Fall 2015

Thursday, November 19, 2015
Clark Student Center

Undergraduate research is an inquiry or investigation conducted by one or more undergraduate students, with faculty guidance, that attempts to make an intellectual, creative, or applied contribution to one or more disciplines.
# Undergraduate Research & Creative Activity Forum

**Time & Venue**

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<th>Time &amp; Date</th>
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### Time & Venue

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<th>Time</th>
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<td>8:00 – 9:00 a.m.</td>
<td><strong>PARTICIPANT CHECK-IN</strong></td>
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<td><strong>Student &amp; Mentors</strong></td>
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<td>9:00 – 10:40 a.m.</td>
<td><strong>CONCURRENT ORAL PRESENTATIONS</strong></td>
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<td><strong>SESSIONS 1A &amp; 1B</strong></td>
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<td>10:40-11:00 a.m.</td>
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<td><strong>Atrium</strong></td>
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<td>9:00 – 10:30 a.m.</td>
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<td>1:30 – 3:00 p.m.</td>
<td><strong>SESSION 3</strong></td>
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9:05-9:25  
**Literary Works and Postcolonial Nigeria**  
Adaobi Ezeodum. Mentor: Dr. Lucy Schultz, Humanities, Prothro-Yeager College of Humanities and Social Sciences  
Postcolonial studies is an academic discourse that attempts to analyze, deconstruct, and break down the various effects of colonization by European nations on now independent nations. Chimamanda Ngozi Adichie and Chinua Achebe are prominent Nigerian writers who have used their literary work to delve into postcolonialism in Nigeria. *Half of a Yellow Sun* by Adichie is a book that tells the story of the Biafra War. She explains the story of the Biafra War from the perspectives of the Igbo people, and at the same time uses the love story of Olanna and Odimegwu to highlight the war and its effect in exacerbating tribalism in Nigeria. In *Things Fall apart*, Okonkwo and the colonial British officials often go head-to-head due to their differences in cultures and traditions. This project is going to critically analyze *Things Fall Apart* in the way that Achebe delves into postcolonialism during the period of colonization, and the various ways in which Nigerians were affected by the sudden infuse of British officials and missionaries. In *Half of a Yellow Sun*, Adichie explores postcolonialism from the perspective of looking at Nigeria shortly after independence. The Nigeria that remained after colonization was one that had no idea of how to run herself. This led to increased tribal tensions. At the end of this project, the ways in which Adichie and Achebe examined postcolonialism in Nigeria would be manifest. Also, both books would be juxtaposed against each other to further illuminate their perspectives of looking at postcolonial Nigeria.

9:30-9:50  
**Fort Hood Free Grazers: Central Texas Cattle Ranchers and the Role of Federal Government in the Economic Development of the Post-War American West.** Kristen Johnson. Mentor: Dr. Leland Turner, History, Prothro-Yeager College of Humanities & Social Sciences  
In 1941 the United States government seized some 150,000 acres of privately held Central Texas grasslands. The purpose was to build an Army training facility. Nonetheless, that seizure set the course for a repetition of federal government initiated opportunity for cattle raisers on the Great Plains. The history of the American West is largely a history of economic opportunities provided through federal initiatives. The government sponsored expeditions to survey new lands, financed railroads that connected such lands to the larger economy, distributed those lands to industrious farmers through the Homestead Act of 1861, and allowed cattle raisers to graze their stock on unclaimed grasslands, or the open range. Following World War II the federal government provided another economic opportunity to Central Texas cattle raisers. In 1949 ranchers were permitted to graze cattle on surplus Fort Hood lands. Fences were, however, prohibited. Much traditional history considers the rancher in the light of western lore and mythology – an individual requiring little of others, and in particular, nothing of the federal government. Yet, open range cattle ranching that depended on the availability of federal grasslands, was the model of Great Plains beef production before the 1890s.
Integrating Children’s Literature in Elementary Math Methods: Fostering Understandings and Connections

Melissa Whitwood and Nikki Bussue. Mentor: Dr. Dittika Gupta, Education, West College of Education

Children’s literature provides a strong reading connection to teaching elementary mathematics. Be it through content development, introduction of manipulatives, or preparation for a concept or skill, children’s literature promotes mathematical communication and understanding. Although integration of children’s literature and mathematics is popular, not all educators or pre-service teachers know about it (Ruiz, Thornton, & Cuero, 2010). In this research study, the pre-service teachers in their mathematics methods course are exposed to strategies for integrating children’s literature to teach elementary mathematics. The purpose of this research study is to examine pre-service teachers’ attitudes and perceptions towards integration of children’s literature with teaching mathematics. Qualitative analysis using open and axial coding was used to analyze pre- and post-interviews, lesson plans, class discussion, and pre-service students written work. Results of the study provide insight into pre-service teachers’ criteria and attitude towards selecting and using children’s literature in their own classroom. The researchers hope that the study will provide a model that can be used in teacher preparation programs to expose pre-service teachers to integrating reading in elementary math classrooms and positively influence them to incorporate different strategies in teaching.

U.S. Foreign Direct Investment, Exchange Rate Regimes and Expectations in Emerging Economies

Luca Lalor. Mentor: Dr. Pablo Garcia-Fuentes, Economics, Finance, and General Business, Dillard College of Business Administration.

The United States has been the largest foreign direct investor in the world, and its direct investment position in 2013 was $338 billion (UNCTAD, 2014). Therefore, it is important to investigate about the factors that affect US FDI flows. The literature on the determinants of foreign direct investment (FDI) is very vast; however, research on US FDI and exchange rate regimes in emerging economies still deserves to be assessed. This research aims to contribute to this literature by empirically assessing the effect of de facto exchange rate regimes on US FDI flows to the top 20 emerging economies over the period 1983-2012. Specifically, it focuses on assessing the effect of three de facto exchange rate regimes (fixed, intermediate, and float) on US FDI. The economic approach is based on a model of profit maximization that leads to the derivation of the optimal amount of capital at the foreign plant that can be defined as \( K_t^* = f(D_f, v_h, v_f, w_h, w_f) \). An econometrics model to assess the effect of exchange rate on US FDI is defined as

\[
FDI_{it} = \beta_0 + \beta_1 \ln(GDPP_{it}) + \beta_2 DFER_{it} + \beta_3 DIER_{it} + \beta_4 Tt\lnINF_{it} + \beta_5 (\frac{Wh}{Wh})_{it} + \beta_6 K_{it-1} + \alpha_t + \mu_t + \varepsilon_{it},
\]

where \( FDI_{it} \) is the dependent variable and \( DFER_{it} \) and \( DIER_{it} \) are the exchange rate variables of interest. We expect that exchange rate regimes would affect U.S. FDI differently. It is expected that host country demand positively affects U.S. FDI flows, which would support the market size hypothesis. We also expect that factor costs would affect U.S. FDI.
The Power of the ‘Pro Athlete’: An investigation into the Evolution of Basketball as Big Business in America

Gerald Sampson. Honors Program

With the overwhelming fortune, fame, and popularity which surrounds professional basketball and its athletes, it comes as no surprise when people become interested in the history and origins of the game of hoops. Hence, providing satisfactory answers to the questions about the origins of professional basketball is the purpose of this research project. During my research I have discovered a number of iconic personalities who were very important in developing professional basketball and who were influential in shaping the sport into the colossal franchise that it is today. The research makes an attempt at explaining the unique roles performed by these selected individuals in the development and evolution of professional basketball.

Basketball owes its creation to a gym instructor Dr. Naismith, who was forced to create an activity capable of keeping his students physically occupied during the winter months, and so the game of basketball was born. The game quickly grew in popularity across America, a popularity which would eventually transform a mere game into a powerful industry with a global influence.

Today, the power of the professional basketball athlete is tremendous and extends way beyond the confines of the basketball court. Players’ leverage has been manifested in many ways, from forcing a lockout in the 1998/1999 season, to boosting sales of almost every advertised product or service.

