TUESDAY, APRIL 28, 2015

Reception for Participants, Faculty and Outside Guests
Carl Grant Events Center 12:00–12:30 p.m.

### Afternoon Concurrent Sessions

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<td>Josh Donnan, Jason LaSource, Paul Orman, and Ethan Simpson (NUR)</td>
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<td>Kristin Carper, Juli Johnson, Krystal Karlen, Ann Kumbani, and Alexandra Maynard (NUR)</td>
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<td>Whitney Clark, Kendall Heyliger, Meredith McClain, and Sarah Moore (NUR)</td>
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<td>Bethany Kindt</td>
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<td>Zachary Pankey</td>
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<td>Megan Kersey</td>
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<td>Megan Peden</td>
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<td>Katherine Murchison</td>
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<td>Karis Kontilis</td>
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<td>Thomas Griffith</td>
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<td>Megan Kersey</td>
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<td>William Pierce V</td>
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<td>Gabrielle Bonner</td>
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<td>Carter Mansolino</td>
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<td>Mason English</td>
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<td>Jacob Landfield</td>
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Break 2:40 p.m.
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<td>ICS/LAN PAC D-54</td>
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<td>ThM JEN 212</td>
<td>Caleb Valentine, Andrew Denning, Stephen Wunrow, Evan Kunz, John Keller</td>
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The Value of Photography in Society: Historically vs. Today  
Presenter: Hannah Russell  
Faculty Advisor: Steve Halla

The research on this topic will cover findings on how the value and use of photography has changed over time. In its beginning, photography was a time consuming process that required lots of skill. In today's society it is widely accepted that almost anyone can be a photographer. With such a mindset, the world is being filled with a mass of poorly executed images. This research will show the importance of going back to viewing photography as a complicated and valuable skill set that requires an education and much dedication.

Meaning in Making: The Value of the Handmade Object  
Presenter: Megan Peden  
Faculty Advisor: Steve Halla

A common question that the artisan or craftsman must address in a culture of manufactured and mass produced objects is whether or not the handmade objects they make are somehow better and more meaningful than the equally functional machine made object. This research project is a look at the craft tradition and the voices that argue for its validity as something that can add meaning to daily experiences. Drawing from the writings of the Japanese philosopher Soetsu Yanagi, a collection of essayists on the handmade object and Howard Risatti's work in developing a theory of craft, an argument that craft operates for a purpose beyond function emerges. The handmade object has a function which goes beyond practical use, and for the maker this opens up innumerable opportunities to tie meaning into the making of these functional objects.

Building Shalom  
Presenter: Megan Peden  
Faculty Advisor: Chris Nadaskay

In this world of brokenness and hurt, art can be a powerful medium through which to speak of hope and of a time when all will be made whole again. Until that day, the Christian is called to work and mend the broken, heal the hurt and watch for the Kingdom to come. The processes of stitching, binding, and wrapping are all meaningful in this sense, and the soft, fragile materials of cloth, paper and thread speak of the fragile and temporary nature of the artist-Christian's work within the world. This work is not the ultimate end; the ultimate end will be more than just something that is mended because in the end all will be made new. This presentation is a look at the influences, background and processes of one artist's pursuit of a body of work that will speak this message to the world.

Functional Objects  
Presenter: Andrew Clark  
Faculty Advisor: Chris Nadaskay

This presentation will be an explanation of my view of handmade objects and my work as an artisan. Handmade objects give the user a unique experience and help achieve a life of significance instead of monotony. I will present my body of work in furniture and pottery and connect it to my idea of experiential interaction with the creator and the process by which it was made. I will explain the making of these objects and discuss my influences.

The American Functional Pottery Tradition  
Presenter: Andrew Clark  
Faculty Advisor: Steve Halla

This research project is a look into the beginning of the modern pottery movement in America. The initial influence of Peter Voulkos and Rudy Autio, who began the modern American pottery tradition, will be researched. Moving from these two pioneers my research will cover the beginnings of their fresh mindset based on the influences of British and Japanese customs and how the tradition has evolved over the last 70 years. I will connect my own body of work to this functional pottery tradition in conclusion.

The Keane and I: How Character Designer Glen Keane Has Inspired My Work  
Presenter: Emilie Malone  
Faculty Advisor: Steve Halla

This presentation will serve as an informative guide explaining how animator Glen Keane's character development work from the film Tangled has impacted the way I work as an illustrator. Keane's expressive line quality and imaginative character designs have served as inspiration for me since I first discovered them. The ability to create characters that clearly convey emotion is an import skill that aids in portraying illustrations that are fully comprehensible. The key to good storytelling is making a connection with the audience and well-designed characters are often essential in this process. Keane's success in this area has inspired me and informed my work.

