-related benefit of this trait. The aim of this research was to test specific hypothesis relating to this theory. Information from two censuses (1997, 2007) taken in Ust-Avam, in Siberia, Russia, was used to gather data on the reproductive success, age, and relative-relatedness of females who had died violently. Our findings included a trend toward lower numbers of offspring for women who died violently. We argue that lower numbers of offspring may serve as a cue for reproductive potential (RP), thus we fail to reject Daly and Wilson’s hypothesis that women with higher RV would be more susceptible to violent acts. Further, we found a trend of decreased local kinship ties for those women who died violently. Two measures of relatedness—absolute number of immediate kin (immediates) and average consanguineal relatedness to all community members (FgAll)—were not statistically significant due to our limited sample size, but clearly show a trend expected in Daly and Wilson’s hypothesis that increased kinship networks reduce female susceptibility to male perpetrated violence.

Dani Subsistence and Environmental Adaptations

Michael Stadther, Adrienne Hall, Kellie Joyce, and Kat Zeck
Department of Anthropology
Faculty Sponsor: Dr. John P. Ziker

The spread of western civilization and industrial societies in the last century have lead to the disruption of many cultural systems of tribal peoples who only recently have been contacted. Such outside influence has lead to the alteration and/or destruction of many environments across the globe. One society which has managed to resist outside influences are the Dani, a people living in the central highlands of Papua New Guinea. These intriguing peoples have developed and maintained, through religious beliefs, subsistence strategies, and political and economic systems, a relationship with their environment which has lead to optimization of tropical rainforest resource use with no seasonality and low levels of diversity. Their resistance to outside influences by Christian missionaries beginning in the 1960’s has allowed the Dani to maintain their traditional life ways and as a result their environment and ecosystems have remained relatively unchanged.
**Hmong Agriculture and Conservation in Northern Thailand**

Kayla Dawson, Chris Robison, and Joe Hackman  
Department of Anthropology  
Faculty Sponsor: Dr. John P. Ziker

The purpose of this research was to understand the agricultural innovations of Hmong farmers in Northern Thailand, and how these innovations were brought about as a result of national development programs and international movements regarding opium eradication and environmental conservation. The history of the Hmong, along with their human-environmental interactions, have shaped their perceptions about conservation and facilitated an intense involvement in conservation efforts. The methodology used was a survey of the relevant ethnographic work and other published materials on the history of the Hmong, their economic interactions as well as their traditional agriculture known as swidden cultivation. We looked at some of the specific conservation efforts in which they have been involved, within Northern Thailand, and concluded that local people do in fact play an important role in global conservation movements while still maintaining their cultural identity.

**Koyukon Issues of Conservation and Sustainability in the 21st Century: Struggling to Preserve Cultural Heritages**

Christiane Campbell, Bill Holland-Smith, and Michelle Rosenberger  
Department of Anthropology  
Faculty Sponsor: Dr. John P. Ziker

This research examines the impact of statehood, on the traditional subsistence patterns and practices of the Koyukon, a northern Athapaskan people of interior Alaska. We used existing ethnography, as well as a recent visit by one of our members, to provide insight into the Koyukon’s complex belief system and their seasonal hunting, fishing, and game selection practices. We looked at the effects of designation of wildlife refuges and national parks encompassing large tracts of historic Koyukon hunting and fishing territories. The Koyukon have a broad perspective on the entire social-ecological system, including history and political landscape. For the Koyukon, subsistence is related to the larger political, spiritual, epistemological settings of their lives and their culture. We make a comparison of our ethnographically enriched political ecological model of Koyukon resource use and settlement with Lewis Binford’s (1980) Forager-Colllector model. Koyukon political economy incorporates traditional strategies in a modern context and local attempts to preserve their cultural heritage. The Koyukon, provide a unique opportunity to study a group with a rich and expansive knowledge of their history, culture and traditional patterns of subsistence. These topics are not merely academic interests, but vital to their daily lives.

**Private Property Versus Collective Property in Rural Hungary: A Test Case for the Anthropology of Sustainability**

Paige Fetzer  
Department of Anthropology  
Faculty Sponsor: Dr. John P. Ziker

My research investigated land privatization in post-socialist Hungary and the effect of this property regime change on resource use and land production efficiency in rural communities. I developed models that illustrate the changes in land distribution as a function of the change in government policies on property and food distribution/markets. I reviewed literature and case studies focused on the transitional use of resources for the area, specifically during the privatization of land. The research addressed the question of whether privatization of land affected resource use by 1) degenerating the land or 2) by reducing the productive efficiency of the area as predicted by Garrett Hardin’s “Tragedy of the Commons” and Marginal Value Theorem, respectively.
**FIRST IMPRESSIONS: THE FACTORS OF INFLUENCE**

Taylor Dury, Keith McGowan, Danika Kramer, Cassie Lovejoy, and Diana Ries  
Department of Communication  
Faculty Sponsor: Dr. Laurel Traynowicz