Bacterial Endophytes in Seeds with High and Low Melatonin Content: Survival Implications

Meaghan Rose and Shamberia Thomas. Mentors: Dr. Magaly-Rincón-Zachary and Dr. James Masuoka, Biology, College of Science and Mathematics

Non-pathogenic bacteria and fungi that live within plant cells are referred to as endophytes. While many different genera of endophytic bacteria have been isolate and identified in all plant species that have been examined, their role in plant metabolism, growth and development, survivorship, immunity, etc. is not known. The purpose of our investigation is to isolate and identify endophytic bacteria in seeds that have been reported to contain melatonin. Using aseptic techniques, we sterilized the surface of seeds containing varying levels of melatonin. The seeds being used currently came from celery (Apium graveolens L.) and sweet corn (Zea mays L.) plants. We then crushed the seeds and aseptically placed them in test tubes containing BHI broth. The broth provided nutrients for any potential endophytes within the seeds so that they may grow and reproduce.

Six bacterial endophytes have been isolated from within celery and sweet corn seeds. These colonies were grown on BHI 1.5% Agar plates. Two variations of pink colonies and a predominant yellow species were isolated from the celery seeds. We cultured three types of bacteria from within the sweet corn seeds. Both of these seed types have low melatonin content. The seeds with high melatonin levels will be tested next to see the diversity within them. We will Gram’s stain the bacterial endophytes we found, and use metabolic tests in order to identify them.
A Bevel Gear Based Quasi-Continuous Transmission

Sharon Peralta, John Krawietz, Jacob Virgin, Aaron McKenzie and Wayne Vincent. Mentor: Dr. Salim Azzouz, McCoy School of Engineering, College of Science and Mathematics

A Transmission system is a crucial part of a vehicle system. It allow for the changing of speed and torque for various loading conditions. Since transportation vehicles were invented, new transmission systems have been developed that have truly revolutionized the automotive industry. The two most common are the manual and automatic transmissions. The manual one uses a clutch and synchronizers to engage and disengage different gears to obtain different speeds and torques. The automatic one uses planetary gear systems coupled with a torque converter that changes torques and speeds. The goal of all developed transmissions is to get as close as possible to a continuous variable transmission (CVT) so the vehicle can adapt to all possible loading conditions. This research project introduces a bevel gear based quasi-continuous variable transmission. This design consists of a large central bevel gear surrounded by a high number of follower special bevel gears. The input power enters the large conical gear and goes through each of the follower gears to a specific output shaft. Electromagnetic clutches are used to engage each follower gear in a specific order. This design allows for more gear ratios which results in less wasted energy and ultimately better gas mileage. The proposed design is created using CAD software and Newton’s second law is used to determine the kinematic and dynamic behavior of the gearing system. A prototype for this design is being currently built with a 3-D printer, and will be tested during the Spring 2016 semester.

Use of Hydrochloride acid (HCl) to Control pH Value for Superabsorbent Polymer Solutions

Connor Kirby and Cody Chancellor. Mentors: Dr. Mahmoud Elsharafi and Dr. Jeong T. Ok, McCoy School of Engineering, College of Science and Mathematics

The purpose of this study is to observe the effects of superabsorbent polymers (SAP) AT-O3S and 2G-110 when introduced to brine solutions of varying pH values. When injected intoan oil well, a superabsorbent polymer will swell, blocking high permeability zones. The swelled polymer will decrease reservoir heterogeneity, diverting injected water to oil rich zones/areas of the formation. Understanding the kinetics of an SAP is crucial to its proper employment. However, when the AT-O3S and 2G-110 polymers are introduced to brine solutions containing calcium, reactions involving the sodium crosslinker of the polymers result in the destruction of the polymers and the formation of a precipitate. In an attempt to solve this problem, pH values of calcium chloride/deionized watersolutions will be varied and introduced to polymer samples to determine if lowering the pH can prevent precipitation. The procedure includes first introducing hydrochloric acid to brine mixtures, mixing and agitation the polymer with the brine solution, and lastly recording the results. The measurements to be recorded will include the volume of the polymers before, during, and after the reaction. From this data, the swelling ratios of the polymer samples will be calculated, graphed, and contrasted appropriately according to time intervals and the pH of each sample. By following this procedure, the preliminary data shows that the reaction is delayed by decreasing the solution pH, but the reaction has not been fully prevented yet. This does not rule out the original assumption, as some refining is needed to gain a more accurate understanding of the role of pH.
11:00-11:20 (O9)  
**Factors Driving Down Oil Prices: Implication for the North Texas Regional Economy**  
**Curtis Knobloch.** Mentors: Dr. John Martinez and Dr. Robert Forrester, Economic and Finance, Dillard College of Business Administration  
Using a variety of statistical and econometric techniques, this research estimates the extent to which the recent slowdown in the growth of global oil demand has been responsible for the recent drop in oil prices. Econometric analysis will be used to estimate the relationship between changes in oil prices and changes in world demand factors with the 10-Year Constant Maturity Treasury rate and the U.S. Dollar Exchange Value serving as proxies for world demand. In our analysis, we use monthly data from June 2014 to June 2015 to determine the relationship between changes in the price of oil and changes in world demand factors. The estimating model will then be used to calculate how much of the change in the price of oil could have been predicted solely on the basis of changes in world demand factors. The hypothesis under investigation is that the greater portion of the oil price change occurring from mid-year 2014 to mid-year 2015 was affected more by the broader weakness in the global economy than to any specific development in oil markets in particular. Using time series techniques we forecast the near-term change in these factors and their likely impact on future oil prices. The second stage of the research will determine the impact of the oil price decline on the North Texas economy. Using the North Texas Input-Output model, we estimate the potential impact of falling oil prices on regional earnings and output.

11:25-11:45 (O10)  
**Self-control and Sustainable Behaviors**  
**Cameron Harper, Ta’Les Russell, Brandi Reid, and Jose Sanchez.**  
Mentor: Dr. Thuy D. Nguyen, Marketing, Dillard College of Business Administration  
Self-control is central to our behavior, emotion, and cognition. This study explores the relationships between self-control and sustainable behaviors, such as spending habit, eating habit, and recycling habit. Using secondary research, qualitative study, ANOVA and regression analyses, the results show that self-control has significant relationships with the three sustainable behaviors. The discussion provides the importance of the research to individual and society at large.

11:50-12:10 (O11)  
**Remittances Effect on Poverty in Developing Countries: The Human Capital Channel**  
**William R. Ash.** Mentor: Dr. Pablo García-Fuentes, Accounting, Dillard College of Business Administration  
Remittances are an important source of external financing to developing countries, which are second to foreign direct investment inflows and larger than official development assistance inflows to developing countries. Therefore, it is important to assess the impact of remittances on poverty reduction. This research focuses on the impact of remittances on poverty through human capital. It uses an unbalanced panel data set for a sample of developing countries drawn from Latin America and the Caribbean, Middle East and North Africa, Europe and Central Asia, East Asia, South Asia, and Sub-Saharan Africa, and covers the period 1975-2013. Specifically, it assesses the effect remittances on poverty through three proxies of human capital (primary education, secondary
education, and tertiary education). It estimates the moderating effect of human capital on the relationship between remittances and poverty. It also estimates the direct and indirect effects of remittances on poverty. It uses an empirical model as in Adams and Page (2005), which is defined as \( \ln P_i^t = \beta_0 + \beta_1 \ln P_i^{t-1} + \beta_2 \ln PCGD_P_i^t + \beta_3 \ln Rem_i^t + \beta_4 \ln H_i^t + \beta_5 \ln Rem_i^t \cdot \ln H_i^t + \beta_6 \ln PR_i^t + \beta_7 \ln Open_i^t + \beta_8 \ln ODA_i^t + \alpha_i + \mu_t + \epsilon_i^t \), where \( \ln P_i^t \) is poverty as dependent variable and \( \ln Rem_i^t, \ln H_i^t, \) and \( \ln Rem_i^t \cdot \ln H_i^t \) show the relations of interest. We account for endogeneity of remittances and expect that remittances have a direct contribution to decreasing poverty in developing countries. We expect that remittances contribute to decreasing poverty through human capital, which is an indirect effect of remittances on poverty. We also expect human capital has a direct contribution to decreasing poverty in developing countries.

