

Program and Abstracts

Wichita State University

11th Annual

Undergraduate Research and Creative Activity Forum—URCAF



April 5, 2011

Rhatigan Student Center

Lawrence Whitman, URCAF 2011 Chair

2011 URCA FORUM

Organizing Committee

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Office of Research Administration
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Wichita State University
11th Annual Forum
Undergraduate Research and Creative Activity Forum—URCAF

Note: All presentations are in RSC 223

URCAF - RSC	
9:30 – 12:30	Natural Sci./Eng. Room 223
11:30 – 1:15	Performance/Creative Activity, RSC Shocker Square
1:00 – 3:45	Social Sciences, Room 223
10:00 – 12:00	Viewing Posters (RSC Hallway)
4:00 – 4:30	Awards Room 223

URCAF ORAL PRESENTATIONS

URCAF Natural Sciences Session, Moderator – Atul Rai, Business, RSC 223

page

9:30	Ryan Brown	Maximizing the Network Lifetime of an NxN Sensor Network Grid
9:45	Lucas Burson	Breadth-First Search Based Data Preservation in Sensor Networks
10:00	Paige Feikert	A Detailed Study of the Nano-Porous Membranes with Applications in the Enhanced Detection of Cardiovascular Biomarker Proteins
10:15	Ziqian Gao	Chemokine Gene Expression Profile in Human Perprosthetic Tissues
10:30	Adon Harris	Apoptosis in Chronic Sinusitis Bone Tissue
10:45	Andrew Hart	Charged Pion Multiplicity Below 1.0 GeV/c from the MIPP Experiment
11:00	Rachel Jacobs	Supramolecular Ruthenium Phthalocynine - Porphyrin and Ruthenium Naphthalocyanine - Porphyrin Complexes as Photosynthetic Energy Harvesting Antenna
11:15	Mary Kellerman	Polymer-Coated Carbon Nanotubes for Enhanced Detection of Biomarkers
11:30	Cierra King	A Case Study on how Structured Exercise Effects Multiple Sclerosis
11:45	Sarah Stallard	Cessna Metal Bond: Flow Improvement Analysis
12:00	Ramon Nola	Synthesis of Donor-Acceptor Thiophene-C60 Derivatives for Organic Solar Cells
12:15	Jarrett Perry	Production of Recombinant Mouse Follicle Stimulating Hormone in Gh3 Cells

URCAF Exhibition/Performance Session, Moderator, Robert Bulp, Fine Arts Shocker Square (RSC)

11:30	Justin Hall	한국어수집노래, Korean Collection: A Medley Of Korean Pop Songs for Marimba
11:45	Chiyoko Myose	Sojourning
12:00	Nam Le	Another moment to live
12:15	Tim Stone	Colorful Fiction: Exploration the Space Between the Abstraction and Recognition

12:30	Hannah Scott	Wanderlust: Illustrations of the Internal
12:45	Heidi Cruz	Puppets
1:00	Amber Creasser	Tartuffified
1:15	Hannah Carter	Costume and Make-Up Design for Eugene Ionesco's Absurdist Play, The Chairs

**URCAF Social Sciences Session, Moderator William Vanderburgh, Executive Director,
Office for Faculty Development and Student Success, RSC223**

1:00	Malcolm Johnson	Threats, socialization and attitudes as factors of motivation
1:15	Stevie St.Clair	Alive, but Not Living
1:30	Baylee Cunningham	Democracy, Development, Capitalism and the Ecological Footprint: an Analysis of Indicators, A Global Perspective
1:45	Veronica Ealey Pyles	Eye Movement Desensitization and Reprocessing: An Eye Moving Exploration
2:00	Robert Freeman	Will Depreciation of the Dollar Decrease the US Trade Deficit with China?
2:15	Carolyn Hekele	The Relationship Between Spirituality and Well-Being of Older Adults
2:30	Nicole Lowery	Relationship Between Social Support and Well-Being of Older Adults
2:45	Megan Pauly	Greensburg & Sustainable Corporate Partnerships
3:00	Jennifer Rafter	The Effect of Poverty on Older Adults
3:15	Shelby Batt	Racial Difference: Spirituality and Social Support Among Elderly White and African Americans
3:30	Vincent Tafolla	Cognitive Performance and Physical Activity Among Older Adults in Kansas

URCAF Poster Presentations (First Floor RSC Hallways)

UPSE1	Timothy Eberl	Isolation and Characterization of Microbes from Hot Lake, WA
UPSE2	Caitlin Farrington	Development of Quantitative PCR Analysis for pGC LH-receptor mRNA
UPSE3	Tyler Foster	Lithofacies, Stratigraphic Architecture, and Controls on Alluvial Fan

Deposits

UPSE4	Shina Hutchinson	Studies on the Outer Membrane Usher Cooc from Enterotoxigenic E. Coli.
UPSE5	Benjamin Knoblauch	Common Firewall Approach to Aviation Network Architecture
UPSE6	Ashley Lida-Venegas	Toward Understanding the Physical Basis of Interactions Between Cmg2 And Collage
UPSE7	Daniel Mettman	Optical and Singlet Oxygen Studies on Dipyrromethane and Azadipyrromethane Photosensitizers as Potential Photodynamic Therapy Agents
UPSE8	Aditi Pasupulati	Header Compression with Nat and Packet Inspection
UPSE9	Nguyen Pham	Model Complexes for Nickel Superoxide Dismutase
UPSE10	Pie Pichetsurnthorn	Nanosensor for Detecting Trace Pesticides in Water
UPSE11	Zachary Quick	Herbivore Diversity Alters Different Fitness Components of Helianthus Maximilia
UPSE12	Teal Scott	Designing New Class of Ultra Sensitive Biosensors with Polymer Vesicles
UPSE13	Roxanne Adeline Uy	OXP and OXC: Spectral, Computational, And ITC Studies Of Anion Binding
UPSE14	Rana Zayed	Aligned Heterogeneous Polymer/Carbon Nanofibers for Biomolecule Detection
UPSS1	KymberlyBirkner	Loneliness In Old Age: How It Affects The Well-Being Of Elderly Adults
UPSS2	Erin Haag	An Examination of a Positive Support System for Older Adults
UPSS3	Sean Hess	Quality of Life, Nutrition, and Respiratory Health in Older Adults
UPSS4	Jennifer Lasley	Different Health Status Between Caucasian and African American Older Adults
UPSS5	Hollie Reinhart	Incentive Programs and Employee Behavior
UPSS6	Brooke Simms Roberson	Relationship Between Financial Problems and Well-Being of Older Adults
UPSS7	Sarah Smart	Different Spirituality and Social Support Between White and African American Older Adults
UPSS8	Meagan Waltner	Spirituality, Physical Functioning, and Depression Among Older Adults in Kansas

Ryan Brown
Faculty Sponsor: Bin Tang
Electrical Engineering and Computer Science

Maximizing the Network Lifetime of an NxN Sensor Network Grid

Technological advancements and scientific discoveries have led to a need to generate, collect, and interpret vast quantities of data. Sensors dispersed throughout ecosystems would provide a wealth of information pertaining to the environment. However, sensor networks could be limited by specific data collection times, energy within a node, and storage capacity, requiring sensors to operate together to preserve the integrity of the data collected until the data can be collected and stored elsewhere. The project aims towards developing an efficient algorithm that would store data around the network to optimize the network lifetime. The data integrity is compromised, or the network lifetime is reached, when the first sensor containing data depletes its energy reserves and dies, causing the data to be lost. The network consists of source nodes, which generate data, and all other sensor nodes, which can store data. To prolong the network lifetime, data in source nodes must be distributed to sensors nodes with high battery power. The algorithm organizes the source nodes in increasing order of energy level and finds the shortest path between the source nodes and the highest energy nodes within the network. With the implementation of the algorithm, several different scenarios were tested using varying initial energy levels and placement of source nodes. For most cases, the algorithm efficiently finds the optimal network lifetime. However, the heuristic algorithm fails when confronted with a scenario where the highest energy levels within the network are equal, resulting in a network lifetime below the optimal solution for the network.

Lucas Burson
Faculty Sponsor: Bin Tang
Electrical Engineering and Computer Science

Breadth-First Search Based Data Preservation in Sensor Networks

Sensor networks are used to monitor the environment by analyzing data collected from it. We have a network of battery powered sensor nodes with varying amounts of energy that can communicate with one another wirelessly. These nodes lose a small amount of energy over time and they lose a large amount when communicating. A subset of these sensor nodes, called source nodes, contains valuable data; this data is lost when any source node's energy is depleted. All data must persist until collected and when the first data node dies this is the lifetime of the network. Thus it is paramount to move the data to nodes with more energy to preserve the data and extend the lifetime of the network. I propose to use a greedy breadth-first heuristic search to find a path from a data node to some destination node that fits the high-energy criteria. Using simulations, we show that this selection scheme has the potential to optimize the lifetime of the network.