First impressions of women are formulated from observable characteristics that convey messages about their personality characteristics and demeanor. Hair, clothing, posture, smile and eye contact are a few examples of the factors that influence these perceptions. Impression management is important not only because judgments are made in a quick and permanent manner, but they may also affect the future of a relationship before it has even started. The purpose of this study was to determine the specific factors that influence the first impressions of women, as well as the messages each of these factors convey. To collect data during the research of this topic, students at Boise State University over the age of 18 were asked to either complete an online survey or participate in a personal interview. Both methods led respondents to list or discuss elements that influence the formulation of opinions about women in five different categories: intelligence, confidence, sociability or friendliness, trustworthiness or honest and physical attractiveness. The study was limited by respondent fear of judgment and a topic scope that was larger than anticipated; however, the results of this study revealed that (a) as a whole, first impressions are influenced by nonverbal communication and body language more than clothing, hairstyles and accessories, and (b) first impressions cannot be scientifically determined due to the highly subjective nature of the elements of social desirability.

**VIDEO GAMES AND THE SEXES: A LOOK AT THE SEXES AND HOW THEY UTILIZE VIDEO GAMES**

Linsey Saras, Darcy Sullivan, Geo Sanchez, and Matt Sebby  
Department of Communication  
Faculty Sponsor: Dr. Laurel Traynowicz

Using the student population at Boise State University, surveys were conducted to gather information on the positive aspects of video games among male and female students. Using surveys, students could fill out online through the use of Qualtrics, as well as having participants filling out paper surveys; we had a total of 82 complete responses (56 men and 26 women). Participants were asked about their age (average: 25.59 men and 23.27 years women), how long the respondents had been playing video games (both males and females have over 10 years), and how many hours each participant played video games during a day (average: men 1.68 hours per day and women played for 1.26 hours.) Special attention was paid to game selection and the gratifications and rewards associated with playing video games. The results indicate that the top two gratifications/rewards that men and women gain from playing video games is for the arousal (men 4.23 and women 3.77) and social interaction (men 3.75 and women 3.96). The result for game selection shows that the top three games genres selected by men are shooter, action/adventure and sports games. The top three game genres for women were puzzle, racing/speed games and arcade games. Additionally, the games were coded for aggressiveness, as well as ranked the categories based on the types of games that existed within the category and their potential for aggressiveness. The aggressiveness of the top three games, based off of our code (#1-most aggressive through 10-least aggressive), for males was shooter (#1), action/adventure (#3) and sports games (#6). For the women puzzle (#10), racing/speed games (#7) and arcade games (#8). After analyzing the content of our results, our basic assumptions about men and women in reference to game selection and the correlation of violence/aggression in the games compared to the sex of the player was supported by our research.
**Bullet Lead Analysis: Unreliable and Potentially Misleading**

*Sally Studnar*

*Department of Criminal Justice*

*Faculty and Staff Sponsors: Dr. Greg Hampikian, Biology and Criminal Justice; and Richard Visser, Assistant Director of the Idaho Innocence Project*

Comparative Bullet Lead Analysis (CBLA) is a forensic technique that utilizes analytical chemistry to identify amounts of trace elements such as copper, arsenic, antimony, and tin within bullets. These tests are performed to link crime scene bullets to other bullets possessed by suspects. The analysis is based on the theory that every batch of lead has a unique elemental makeup. These assays are typically employed when the firearm involved in a crime has not been recovered or when the physical markings of a fired bullet are too mutilated for comparison. This technique was introduced after President John F. Kennedy’s assassination in 1963 and has since been used in approximately 2500 cases by the FBI. However, in 2002, the FBI asked the National Research Council (NRC) to evaluate the scientific basis of comparative bullet lead analysis. The NRC concluded that variations in the manufacturing process of ammunition rendered the science “...variations among and within lead bullet manufacturers make any modeling of the general manufacturing process unreliable and potentially misleading in CABL comparisons.”

This study examines: the scientific history of CBLA as well as its history in the courts. These findings are being used to examine several Idaho criminal cases where CBLA played a key role.

1. FBI Laboratory Announces Discontinuation of Bullet Lead Examinations; Sept. 1 2005. www.fbi.gov/pressrel/pressre105/bullet_lead_analysis.htm