### Remittances and Human Capital Impact on Inequality in Developing Countries

**William R. Ash.** Mentor: Dr. Pablo García-Fuentes, General Business and Accounting, Dillard College of Business Administration

Remittances are second to foreign direct investment and larger than official development assistance inflows to developing countries, as well as an important source of external financing to these economies. Therefore, it is important to assess the impact of remittances on inequality. This study focuses on the effect of remittances on inequality through human capital. It uses an unbalanced panel data set for a sample of developing countries that represent Latin America and the Caribbean, Middle East and North Africa, Europe and Central Asia, East Asia, South Asia, and Sub-Saharan Africa, and covers the period 1975-2013. It assesses the impact of remittances on inequality through three measures of human capital (primary education, secondary education, and tertiary education). It estimates the moderating effect of human capital on the relationship between remittances and inequality, as well as the direct and indirect effects of remittances on inequality. It uses an empirical model as in Adams and Page (2005) defined as \( \ln G_i^t = \alpha_0 + \alpha_1 \ln P_i^{t-1} + \alpha_2 \ln PCGD_P_i^t + \alpha_3 \ln Rem_i^t + \alpha_4 \ln H_i^t + \alpha_5 \ln Rem_i^t \cdot \ln H_i^t + \alpha_6 \ln PR_i^t + \alpha_7 \ln Open_i^t + \alpha_8 \ln ODA_i^t + \alpha_i + \mu_t + \epsilon_i^t \), where \( G_i^t \) is inequality in country \( i \) at time \( t \), \( Rem \) is remittances as a share of GDP, and \( H \) is human capital. We expect \( \alpha_3 < 0, \alpha_4 < 0, \) and \( \alpha_5 < 0 \). We account for endogeneity of remittances and expect that remittances have a direct contribution to decreasing inequality. We expect that remittances contribute to decreasing inequality through human capital, which is an indirect effect. We also expect human capital to decrease inequality in developing countries.
11:00-11:20  
**Vertical Drivetrain Transmission for a Wind Turbine**  
William Moore, Peter Lovelace, Nathan Galbraith, Adikarige Nethmal Perera, and Lewis Mombo. Mentor: Dr. Salim Azzouz, McCoy School of Engineering, College of Science and Mathematics  
The increasing worldwide demand for energy, coupled with the growing desire to integrate renewable resources into the energy mix has inspired this project. The main motivation for this research is to design a new wind turbine structure in a way that increases power production, accessibility, and safety in the same time. To accomplish this goal, the research explores whether or not the power generator can be moved from the nacelle to the base of the tower. By moving the generator to the ground, size constraints placed upon the generator are completely eliminated. This would allow operators to use larger generators, and therefore produce more power. It also reduces upkeep costs for the turbine, by increasing the accessibility and safety for maintenance crews.  
This project consists of two parts: First, a vertical drivetrain which transmits the power from the gearbox hosted into the nacelle down to the generator on the ground, and a working dual-turbine on the nacelle top, are designed using CAD software. Newton’s second law is used to determine the wind turbine kinematic and dynamic parameters, while the wind turbine rotor theory is used to determine the flow of power through its components. Part two involves the use of the FAST and Matlab software to model a real large scale wind turbine. This fact, is allowing the comparison of the proposed new model to the classical current ones. It is envisioned that a small model of the wind turbine will be built during the spring semester.

11:25-11:45  
**Compact Fresh Water Generator Using Renewable Energy**  
Chavindra Hatharasinghe, Andrew Krezinski, Yaning Liu, and Kyle Poirot. Mentor: Dr. Sheldon Wang, McCoy School of Engineering, College of Science and Mathematics  
The demand for fresh water is extremely important for the survival in the open sea. In this project, we endeavor to produce the fresh water using renewable energy resources in wind and solar forms. Our research project also focuses on the design of a Compact Fresh Water Generator suitable for various life boats. In our compact desalination system, we have foldable solar panels, wind turbine blades, water distiller, and battery as well as retractable structures and canopies. Based on thermodynamic principles, we found that the energy required to evaporate 1 gallon of water is about 8.2 MJ. For the distiller we consider in this work, the total power supply has been estimated to be 3.2 KWh or 11.5 MJ. Thus, the overall energy conversion efficiency is 70%. We attempt to provide such energy with the combination of solar panels and wind turbines. This project has significant implications for the safety of navigation.
Chain Based Planetary Automatic Transmission
Jn Claude Gustave, Bryce Tucker, Jennifer Sissel and Nanette Philip.
Mentor: Dr. Salim Azzouz, McCoy School of Engineering, College of Science and Mathematics

Current transmission systems have torque limitations when running to various vehicle loading conditions. The best ideal vehicle transmission is a continuous variable transmission that delivers an optimum torque to any loading condition. The motivation for this research project is to design a new transmission that would increase the number of gear ratios, consequently, increasing the number of available torques to achieve many optimum loading conditions for a working vehicle. The new transmission involves the use of two planetary gears systems coupled by a driving chain. It includes multiple inputs and outputs with the possibility of using one of the outputs to drive other engine components. The system is currently investigated for all possible gear ratios and usable torque configurations. The gear ratios are determined using the Willis formula for planetary gears. Newton’s second law is used to determine the kinematic and dynamic behavior of the gearing system. The theory of probabilities is applied to determine all gearing ratio combinations. A CAD software is used to design and analyze how stressed are the components within the system. A prototype is currently being designed and is projected to be built in the spring semester of 2016. After construction, experimental data will be collected from the prototype.

CUDA Simulations of Granular Flow
Matthew Aaron. Mentor: Dr. Martin Melhus, Computer Science, College of Science and Mathematics

Granular materials such as sand, salt, dirt, and gravel are all around us, yet no equations governing their exact behavior exist. The purpose of our project is to build a particle simulator in C++ with CUDA and use this software to run experiments pertaining to granular flow. For normal particle-particle interactions, we use Gear's 5th-order predictor-corrector scheme, in which for every timestep, we "predict" each particle's position based on its velocity, acceleration, and third and fourth time derivatives, calculate the forces acting on each particle, and then "correct" each particle's position based on the forces. For tangential particle-particle interactions, we intend to use Gear's 3rd-order predictor-corrector scheme, which is the same except that it lacks third and fourth derivatives. We expect to be able to perform simulations with about two thousand particles, generating numerical data and visualizations of the particle flow.
Oral Presentations
Comanche Suites
Session 3A
1:30 – 3:30 p.m.

MODERATOR: JEFF BLACKLOCK

1:30-1:50 (O17)  
**Monitoring and Improving a Combustion Chamber with Thermodynamics and Computational Fluid Dynamics: Another Step for Emission Reduction**

*Tomas Grejtak.* Mentor: Dr. Sheldon Wang, McCoy School of Engineering, College of Science and Mathematics

In this project, we will first estimate the ideal discharge gas contents and volume flow rates based on thermodynamics principles. This of course is based on the assumption that the spatial mixing is complete and the combustion process is thorough. In practice, mixing depends highly on the spatial arrangement of the injection fluid, the spatial temperature distribution, and the spatial design of the furnace. A more comprehensive simulation based on Computational Fluid Dynamics will be introduced to study the turbulent mixing and combustion process within the furnace. Some feasible measures will be proposed to eliminate or reduce the emission of toxic gases.