Paige Feikert
 Faculty Sponsor: Shalini Prasad,
 Bioengineering

A Detailed Study of the Nano-Porous Membranes with Applications in the Enhanced Detection of Cardiovascular Biomarker Proteins

Abstract: Nanomaterial is widely used to design ultra-sensitive molecular biosensors. The objective of our study is to identify the role of nanoporous alumina membranes in achieving nano confinement of protein biomolecules towards designing protein biosensors with enhanced sensing capabilities. The purpose of investigating these nano-porous alumina membranes is to enhance detection through mimicking the phenomena of macromolecular crowding, which states that nano scale confinement enhances stability and efficacy of biomolecules in biological systems. We are mainly focused on the properties of these alumina membranes that cause the largest increase in sensitivity in detection including pore diameter, pore depth and pore densities. We are evaluating C-reactive protein, an inflammatory protein as the study protein. We have been using silicon based microchips integrated with the nanoporous alumina membranes as cardiac biosensors for detecting C-reactive protein. These biosensors exhibit binding of biomarker proteins through the impedance changes analyzed through electrical impedance spectroscopy. We see these changes in impedance due to the perturbation of the double layer at the solid liquid interface on the gold electrode located on the silicon microchip of the biosensor. The ultimate goal of this research is to develop a relationship between the properties of nanoporous alumina membranes and the performance metrics of the biosensors.

Ziqian Gao, Andy Yang, and Ling Bai
 Faculty Sponsor: Shang-You Yang
 Biological Sciences

Chemokine Gene Expression Profile in Human Periprosthetic Tissues

Aseptic loosening of the artificial joint component has become the single most common long-term complication following total joint replacement procedure. Although the exact etiology of the complication remains debatable, the interaction between implant wear debris and the cells that accumulate in the periprosthetic tissues appears playing critical roles in the inflammatory tissue formation surrounding the implant and the subsequent bone resorption. Our hypothesis is that wear debris particles at the prosthesis promote inflammatory and osteoclastic cell activation and infiltration, which in turn result in periprosthetic osteolysis and implant loosening. The objective of this study intends to identify some molecular interactions responsible for the aseptic loosening process. Periprosthetic tissues from 15 aseptic loosening patients and some non-inflammatory connective tissues from 4 patients were obtained and processed to isolate RNA and reverse transcribed into cDNA. Real time PCR were used to examine chemokine and cytokine gene expression profiles including IL-1, IL-6, TNF, IL-8, MCP-1, CXCR-4 and SDF-1. The result showed some variations among individual cases in chemokine/cytokine expressions. Although with the relatively small sample size, it appears that CXCR-4, TNF, and IL-8 were over expressed in tissues from majority of aseptic loosening patients, in comparison to controls. They may be associated with the trafficking of the blood monocytes and other inflammatory cells to the periprosthetic site and the local inflammation and bone resorption. We are continuing the research effort to evaluate more patient tissues using real time PCR and immunohistochemical

techniques to confirm our findings and explore potential therapeutic approaches against inflammation and osteolysis.

Adon Harris
Faculty Sponsor: Shang-You Yang
Chemistry, Biology

Apoptosis in Chronic Sinusitis Bone Tissue

Chronic rhinosinusitis, an inflammatory disease of the mucosa and periosteum of the sinuses, is often non-responsive to medical therapy. Although numerous studies have focused on the cytokine profiles in the inflammatory mucosa and polyps, ethmoidal histopathological changes during chronic sinusitis have yet to be fully investigated. Apoptosis is essential in regulating immune function. We hypothesized that the inflammatory process of adjacent ethmoidal bone plays a critical role in the persistence of rhinosinusitis, and regulation of the local apoptosis would provide an alternative therapeutic approach for the treatment of chronic sinusitis. The objective of this study was to examine the histopathological changes and cell apoptosis in ethmoidal specimens of chronic rhinosinusitis patients. Nineteen ethmoid bone and adjacent mucosa tissues were collected from chronic sinusitis patients undergoing ethmoidal surgery. Nineteen non-inflammatory ethmoidal tissues from individuals undergoing surgery for augmentation rhinoplasty were also obtained as controls. The study was approved by Institutional Review Boards and the Informed Consent was signed by all the participating patients. Tissue sections were Hematoxylin&Eosin stained for morphology evaluation and cell counts. Cell apoptosis in sinusitis and control tissues were illustrated by TUNEL (TdT mediated dUTP nick-end labeling) stain and quantified using ImagePro+. The apoptotic index was averaged 9.25 in chronic sinusitis tissue whereas 7.42 in the non-inflammatory tissues. The independent samples T-test (SPSS) was used for significance comparison. It was found that the sig. value was .114 and the 2-tailed sig. value was .507, indicating that no statistically significant difference exists between the groups. Due to the limitation of the small sample size, further investigation may be warranted to correctly reject the null hypothesis.

Andrew Hart
Faculty Sponsor: Nickolas Solomey
Physics

Charged Pion Multiplicity Below 1.0 GeV/c from the MIPP Experiment

The MIPP experiment is designed to study particle production from several targets, using various beam species and momenta. Using beams of ~ 58 GeV/c pions, kaons, and protons, we present multiplicities of 0.1 - 1.0 GeV/c charged pions versus target atomic weight (A) for the following targets: liquid hydrogen, beryllium, carbon, aluminum, copper, bismuth, and uranium. We quantify the dependence on A and present this for each case. In addition, for liquid hydrogen, we present charged pion multiplicities for -20 and -85 GeV/c pion, kaon, and proton beam particles, illustrating the dependence on beam momentum.

Rachel Jacobs
Faculty Sponsor: Francis D'Souza

Supramolecular Ruthenium Phthalocyanine - Porphyrin and Ruthenium Naphthalocyanine - Porphyrin Complexes as Photosynthetic Energy Harvesting Antenna

Exploitation of renewable resources for energy to decrease our reliance for fossil fuels has been an ongoing process. Harvesting solar energy to meet the energy demand is considered to be one of the plausible solutions. Among the different approaches, adopting the steps of photosynthesis seems to be logical. Hence, mimicking the photosynthetic functions by using synthetic model compounds is important to further our understanding of the process of bioenergetics. Research in this area also holds promise for technological advances not only in solar energy conversion but also in building molecular optoelectronics such as photonic wires and switches. In the present study, excited energy transferring photosynthetic antenna systems are built using ruthenium phthalocyanine and ruthenium naphthalocyanine as energy acceptors and imidazole-appended free-baseporphyrin as energy donor. The presentation will focus on the synthesis and the characterization of the components, donor-acceptor assembly formation, and photochemical studies revealing occurrence of photoinduced energy transfer from the donor to acceptor in nonaqueous solvents.

Mary Kellerman
 Faculty Sponsor: Shalini Prasad
 Bioengineering

Polymer-Coated Carbon Nanotubes for Enhanced Detection of Biomarkers

The objective of our study is to identify the role in arraying in creating nanostructures with nanospaces that can be leveraged for enhanced detection. The idea behind the experiment is that the nanoweb of polystyrene-coated carbon nanotubes will provide increased surface area for antibody binding. Achieving nano confinement of protein biomolecules leads to designing protein biosensors with enhanced sensing capabilities. Carbon Nanotubes (CNTs) are good conductors and can be polystyrene coated which makes them reactive with antibodies. The more antibody binding that occurs, the more sensitive the detection can be. The purpose of investigating these nanowebs is to enhance detection through providing more places for binding to occur. We are hoping that by making these devices more sensitive that detection of very low concentration antigens, in the femptogram/ml range, will be possible. We are evaluating C-reactive protein, an inflammatory protein as the study protein. We have been using silicon based microchips integrated with the polystyrene-coated carbon nanotube webs as cardiac biosensors for detecting C-reactive protein. These biosensors exhibit binding of biomarker proteins through the impedance changes analyzed through electrical impedance spectroscopy. We see these changes in impedance due to the binding of the antigen to the antibody on the gold electrode located on the silicon microchip of the biosensor. The ultimate goal of this research is to develop a relationship between the properties of polystyrene-coated carbon nanotube webs and the performance metrics of the biosensors.

Cierra King
 Faculty Sponsor: Ruth Bohlken
 Human Performance Studies

A Case Study on how Structured Exercise Effects Multiple Sclerosis

Abstract Objective: Multiple Sclerosis (MS) is an autoimmune disease that damages the central nervous system (CNS). Damage to the CNS retards muscle nerve impulses which results in extreme and progressive declines to mobility and other functional abilities for persons with MS. There are four known types of MS which include relapsing-remitting MS (RRMS), secondary-progressive MS (SPMS), primary-progressive MS (PPMS), and progressive-relapsing MS (PRMS). Currently there is no cure for MS, however, specialized fitness training may improve the physiological declines often associated with the disease. Exercise program design for individuals with MS should focus on maintaining and enhancing functional abilities for the purpose of delaying physical frailty and thus improving quality of life. **Methods:** The purpose of this case study was to evaluate the development and benefits of a specialized exercise program for a person with multiple sclerosis. Methods used to conduct this research included pre-fitness testing measurements of cardiovascular endurance, muscular strength, and balance. Pre-testing was followed by the development and participation of a specialized fitness training program with an emphasis on aerobic, muscular, flexibility, and balance improvement. Post-fitness testing measurements were repeated after six months of participation in a specialized fitness training program. Testing protocols included the YMCA submax cycle ergometer test, functional fitness testing developed by Rikli and Jones, and the Berg balance test. **Results:** Results of this case study indicate significant improvement to physical components important to functional fitness;

muscular strength, flexibility, and balance after six months of participation in a specialized physical activity program. Results indicate cardiovascular improvement to be insignificant. Conclusion: This case study suggests the possible benefits of a specialized fitness training program for individuals with MS. Benefits that could enhance functional abilities and ultimately quality of life for persons afflicted by MS. Further research is needed with regard to the benefits or detriments of such a fitness program.