**Evolving Perceptions of American Nature: The Sagebrush Rebellion and the Struggle to Find Common Ground**

*Dane Vanhoozer*

*Department of History*

*Faculty Sponsor: Dr. Lisa Brady*

Americans’ perceptions of nature determine in what ways they physically interact with their environments. Conversely, the visible consequences—positive and negative—of peoples’ physical relationships with nature serve as catalysts for fundamental shifts in how nature is intellectually experienced. Due to this fluid and personal process, legislating the appropriate use of the nation’s land has been a constant source of dispute. Therefore, it is important to evaluate how these perceptions have evolved and expressed themselves through federal land policy. The Sagebrush Rebellion of the late 1970s was aimed at transferring federal lands to state and private ownership; it was a unique reaction against the challenges environmentalism made to the widely held philosophy of conservation. Research into primary literature concerning the rise of conservation in the late 19th century formed the cornerstone of this project. An explanation for the emergence of the Sagebrush Rebellion was established by comparing and evaluating conservation’s precepts with those of environmentalism, which gained ascendancy in federal land policy in the 1960s. Comparative analyses of numerous primary and secondary sources identified the causes and historic significance of the Sagebrush Rebellion. This political movement illuminates the variables at play in the struggle to achieve balance between conservation’s emphasis on land development and resource exploitation and environmentalism’s insistence on preservation. Ultimately, the Sagebrush Rebellion emerged in response to and as a result of intellectual evolutions in American perceptions of nature and their expression in federal land management policy.
**NEW FORENSIC ART TECHNIQUES: WHAT IS ALLOWED IN COURT?**

Sherri Burnett  
Department of Criminal Justice  
Faculty and Staff Sponsors: Dr. Greg Hampikian, Biology and Criminal Justice; and Richard Visser, Assistant Director of the Idaho Innocence Project

A working definition of forensic art is any art that aids in the identification, apprehension, or conviction of criminal offenders, or that aids in the location of victims or identification of unknown deceased persons. These techniques have been used in courts since the earliest days of police sketch artists. Newer techniques rely on sophisticated computer programs as well as sculptural interpretations of data. For example, data on craniofacial growth is essential in forensic age progressions, but in the end the final rendering is still in the hands of an artist. All of this must be taken into account by the judge who is the final arbiter of whether such evidence can be used in court. This study presents a summary of new techniques, and the court’s reaction to these novel combinations of art and science.

1. Taylor, Karen A. “Forensic Art and Illustration” 2001

**THE UTILIZATION OF FAMILIAL DNA SEARCHING IN CRIMINAL CASES: FINDING CLOSE RELATIVES OF THE PERPETRATOR**

Janet Nutting  
Department of Criminal Justice  
Faculty and Staff Sponsors: Dr. Greg Hampikian, Biology and Criminal Justice; and Richard Visser, Assistant Director of the Idaho Innocence Project

Familial DNA searching is an effective but controversial new forensic tool. It allows law enforcement to use criminal databases to search for relatives of someone who left an unidentified DNA profile at a crime scene. When a complete DNA match cannot be found, this technique is used to find imperfect DNA matches to people who may be close relatives of the perpetrator such as a parent, sibling, or child. This method can be effective because forty-six percent of prison inmates have a least one relative who has been in prison. However, not all crime labs are using this method for solving cold cases, and serious civil rights questions have been raised about it. This report assesses the use of this practice throughout the fifty states, as well as its application in international labs, and includes a survey of the software used by responding agencies.


**PRESIDENT-ELECT BARACK OBAMA’S RISE TO POWER IN THE DEMOCRATIC PARTY**

Nolan Wittrock (Honors College)  
Department of Political Science  
Faculty Sponsor: Dr. Ross E. Burkhart

My project will be a research paper that analyzes the events surrounding the 2008 Democratic Primary Election. The paper will focus on the rise of Barack Obama in the Democratic Party, from his status as a relatively unknown junior senator to the top of the Democrat ticket. It will discuss the shift in support from candidate Hillary Clinton to President-elect Obama by analyzing various aspects of the primary election cycle, including such items as campaign strategies, fundraising tactics, the public interest, and internal Democratic Party politics. It will also include a more general discussion of presidential primary politics and the primary and caucus systems to provide background and context for the 2008 race.
**Motor Scooter Legislation: Is it Adequate at Protecting Idaho’s Roadways for all Users?**

Michelle O’Brien  
*Department of Political Science*  
*Faculty Sponsor: Dr. Elizabeth Fredericksen*

This proposal considers the growing use of motor scooters as a means for transportation in Idaho. Verbal reports from law enforcement officers around Southern Idaho indicate a rise in usage and accidents involving scooters. This may be due to several factors including lack of training, experience and licensing. This issue requires research to analyze whether there is a correlation between the increase of accidents involving motor scooters, an increase of the population using motor scooters and a lack of experience, training or appropriate driving endorsements. According to laws and statutes in Idaho, drivers must have an “M” endorsement on their driver’s license to operate a scooter/motorcycle on public roadways if said vehicle is over 50cc’s. This research also necessitates examining Idaho's laws and statutes to evaluate if motor scooters need to be differentiated as a sub-group from motorcycles or if Idaho would be better served by breaking motor scooter and motorcycles apart by cc’s and maximum load capacities. This research will also consider accident or traffic stop frequency associated with people who do not have the appropriate endorsement, insurance and are following current statutes. Findings from this project will be used to develop a grant application intended to support law enforcement agencies in efforts to enforce the laws requiring the appropriate endorsement for motor scooter users, adequate levels of insurance, and training.