1:55-2:15 (O18)  
**Enhanced Oil Recovery Using Microfluidic Porous Media Analog**

*Matthew Felix, Cecil Francis, Ayesha Madamawatta, and Matthew Murphy.* Mentors: Dr. Jeong Tae Ok and Dr. Mahmoud Elsharafi, McCoy School of Engineering, College of Science and Mathematics

Enhanced Oil Recovery (EOR) is a tertiary method to recover the residual oil that was left in the networks after the completion of the primary and secondary recovery processes. Unlike the forceful methods of extraction used in the conventional processes, EOR alters the fluidic properties of the oil using chemicals such as surfactants, which reduce the interfacial tension between the water and oil, in order to make the residual oil more readily accessible for extraction. This project aims to simulate an EOR process in a naturally occurring porous media within the petroleum reservoir by creating a 2-D microfluidic porous media analog (µPMA) model using a hydrophobic, meaning that the substance is oil-wet, polymer. We selected polydimethylsiloxane (PDMS) and Norland Optical Adhesive NOA 60 as the materials used to create our µPMA model since both polymers allow the simple fabrication procedures, direct visualization, and measurement of the extraction process. We plan to conduct single/multiphase flow measurements in the µPMAs. For the single phase flow experiments, the hydraulic permeability of the µPMA will be measured by infusing dyed deionized water at a constant pressure and measuring the flow rate through the device. We will then apply the Kozeny equations in order to determine the hydraulic permeability of our device. Using an identical setup as in single flow studies, multiphase flow experiments will be conducted to examine the displacement of light mineral oil by brine (0.5-1.5 wt. % NaCl) or by the surfactant solution (0.5-1.5 wt. % NaCl and 0.5 wt. % EA).

2:20-2:40 (O19)  
**Robotics Flexible Manufacturing Cell**

*Bodie Choate, Tim Young, Keyla Ahow, and Dhakshitha Weralavithana* 
Mentor: Dr. Jan Brink, McCoy School of Engineering, College of Science and Mathematics

There is a demand in automated manufacturing for robotic processes that are reliable and robust. Interruption to any process often results in down time and loss of money for a manufacturer. The intent of this senior design project is to improve autonomous block identification, drilling, and palletization using the robotic resources found in the McCoy School of Engineering.
The existing robot manufacturing cell is in need of design improvement to ensure that the operation is safe, reliable, and highly repeatable. Project objectives are to correct inconsistent loading of the wood and acrylic blocks, material specification verification, automated material identification, six axis robotic arm programming inefficiencies, and to redesign the pneumatic drilling station. A rapid demonstration in the McCoy School of Engineering will exhibit the improvements to the system upon completion of this project. The demonstration will also show major improvements in repeatability as needed by today’s manufacturing processes.

**2:45-3:05**

*Design and Implementation of Electronic Sensors*

Clayton Brown, Yumeng Cheng, Joshua Frawley, and Kingsley Irish.

Mentor: Dr. Yu Guo, McCoy School of Engineering, College of Science and Mathematics.

This project is aimed at designing and implementing two torque sensors and two load cells. These torque sensors and load cells are bridge based electronic sensors that make use of strain gauge measurement to indicate torque or force. The measurement ranges of the torque sensors are 80 lbin and 100 lbin, respectively. And the measurement ranges of the load cells are 100 lbs and 200 lbs, respectively. Different design concepts have been investigated, and suitable concepts were chosen to fit the project requirements. Parametric analysis was performed to optimize the design. And static structural analysis was carried out to estimate the range of strain measurements of the strain gauge. Modal analysis was studied to determine the natural frequencies and mode shapes for each elastic body. Such natural frequencies and mode shapes were evaluated so that the dynamic response of the elastic bodies would not interfere with the signal to be measured. Calibration fixtures will be designed in the future to provide proper calibration platform. Data acquisition program will be designed to perform tasks such as calibrating the sensors and monitoring the signals.

**3:10-3:30**

*Pneumatic Trainer Senior Design*

Silvestre Barajas, Brandon Poirot, Carlo Santos, and Ty Healer.

Mentor: Dr. Jan Brink, McCoy School of Engineering, College of Science and Mathematics.

The purpose of this project is to design and build a pneumatic trainer and write up a corresponding lab manual. The trainer is to be strictly pneumatic with no electrical controls, and is to be mobile. The trainer would serve as an educational aid to future engineering students, as well as a refresher to industry professionals involved with mechanical and pneumatic processes. From a student’s perspective, an efficient educational trainer needs to be able to capture a student’s attention and have the capacity to relate theory to practical applications. The lab manual would start with a basic single actuator circuit and end with a multi-actuator robotic arm circuit. The design of the trainer is based entirely on the progression of complexity of the pneumatic circuits. To utilize the limited size of the trainer and the requirement of mobility, a dual sided panel concept was selected. The lab manual for the pneumatic trainer is outlined relating to the length of a standard fourteen week semester at the university. There are twelve labs outlined for the trainer that include theory, procedure, and questions to answer. The lab circuits have been designed using Automation Studio, and the preliminary design for the trainer itself has been drafted in SolidWorks. The necessary components will be ordered by the end of this semester and construction of the trainer will start in the beginning of the spring.
Oral Presentations
Kiowa
Session 3B
1:30 – 3:05 p.m.

**MODERATOR: DITTIKA GUPTA**

1:30-1:50 (O22)  
**N-body Simulations of Dwarf Galaxies**  
**William Dinwiddie.** Mentor: Dr. Jacqueline Dunn, Chemistry & Physics, College of Science and Mathematics

The effects of gravitational interactions on the evolution of dwarf irregular galaxies are explored through the use of N-body simulations. Numerous studies have been performed on N-body simulations of dwarf galaxies, with most focused on modeling the tidal interactions of satellite and host galaxies. Here, two general scenarios are considered: the interaction of two dwarf galaxies, and a single dwarf galaxy nearby a large spiral galaxy. Initial conditions for each galaxy model were produced using GalactICS, with N-body simulations being run through GADGET 2. A galaxy cluster is included in the simulation using a gravitational potential function introduced into the GADGET 2 code. Each scenario is run both with and without the cluster potential present. Additionally, a single dwarf galaxy in the presence of the cluster potential is simulated. In all instances, the most drastic changes are seen under low velocity interactions. The results of the simulations imply that global environment (group / cluster membership) has more impact on dwarf galaxy evolution compared to local environment (nearby neighbor).

1:55-2:15 (O23)  
**A Pneumatic Dome Shaped Active Road Rumble**  
**Daniel Goodey, Donnie Hudnell, Austin Fidlar, Varuna Denawakage Don, and Ronell Pemberton** Mentor: Dr. Salim Azzouz, McCoy School of Engineering, College of Science and Mathematics

Vehicles travelling on busy highways lose an appreciable amount of their kinetic energy to their surroundings. These losses can be attributed to various sources, such as loss of energy in the braking system, and tire roll on the ground. According to the Federal Highway Administration, there is an average of 304,000 cars a day travelling on the US-75 through the Dallas area. The purpose of this research project is to design a system that recycles some of this lost energy using a pneumatic cylinder built into the road. The cylinder has a dome shape that lies slightly above the ground. As cars pass over the dome, it depresses and compresses air, which is stored in a pressure vessel under a designed pressure. The energy of the compressed air in the tank can be used for multiple purposes such as: a toll booth, highway structures, or high traffic parking lots. The compressed air tank may be removed, transported and sold elsewhere. The harvesting pneumatic circuit is designed using CAD and pneumatic software. Matlab is used to simulate the air compression as a polytropic transformation. A physical prototype of the pneumatic cylinder is currently being built to gather experimental data. The data will be used to validate the concept and will help in the final design of a platform integrating many pneumatic cylinders. It is envisioned that the platform will be tested during the spring 2015 semester.
Failure and Leakage Analysis of Sucker-rod Pumps

Tomas Grejtak and Latham Moody. Mentor: Dr. Sheldon Wang, McCoy School of Engineering, College of Science and Mathematics

In this project, we will revisit the issues related to column buckling with both theoretical and experimental approaches. The intention is to come up with simple formulas as guidelines in engineering practice for beam column structures made of different materials. More importantly, we would like to point out the importance to delineate the difference between material and structural failures. As a result, fundamental concepts related to finite or infinite life span design principles along with low stress high cycle fatigue and high stress low cycle fatigue will be elaborated using the same approach. The results will have immediate application to the finite and infinite fatigue life design and maintenance of the beam lift system widely used in Petroleum Industries.