Sarah Stallard and Anish Gupta
Faculty Sponsor: Don Malzahn
Industrial Engineering

Cessna Metal Bond: Flow Improvement Analysis

The Cessna Metal Bond Shop in Wichita, KS is where the assembly process for a Cessna aircraft begins. It is here that aluminum parts are sub-assembled to form parts for an aircraft. In the broadest sense, the Metal Bond process can be categorized by the following procedures: PAA (phosphoric acid anodize) line, bond-primer, lay-up, bagging, autoclave cure, and debagging, de-flash, and post-cure inspection. Our team worked to reduce the variability in tool turnaround so that all tools exit debag within a maximum of two days of lay-up. This improves tool responsiveness, reduces inventory and associated holding costs, and ensures that Cessna can meet customer demand on time while reducing the amount of overtime that is currently needed. With competition mounting from other aircraft companies (or from out-sourcing), these improvements at Cessna's Metal Bond Shop should provide more confidence in their facilities ability. Using ARENA, a discrete-event simulation software, our team created a current state simulation. This simulation is based off of numerical data that was collected through forms that the Metal Bond operators filled out. Based on results from the current state simulation, we determined the constraints of the system. Future state simulations were tested by altering factors within the current state simulation. With the help of our sponsors, we addressed these constraints and came up with various short-term and mid-term improvement recommendations. As of December 2010, short-term recommendations have already been implemented at Cessna. Mid-term recommendations will be implemented in the future once a new "current state" system has been analyzed. With all of our recommended process improvements at Cessna Metal Bond, there is a projected savings of over \$260,000 annually in reduction of overtime and inventory holding cost. The maximum tool turnaround goal of two days will be met upon completion and sustainment of this project.

Ramon Nola, Chandra Bikram, and Naveneeth K. Shubhavana
 Faculty Sponsor: Francis D'Souza
 Chemistry

Synthesis of Donor-Acceptor Thiophene-C60 Derivatives for Organic Solar Cells

Novel materials for constructing efficient organic solar cells are recently becoming a topic of significant interest in renewable energy. In a typical bulk heterojunction solar cell, a donor polymer (P3HT) is mixed with an acceptor (C60) and spin coated on conducting surface. On top of it a counter electrode is deposited with a buffer layer in the middle as shown in the scheme below. Of all the fullerene derivatives that have been used as electron acceptors for organic solar cells, fulleropyrrolidines have not been explored. Here we report the syntheses of a series of fulleropyrrolidine derivatives bearing covalently linked bithiophene and terthiophene units as donors for constructing photovoltaic solar cells. The syntheses involve refluxing of corresponding thiophene aldehydes with fullerene and an amino acid such as sarcosine in toluene. Thus, synthesized compounds are characterized by ¹H NMR, UV-Visible absorption spectroscopy, mass spectroscopy, and electrochemical techniques. Our strategy for synthesizing bithiophene and terthiophene based fullerene is derived from the fact that thiophenes are well known for electropolymerization, and upon linking with electron acceptor fullerene, it forms donor-acceptor dyads. Studies involving photovoltaic cells using these novel donor-acceptor dyads are in progress.

Jarrett Perry
 Faculty Sponsor: Bin Shuai
 Biology

Production of Recombinant Mouse Follicle Stimulating Hormone In Gh3 Cells

Follicle stimulating hormone (FSH) is one of four gonadotropic hormones necessary for an organism's reproductive system to function properly. FSH is comprised of a and β subunits. During research conducted by Dr. George Bousfield it was shown that human FSH (hFSH) has two distinct glycoforms. The first glycoform is di-glycosylated hFSH in which the β subunit has no glycans attached to the glycosylation sites of the subunit. The second glycoform is tetra-glycosylated hFSH which is characterized by all the glycosylation sites on both the a and β subunits are being occupied by glycans. Dr. Bousfield's research team established a mouse model to study the structure and functional relationship of these two glycoforms. It was quickly realized that the glycosylation patterns of mouse FSH (mFSH) were not fully understood, and that the antibodies needed to specifically detect mFSH are currently unavailable. In order to further our understanding of mFSH we decided to use recombinant DNA technology to produce a recombinant mFSH. The recombinant protein can be mass produced and easily purified, and the system is more efficient and cost-effective than regular protein purification method relying on biological samples. There has now been a completion of the first step of the research by constructing an expression vector for mFSH containing both the a and β subunits. The next step will be to transfect GH3 cells derived from a rat pituitary tumor with the mFSH expression vector so that the hormone will be produced in these cells.

Malcolm Johnson

Faculty Sponsor: William L. Vanderburgh
Honors – Environmental Philosophy

Threats, socialization and attitudes as factors of motivation

The research on the sources of motivation for people and groups indicates that there are certain factors that determine if a person will be motivated or not. In the current climate, there is an overwhelming amount of discouraging information about the environment and ways that people can do their part to help. This paper mines 7 previous research studies on both the psychological and sociological factors of motivation. This paper connects that previous research to the problem of motivating people to solve environmental problems. This paper argues that of the vast number of factors that effect motivation, (1) individual attitudes, (2) social contact and (3) threats versus opportunities are most significant. The implications of the findings could potentially help motivate individuals to become more politically active when it comes to environmental issues.

Stevie St. Clair

Faculty Sponsor: William L. Vanderburgh
Honors – Environmental Philosophy

Alive, but Not Living

In my paper, I will argue that we are morally responsible for improving the treatment of animals in slaughterhouses and factory farms. In particular, I will depict how some of the current methods of raising swine are immoral, and showing that morally better policies would benefit for animals, humans, and the environment. Knowing we are raising factory animals for our own consumption should be enough to make a person treat the animals with respect. However, this rarely happens. Drawing on research on animal ethics and environmental philosophy, I will argue that in order to protect the Earth we must also protect ourselves, which means growing animals in sound ways, not inside cramped, dark, unclean, abusive farms. To help factory farm animals, we need to buy more organic foods, spread knowledge about the problem, and not turn a blind eye to the inhumane treatment as many of today's consumers are doing. It is our moral duty to protect the Earth we live on, so we need to work on changing policies today!

Baylee Cunningham
Faculty Sponsor: Dinorah Azpuru
Political Science

Democracy, Development, Capitalism and the Ecological Footprint: An Analysis of Indicators, A Global Perspective

This research will address and examine the role of democracy, development and capitalism in global ecological resource consumption. I will explore these three characteristics to determine whether or not any can be considered indicators of environmental performance. Furthermore I will discuss the various theories currently being conceived and expanded upon in the emergent issue that is environmental sustainability. The purpose of this research is to address the following questions: Question 1: Are there any specific, individual variables that indicate a country will have a high ecological footprint? Question 2: Are countries that are democratized likely to have a higher ecological footprint or a lower ecological footprint? Question 3: Are countries that are highly developed likely to have a higher or lower ecological footprint? Question 4: Does a country's Gross Domestic Product indicate a country will have a higher or lower ecological footprint? Due to the infancy of this research there are limited statistics available. To further analyze this data and determine if an exact correlation between any of the individual variables exists requires a higher level of research. In order to do this I must create a database which includes each variable as well as the corresponding statistical data, which I have collected independently. My results were largely consistent with my expectations. A bivariate correlation test proved that there are consistent correlations between all three independent variables in conjunction with my independent variable. Additionally, more extensive tests and results are discussed within my presentation.

Veronica Ealey Pyles
Faculty Sponsor: Orren Dale
McNairs Scholars Program

Eye Movement Desensitization and Reprocessing: An Eye Moving Exploration

Eye Movement Desensitization and Reprocessing (EMDR) is a widely used treatment for Post-Traumatic Stress Disorder (PTSD). This survey examines therapist's perceptions of its effectiveness based on the client's problem, the therapist's discipline, and treatment setting variables. There has been debate regarding the effectiveness of EMDR due to variations in the application of the technique. An online survey was conducted using a sample of convenience. Twenty-five clinicians were originally contacted and were asked to complete the survey. In addition, in order to increase sample size, each clinician was asked to provide the name of other clinicians who use EMDR. This snowball method was used to increase sample size. Survey results indicate that respondents perceive EMDR to be very effective, with 83% of the clinicians saying they will most likely use it in the future. The study also compared EMDR to other forms of therapy, such as Cognitive Behavioral Therapy (CBT) and Relaxation, and EMDR was found to be as widely used as those other methods. In the future, a larger sample size can be used to examine other variables affecting the use of EMDR with PTSD sufferers.