**The Effects of Trauma, Dissociation and Gender on Emotion Regulation**

Sierra Clifford, Tess Grover (Honors College), and Nik Silveira  
*Department of Psychology*  
*Faculty Sponsor: Dr. M. Rose Barlow*

Individuals faced with traumatic experiences may develop strategies to minimize or avoid powerful negative emotions. Such strategies might involve more focus on control and monitoring, or detaching from emotional events. Psychology 101 students completed a variety of self-report measures of emotion regulation, as well as measures of trauma and dissociation. The first hypothesis was that trauma would be correlated with increased use of thought control, while dissociation would be correlated with strategies emphasizing emotional control, emotional avoidance, and distraction. The second hypothesis was that men would rely more on these emotional avoidance strategies than women, which could imply gender differences in coping with trauma.

**The Importance of Actively Dealing With Stress**

Lindsey Ward, Kelsy Newton, and David Martin  
*Department of Psychology*  
*Faculty Sponsor: Dr. M. Rose Barlow*

Stress plays a large part of college life. To understand the reasons for stress, this study examined aspects that either decrease or increase the frequency of stress in Psychology 101 students. The study demonstrated that the frequency of stress responses was lower as students actively deal with stressful thoughts. This meant that a negative correlation was found between the Metacognitions Questionnaire - which measured the frequency of stress responses, and the Thought Control Questionnaire - which measured individuals “ways of dealing with stressful thoughts.” A positive correlation was found between the experienced trauma and the frequency of stress responses in students’ lives. The Impact of Events Scale
Promiscuity and GPA: Does Hooking up Interfere with Higher Education?

Ian Mosley (McNair Scholar)  
Department of Psychology  
Faculty Sponsor: Dr. Eric Landrum

Recent research has focused on the possible reasons behind, or emotional consequences of, casual sexual behaviors among college students. In an effort to measure actual quantitative consequences of casual sexual behavior, seventy-four college students were surveyed about their sexual behaviors to determine if casual sexual conduct has an effect on GPA. A 221 question omnibus survey was administered to students in an introductory psychology class at a northwestern university. The final analyses found no significant connection between casual sexual behaviors and GPA. Those respondents who reported a higher number of lifetime sex partners also reported more problems in their academic lives. This contradictory information emphasizes the need for future research into the consequences of casual sex behavior among college students.

Friendship Quality and Interparental Conflict as Predictors of Relationship Status

Andrea Phillips  
Department of Psychology  
Faculty Sponsor: Dr. Eric Landrum

In order to fulfill the requirements of a psychology research methods course in the 2008 fall semester, I designed and implemented a survey-style study. This study examined the importance of friendship quality, parental marital status, and interparental conflict on young adult romantic relationships. Eighty-three general psychology students took surveys about current relationship status, friendship quality, and observed interparental conflict. Results show that there is a strong correlation between friendship quality and the length of participants' relationships. There is also a significant difference between males and females regarding how often they talk to their friends. There is a significant negative correlation between talking to friends and how often participants fight with their partners. Results also indicate that participants who report experiencing more interparental conflict growing up are likely to fight more often in their current relationships than those participants who reported relatively less interparental conflict. The implications for parents understanding the impact of their own conflict on the later relationships of their children are discussed.

Intrinsic and Extrinsic Motives for Exercise

Sara Burrington  
Department of Psychology  
Faculty Sponsor: Dr. Eric Landrum

Obesity in America is becoming a more prevalent issue within today's society. The purpose of this study was to see what the connection was between people's intrinsic and extrinsic motives to exercise. This study surveyed 74 Boise State University students on physical, social, and health related aspects of wellness. It was hypothesized that people would be more intrinsically motivated to exercise for reasons other than social and physical motives, such as health. In opposition to my hypothesis, the results indicated that there was no relationship between people that exercised for intrinsic motives and their body mass index (BMI), which was my way of measuring health. Further studies should take into consideration the workout frequency and duration to get a better overall assessment of wellness. Also further studies should look into the use of self-determination theory to better understand the relationship between exercise and psychological well-being (Maltby & Day, 2001). In the end, the study provided information about gender differences and body image.
**The Effects of Addiction Awareness and Personal Behavior**

*Brittany Whitman*

*Department of Psychology*

*Faculty Sponsor: Dr. Eric Landrum*

The present research examined the significance that addiction awareness has on personal behaviors in college students. Students (N = 91) received a survey, answering questions on their personal addictive behaviors and their own knowledge of family history with addictions. The results indicated that college students do not participate in risky behavior to alleviate stress and most students are aware of their own personal limits, which are correlated to their knowledge of family history and verbal communication about addictions. This suggests that there is importance in discussing history of addictions and being aware of your personality traits that may cause a long life filled with addictions. The importance of these factors is discussed and the negative consequences if the subject of addictions is avoided. The present research contradicts previous research done, as there seems to be a problem with avoidance and further growing addiction problems. Historically, research has been done to indicate that college students have a reckless mannerism and that the decisions they make can become habitual and have an impact on their later lives.