The Illustrative Work of Emilie Malone  
Presenter: Emilie Malone  
Faculty Advisor: Chris Nadaskay

This presentation serves as an insight into the work that I make as an illustrator, specifically the work I have developed for my senior show. My work is a way of inviting others to experience stories through visual depictions. My artistic beginnings were
inspired by the stories I loved as a child. The illustrations I create now are inspired by the folklore, legends, and fairy tales that have influenced me my entire life. This presentation will evaluate how those influences still impact my current work. In addition to discussion on my influences, the information presented will be an overview of how and why I make work.

**Back to Basics**
**Presenter:** Ragan Pendley  
**Faculty Advisor:** Chris Nadaskay

This presentation will be an oral description of the body of work I have created in my Drawing IV class. My work is titled, “Back to Basics.” As an artist, a challenge that I face is drawing the human figure. It is a daunting task to try to master the figure – something that God made perfectly and is His most prized creation. I have a fascination with the idea that one can master the figure, and I hope to advance towards that goal. God has chosen to make man his most beautiful and adored creation. In His image we are made. As I draw the human body, I hope to see the body as God sees it: beautiful and perfect. Though I may face challenges in my attempt to put the body on paper, I am anticipating the challenge and will let it remind me of how complex the body truly is.

**Visual Storytelling: Illustration for Four Celtic Myths**
**Presenter:** Samantha Tucker  
**Faculty Advisor:** Chris Nadaskay

The theme of this body of work is exploring visual storytelling methods by illustrating four Celtic myths. I’ve always been fascinated by myths and narratives from other cultures, especially mythology. For this project I chose myths from different regions of the British Isles, setting them throughout different eras to reflect their timelessness and provide more opportunity for experimentation in character design. They are “The Poet’s Curse” from Ireland, “Y Chadee” from the Isle of Man, “The Kelpie” from Scotland, and “The Bukkys” from Cornwall. My portrayal of these myths has the second layer of exploring the modern storytelling tool of illustration. Because of this, I chose the mediums of graphite and colored pencil, which are traditionally vital to developing and refining illustrations.

**Post-traumatic Stress Disorder Awareness**
**Presenter:** Hannah Halter  
**Faculty Advisor:** Steve Halla

With this presentation I want to create awareness of the statistics and problems of post-traumatic stress disorder. I am personally invested in the repercussions of this disorder because my fiancé has been on combat deployments that have affected him in so many ways. I have involved myself in this issue by already creating an awareness campaign on campus as a graphic design project, for the Wounded Warriors Project. I have also been an occasional donor to the project, and I try as hard as I can to help the soldiers that have the problem of assimilating back into normal civilian life. In my presentation I will not only show statistics and facts about Post-traumatic stress, but I will also show examples of my past work on this issue, and other artists that have dealt with this issue in their work. The purpose of the presentation is to just show people what they may not have already realized about Post-traumatic stress, and maybe to incite them to react in some way.
**Paintings Within the Church**
Presenter: Thomas P. Griffith  
Faculty Advisor: Chris Nadaskay

Through the creating of and deliberating on paintings intended for the church building, a discussion will be begun that seeks to propagate the use of hand-crafted visual art as a source of not only enjoyment and aesthetic pleasure, but also a tool for spiritual growth and challenge. With a specific work created for a specific church purpose, the discussion will first focus on the technical aspects of creating the work, followed by an argument for furthering the use and endorsements of visual arts within the church. This will attempt to promote visual arts within the church as not merely a recreational pastime, but something that is worth pursuing as a spiritual practice of personal and communal devotion.

**Board Games: What They Look Like Matters**
Presenter: Megan Kersey  
Faculty Advisor: Steve Halla

Board game history is almost as long as human history. Today, board games could be categorized as the most interactive form on entertainment sold. The success of a board game is not only in the mechanics of a game but also in its graphic design. Research shows the link between a good brand design and successful product. Some games have used this knowledge to their advantage, creating a logo and brand identity to implement across the game and through various updates. *Monopoly* provides an excellent example. However, others have been published without a strong brand and most are unknown among the general public. One such example is *Buccaneer*. With creative game play, it needs new design if it is to gain popularity in the store and in the home.

**The Bauhaus: Marguerite Wildenhain**
Presenter: Candace Gooch  
Faculty Advisor: Steve Halla

The Bauhaus movement was born in 1919 in the city of Weimar when German architect, Walter Gropius, founded a school with a radical vision. It was his intention to bridge the gap between art and industry by combing crafts with fine arts. Prior to the Bauhaus movement, many fine arts were held in a higher esteem than those of craftsmanship, but Gropius believed that all forms of craft could be unified. At that time, in post-World War I Germany, Gropius believed that the arts should reflect the times and adapt to the era of machine. Thus, the Bauhaus also focused on the importance of designing for mass production.