Robert Freeman
Faculty Sponsor: Jen-Chi Cheng
Economics

Will Depreciation of the Dollar Decrease the US Trade Deficit with China?

Using data on exchange rates, Chinese imports and exports, Chinese income, and relative price between the US and China, I applied regression analysis to determine whether there is a connection between a weakening of the US dollar and an increase in Chinese imports from the US. I studied the price elasticity and income elasticity for both the short run and long run. The key hypothesis is that the gains in US exports to China due to a weaker dollar will be offset by decreased Chinese income from exporting to the US. This will diminish the hope of improving the U.S. trade deficit with China. I found that the short run income elasticity for Chinese imports is 1.3229, while the US_ was approximately 5 times greater at 6.7960. The short run price elasticity for Chinese imports was -0.1047, and the US_ price elasticity is -0.4220. Similarly, I found that the long run income elasticity for Chinese imports is 1.3172, a number much smaller than the income elasticity of the US, 7.3024. The long run price elasticity for Chinese imports, -0.0031, is also much smaller than the US price elasticity, -0.9253.

Carolyn Hekele, Dene Lee, Jennifer Sarchet,
Kimber Spencer, and Samantha Williams
Faculty Sponsor: Kyoung Hag Lee
School of Social Work

The Relationship Between Spirituality and Well-Being of Older Adults

Purpose: Older adults are at an increased risk for several mental and physical ailments including but not limited to issues with mobility, cardiovascular disease, arthritis, diabetes and cancer. This study examines 150 older adults who are 65 years old or over living in Kansas. The objective of this study will build on existing research explaining the relationship between spirituality and well-being of older adults in Kansas. Methods: All participants were volunteers without noticeable severe mental illness. By conducting face-to-face interviews with the participants, researchers obtained complete surveys. This study utilized a cross-sectional design method and quantitative approach. The survey questionnaire was designed using the Geriatric Depression Scale (S-GDS), the General Well-Being Schedule (GWBS), and the Brief Multidimensional Measures of Religiousness/Spirituality (BMMRS). The interviews were conducted between February 22nd and March 7th of 2011. Each participant participated in one interview lasting approximately one hour. Results: Descriptive statistics and regression analysis method were used to measure our results. This study expects to discover a positive correlation between spirituality and physical well-being. Additionally, this study expects to find a negative correlation between spirituality and depression. Implications: The overall goal of this study is to understand how spirituality affects the physical and mental well-being of older adults. In addition, this study expects to assist in development of future interventions for this increasingly growing population. This information can be utilized by social workers while assisting the elderly in finding spiritual resources within their community.

Nicole Lowery
Faculty Sponsor: Kyoung Lee
School of Social Work

Relationship Between Social Support and Well-Being of Older Adults

Purpose: The purpose of this study is to understand the relational correlation between social support and how it can affect the well-being of older adults. What this research plans to address is the nature of a social support network and how this influences elderly wellbeing. Can family and friends affect our well-being? How important are these elements to our health? **Method:** The method that is used in this study is quantitative. A face to face survey questionnaire was used, which each participant took 50-60 minutes to complete. The 150 subjects in this study are elderly persons age 65 years old and over. The subjects in this study were chosen from public domains. The participants were interviewed with close-ended questions and to complete a signed consent form to ensure confidentiality. **Findings:** Our study showed that the elderly with stronger social support were in higher spirits, better health, and had less anxiety. We also found that the single elderly were more depressed and did not have anyone to turn to for social support. **Implications:** This study will help the elderly community in gaining support to contribute to their overall well-being. One implication for the elderly is to help them in their community to build stronger social ties to improve their well-being. Another is to help raise awareness in the community at large about the need for social support to the elderly.

Megan Pauly
Faculty Sponsor: Charles Koeber
Department of Sociology

Greensburg & Sustainable Corporate Partnerships

The increasing global trend/effort of corporations providing increasing support for an environmental sustainable lifestyle is an up and coming issue. By examining the corporate motives from an ethical and economic standpoint, I hoped to recognize a willingness of corporations to promote natural capitalism without involving any green washing. I conducted three in-person, in-depth interviews in addition to consulting various sources of secondary material, observations, and tours of various facilities in Greensburg. Sample questions existed as: Describe the process by which you became involved with a corporation in Greensburg, including the various steps that were involved, how long each step took, and the people or groups of people who participated in each of the steps. What benefits did you receive in this partnership? What did you, in turn, provide to the corporation in Greensburg? What were the most significant challenges in forming your partnership with a corporation-based partnership? In conclusion, I found that Greensburg partnerships must be ethically examined on an individual case-by-case basis, but as a whole exist as a model for the existence—and possibility for the advancement—of natural capitalism when the partnership is based on trust.

Jennifer Rafter, Addy Duncan, Linsey Norton, Monica Rojas,
Bridgette Schneck, and Stephanie Thummel
Faculty Sponsor: Kyoung Lee
School of Social Work

The Effect of Poverty on Older Adults.

Purpose: Existing research indicates that vulnerable elderly populations are at risk of lower overall health and well-being due to issues of poverty, safety, lack of access to services, and lack of socialization. The older adult population looks to social researchers to identify these holes in our social network, allocating social programs to streamline services to those specific needs. The purpose of this study was to identify any relationship that may exist between economic status and well-being of the elderly. This study shows how income proportionally affects the health of older adults, and to what degree the contributing factors are responsible for the effect. **Methods:** One hundred twenty one subjects over the age sixty-five were surveyed using the face-to-face interview method, and were chosen by using the convenience sampling method. The instrument used in this study was the General Well-Being Scale (GWBS), in combination with several questions specified to the subjects_ income and economic standing. **Results:** Results were gained and evaluated using the quantitative method. This study indicates that elderly persons_ incomes proportionally effect their well-being, with persons in lower-economic brackets having lower results of overall health and well-being. **Implications:** These implications can be utilized in order to streamline social services to intervene with vulnerable and elderly populations offering services in areas which can benefit. One way of doing this would be to subsidize basic necessities such as food, healthcare, and transportation for low-income older adults in vulnerable areas, as well as offer services such as financial management classes. By implementing these services, older adults will feel less strain on their income and their overall well-being will greatly improve.

Jamie Bailey, Shelby Batt, Rebecca Buckridge,
CarisaDieffenbaugh, Sonya Sanborn, Tylin Young
School of Social Work

Racial Difference: Spirituality and Social Support Among Elderly White and African Americans

Nearly 35 million Americans are 65 years of age or older. Extensive research has been done on spirituality and social support of elderly Americans. However, more research is needed on the differences between African American and White elderly Americans. This study examines 121 elderly Americans who are 65 years or older in Kansas. The objective of this study is to explore if there is a difference between spirituality and social support in elderly African Americans and White Americans. **Methods:** Face-to-face interviews were conducted with elderly White and African American participants' age 65 years or older. The study utilizes both cross-sectional deign methods and a quantitative approach. A structured survey questionnaire includes two standardized instruments to measure levels of spirituality and social support. The interviews were conducted between February 22nd and March 7th 2011. **Results:** Chi-Square (χ^2) measurements and the T-test method will be used to measure the results. This study is expected to discover the difference between spirituality and social support between elderly Whites and African Americans. It is expected that elderly White Americans will have better social support systems, and African Americans will have a stronger ideology of spirituality than elderly White

Americans. **Implications:** The overall goal of this study is to better understand the implications of race and how this affects spirituality and social support of elderly Americans. The results of this study will help guide new policies and practices for social work and guide the profession with evidence-base practices.

Vincent Tafolla, Paige Unruh, Amber Underwood, Lindsey Irvine, Timothy Hunter, and
Katherine Cooper
Faculty Sponsor: Kyoung Lee
School of Social Work

Cognitive Performance and Physical Activity Among Older Adults in Kansas

Purpose: The purpose of this study is to understand the relationship of cognitive function and physical function, past research has shown a significant difference amongst older adults of different races. Concerns of health issues among older adults are increasing. Facing loss of cognitive function, and physical function are two major areas of focus in past research. This study examines 121 older adult participants who are 64 years of age or older and are living in the state of Kansas. **Methods:** To select all participants, this study used a non-probability convenience sampling method. Cognitive functioning, the independent variable, was measured using the Mini Mental Status Evaluation (MMSE). This instrument measured the recall abilities of the sample population. Physical activity, the dependent variable, was measured using the Short Form 36 Health Survey questionnaire. The questionnaire consists of 36 questions relating to active daily living, including physical and mental health status. **Results:** The data was analyzed using PASW-Predictive Analytics SoftWare 18. In addition to reporting the socio-demographic conditions the study also used a multivariate regression analysis to understand the relationship between cognitive function and physical function. Further analysis was performed using Chi-Square (X²) and T-Test methods to understand the differences between the racial and ethnic demographics of the research population. This study expects to discover that a low level of physical function is associated with a low level of cognitive function. **Implications:** The overall goal of this study is to understand how maintaining high levels of cognitive function will result in higher levels of physical functions. This will allow social work professionals to incorporate components of cognitive therapies into intervention therapies; thereby, allowing elderly populations the opportunities to remain in independent living situations.