**The Effect of Parental Financial Support on College Level Academic Performance**

*Linzy Self*

*Department of Psychology*

*Faculty Sponsor: Dr. Eric Landrum*

The subject of parental financial support and how it affects college level grade point average is important to many people. The first hypothesis of this study is that those students whose parents provide more financial support will have the higher grade point averages. The second hypothesis is that these students will also not have the financial strain and stress on them that working, and paying for their own expenses may cause. Data was collected by survey from general psychology students. The data were analyzed and a correlation between GPA and financial support was insignificant. The initial hypothesis was tested and this information used to support the current literature. After the analysis of the data the hypotheses were found to be insignificant. However, the findings of this study are still important to the current body of literature. It is important because a study like this has not been done and it provides a starting off point for future researchers.

**Transition After High School: Should Everyone Be Encouraged To Go To College?**

*Jennifer Ross*

*Department of Psychology*

*Faculty Sponsor: Dr. Eric Landrum*

This study examines the motivating factors and demographics for students pursuing a post-secondary education. College was once thought to be only for people of a particular social class or those with college-educated parents. The current expectation is all students, even those with low academic achievement, are expected to go to college. Ninety-five percent of high school graduates are college-bound, yet less than one-third have a bachelor’s degree or higher by age 30 to 34 according to James E. Rosenbaum, author of the book Beyond College for All: Career Paths for the Forgotten Half. The data presented in this article was collected from surveys completed by 74 general psychology students at Boise State University. The results indicate that college students are not necessarily from a high or middle socioeconomic status. Adolescents are more likely than their parents to enroll and attend college, regardless of their parents’ education level. According to research from Jacquelynne Eccles, Mina N. Vida, and Bonnie Barber, students enrolled full-time at age 20 were from families with higher incomes and whose mothers were more educated. My data contradicts this finding because parental education levels had no influence as to whether the adolescent
attended college. More research is needed to find the motivating factors for adolescents pursuing a post-secondary education and recommend research study the influence teachers, counselors, and parents have on encouraging young children and adolescents to enroll and attend college.

**Attachment Style and Pet Bonds**

*Cory Hutchinson*  
*Department of Psychology*  
*Faculty Sponsor: Dr. Mary Pritchard*

The purpose of the present study is to examine the relation between a person’s attachment style and their relationship with their pet. Attachment Theory suggests that how an individual attaches to one or both parents in childhood can become the working model for future adult relationships. Arguing that the human-animal relationship is an adult relationship and applying Attachment Theory to the human-pet relationship, this study begins this important work by determining if there is a correlation between adult attachment style and how humans tend to relate to companion animals. Data collection is currently underway; the study will ultimately have 400 undergraduate participants from Boise State University. Data were collected anonymously using the Qualtrics survey software program. The surveys used were the Lexington Attachment to Pet Scale, Inventory of Parent and Peer Attachment, and the Childhood Pet Ownership Questionnaire. These questionnaires had been previously tested and were combined in a survey that took approximately 30 minutes to complete. Results will include an analysis of mother-child attachment as it relates to attachment to pets as well as father-child attachment as it relates to attachment to pets.

**The Social Construction of Gender: Attitudes on Sexual Assault**

*Christine Fuller*  
*Department of Psychology*  
*Faculty Sponsor: Dr. Eric Landrum*

The present research analyzes men and women’s attitudes on sexual assault. The purpose of this research is to examine attitudes to gain understanding about the existence and perpetuation of rape cultures on college campuses. Clearer understanding of students’ attitudes about sexual assault will allow college campuses to create and implement more comprehensive sex education programs. For this study 74 participants from Boise State University who were enrolled in general psychology in the fall semester of 2008 assisted in gathering information. Participants received a survey questioning their personal opinions on sexual assault, sexual coercion and the phenomena of victim blaming. The survey questions were created entirely by the author. These questions were formed from a literature review and pilot tested prior to the experiment. Participants were given 50 minutes to complete a 221-question survey. The questions in Table 1 were part of the larger survey. As the participants completed they were thanked for their service and debriefed. The results were measured using an independent means t test and correlation analysis. The results indicate that there is a positive correlation between men and women’s attitudes on sexual assault, sexual coercion and victim blaming. There is also significant evidence from the results of a lack of understanding by men and women on sexual consent and sexual coercion. This suggests a need for more comprehensive sex education programs. Understanding men’s and women’s attitudes and behaviors in regards to sexual assault provides educators evidence to develop a variety of approaches to educate students about these issues. This studies intention is to expand the research on sexual assault. Creating awareness of gender attitudes is critical in reducing the existence of rape cultures on college campuses.
Rates and Effects of Television Consumption in College Students