When the National Socialists came to power in 1933, a Bauhaus trained ceramic artist, Marguerite Wildenhain, was forced to leave due to her Jewish ancestry. After immigrating to the United States in 1940, she took a job teaching pottery at an artists’ colony in Northern California called Pond Farm Workshops. Over the course of her life teaching at Pond Farm and across the United States, this master potter touched the lives of countless aspiring artists. Faithfully emphasizing and sharing the ideals of her former school, Wildenhain can be considered one of the first to bring the Bauhaus movement to America.
abstract and carry meaning. The presentation will cover the processes for creating these three pieces, specifically about the welding. Some time will also be dedicated to discuss the materiality (inherent meaning) of metal and wood, and why they were used in making these three sculptures.

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**Portraiture and Geometry**  
**Presenter:** Bethany Kindt  
**Faculty Advisor:** Chris Nadaskay

These portraits juxtapose geometric fields of color with a rendered subject. My work is influenced by Piet Mondrian's *Composition* series, which captured my attention upon my first encounter with it. This fusion between the organic human figure and geometry provides me with a compositional challenge as well. I must choose the placement, hue and shape of the color field to correlate to the subject's personality, and thus, represent more than a physical likeness. In this way, I hope to gain some deeper understanding of my subject as a complex and deeply profound human being.

Of the increasingly diverse range of functions art serves in contemporary culture, investigation is philosophically a valid one. I paint portraits to wrestle with the implications of the humanity of my subjects.

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**The Revival of Hand-Lettering and Handmade Typography in the Digital Age**  
**Presenter:** Katie Williams  
**Advisor:** Steve Halla

When digitalization became available to designers and typographers around the world in the late 20th century, some of the most talented graphic artists put away their pens and tools and headed straight to the screen, where structured layouts and fonts galore awaited them. Only a few decades later, we are surrounded in a design culture tired of its recent robotic tendencies. Typographers have put their hands back in the dirt to get a hold of the rich roots and handmade elements of design to breathe life back into the digital age. This presentation will give a select anthology of work from today's most popular and antithetical typographers who work primarily in hand-lettering and handmade type. It will also include a general timeline of the progression and popularity of hand-created typography as it have moved from necessity to novelty to normalcy.

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**Furniture: The Forum for Relationships**  
**Presenter:** Zachary Pankey  
**Faculty Advisor:** Chris Nadaskay

Furniture is a catalyst for relationships—a platform for communication. People furnish their homes with it not for the sake of having it, but so that they might fill it with other people. Through my furniture I seek to create spaces that facilitate both conversation and coexistence. This presentation will demonstrate the role of furniture in facilitating conversations and relationships in examples of student and professional work. It will address the utility of furniture to human interaction and present successful and unsuccessful instances of this. Included will be answers as to why and how furniture can potentially serve this purpose. The presentation will also discuss processes and materials as they relate to the function, aesthetic, and content of a piece in service to creating spaces for conversation.

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**The Influence of Alexey Brodovitch**  
**Presenter:** Courtney Brown  
**Faculty Advisor:** Steve Halla

During his time at *Harper's Bazaar*, in the early 20th century, Alexey Brodovitch helped change the course of magazine design history. He implemented ideas and standards that are still in practice almost a century later, and his influence has reached photographers, designers, and the general fashion industry in huge ways. Between his innovation with design, teaching and training of future photographers and designers, and vision for the future of fashion magazines, he became one of the most impactful graphic designers of his time. This influence has long been celebrated in the design community, but it is time for his genius to reach a broader audience. In order to do so, this paper will explore the legacy and history of Alexey Brodovitch to communicate to the common person how his work continues to influence the magazine industry to this day.

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**An Exploration of Life-Like Portraiture, Using Charcoal on Tar Paper**  
**Presenter:** Katie Williams  
**Advisor:** Chris Nadaskay

Over the six semesters I have practiced drawing at Union, I have found an affinity for capturing the intricate aspects of a person’s distinct features (eyes, facial expression, clothing) that I find to be a reflection of personality and character. Simultaneously I have discovered stylistic tendencies and materials that best capture these features and the overall raw but realistic tone I strive to convey. Most recently this has been achieved best through applying white and black charcoal to tar paper. Each portrait is 22 by 28 inches and is composed primarily of the subject’s face and neckline, making them slightly larger than life-size. This presentation will consist of showcasing a series of 8 to 10 portraits created this semester using these materials and guidelines. I will discuss the purpose of these works and the evolution of altering various techniques in order to best achieve my artistic goals.
**BIOLOGY**