Timothy Eberl, Kyle Rowe, James D. Crisler, and Brian Kilmer
Faculty Sponsor: Mark Schneegurt
Biological Sciences

Isolation and Characterization of Microbes from Hot Lake, Wa, An Environment with High Magnesium Sulfate Concentrations

Hot Lake, near Oroville, WA is an athalassohaline (not of marine origin) epsomite lake that contains high concentrations of magnesium sulfate. Microbes that are able to tolerate high solute concentrations are typically found in environments that contain a high concentration of sodium chloride (halotolerant), although there are some that are from environments high in sugars or other salts such as magnesium chloride. Characterizing microbial isolates from epsomite lakes that grow at or require high magnesium sulfate concentrations would classify them as being either *_epsotolerant_* or *_epsophilic_*, respectively. Aquatic sulfate-dominated systems show higher water activity than those of chloride-dominated systems at the same salinities. An assay done using agar gelation has shown that magnesium sulfate concentrations below 0.5 M stabilize macromolecular structures, while those with concentrations above 0.5 M are chaotropic. Using microbes collected from the Great Salt Plains of Oklahoma, epsomite tolerance was measured and many of the isolates were found to grow at high (2 M) magnesium sulfate and sodium chloride concentrations. Samples were taken from Hot Lake and grown using media that contained 10% or 2 M magnesium sulfate or 10% sodium chloride. Over 100 isolates have been collected and cultivated from Hot Lake. Characterization of the isolates includes 16S gene sequencing, Gram and endospore staining, pH, salinity and temperature tolerances, fermentation capabilities, and enzymatic activities, among others. Thus far, magnesium sulfate and sodium chloride tolerances seem to have broad ranges, while fermentation and enzymatic activities are limited in number. Studying environments such as these will provide insight into organisms relevant to epsomite-rich soils that exist on the surface of Mars with respect to forward contamination and a search for life.

Caitlin Farrington
Faculty Sponsor: Jeffrey May
Biological Sciences

Development of Quantitative PCR Analysis for pGC LH-receptor mRNA

The goal of this project is to compare the *in vitro* bioactivities of two human FSH glycoforms via their effects upon LH-Rc mRNA expression as determined via qPCR using a pGC model. Porcine LH-Rc-specific oligonucleotides for qPCR were generated via analysis of homologous human sequences and were designed such that the amplified region spanned at least one intron. An initial experiment compared pGC LH-Rc mRNA expression in culture following 48 hr treatment with 200 ng/ml di-FSH, tetra-hFSH, a FSH reference preparation, or no FSH. CT values obtained were 24.33, 21.85, 22.3, and 23.3, respectively, for control, di-, tetra-, and ref-FSH, demonstrating a more potent effect of the di-FSH. To enhance our analytical approach, we sought to adapt standard curve methodology and data normalization to qPCR. Porcine primers to the housekeeping gene, GAPDH, were prepared as described above for the LH-Rc primers. Total RNA was prepared from pGC isolated from small ovarian follicles and reverse transcribed. Standard PCR was run using pLH-Rc and pGAPDHcDNA and their respective primers. PCR products were separated by 2% agarose gel electrophoresis and the dsDNA products purified then quantitated by spectroscopy. Serial dilutions of LH-Rc and GAPDH dsDNA were used in

qPCR and the CT values plotted against DNA levels. Linear semi-log plots were obtained for both LH-Rc and GAPDH analyses from 0.1 fg to 10 pg DNA. This standardization will now allow true quantitative assessment of LH-Rc mRNA levels normalized to GAPDH mRNA on a unit DNA equivalent basis. (*Support: K-INBRE ARRA Scholar award #P20RR016475)

Tyler Foster
Faculty Sponsor: Wan Yang
Geology

Lithofacies, Stratigraphic Architecture, and Controls on Alluvial Fan Deposits

Abundant poorly sorted and gravelly sediments typically make up alluvial fan depositional systems. Modern alluvial fans are particularly common in areas of high relief, such as on the piedmont of mountain fronts and downslope from major fault scarps in half grabens where the tectonic influence on sedimentation is significant. This study focuses on three dimensional stacking patterns, lateral thickness and lithologic changes, and the paleoclimatic and paleotopographic controls on alluvial fan and braided stream depositional environment of the Daheyan Formation exposed in the Bogda Mountains, NW China. Daheyan Formation was deposited as synrift basin fill in the Tarlong-Taodonggou half graben on the greater Turpan-Jungar rift basin ~300 million years ago. On four measured sections, the maximum clast size and abundance of conglomerates decreases up section, indicating reduced relief of the Northern Tianshan source area and enlargement of the catchment basin, with a major shift from braided stream to lacustrine sedimentation. The appearance of braided stream cycles capped by calcisols, an ancient soil with calcitic nodules and illuvial oxidized sandy mud, in upper Daheyan indicate a shift to a semiarid-subhumid climate. A study of strata geometry and sedimentologic characteristics of modern alluvial fan deposits provides an analog to the facies and environmental interpretations of the ancient Daheyan deposits. Braided stream systems in both Daheyan and the modern analog are characterized by rapid lateral facies change, and amalgamated lenticular shaped channel fill bodies with coarse, upward fining, well imbricated, thick channel lag.

Shina Hutchinson
Faculty Sponsor: Jim Bann
Biochemistry

Studies on the Outer Membrane Usher CooC from Enterotoxigenic E. Coli

Enterotoxigenic *Escherichia coli* produce filamentous CS1 pili that are known to cause debilitating /virulent diarrheal disease, especially in developing countries. The key proteins CooA, CooB, CooC, and CooD are known to assemble and form CS1 pili, however the exact mechanism of assembly is not known. It is suggested that CooB, which is a chaperone located in the periplasm, folds into the proper conformation the pilus subunits CooA and CooD. CooC acts to assemble the subunits CooA and CooD into a functional pilus fiber, and provide a portal for movement of these subunits from the periplasm to the surface of the bacterium. We have purified CooC, and show that its structure is similar to that of PapC, a well-characterized usher involved in the assembly of P-pili. We carried out experiments directed at determining whether a direct interaction between CooC and CooB is possible, using streptavidin affinity chromatography. Results and future studies will be discussed.

Benjamin Knoblauch
Faculty Sponsor: Ravi Pendse
Electrical Engineering and Computer Science

Common Firewall Approach to Aviation Network Architecture

In today's ever expanding airline industry, the security, clarity and reliability of the communication link between airplane and Air Traffic Control (ATC) is vital to flight safety. According to recent reports, ATC is reaching its potential controlling capacity. One of the major reasons for this approaching limitation is the outdated technology still utilized to communicate with flight crews. In addition, an FAA study in 2009 reported multiple security threats with the current ATC technology and practices. The purpose of this research is to propose an IP-based LAN architecture for the aircraft which provides a scalable solution without jeopardizing flight safety. This architecture separates the network by creating security zones in order to protect sensitive aviation information. For this aviation network scenario, four separate zones are proposed: a completely trusted zone for the Embedded-Control Systems network, a demilitarized zone (DMZ) for the flight crew, a less-trusted DMZ for the ATC and a completely untrusted zone for the passenger network. In the creation of these zones, necessary communication between zones are discussed as well as needed intrusion prevention and detection. Lastly, this research investigates the capabilities of a TCP secure protocol and network monitoring in order to provide the most secure and reliable connection between end-users. This work evaluates the risks specific to aviation that remain if the technologies are deployed. Secondly, it investigates the possibility of intruders in this type of system, both internal and external, which could jeopardize flight safety. Lastly, this research assesses the security and application benefits of a switch to this advanced security technology that already exists in other industries today.

Ashley Lida-Venegas, Lauren Hayashi, and Hans Peter Bachinger
Faculty Sponsor: James Bann
Chemistry

Toward Understanding the Physical Basis of Interactions Between Cmg2 and Collage

Capillary morphogenesis protein 2 (CMG2) is a receptor for the anthrax toxin protective antigen (PA), a protein required for the pathogenesis of anthrax. Although the X-ray crystal structure of PA bound to the von Willebrand factor A (VWA) domain of CMG2 (the ligand binding domain) has identified key interactions between PA and CMG2 that contribute to the high (~200 pM) affinity, the role of CMG2 within the cell remains a mystery. CMG2 has been shown to bind to two ligands within the basal lamina, collagen type IV and laminin, but the physical and functional basis of this interaction is not understood. Our hypothesis is that PA outcompetes with the collagen IV or laminin for binding to CMG2, because the affinity of PA for CMG2 is higher than that of the natural ligands. To test this hypothesis, we used fluorescence anisotropy of fluorescently labeled CMG2 to study binding to purified mouse type IV collagen and laminin. We also carried out studies with HR9 cells, a mouse teratocarcinoma cell line producing type IV collagen, to determine the extent of binding to fluorescently labeled PA in comparison to two cell types known to bind PA – mouse embryonic fibroblasts and Chinese hamster ovary (CHO) – K1 cells. Our studies indicate that the binding affinity for collagen weaker than that of CMG2 – binding to PA. However, we detected very little binding of PA to the surface of HR9 cells, suggesting that under certain conditions, type IV collagen can prevent binding of PA to the cell surface.