Jett Field  
Department of Psychology  
Faculty Sponsor: Dr. Eric Landrum

Television addiction is a relatively unknown problem that many people struggle with that currently has only limited research and support. Many cases of possible television addiction go undiagnosed largely due to lack of definition and study on the matter. Few studies have created an in depth model of what the definition of dependence is with regards to television usage, both in terms of time spent as well as content. Confounding the issue is the fact that unlike many other addictions, this problem is seen as an issue of self control and personal discipline rather than focusing on the reasons why viewers log so many hours in the first place and what can be done to curb consumption. Although the purpose of this study was only to speculate on the matter, it attempted to find relationships between subjects who self reported moderate to high television usage with lowered college GPA scores and a tendency to keep later personal hours than those who report lesser amounts of viewing times. Indeed, relationships were found for television usage and GPA scores, and data suggests a relationship could possibly exist between usage and personal hours kept. The primary assertion that the data provides for is that there are connections between television usage and personal behavior, and that much more research and resources need to be made available and applied to diagnose and classify levels of dependence and more wholly understand the mental processes of television dependence and addiction.

Ideas on the Definition of Binge Drinking and Its Prevalence Among Students

LaLania Woodstrom  
Department of Psychology  
Faculty Sponsor: Dr. Eric Landrum

Binge drinking is a widespread problem among many groups. The aim of this study was to look at differences among gender and Greek and athlete members versus non-members. Another aim was to see if those who drink more in one session define binge drinking in larger amounts, as well as consider themselves to be binge drinkers. Ninety-one students, from the general psychology classes, were surveyed and results showed that there were no significant differences among gender and Greek and athlete members versus non-members. Also found was those who drank more defined binge drinking in larger amounts and also were more likely to consider themselves to be binge drinkers, whereas those who drank less defined binge drinking in smaller amounts and were less likely to consider themselves binge drinkers. Though binge drinking is seen as a problem on many campuses, it does not appear to be a problem on the Boise State campus among any of the groups studied. This study showed that 71.7% of the students surveyed did not even meet the criteria for binge drinking. With this said, one aspect of this research brought up the question of a universal definition of binge drinking which may provide a better analysis of research done on binge drinking. Doing this may provide more comparable and reliable research for in the future. And this, in turn, may help researchers get a better grasp on the problem of binge drinking, especially among college campuses.
**The Importance of Studying Stigma in People with Epilepsy**

_Caitlin Farber_
_Department of Psychology_
_Faculty Sponsor: Dr. Eric Landrum_

The present research examined the importance and value of both stigma against individuals with epilepsy and knowledge of the disorder. Participants (N = 70) received a survey questioning their personal opinions on stigma toward epilepsy. Of these participants, 69 individuals answered that they did not have epilepsy and one participant abstained from answering. These participants were psychology students enrolled in a general psychology class at Boise State University. The ages of the participants ranged from 17 to 42, and were self-selected using a program called Experimetrix. The goal of this study was to determine the frequency of negative stigma and assess college student opinions toward individuals with epilepsy. The majority of the people who participated in the study were well educated on the disorder (90%). The results indicated that there is a significant difference between not knowing an individual with epilepsy and presumed stigma. In addition, there was a significant difference between persons who know an individual with epilepsy and higher quality of life in persons who have been diagnosed. This difference suggests that knowing individuals with epilepsy contributes greatly towards positive attitudes of the disorder. The outcomes of the study stress the importance of gaining and continuing education on epilepsy as well as positively influencing the quality of life to those who have been diagnosed. This study also highlighted the importance of knowledge and interaction and shows that education and personal relationships with people with epilepsy play a large role in positive attitudes toward the disorder.

**The Relationship Between Student Textbook Preferences and Learning and Grade Orientations**

_Nathan Spann (Honors College) and Kelti Baker_
_Department of Psychology_
_Faculty Sponsor: Dr. Eric Landrum_

Introductory psychology is one of the most populated courses in psychology departments nationally. Given this important learning opportunity for so many students, it would be beneficial to understand how textbook use is related to student attitudes about learning and grades. A key question of interest was to understand how student preferences for textbooks are related to their learning orientation and grade orientation. Once enrolled in our study, students were provided a link to an online Qualtrics survey where the textbook preferences were provided. In addition, students completed the LOGO to measure orientation (Milton, Pollio, & Eison, 1982) as well as other demographic items. LOGO results were correlated with each of the 9 subscales yielded by the textbook preferences instrument. Our interest was in those subscales in which there were positive correlations for both learning oriented attitudes and grade oriented attitudes. By identifying this pattern of results, we can better understand those factors that most widely appeal to a greater number of students. For each of the following subscales, we provide the correlation coefficient for the learning oriented attitudes (LOA) score and the grade oriented attitudes (GOA) score, respectively: like the book due to applicability and convenience, 0.41, 0.28; like the book due to its accessibility, 0.22, 0.24; use book for study aids, 0.39, 0.28; use book because of instructor use, 0.24, 0.19; use book because it is easy to use, 0.44, 0.38. All correlations were significant at p ≤ .01. Based on the results of this research, a textbook which encompasses the five key factors from above is more likely to appeal to a greater number of students; developers of introductory psychology textbooks may want to hold these five subscales ideas as paramount as they think about how to reach the widest number of students.
**Effects of Caffeine on Learning Abilities of College Students**