Flow Loop Systems Involving Heat and Mass Transfer

Tomas Grejtak, Westin Gilbert, Daniel Dubose, and Erick Goytia

Mentor: Dr. Sheldon Wang, McCoy School of Engineering, College of Science and Mathematics

The purpose of this project is to help students get a better and more visual understanding of the characteristics and behaviors of fluids. This project, specifically, focuses on heat and mass transfer. The flow loop system will include three horizontal PVC lines. The top line will measure flow rate and pressure difference; this will be accomplished by a having a flow meter incorporated into the line, and also having pressure transducers at opposite ends of the pipe. The middle line will be used for mass transfer; colored dye will run from a plastic tank concentrically into the main PVC line, where the dye will then be released into the flow so that mass transfer can be observed. The bottom line will be used to measure heat transfer; an electric tankless water heater will feed hot water concentrically in the main PVC line, the concentric line will release hot water into the room temperature water line and the temperature will be read at different locations by use of thermocouples and a non-contact temperature gun. A computer will be stationed in front of the flow loop system and will be receiving readings from the pressure transducers, thermocouples, and flow meter; all of this data will be viewed on a LabView program where the results can be organized graphically and visibly observed.
(P1)  

**Meter Scale Cycles in the Geologic Record: Implications for Interpreting Ancient Sea Level Change**  

**Jeff Snowden.** Mentor: Dr. Jesse Carlucci, Geoscience, College of Science and Mathematics  

The pattern and formation of meter-scale cycles has long been a source of debate in the geologic community. The object of this research project is to use a statistical analysis of the fossil and mineral composition in one of these cycles from the mixed carbonate-siliciclastic Bromide Formation (Ordovician), to determine the rate and direction of sea level change. Possible end-member models for meter scale cycles include R-cycles (sea level shallowing), T-cycles (sea level deepening), and symmetrical T-R cycles. Sampling at a fine scale has not been performed on this area previously, and the methodology could be used to facilitate inquiry in other sedimentary systems. Samples were taken at 12 cm intervals over a 3 meter section, three thin section replicates were created for each sample location for a total of 75 slides. Preliminary data from a point counting analysis (minimum of 800 points per slide) on grains indicates a strong dependence between grain or fossil type and sea level changes. For example, authigenic apatite and hematite increase in abundance between the transgressive surface (TS) and flooding surface (FS), whereas siliciclastic fines (sands) increase in abundance during the regressive (“R”) portion of the meter-scale cycle. Mineral and fossil indicators both suggest that meter-scale cycles in the Bromide Formation are symmetrical and contain both transgressive (“T”) and regressive (“R”) components, and are not simple parasequences.

(P2)  

**DDT Dechlorination Catalyzed by A Substituted Iron(III) Porphyrin**  

**Yuxiang Tang.** Mentor: Dr. Jianguo, Chemistry & Physics, College of Science and Mathematics  

DDT (1,1-bis(4-chlorophenyl)-2,2,2-trichloroethane) was utilized worldwide in the 1940s as an effective insecticide in agriculture and its use has been banned since the 1970s as concerns arise about its severe bioaccumulation in the environment. The purpose of this project is to seek a valid catalyst that is able to accelerate the degradation of DDT. A substituted iron porphyrin, *meso*-tetrakis-(pentafluorophenyl) porphyrin iron(III) chloride [(T-F₅PP)Fe³⁺Cl], was examined as to its properties in catalyzing the dechlorination of DDT in pyridine. In the absence of added DDT, three reversible redox reactions were observed for this iron porphyrin corresponding respectively to the processes of [(P)Fe³⁺]/[(P)Fe²⁺], (P)Fe²⁺/[(P)Fe¹⁺] and [(P)Fe¹⁺]²⁻/[(P)Fe¹⁺]²⁻, where P represents the T-F₅PP porphyrin ring. With the addition of DDT to the solution, the first two redox processes do not exhibit any changes, but the third process, [(P)Fe¹⁺]/[(P)Fe¹⁺]²⁻, shows a remarkable increase in the reduction current. This change clearly indicated that the triply reduced species, [(P)Fe¹⁺]²⁻, is able to interact with DDT to catalyze its dechlorination. Controlled-potential electrolysis combined with GC-MS further confirmed that three dechlorinated products were detected which included 1,1-bis(4-chlorophenyl)-2,2-dichloroethane (DDD), 1,1-bis(4-chlorophenyl)-2,2-dichloroethylene (DDE) and 1,1-bis(4-chlorophenyl)-2-chloroethylene (DDMU).
(P3) **Identifying Subsurface Granites of the Southern Oklahoma Aulacogen in the Arbuckle Mountains**

**Challena Pinckney.** Mentor: Dr. Jonathan Price, Geoscience, College of Science and Mathematics

The Southern Oklahoma Aulacogen (SOA) is a 540-million-year-old failed continental rift, a feature that stretches from North Texas to Utah, largely obscured by younger sediments. These buried rocks hold further clues on the nature of aulacogen construction through the distribution of individual magmatic events (volcanic centers and plutons). Fortunately, the buried SOA is extensively sampled by oil and gas exploration wells; each producing numerous small (~2 mm) fragments during drilling. I prepared fragments from four samples from the Chapman Ranch (CHP, Arbuckle Mountains, OK) drill hole at depths of 1590ft, 4330ft, 5340ft, and 6500ft. I characterized chemical compositions of the dark grains using LIBS and ran the acquired spectra through principal component analysis (PCA). I compared my Chapman Ranch samples to previously acquired Arbuckle samples (SR, TF, MW, and UM). PCA revealed substantial differences in the Ca, Na, Mg, and Fe peaks in samples SR11550, TF3260, MW10670, and CHP1590. Electron microprobe analysis at the University of Oklahoma revealed these outlier samples to contain chlorite (altered amphibole). Further LIBS work on the chlorites suggested that Ca and Mg peaks were distinctive among the chlorite populations and may be used for future discrimination. Samples UM, SR samples plot in negative PC1 space relative to TF, MW, and CHP samples that plot in positive PC1. This consistent with a geographic west-east distribution. The findings suggest two amphibole populations, which may indicate the presence of two different plutons.

(P4) **Forecasting the Reservoir Performance Data of Oilfield in Libya by Using Decline Curve Analysis**

**Mohamed Hussen Masaud.** Mentor: Dr. Mahmoud Elsharafi, McCoy School of Engineering, College of Science and Mathematics

The objective of this study is to determine and clear estimation of a reservoir performance in Libyan Oilfields by using Decline Curves Analysis and estimate the reservoir life. Decline Curves Analysis commonly ordinarily applied to evaluate the original hydrocarbon in place, hydrocarbon reserves, and forecasting future production performance. The Decline Curves Analysis development was presented by Johnson and Bollens in (1928) and later on (1945) which is called "loss-ratio". Many discussions of the mathematical relationship between the past time, production rate, and the cumulative production depend on the decline rate. Decline Curve Analysis is a technique which might be stratified for a single well or whole reservoir by either production engineer or reservoir engineer. In oil industry, remaining reserves are the substantial target. Also, in this work we simulate the production operation data to find out the better matching of forecasting results and the economical impact of the selected reservoir. This research is an attempt to determine one of Libyan reservoir performance and determine which one of the three classifications of the Decline Curves are Exponential, Hyperbolic, and/or Harmonic by using one of the most widespread important reliable methods to estimate the depletion of reservoir pressure with the consideration of the method limitations, the changes in the facilities downstream, and hydrocarbons production rate.
Prevalence of Pathogenic Isolates in Migratory Birds and Transfer to Local Populations

Qianying He & Yaning Liu. Mentor: Dr. James Masuoka, Biology, College of Science and Mathematics

Like humans, birds naturally serve as hosts for microorganisms. In some cases, these microorganisms can cause diseases in humans. Migratory birds, such as seagulls, can transport these pathogenic microorganisms and introduce them into new communities by contaminating local water supplies. The introduced pathogens may become a permanent part of these communities if taken up by local waterfowl. The goal of this research project is to determine if the annual appearance of seagulls in Wichita Falls affects the composition of symbiotic bacterial populations in local waterfowl. Fecal samples were collected from seagulls and resident waterfowl at Sikes Lake. Selective media were used to enrich for *Escherichia coli* and *Staphylococcus aureus*. So far we have collected samples from 41 birds. From these samples we have isolated six *E.coli* strains and no *S. aureus* strains. No identified strains were resistant to cefotaxime or imipenem, and all had intermediate resistance to tetracycline. Of the six *E.coli* isolates four were from seagulls, one was from a mallard, and one from a Canadian goose. Thus, it appears that *E.coli* is found predominantly in seagulls, and few strains are isolated from waterfowl. We will continue to collect samples to see if this trend continues when the seagulls return.