Daniel Mettman, Anu Amin, and Aravinda Wijesinghe
Faculty Sponsor: Francis D'Souza
Chemistry

Optical and Singlet Oxygen Studies on Dipyrromethane and Azadipyrromethane Photosensitizers as Potential Photodynamic Therapy Agents

Photodynamic therapy is a medical treatment that can be used to eradicate premalignant conditions or early-stage cancers and downsize tumors in advanced cancers. In photodynamic therapy, the first step is injection of a photosensitizer into the patient. Photosensitizers are able to absorb light and transfer energy from light to other molecules. The photosensitizing agents employed in photodynamic therapy remain in cancerous cells longer than they remain in normal cells. After most of the photosensitizer has left normal cells, the cancerous tissue is exposed to visible light. The photosensitizer absorbs the light and then transfers the absorbed energy to oxygen present in the tissue. When oxygen absorbs energy from the photosensitizing agent it is converted from the triplet ground state to the excited singlet state. The generation of singlet oxygen leads to oxidative stress and cell death. In the present study, a series of boron dipyrromethane (BDP) and boron azadipyrromethane (ADP) compounds are employed as potential photodynamic therapy agents, and report on their optical and singlet oxygen generating properties. Specifically, we determine key factors such as dipole moments of the ground and excited states using absorption and emission studies, and quantum yields of singlet oxygen generation in solution using near-infrared emission technique.

Aditi Pasupulati
Faculty Sponsor: Ravi Pendse
Electrical Engineering and Computer Science

Header Compression with Nat and Packet Inspection

The data exchanged throughout a network is encapsulated in several layers of packer headers which contain information on how to deliver the packet to its destination and how to process the packet once it is received. While this information is very important, many communications exchange thousands of packets while the header information remains relatively constant throughout the connection. Packet header compression was introduced as a process of compressing the excess protocol headers of a packet by 90%, providing better link efficiency, faster data transmission with low bandwidth utilization. While there are many benefits to the bandwidth reduction achieved through packet header compression, several security techniques used today are based on the information available in the packet header. This research evaluates how the header compression behaves when using network address translation (NAT) to secure the private IP addresses within a network. This work also investigates the outcomes of using header compression when stateful inspection is enabled on a firewall device, which by design inspects every field of a packet header. Header compression is only used across low bandwidth links such as serial or WAN links today, but understanding the impact on header compression on these common security techniques may make it a more viable solution for all communication links.

Nguyen Pham
Faculty Sponsor: David Eichhorn
Chemistry

Model Complexes for Nickel Superoxide Dismutase

Nickel superoxide dismutase (NiSOD) catalyzes the disproportionation of superoxide into oxygen and hydrogen peroxide. What makes NiSOD unique when compared to the other metalloenzymes is that the nickel normally has a reduction potential that would not have the ability to catalyze superoxide disproportionation. The ligands attached to the nickel must play a role in the ability of NiSOD to catalyze superoxide disproportionation. The NiSOD active site contains thiolate, amide, and amine donors. Our group has been synthesizing model complexes for the NiSOD active site which reproduce the thiolate and amine donors, with an imine donor replacing the amide, in order to understand how these donors enable the Ni atom to catalyze superoxide disproportionation. In this paper, we expand on that approach by synthesizing analogous compounds with an O-based phenoxide ligands replacing one of the S-based thiolate ligands, in order to assess the importance of the thiolate ligand on the properties of the Ni atom.

Pie Pichetsurnthorn
Faculty Sponsor: Shalini Prasad
Bioengineering

Nanosensor For Detecting Trace Pesticides In Water

Atrazine is a pesticide commonly used in agricultural crops. Its runoff into local water systems and later into larger water systems raises environmental and health concerns. Some studies show Atrazine may cause impaired fertility, delayed onset of puberty, liver degeneration, etc. Atrazine contamination in water streams are in the low nanogram/ml range. The objective of this project is the design and testing of a nanosensor for trace detection of Atrazine and to increase sensing sensitivity by lowering the detection limit. The biosensor uses nanoporous membranes to achieve ultra low detection of Atrazine. The detection assay uses antibody– antigen binding chemistry to achieve detection. Binding is detected through impedance spectroscopy as a cascading charge transfer results from specific binding between the antibody and Atrazine. The change in impedance before and after binding is recorded from the biosensor. The change correlates to the Atrazine concentration within the sample. By increasing sensing sensitivity to detect lower concentrations of Atrazine in water systems, environmental and health concerns from Atrazine exposure can be addressed in quicker and more efficient manner.

Zachary Quick
Faculty Sponsor: Gregory Houseman
Biological Sciences

Herbivore Diversity Alters Different Fitness Components of *Helianthus Maximilia*

Although it is known that herbivores influence plant fitness, there is relatively little information quantifying the combined effects of multiple herbivore groups on plant fitness and determining whether such effects may vary with plant nutrient status. *Helianthus maximiliani*, is a highly nutritious perennial plant sought after by a variety of organisms in prairies. To study the impact of herbivore diversity on the fitness of *H. maximiliani*, different herbivore groups (insects and mammals) were excluded from plots in a restored prairie at the Ninnescah Reserve near Viola, Kansas. Ninety-six, 3x4 m plots were randomly assigned to various herbivore exclusion treatments designed to protect plants from insect, above ground and below ground mammal activity. To test the potential effect of plant nutrient status on herbivory, each herbivore treatment was also assigned to either fertilized or unfertilized treatments. All treatment combinations were replicated eight times. Plants were significantly taller in plots with above ground cages compared to control plots but this difference was only apparent when plots were fertilized. This pattern suggests that large herbivores such as deer are selectively feeding on the most nutritious plants available and potentially limit the size of *H. maximiliani*. In contrast, seed production was reduced by the combined exclusion of insects and above ground mammals. Effects on seed production occurred regardless of plant nutrient status. These results suggest that different herbivore guilds influence separate components of plant fitness so that the combined effects of increased herbivore diversity may be to reduce individual plant success.

Teal Scott
Faculty Sponsor: Shalini Prasad
Bioengineering

Designing a New Cass of Ultra- Sensitive Biosensors with Polymer Vesicles

Accurate and early detection of biomolecules is very important for many diagnostics applications. In the medical field, early detection of trigger proteins or hormones which are known as biomarkers can help save lives. Biosensors can be used to detect concentration levels of proteins in the blood stream. The more accurate a biosensor is, the lower the concentration level of the protein can be accurately detected therefore it is possible to design early disease diagnostics devices. Cheap manufacturing and ease of use is also important in the development of biosensors. One way to improve detection of these protein biomarkers is by introducing vesicles as binding mediators for enhancing detection sensitivity. This experiment compares positive, negative, and glucose-coated vesicles in concentrations from 2nM increased by magnitude of ten up to 20 mM.

Roxanne Adeline Uy
Faculty Sponsor: Francis D'Souza
Chemistry

OxP and OxC: Spectral, Computational, and ITC Studies of Anion Binding

Anions play a significant role in many living organisms as well as in non-living systems. Designing an anion binding host requires careful consideration of parameters such as anion size, shape and solvation free energies. Therefore achieving selectivity in anion binding is much more challenging compared to related spherical cations. Among the different macrocycles known to bind anions, oxoporphyrinogen (OxP), a highly colored redox active compound, is known to bind different anions with binding constant varying from 10^4 to 10^5 M⁻¹. Oxoporphyrinogen exhibits visible evidence in its electrochemical and spectral properties upon binding to different anions. In this report, to understand thermodynamic properties behind anion binding to OxP, we have performed isothermal calorimetric (ITC) experiments wherein, enthalpies, entropies, as well as the binding constants are determined in a single experiment for different anions binding to OxP. Additionally, anion binding properties of a new class of modified OxP known as oxocorrologen (OxC) is also performed. A comparison between the thermodynamic parameters obtained by spectral, computational and ITC methods with respect to the two types of anion receptors will be presented. Note: Word format of the abstract submitted to Dr. Whitman's email

Rana Zayed
Faculty Sponsor: Shalini Prasad
Bioengineering

Aligned Heterogeneous Polymer /Carbon Nanofibers for Biomolecule Detect

Label free biomolecule sensors for detection of inflammatory protein biomarkers were designed and fabricated using nano- textured polystyrene polymer structures that functioned as sensing elements coupled with electronic measurement equipment. We demonstrated that scaling down the surface texturing to the nanoscale enhances the amplitude of the measured detected signal strength. We believe that the nano-scale fiber morphology provides size matched spaces for trapping and immobilizing the protein biomolecule resulting in improved detection signal strength. We selected a conducting polymer PVA reinforced with carbon nanotubes which were aligned in a controlled manner on the microscale measurement substrate using gradient electrical fields. We demonstrated the detection of human serum C - reactive protein (hs - CRP) at clinically relevant concentrations. We employed these findings in designing a platformlab-on-a-chip protein sensor.