*Savvas Diakonikolas*

*Department of Psychology*

*Faculty Sponsor: Dr. Eric Landrum*

The present research examined the importance and value of caffeinated products on learning abilities of general psychology students at Boise State University. Individuals (N = 70) received a survey questioning their personal opinions on if caffeinated products can improve the students’ learning abilities, increasing the GPA and the mentality. The students ranged in age from 17 through 42 (M = 20.17, SD = 4.74), both males and females. The products which students use are general coffee drinks, soda drinks, energy drinks and energy shots. The results indicate that there is no significant difference between genders’ ability for improving their learning abilities using caffeine products according a t test. However, percentages of students believe according to the results that caffeine helps to improve their learning abilities and have better GPA (total 30.0%). Also, a significant difference between males’ (M = 0.42, SD = 0.78) and females’ (M = 0.88, SD = 0.89) perceptions regarding caffeinated products which extent their studying hours exist, t (64) = 0.04, p ≤ 0.05. This suggests that males use caffeine to extent their studying hours differently than females. In this study, the more caffeine use from students before studying, the higher the value, satisfaction, and intimacy to extend the studying time. This research supports that caffeine products extend the studying time. According to the data, both of the predicted hypotheses did not state in this study, however the most important parts of the study is the percentages using the frequency scale for some items that caffeine products help students to improve learning abilities and mentality before a quiz, a test or an exam. This research stresses the importance of the effects of caffeine on students’ learning abilities. This study continues the research which previous studies started for the understanding of the effects of caffeine on students and their learning abilities and behavior in the school. The importance of caffeine products on students’ learning abilities is discussed, and more research is highlighted.

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**The Effects of Waiting Room Appearance on Patient Satisfaction**

*Alyssa Robling*

*Department of Psychology*

*Faculty Sponsor: Dr. Eric Landrum*

This research looked at how certain physical attributes in a physician’s waiting area affected the patient’s opinion of that physician. The data was taken from 70 students on the Boise State campus. The students volunteered for this survey and were rewarded with extra credit for participating. Each of the nine questions asked for this research were part of a larger survey that was being given, compiled of 225 questions. The survey asked questions referring to how important certain physical attributes in a physician’s waiting area are to them and if the waiting area appearance affected their opinion of that physician. Correlations were used to show a relationship between each of the physical attributes measured and their influence those attributes have on the patient’s opinion of the physician. The physical attributes that were used for this study were waiting room color, r(68) = 0.33, ≤ .01; visual stimuli in the waiting area, r(66) = 0.33, p ≤ .01; and the comfort of the seating in the waiting area, r(68) = 0.25, p ≤ .05. This research also looked at the differences between gender on each of the physical attributes and t tests were used to calculate the data. The data show that for men and women there were no differences between the physical attributes, except for room color. The data show that waiting room color was more important to women than to men. The data also show that waiting area appearance does influence the patient’s opinion of that physician. There is a relationship between the affects of the physical attributes in the waiting area and the influence they have a patient’s opinion of their physician. This research suggests that patients are paying attention to waiting area appearance and this should not be ignored by the physician.
**Self-Disclosure of Illicit Activities on MySpace, Facebook and YouTube: What Gets Posted and Why**

Katie Hiatt, Kanisha Morris, and Tonne McCoy  
Department of Psychology  
Faculty Sponsor: Dr. Elizabeth Morgan, Dr. Chareen Snelson, and Dr. Patt Elison-Bowers

The purpose of this study is to gain more information about young adults’ self-disclosure online. In particular, this study seeks to examine why young adults chose to post pictures or videos of themselves drinking alcohol and smoking marijuana, which are two activities that could be viewed as socially unacceptable by others, including parents and/or potential employers. This study will include an analysis of an online questionnaire administered to students enrolled in an introductory psychology class at Boise State University. The questionnaire will be administered via a secure online website and include open-ended and closed-response questions about participants’ internet and general drug use, social networking profiles, and history of posting pictures or videos of themselves drinking alcohol and smoking marijuana. The results of this research will reveal what kinds of pictures and videos young adults’ post in which they are drinking alcohol and smoking marijuana, including the typical settings and number of individuals present, and activities being depicted. The research will also provide information regarding why young adults chose to post these pictures and videos and the responses they have received from others regarding these pictures. This research is important because of the extensive number of young adults who both use online social networking websites and who also post images of themselves that could potentially be detrimental to their professional or personal images at later dates. Understanding why young adults participate in these behaviors will help parents and educators better address these activities when attempting to alert young adults to the potential perils of engaging in this kind of online self-disclosure.