Slip-In Cartridge Valves vs. Conventional Spool Vales: A Comparison Study

Jn Claude Gustave. Mentor: Dr. Jan Brink, McCoy School of Engineering, College of Science and Mathematics

Before the invention of conventional spool valves, slip-in cartridge valves were the main means of controlling fluid flow in a hydraulic system. However, their use in the hydraulic industry has been neglected since the onset of its counterpart. Conventional spool valves serve primarily as an inexpensive alternative to slip in cartridge valves. Irrespective of its cost, slip-in cartridge valves may still be better suited for some hydraulic applications. This study was performed to determine the differences between slip-in cartridge valves and conventional spool valve for various hydraulic applications. Using a hydraulic simulation software, multiple hydraulic systems were designed, simulated, and compared using conventional spool valves and slip-in cartridge valves. While conventional spool valves are a cheaper replacement, the use of slip-in cartridge valves were determined to still be relevant in modern hydraulic application. Slip-in cartridge valves were shown to experience less energy losses and leakages as compared to a conventional spool valve. Hydraulic system with slip in cartridge valve were also shown to handle larger flow rates with less pressure drops than conventional spool valves. Systems with slip-in cartridge valves were also smaller and contained less conductors. Nonetheless the implementation cost of the slip-in cartridge valves were still considerably higher than that of conventional spool valves.
Effect of Glycosylation on Cell Surface Hydrophobicity of the Opportunistic Fungal Pathogen Candida albicans

Kathryn Crouch. Mentor: Dr. James Masuoka, Biology, College of Science and Mathematics

Candida albicans is the causative agent of the fungal diseases fungal vaginitis (“yeast infections”) and oral thrush. It is responsible for nearly 50% of hospital-acquired fungal bloodstream infections. Cell surface hydrophobicity (CSH) is an important factor in fungal cell adhesion to host tissues, as well as to prosthetic devices. Previous work suggested that the degree of carbohydrate modification (glycosylation) of cell surface proteins regulated surface hydrophobicity. The aim of this study is to determine the surface hydrophobicity of cells defective in one or more glycosylation steps. CSH is determined by measuring adhesion of hydrophobic microspheres to fungal cells. To date, CSH has been determined for two naturally occurring (“wild-type”) strains and two mutants defective in one of the glycosylation genes. Preliminary results indicate the mutants become more hydrophilic under conditions in which the wild-type cells are hydrophobic. Thus, the extent of glycosylation does appear to influence CSH. In addition, the growth medium appears to affect CSH. As the project proceeds, additional mutants will be obtained from collaborators and tested. These experiments will determine at what step surface protein glycosylation influences CSH. These results might subsequently suggest strategies for developing new antifungal agents to alter CSH to treat various forms of candidiasis.

The Death of Ivan Ilyich and Other Stories

Alicia Ward and Jonathan Henderson. Mentor: Dr. Kirsten Lodge, English, Humanities, and Philosophy, Prothro-Yeager College of Humanities & Social Sciences

The Death of Ivan Ilyich, written between 1870 and 1886 by Leo Tolstoy, is like many other famous classics in that a coherent and updated translation appropriate for undergraduate students is unavailable. Dr. Kirsten Lodge has been translating this important Russian novella, the theme of which remains relevant today. We, Alicia Ward and Jonathan Henderson, have been providing supplemental research to include with the main text which will help contextualize, make understandable, and improve upon the finer points of The Death of Ivan Ilyich. Aside from surveying a wide variety of Tolstoy’s work, we are providing, for Dr. Lodge’s review, recommended short stories, philosophical works, and critiques of the novella itself to be included in this new translation. We are currently going through all of Tolstoy’s letters (some of which will be included in the final text), reviewing the translations of the manuscript, the translations of the short stories, and attempting to help Dr. Lodge piece together the final manuscript to turn in to the publisher. This presentation will be about our experience in researching for publication which will play a large role in our future academic careers.
Feedback Control of a Multi-DOF Robot using Bluetooth
Huiluo Chen and Xitong Li. Mentor: Dr. Yu Guo, McCoy School of Engineering, College of Science and Mathematics

The project is aimed to establish the Bluetooth communication between a Multi-DOF robot and computer. Previously a vision system that provides controls based on information such as: shape, size, distance, patterns, etc. was simulated with an industrial programmable camera. In this project, the system will be redesigned to achieve more advanced recognition tasks. A wireless camera and distance sensor will be used and image processing program will be built on a computer which is much better in term of computational performance to the programmable camera. Development of signal processing program will be carried on in order to establish a more comprehensive vision system for the robot. And the extracted information will be used to generate commands that will be sent to the Multi-DOF robot through Bluetooth, which forms a closed loop control of the behavior of the robot.

At current stage, the distance sensor was attached on a bracket mounting on the robot. Calibration has been done for the sensor and, through programming, the computer has successfully received the feedback. In addition, several new motions have been designed and integrated into programming code. Upon sending instructions on a temporary designed user interface, the robot can perform a series of motions. The overall result so far is good, and the wireless camera is expected to be added later in the future to perform more complex motions.

Computational study of film boiling droplet motion on Micro- and Nano-scale ratchets
Kiran Chapagain Mentor(s): Dr. Jeong Tae Ok, Dr. Yu Guo, Dr. Sheldon Wang and Dr. Mahmoud Elsharafi, McCoy School of Engineering, College of Science and Mathematics

When a liquid is in contact with a surface significantly hotter than a liquid’s boiling point, it produces an insulating vapor layer. This vapor layer keeps liquid droplet from evaporating rapidly. The liquid droplet can be seen to levitate and move freely around the hot surface floating on its own vapor layer. This phenomenon is called Leidenfrost effect. While on a flat surface, a random motion of liquid droplet is observed, an introduction of asymmetrical ratchet topology can be implemented to achieve a linear direction along the ratchets. These applications include, but are not limited to microprocessor cooling, transportation of liquid using the waste heat generated and to any mechanical system where friction is a major hindrance.

This study infers to acknowledge the driving mechanism behind the self-propulsion of liquid droplet on a hot Leidenfrost ratchets system. The research uses a systematic Computational Fluid Dynamics approach to study the force behind the droplet motion. A computer simulation software COMSOL Multiphysics will be used throughout the research period. With considerable amount of patience and simulation effort, the level set method, which is a microfluidics module within the simulation software, has been chosen. The level set method will investigate the droplet deformation as it comes in contact with the ratchet. Further, while studying the driving mechanism, the effective
length, which is the length that is parallel between the droplet and the ratchet surface while the droplet is in motion, will be of major focus.