Kimberly Birker, Erin Connelly, Rachel Lange, Tabatha Ward, Chicara Harris,
Jaci Pottberg, Sarah Adams, and Kymberly Birkner
Sponsor: Kyoung Lee
School of Social Work

Loneliness in Old Age: How it Affects The Well-Being of Elderly Adults

Purpose: As elderly adults increase in age their social support circles decrease in size, thus further alienating them from a more youthful society. The objective of this study is the attempt to determine the effect loneliness has on the general well-being of elderly adults. **Methods:** The study will examine 100 older adults, ages 65 or older, who participate at local elderly activity centers. The study lasted one month between February first and March first of 2011 in which the examiner used a quantitative, face-to-face interview that lasted for approximately one hour for each participant. The interviewer presented each inquiry orally to the participant to avoid literacy, or vision issues. The location of the interview was within participant's home in order to increase the comfort level and to maintain confidentiality. **Results:** Anticipatory conclusions predict to show a correlation between a lower subjective well-being, with a higher subjective level of loneliness. The results will be determined through descriptive statistics and regression analysis method. **Implications:** The topic of elderly loneliness is only minimally researched, especially when topically corroborated with health status. In the past, loneliness studies have restricted their sampling to specific portions of the population (e.g. college students, addicts, women, etc.); in addition they typically have not placed emphasis on the living arrangements of the subjects. An advantage of a subjective survey study is that it allows professionals to see how loneliness affects the perceived health of elderly adults.

Erin Haag
Faculty Sponsor: Kyoung Lee
School of Social Work

An Examination of a Positive Support System for Older Adults

Previous research for older adults mainly focuses on depression, stress and distress, rather than the positive aspects of well-being. This study investigates how a positive multidimensional social support network leads to a better quality of life in older adults. By dividing social support into four dimensions: spiritual, technology, family/friends, and social networks, we are better able to assess in which area an older adult's life could be enriched. This study used a quantitative, cross sectional survey method to gather information for exploration of the social network the participant currently has in place and how this impacts their well-being. Data analysis is done using the Statistical Package for the Social Science, (SPSS), Predictive Analytics software 18, (PASW), and descriptive statistics were analyzed using the Regression analysis method. We expected to find the quality of life for older adults will be enhanced by equal positive support in multidimensional categories. Those that do not receive equal positive support will show a reduced sense of well-being. We expect social support programs will use the results of this study to implement programs for older adults and their families, educating them on the four dimensions and how to apply to their lifestyles.

Sean Hess

Faculty Sponsor: Lyn Goldberg
Communication Sciences & Disorders

Quality of Life, Nutrition, and Respiratory Health in Older Adults

Whether aging in a healthy manner or experiencing disease, all older adults (65+years) are at-risk for swallowing difficulties (dysphagia) and thus disrupted hydration, nutrition, and lung function. Such disruptions can have a profound and adverse effect on health and quality of life (QOL). This study sought to compare perceptual and objective measures of QOL, nutrition, and respiratory status in 10 healthy older residents of a continuing care community. Each participant completed a series of self-report questionnaires (Short Form-36 Health Survey; Hearing Handicap Inventory; Reflux Symptom Index; Nutrition QOL Survey; and Swallowing QOL Survey). The following objective measures were obtained: Body Mass Index (BMI; including height and weight); blood pressure; mid-arm muscle circumference (to estimate body fat); bioelectrical impedance (to estimate hydration); tongue strength and endurance; vital (breathing) capacity; pulse oximetry (blood oxygen level); and swallowing function. Statistical analysis is underway and will be completed by the end of March. This work is part of a larger study to investigate perceptual and objective measures of QOL, nutrition, and respiratory status in healthy older adults and those who have swallowing problems. This research will improve our current understanding about typical swallowing, nutrition, and respiratory status in older adults, how nutrition and respiration change when swallowing function declines, and how QOL is affected.

Jennifer Lasley

Faculty Sponsor: Kyoung Lee
School of Social Work

Different Health Status Between Caucasian and African American Older Adults

Purpose: The purpose of this study is to focus on the different health status between Caucasian American and African American older adults and identify factors that may account for these differences. Does ethnicity have a significant effect on a person's health? The hypothesis of this study is that there are significant health differences between Caucasian and African American older adults in Kansas. **Methods:** The target sample of participants includes 121 men and women, ages 65 and over, of African American and Caucasian American decent. The instrument used to measure the independent and dependent variables will be a structured survey questionnaire. Surveys will be conducted face to face. This study uses Chi-square and t-test methods to compare characteristic differences between African American and Caucasian American older adults. **Findings:** This study expects to find that African American older adults will have more health problems compared to Caucasian American older adults. Demographics, chronic health conditions, and spirituality are all contributors affecting the health and well-being of older adults. **Implications:** The standards for cultural competence in social work practice, are very useful in this study. Social workers should continue to develop specialized knowledge of the history, traditions, values, family systems, and artistic expressions of major client groups they serve. With this being said, social work practice is more than relevant for this particular study.

Hollie Reinhart
Faculty Sponsor: Victoria Shaffer
School of Social Work

Incentive Programs and Employee Behavior

Currently companies are spending a large sum of money on incentive programs for their employees (Shaffer &Arkes, 2009). Two common methods of incentives are cash incentives and non-cash incentives, such as a tangible item. This study was designed to see how these types of programs affect employee performance and satisfaction within a program. Literature on this subject suggested that in a direct comparison employees will prefer cash incentives over non-cash, but are more satisfied with a non-cash incentive (Shaffer &Arkes, 2009). This study compared a cash incentive against a non-cash incentive with employees of a large retail chain. The employees were rewarded with their incentive when they successfully had a customer sign up for the store credit card. There are three conditions involved: the non-cash; employees receive points for credit card applications, and then can exchange points for products, the increased cash program; employees receive an extra \$5 per credit card application, and the regular cash program; employees receive \$3 dollars per credit card application. After employees were assigned to conditions and participated for 3 months they were asked to complete a survey regarding their satisfaction towards their assigned incentive program. Analyses will be done to address our research question and look at the performance and motivation of the employees in each incentive program.

Brooke Simms, Rachelle Roberson, Cara Biddle, Cortney Selgem, Megan Cohmia, and Megan Rubi

Faculty Sponsor: Kyoung Lee
School of Social Work

Relationship between Financial Problems and Well-Being of Older Adults

Abstract Purpose: The purpose of this research paper is to determine how financial status affects the mental and physical well-being of older adults 65 years of age and older. We will discover how financial situations affect a person's mental and physical abilities and their way of life. **Methods:** Surveys were given to 121 older adults through churches and community centers in Kansas. By analyzing surveys, this study was able to get a better understanding of how these variables affect each other. This study utilizes a cross-sectional design and a quantitative approach. A structured survey questionnaire includes standardized instruments that measures financial status, mental and physical health, and overall well-being. **Results:** This study expects findings to conclude that financial status has a significant effect on the mental and physical well-being of older adults. **Implications:** By studying this relationship between financial status and the mental/physical well-being of older adults, the social work community will have an enhanced understanding of how to better assist this population by making resources more accessible. Further education will also need to be available for both the social service community, in particular social workers, and for the elderly adults that have mental and physical health issues due to their financial status.

Sarah Smart, Cassandra Owens, Emily Wilder, and Brenna Miller
Faculty Sponsor: Kyoung Lee
School of Social Work

Different Spirituality and Social Support Between White and African American Older Adults

Purpose: Spirituality and social support can be important factors in the elderly population. This study examines 121 older adult Caucasian and African American participants who are 65 years old or over. The objective of this study is to explore the different spirituality and social support between Caucasian and African American older adults. **Methods:** Participants were selected using the convenience sampling method. Participants were from churches, agencies, SRS offices, and assisted living facilities. Researchers conducted face to face interviews with the participants that lasted approximately one hour. The study utilized a cross-sectional design method and quantitative approach. The interviews were conducted between February 22nd through February 28th 2011. The survey included standardized instruments measuring social support and spirituality. **Results:** Descriptive statistics, Chi-square, and t-test will be used to measure results. This study expects to discover different spirituality and social support between Caucasian and African American older adults. **Implications:** One goal of this study is to understand how Caucasian and African American older adults have different spirituality and social support. A second goal is to recognize the needs of the aging population to be able to meet their spiritual and social support needs.

Alyssa Davidson, Brenda Decow, Lindsey Martin, Meagan Waltner, and Lauren Wilson
Faculty Sponsor: Kyoung Lee
School of Social Work

Spirituality, Physical Functioning, and Depression Among Older Adults in Kansas

Purpose: In today's society, the elderly population's health is declining due to underrepresentation. Many researchers have studied the effects of spirituality and well-being of older adults. However, there are no studies that examine the connection between spirituality and well-being of older adults in Kansas. The objective of this study is to explore the relationships between spirituality and well-being among older adults who reside in Kansas. This study examines 121 older adult participants who are 65 years old or over and have no severe mental disorders or cognitive impairments and are living in Kansas. **Methods:** All participants are selected by using the nonprobability convenience sampling method. By conducting face to face interviews with participants, the researchers obtained completed surveys. This study utilizes a cross-sectional design method and a quantitative approach. A structured survey questionnaire includes: standardized instruments to measure levels of health and spirituality. The interviews are being conducted between February 22nd and March 30th of 2011. One interview is conducted with each participant and lasts approximately one hour. **Results:** Descriptive statistics and regression analysis are used to measure the results. This study expects to find that high levels of spirituality are associated with high levels of well-being in older adults. **Implications:** The overall goal of this study is to understand how spirituality affects the health of older adults in order to develop services for the elderly in Kansas. Through this research, social services for older adults can be improved.