**Do Preferred Characteristics Mirror Personal Characteristics in Online Dating Website Profiles?**

Emily VanNess and Tamara Richards  
Department of Psychology  
Faculty Sponsor: Dr. Elizabeth Morgan

Personal advertisements are a tool utilized by millions of individuals looking to connect with others for friendships, romantic relationships, and sexual relationships. In addition to information about themselves, many of these websites allow users to include a narrative or list of the characteristics of their preferred partner. The purpose of this project is to explore themes within the listed preferred partner characteristics that online dating website users provide. A content analysis will identify emergent themes in the narratives of preferred partner characteristics. Comparisons will be made between users of differing demographics. For example, past research has identified that heterosexual men are more likely to express interest in a physically attractive partner while heterosexual women are more likely to express interest in a partner with a good sense of humor (De Backer, Braekman & Fairinpour, 2008). It is anticipated that preferred characteristics will mirror personal characteristics as described by advertiser. This analysis will indicate that preferred partner characteristics differ based on the age, gender, sexual orientation, and desired relationship-type of the person who posted the profile. The results from the present study have implications regarding our understanding of the types of romantic and sexual partners individuals seek out and the underlying cultural values represented in these characteristics.
IDENTITY CONSTRUCTION IN ONLINE PERSONAL ADVERTISING PROFILES

Tara Brenner, Danielle Thomas (Honors College), and Daniel Alderman
Department of Psychology
Faculty Sponsor: Dr. Elizabeth Morgan

Personal advertisements are generally viewed as a tool used to connect individuals for romantic and sexual purposes. Many of these websites allow users to create personal profiles where they can choose how they would like to represent themselves. Individuals can create their identities online based on their own personal perceptions of who they are or the way they wish others would perceive them. While a small body of research has explored the use of deception and self-presentation in online advertising, little research has examined online personal advertisements to better understand identity construction. This project seeks to perform content analyses of public-access online personal ads to explore the use of personal narratives by young adult online dating site users to create a representation of the self. The review of narratives on publicly accessible profiles will provide insight into the types of information users feel is important in a description of themselves with the explicit purpose of finding a romantic or sexual partner. Qualitative analyses will include examination of adjectives, activities, and physical characteristics of each participant as indicators of their desirable identity. It is expected that qualitative analyses of the users’ self narratives, whether real or fictional, will provide clarification regarding what traits individuals view as their most desirable characteristics. Comparisons will be made between male and female profile-holders, as well as between participants seeking short-term relationships and those seeking long-term relationships. The results from this study will help elucidate romantic identity construction among young adults who seek partners online.

SEXUAL IDENTITY EXPLORATION AND COMMITMENT IN HETEROSEXUAL YOUNG ADULTS

Katherine Pearce
Department of Psychology
Faculty Sponsor: Dr. Elizabeth Morgan

Following research on general identity development that places individuals into one of four categories based on levels of exploration and commitment (Marcia, 1986), the purpose of this study was to examine reported exploration and commitment in heterosexual young adults’ narrative descriptions of how their sexual identity formed. Participants included 447 undergraduate college students (286 women, 161 men) with an average age of 19.7. Participants provided written responses regarding the formation of their sexual identity; responses were coded for levels of commitment (high and low), sexual exploration with other-sex partners (high and low), and sexual exploration with same-sex partners. Results indicated that 25 participants reported low commitment and low exploration, 173 participants reported high commitment and low exploration, 39 participants described low commitment and high exploration, and 210 participants reported high commitment and high exploration. Of those in the last category, 177 described only other-sex exploration, 17 described same-sex only exploration, and 17 described both other-sex and same-sex exploration. Groups did not differ by gender, age, or religiosity. When compared to quantitative measures of sexual identity exploration and commitment, similar patterns prevailed. The implications of these results suggest that heterosexual young adults do purposefully engage in sexual exploration, contrary to past findings. Additionally, young adults remain likely to indicate low levels of commitment to their sexual identities or sexual orientations, suggesting that sexual identity development continues during this developmental period.
Boise State University:
Increasing Bicycle Use in the Treasure Valley

Ivan Kosorok, Darlene Guthneck, Michel Mowry, Eric Pankau, and Tina Elayer
College of Social Sciences and Public Affairs
Department of Environmental Studies
Faculty Sponsor: Dr. Lisa Brady and Dr. Christopher Hill

The objective of our project is to aid in reducing Boise State’s carbon footprint by reducing the amount of cars on the road and their associated carbon emissions. To achieve this goal we are researching and developing strategies that could increase bicycle use on the Boise State campus and in the Treasure Valley. We are proposing the implementation of a few programs that will increase bicycle use including; a bike sharing program (bike library), reorganizing bike pathways, and increasing public education. The organization of our research is divided into five general topics: public opinion, funding issues, infrastructure issues, staffing for the bike library, and public outreach. This project is a capstone for the Environmental Studies seniors, in which students from various academic backgrounds have conglomerated to construct a real life proposal demonstrating teamwork towards a rewarding goal. The purpose of this project is process-oriented integration of student cooperation and a base of knowledge obtained through course work at Boise State.
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SAVE THE DATE
7TH ANNUAL UNDERGRADUATE RESEARCH & SCHOLARSHIP CONFERENCE
MONDAY, APRIL 12, 2010