(P11) **Identifying Subsurface Granites of the Southern Oklahoma Aulacogen in the Wichita Mountains**

**Magen Brown.** Mentor: Dr. Jonathan Price, Geosciences, College of Science and Mathematics

The Southern Oklahoma Aulacogen is comprised of crust formed during the rifting of proto-North America 640 to 530 million years ago. Magmatic activity produced dozens of volcanoes and plutons, each distinguishable by subtle changes in composition. The chemical composition of one mineral, amphibole, shows the greatest degree of variation and can be a useful discriminator. I am assessing the nature of the aulacogen by evaluating amphibole chemistry in subsurface samples. I have gathered samples of granite from six deep oil and gas exploration wells in the Wichita Mountains region. Four of the wells are represented by drill cuttings (small fragments); these are mounted in epoxy to form 1-inch discs. I will also prepare sections of 1-inch cores as discs. All will be ground flat. I will evaluate amphiboles in each disc using the LIBS (Laser Induced Breakdown Spectrometer). These will be compared against each other and to previously characterized SOA samples using Principal Component Analysis. Outliers and members of co-relatable sets will be evaluated with Electron Microprobe Analysis to determine the precise chemical composition of the amphiboles. In doing so, we will determine if the materials penetrated by the well set are subsets of multiple plutons or if it is from one singular event.

(P12) **Design and Development of an Atmospheric Satellite**

**Michael Arthur Olaya and Sean Egloff.** Mentor: Dr. Yu Guo, McCoy School of Engineering & Biology, College of Science and Mathematics

Development of a low cost altitude control system (ACS) that transforms a traditional weather balloon into an atmospheric satellite. The ACS algorithmically vents helium, extending the flight duration from several hours to approximately three to four weeks. This extended flight duration significantly increases the usefulness and capabilities of the platform. Potential applications include: atmospheric modeling via GPS occultation, low cost internet access to the developing world, security and surveillance, scientific based Earth observations, cube satellite testing platform and astrophysics applications. The low cost nature of the developed technology fills a critical void in existing aerospace capabilities. The research involved the system design and development of flight structures, development of a custom linear actuator valve system, onboard computer systems and sensors, real time communication via the iridium satellite network and relevant atmospheric modeling. Significant use of a 3D printer was used to manufacture hardware based on custom designs. A preliminary test flight of the secondary system was conducted that indicated viability of our approach. This test flight proved the onboard GPS and Automatic Packet Reporting System tracking system, as well as the pressure, altitude, humidity, and photocell sensor. A secondary transcontinental flight of the completed atmospheric satellite is planned with a ACS maneuver to maintain an altitude of approximately 85,000 ft. The payload is being tracked in real time at www.trimtab.space/track.
Design of a Liquid Hydrogen Powered Stirling Engine
Seth Witherspoon. Mentor: Dr. Martin Melhus, McCoy School of Engineering, College of Science and Mathematics
We are designing a novel Stirling engine using liquid Hydrogen as fuel, using the cryogenic liquid to cool the cold heat exchanger, then burning the hydrogen to heat the hot heat exchanger. We use spreadsheets and finite difference equations to model the flow of the gas and temperature in each computational cell along the heat exchanger. If modeled correctly we can determine the efficiency of the engine and work produced by determining pressure in the pistons and the temperature of the gases within the system. The Carnot efficiency of our design is 93%; we anticipate that the final efficiency of the engine to be substantially higher than engines of conventional design.

An Examination of the Sexual Terror Scale v. Violence Against Women Index in Four Developing States: Cuba, Haiti, Honduras, and Venezuela
Julia Brady, Alexis Gay, Andrea Mendoza-Lespron, and Madeline Parker. Mentors: Dr. Steve Garrison and Dr. Linda Veazey, Political Science, Prothro-Yeager College of Humanities & Social Sciences
Increasingly gender based violence is being utilized in quantitative international politics scholarship. Similar to other complex political phenomenon, measurement of gender based violence faces limitations when developing quantitative indicators. Existing indicators, such as the Violence Against Women Index (Htun and Weldon 2012) or Women’s Physical Security (Caprioli et al 2009) are either based on the presence of measureable institutions or subjective evaluations of the level of physical security provided by the government. Given this these measures often underestimate the level of violence carried out by non-state actors. To examine these pitfalls four case studies are being conducted of gender based violence in Cuba, Haiti, Honduras, and Venezuela. The results of the case study analysis will be compared to the corresponding scores from the Violence Against Women Index and the Women’s Physical Security Index. The intent for the paper is to have suggestions for improving the empirical measurement of gender based violence. The preliminary results show the inconsistent or lack of data used in the existing indicators portrays incorrect information. From this, one can predict that more information and variables are required for measurements to correctly indicate a state’s level of gender based violence.
Elementary Students Get A Bit Fit

Samantha Scott and Macy Miles. Mentor: Dr. Stacia Miller, Kinesiology, West College of Education

There is evidence that students’ can have a positive perception of fitness testing when they understand the purpose of testing, the meaning of the results and how to improve their weaknesses. The purpose of this project was to provide elementary students with opportunities and resources for improving fitness test results. Two undergraduate kinesiology students worked as fitness coaches at a local elementary and assisted in collecting pre- and post-FITNESSGRAM data for third, fourth and fifth grade students. After analyzing the pre-data the coaches determined the fitness component strengths and weaknesses of the children tested, then using the data the 4th and 5th graders were placed in small groups for personal training sessions with the fitness coaches and were given two tools to assist in reaching their goals, a FitBit Flex and a fitness journal. The participants were 43 elementary students; ages 8-12 and 53.5% were male. Paired samples t-test revealed that students in the 3rd grade (n=16) significantly improved on 4 fitness tests, 4th graders (n=10) significantly improved on 3 fitness tests, and the 5th graders (n=15) significantly improved on 5 fitness tests. The 5th grade students set realistic goals and worked hard to improve their fitness, making significant improvements. Although the 4th graders received the intervention, they did not make the expected improvements. Unexpectedly, the 3rd graders made positive gains in many areas. Many of the elementary students involved learned how to set fitness goals, and acquired knowledge and skills for maintaining and improving their own fitness.

Using Gaming Technology to Teach Math Facts to Elementary Students with Disabilities: An Exploratory Study

Kayla Fells. Mentor: Dr. Edward Schultz, Special Education, West College of Education

The world of computers and technology has moved faster than educational practices, creating a gap as well as an opportunity. The goal of this project was to determine if teaching math facts to a student who struggles with math, using readily available technology (gaming), results in improved school performance. This exploratory study used a single-case in order to determine if using gaming technology would help improve the math performance of a an elementary age student who struggles with math and math anxiety. This student was provided individualized instruction over a 4-month period using simple computer applications on an IPAD. Results suggest that this type of math instruction helped improve math skills as well as reducing anxiety.
(P17) **Reflective Practices of Pre-service Teachers Using Video Analysis**  
**Kevin Barona**. Mentors: Dr. Emily Graves and Dr. Leann Curry,  
Curriculum and Learning, West College of Education  
The purpose of this research is to explore the reflective practices of pre-service teachers  
that have an impact on teaching effectiveness. Specifically, this case study investigates  
pre-service teachers' professional growth by evaluating their depth of reflection using  
video analyses and shared personal practice protocols. Data collection took place over a  
three week period, during which two, 45 minute lessons were recorded and the  
reflections analyzed for each participant using eight levels of complexity. Participants  
reflected on their teaching in writing before and after watching the videotaped lesson  
recordings. After each teaching observation, a conference was held with the pre-service  
teacher by the faculty mentor. Paired interns reflected on the strengths of each other's  
lessons and provided positive, supportive, and constructive feedback. Constant  
comparative method (Glaser & Strauss, 1967) was used to define emerging categories  
and themes. Individual lesson reflections were transcribed and coded using Robinson  
and Kelley’s (2007) eight levels of reflective thought to determine the number and level  
or reflective thought statements. Preliminary findings suggest videotaped teaching  
analyses and shared practice protocol have a positive impact on reflective thinking and  
depth and complexity of reflection. Level of reflective thought increased from pre to  
post video reflection/shared practice conferencing. Three significant themes emerged  
from the lesson reflections (a) content focused instruction; (b) classroom management  
challenges; (c) learner centered instruction. Findings from this study provide important  
information on the value of videotaped teaching analyses and shared practice protocols  
to facilitate reflective thought, professional growth, and depth and complexity of  
teaching reflections.