Justin Hall
Faculty Sponsor: Gerry Scholl
Percussion

한국어 수집 노래, Korean Collection: A Medley of Korean Pop Songs for Marimba

KOREAN COLLECTION is my interpretation of a few of my favorite Korean pop songs played on the marimba. What I hope to convey in this composition is the idea of “East meets West,” by performing popular Korean music, but in the western world.

The four songs being played are “별, 별, 별 (Star, Star, Star)” by Girls’ Generation, “Hello” by SHINee, “**声をきかせて** (Let Me Hear Your Voice)” a Japanese song by Big Bang, and “훗 (Hoot)” also by Girls’ Generation.

To create this composition, I wrote out the songs through transcribing the music from piano sheet music, and by ear. The most difficult thing about this piece was writing for marimba from four songs with unique styles while applying different techniques in each song. I had to make sure that the melody and chords were represented well also. For example, in the second movement, I wrote out the song to have a moving 16th note passage that involves harmony and counterpoint to the melody. Another example is the fourth movement; during the last phrase, I separated the melody into a triplet line with the melody in the right hand and the chords in the left hand. Through this, the Korean sound of their music will be represented in American sound of my music.

Chiyoko Myose
Faculty Sponsor: Ronald Christ
College of Fine Arts, Painting

Sojourning

My work expresses personal feelings and experiences as a sojourner and my spiritual journey in search of a place to fully call home.

I grew up in Japan, but I have been living in the U.S. for many years. I still feel torn between these two places and cultures. My experience with different perspectives and life expectations of the two cultures leads me to wonder which one I should choose. Not being able to fully choose either, I sense that I am just passing through in both countries and not fully part of either culture; like a sojourner. As a sojourner, I am consoled by the belief that my life on earth is temporary, and that there is a better place with a sure foundation that I really belong to, which is in the spiritual realm.

For this particular body of work, I am expressing the different facets of the reality of my life as a sojourner. The imagery has three components. The first component, the far background, represents the environment or situation of my life in Kansas, the second component represents my mind structure and how contemporary Japan looks like to me, and the third component, the top layer, expresses my spiritual journey searching for the foundation.

My work is personal, but I believe many people are sojourners in one way or another. I hope my work encourages people who are in a similar situation and evokes questions to the viewers both socially and spiritually.

Nam Le
Faculty Sponsor: Barry Badgett
School of Art & Design

Another moment to live

Mother Nature brought Life to Earth. However, we tend to appreciate living creatures over once-to-be-alive ones. In particular, we don't usually consider a dead tree an aesthetical symbol. After the tree dies, its body would just stand there, waiting to be rotted. We forgot about the fact that the tree has engraved its spirit into the body: when a wooden log is cut open, beautiful wood grain will reveal itself to life again.

Although life has departed, it doesn't take away the tree's underlying beauty. I want to explore this beauty by incorporating it into my work. Using woodworking techniques, I can alternate different woods into new forms and thus giving them a chance to be alive again. They gain the ability to show the breath of life through either geometric or organic figures. With the new forms, these dead parts of Nature would gain more appreciation from us, the people who live upon the benefits of them.

Tim Stone
Faculty Sponsor: Robert Bubp
College of Fine Arts

Colorful Fiction: Exploration the Space Between the Abstraction and Recognition

I manipulate what we see as everyday objects and places such as urban architecture, and landscape into a colorful fiction. The word fiction literally means "imaginative narration". With my brushwork I marry chaotic mark making with bold representation. A drama emerges between what the viewer knows and what they are being told they should know in order to question the "constructed space" being presented. This dilemma of fact or fiction sets a conflicting, contemplative mood. Just like the process that created it; the imagery and mark making is chosen and inserted both carefully and spontaneously to present this unlikely union of landscape, languor, speed and concrete.

Pathways, and conflict between the recognizable and the abstract are themes within my work, as well as connection, disconnection, and how that effects the "in between". I build my frames

from 2x6x12 boards and stretch and gesso the canvas myself before painting. When painting I rely on my knowledge of formal elements and self taught intuition to produce colorful landscapes that echo or give voice to the “in between” of the recognizable and abstract. I plan on presenting a slide presentation on cd so I will need a projector; my presentation falls under the exhibition performance category.

Hannah Scott
Faculty Sponsor: Robert Bulp
College of Fine Arts

Wanderlust: Illustrations of the Internal

The work I make is constructed heavily through the use of dry materials, mainly paper and pencil. The process is slow, each piece being worked in several stages until the values and details are fully formed from an idea that began in my mind. These ideas begin as ghosts on paper, slowly advancing into the field as I work until they possess and share with me every intention I had for them in the beginning. Putting paper to pencil and interpreting information in this way allows my young mind to explore what information means to me; that if I spend enough time working on a piece, these shared human experiences of desire, nostalgia, triumph or failure that I attempt to depict will manifest themselves within me finally, so that I can transition into adulthood with a pure understanding of what it means to be human. I take great care when constructing a piece. While the process of drawing may be simple, the internal process is much more complicated, as each decision I make will ultimately reflect back onto me. Nonetheless, the process and the product is paramount. Through my work, I’m allowed to shed my internal layers of growth, so that I can begin to learn again, to feel again, and to create again.

Heidi Cruz
Faculty Sponsor: Levente Sulyok
College of Fine Arts

Puppets

I use watercolor paintings of figures suspended by strings as a means of investigating concepts of manipulation and oppression. By illustrating the pulling and twisting of these figures, I depict manipulated flesh that metaphorically reflects the effects of outside control that many experience, but cannot easily explain with words. The figures become puppets that are completely overtaken by their strings. The layering of watercolor pigment can be interpreted as the physical layering of flesh, or the emotional layering of experience. I use this layering of paint to allow for a certain emotional complexity within the figure. Leaving the idea of the figure's environment and source up to the viewer allows the work to enter a broad range of social, political and psychological terrains.

Early explorations attempted to simply make drawings of figures in uncomfortable poses. I then moved on to investigate the expressive potential of watercolor painting and felt that my figures began to convey my meaning more clearly in this way. As an artist, it is important to me to keep in touch with the contemporary art world. After researching the work of Kiki Smith, whose work touches on the subject of the body, I have begun to redirect my investigation about the human experience in a more focused way.

The resolution of formal and material issues in my painting process and content was ultimately successful. With the help of my Faculty Mentor Levente Sulyok, I have made a cohesive body of work that I believe really speaks to the viewer about the human experience, specifically those issues regarding manipulation and oppression.

Amber Creasser
Faculty Sponsor: Betty Monroe
College of Fine Arts

Tartuffified

This research project revolved around Wichita Center for the Arts upcoming production of Moliere's Tartuffe for which I've been hired as costume designer. As an American in the 21st century, I have a distinct challenge; how do I capture the spirit of the times in a play set in 1660s France and effectively relate this to a modern audience?

My method of research involved perusing artistic primary resources including paintings, sculpture, and architecture. Academic sources included analyses of the play, books focused on fashions as well as historical texts regarding politics, religion, and theatre. Inspirational methods involved study of modern designers' interpretations in art, theatre, and film.

This play appears a simple fairytale comedy about a scam artist's nearly successful swindling of a family results in a happy ending upon the king's intervention. In truth, it's riddled with political and religious statements which are no less true in today's society than when it was written nearly

350 years ago. Better understanding of each of the characters' lives as they knew it is critical in my work.

I found great diversity in resources is necessary to effectively transport oneself, actors, and an audience back in time and truly capture the essence of any period. No matter field, it's imperative not to limit oneself to static resources. One must be open to new, oft unusual, methods that might provide inspiration and further decorate our creative minds, whilst successfully executing our mission.

Amber Creasser
Faculty Sponsor: Hannah Carter
College of Fine Arts

Costume and Make-Up Design for Eugene Ionesco's Absurdist Play, The Chairs

Being an Absurdist play, the design of The Chairs could go in any wild direction and remains open to vast interpretations. Given these circumstances, a challenge was still present: How does one maintain a sense of reality in the midst of such absurd language and concept? How does one bring life to characters that seem so intangible and are of such extreme old age? The speech is so disjointed and seemingly nonsensical, jumping from one extreme emotion to another, but somehow exuding a very real, very human nature. This needed to be brought to the attention of the audience. No background information was given on the characters, so what choice is to be made regarding their appearance? To answer these questions, research was to be performed on the chosen period from which they would be dressed, when they would be at their assumed 'prime', the 1950's. This involved the usage of fashion archives and popular publications of the period, as well as a deep look into the Absurdist movement itself using others of the playwright's work and various writings on the movement. Research was also done on the many intricate details and variation of the effects of old age of the human skin using live observation.