(P18) **Turning up the heat on volunteer motivation: A study examining what makes America’s most famous triple digit weather bike race so attractive for its’ volunteers**  
**Adam Likeness and Aubrey Kass** Mentor(s): Dr. Niyati Kataria and Dr. Jeff Stambaugh, Management and Marketing, Dillard College of Business Administration  
Recruiting, retaining, and training volunteers is expensive (Han, 2007). Previous  
literature has examined reasons for volunteer motivation especially in the arena of sports  
and sporting events (Downward & Ralston, 2005; Reeser, Berg, Rhea & Willick, 2005).  
However, much of this literature focuses on sporting events like the Olympics or  
national competitions which do not recur annually in the same community and also  
where the volunteers are being drawn from highly populated communities. We examine  
the specific case of an American non-profit sports organization that hosts a very large  
annual event by relying almost exclusively on the support of its relatively small local  
community (Wichita Falls). Texas’ ‘Hotter Than Hell’ (HTH) organization hosts  
America’s largest and most famous hot weather bike race and has managed to attract  
and retain a highly motivated volunteer base for extensive periods of time, sometimes
even decades. We want to understand what made this organization so successful in a small community where other non-profits have failed. We begin by reviewing and categorizing existing literature on volunteer motivation. We use these categories to guide our qualitative study where we will interview the board members of HTH to understand why they repeatedly donate their time and resources to this event. We present some preliminary findings based on our initial interviews with two prominent board members of HTH—the founder and the executive director. The findings from this study can provide guidelines for other non-profits in smaller communities on how to create and retain volunteer participation.

**Stress Coping Mechanisms Among Homeless Women**

Ktee Erwin, Macey Fields, Ana Guijosa, and Carisa Roscoe, and Lacey Moore

Mentor: Dr. Packiaraj Arumugham, Social Work, Gunn College of Health Sciences & Human Services

This study examines the stressors among homeless women and their coping mechanisms. Availability sampling was used to select the research participants (N=25) living in homeless shelters, and streets of Wichita Falls, Texas. A self-prepared questionnaire consisting of socio-demographic items and Cohen’s (1994) Perceived Stress Scale was administered to collect data. The participants reported that their main stressors were finances, unemployment, lack of shelter, lack of food, and lack of transportation. Preliminary analysis of the study has revealed that the participants’ stress level was high. The analysis has also revealed that spirituality was a major stress coping mechanism among the participants. Implications of the study and suggestions for future research are discussed.

**Religious Orientation of Church Attendees and Their Coping with Trauma**

Jaisy Garcia, Anthony Adams, Julie Rueda, Peace Anwasi, and Sydney Flynn

Mentor: Dr. Packiaraj Arumugham, Social Work, Gunn College of Health Sciences & Human Services

This study investigates the religious orientation of church attendees and their coping with trauma. Convenient sampling procedure was followed to select the study participants (N=30) living in Wichita Falls, Texas. Data were collected from the participants by administering a questionnaire consisting of the socio-demographic items, traumatic events experienced, and the measure of Allport and Ross (Religious Orientation Scale). Preliminary analysis of the study has revealed that participants who scored high on intrinsic religious orientation were able to cope with trauma better than those who scored on extrinsic religious orientation.

**Effectiveness of Faith-based Rehabilitation Program: Perceptions of Addicts**

Diann Garcia, Garcia Rosalinda, Victoria Mullins, Wendy Moore, and Wesley Stringer

Mentor: Dr. Packiaraj Arumugham, Social Work, Gunn College of Health Sciences & Human Services

This study examines the perceptions of drug and alcohol addicts about the effectiveness of faith-based rehabilitation program called, “New Beginnings” implemented by Faith Refuge, a non-profit organization located in Wichita Falls, Texas. All the participants (N=24) attending this program were selected for the study. A Questionnaire consisting
of socio-demographic items and perceptions about the effectiveness of the program was administered to collect data. Preliminary analysis of the study has revealed that participants have a favorable view about the program. Implications of the study and suggestions for future research are discussed.

(P22) **Stress Management Among Undergraduate Social Work Students**  
**Charles Staats, Kelsey Denne, Isaac Esquivel, Kim Jones, and Kathryn Miser**  
Mentor: Dr. Packiaraj Arumugham, Social Work, Gunn College of Health Sciences & Human Services  
The purpose of this study was to investigate the stress levels of undergraduate social work students, how they manage stress and what stress management techniques they find helpful. By following simple random sampling procedure, a total of 50 undergraduate social work students of Midwestern State University’s social work program were selected for the study. Data were collected by administering a questionnaire consisting of socio-demographic items, stressors, and stress management, and Cohen’s (1994) Perceived Stress Scale. Preliminary analysis of the study has revealed that juniors and seniors managed their stress better than the freshmen and sophomores.

(P23) **Stress Among University International Students**  
**Cailli Perry, Breanna Mosley, Crystal SanMiguel, Dana Bonfy, and Mary Vella**  
Mentor: Dr. Packiaraj Arumugham, Social Work, Gunn College of Health Sciences & Human Services  
The purpose of this study was to examine common stressors among Midwestern State University international students, and the impact of those stressors on them. By following convenient sampling procedure, 30 international students were selected for the study. A survey consisting of socio-demographic details and Cohen’s (1994) Perceived Stress Scale was administered to collect data from the study participants. Preliminary analysis of the study has revealed that finance is a major stressor. Implications of the study and directions for future research are discussed.

(P24) **Vaping Your Life Away**  
**Mason Cain, Deanna Parker, Carly Smith, and Kendell Stewart**  
Mentor: Dr. Jennifer Gresham-Anderson, Respiratory Care, Gunn College of Health Sciences & Human Services  
This study investigated how vaping affects physical, personal, and psychological life. Vaping is inhaling vapor from an e-cigarette. The goal of this study was to identify major themes of their experiences and bring awareness to the public. Five individuals were interviewed who are currently vaping or have had vaped in the past five years. In an attempt to understand the experiences and effects of vaping the following research questions were used to guide the study: Why did you start vaping? How much did you
know about vaping before you started? Do you ever have irritations or do you get sick a lot? How much money do you spend on e-cigarettes? Do you feel like there is a stigma? Does it affect your family when you vape? The answers to these questions were sought using a qualitative approach. It was not the intent of the study to measure, count, or test a hypothesis, so a qualitative approach was appropriate to gain a deeper understanding of the effects of vaping on physical, personal and psychological life. Interpretation of the emerging themes enabled the researchers to draw meaning from the data, leading to understanding about the participants’ vaping experiences. The emerging themes were: (a) Stepping Stone, (b) Influenced, (c) Under-informed, (d) Overall Health. Participants in this study felt vaping was a positive alternative to smoking. However, they had little knowledge about potential effects vaping could have on their long term health.
ACKNOWLEDGEMENTS

We gratefully acknowledge the invaluable support provided by:

MSU Office of Undergraduate Research, Peggy Brennan and Brittany Coulter

EURECA Advisory Committee: Dr. Pablo Garcia-Fuentes; Dr. Jennifer Gresham; Dr. SuHua Huang; Dr. Mitzy Lewis; Dr. James Masuoka; Dr. Dale McDonald; Dr. Stacia Miller; Dr. Whitney Snow; Dr. Bradley Wilson; Naoma Clark; Dirk Welch; Lance Chancellor; Jeff Snowden

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Clark Student Center: Cynthia Cummings; Pete Martinez; Frank Brasher; Kenneth Jones

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Midwestern State University is a leading public liberal arts university committed to providing students with rigorous undergraduate and graduate education in the liberal arts and the professions. Through an emphasis upon teaching, augmented by the opportunity for students to engage in research and creative activities alongside faculty and to participate in co-curricular and service programs, Midwestern State prepares its graduates to embark upon their careers or pursue advanced study. The university’s undergraduate education is based upon a comprehensive arts and sciences core curriculum. The understanding that students gain of themselves, others, and the social and natural world prepares them to contribute constructively to society through their work and through their private lives.