**Effect of Modification of Entrance Hole Size on Habitation of Nest Boxes in Beech Bluff, TN**

*Presenter: Whitney Loftis  
Faculty Advisor: James Huggins*

Urbanization is increasing in human populations, causing a decrease in natural cavities available for cavity-nesting species. Nest boxes are used to aid in conservation. Habitation of nest boxes made for eastern screech owls (*Megascops asio*) was studied on a private farm in Beech Bluff, TN. Seventeen nest boxes were monitored weekly from late August to early December and late January to early April. By placing a camera on a telescoping rod into each nest box, occupancy of nest boxes in unmodified square or modified triangular entrance holes were examined. Eastern screech owls were observed in 3 different unmodified nest boxes 24 times and 2 different modified nest boxes 2 times. Eastern gray squirrels were observed in 5 different unmodified nest boxes 13 times and 7 different modified nest boxes 40 times.

**The Permissive Role of Prostacyclin and Nitric Oxide in Cerebral Vasodilation to H2S in Newborn Pigs**

*Presenter: Courtney Berger  
Faculty Advisor: Andy Madison; Mentor: Charles Leffler*

Hypoxic-ischemic brain injury is a cause of mortality in newborns. Hydrogen sulfide, H$_2$S, is a gas that controls blood pressure and arterial tone. We hypothesized: prostacyclin and NO influence H$_2$S-induced cerebrovascular-dilation. Experiments were conducted in-vivo using α-chloralose-anesthetized, ventilated, newborn pigs with surgically implanted, cranial windows for observation. A saturated H$_2$S-in-water solution was diluted in artificial cerebrospinal fluid (aCSF) and injected under window creating a dose response curve. After administration, response to indomethacin and iloprost was measured. L-NNA was administered. If dilation to H$_2$S was blocked/reduced, response to H$_2$S and SNP was measured. If response was blocked/reduced, response of H$_2$S, L-NNA and SNP was measured. If remained blocked/reduced with indomethacin, H$_2$S, L-NNA and iloprost were added and response measured. H$_2$S caused concentration-dependent dilation. Indomethacin and L-NNA blocked H$_2$S dilation. Iloprost and SNP restored H$_2$S dilation. These findings are consistent with our hypothesis: prostacyclin and NO have permissive roles in cerebral-arteriolar H$_2$S dilation.

**Effects of the Type of Media and pH on Tendency of the Gram Stain Results Bacteria to Change Over Time**

*Presenter: Gabrielle Bonner  
Faculty Advisors: Mark Bolyard and Cathy Huggins*

Gram staining is a procedure that is commonly used in microbiology and in the medical field to classify bacteria. Most bacteria are grouped into two categories: Gram positive and Gram negative. If a bacterial sample is Gram stained after more than 18 hours in culture, a false result could occur. This experiment tested the effects of the type of media and pH on the tendency of bacteria to deviate from their Gram stain classification over time for 7 bacterial species: *Bacillus megaterium, Bacillus cereus, Kocuria rhizophila, Sarcina auranitcia, Neisseria flava, Escherichia coli,* and *Acinetobacter calcoaceticus.* Media and pH did not affect the tendency of bacteria to change Gram stain results. However, two species behaved differently than predicted by their classifications. *Neisseria flava,* a well-established Gram negative bacterium, stained Gram variable. *Acinetobacter calcoaceticus* displayed morphological changes that varied according to the medium upon which it was grown.

**Comparison and Analysis of Growth Factors in the Production of Monoclonal Antibody-Producing Hybridoma Cells**

*Presenter: Spencer Avery Rhodes  
Faculty Advisor: Jennifer Gruenke*

Monoclonal antibody generation depends on the successful fusion and survival of activated B-cells with myeloma (cancerous plasma) cells. These activated B-cells are somewhat difficult to obtain, usually requiring a splenectomy of a donor animal in order to harvest the cells. After harvesting, these B-cells are fused with myeloma cells, and are incubated in media to allow for growth. The fused cells are known as hybridomas. Biomedical researchers and immunologists are using these hybridomas in their research more frequently, as there is an increasing need to produce monoclonal antibodies for laboratory use. This project compared the effects of insulin and zinc-sulfide addition on the growth of hybridoma cells, providing greater insight into promotion of hybridoma growth and proliferation.
Investigation of the Regulation of Enzymes DIO2 and DIO3 in T4 to T3 Conversion by LPS Induction

Presenter: Stephen Machayi Luyakoh  
Faculty Advisors: William Thierfelder, James Mahan, Lunawati Bennett, and Faith Zamamiri-Davis

Thyroid hormones are important in the development and metabolic regulation of vertebrates. Although Thyroxin T4 is the most produced hormone of the thyroid gland it is minimally active and must be converted to T3 in order to attain full biological function. Enzymes known as deiodinase enzymes type II (DIO2) and type III (DIO3) mediate this conversion. DIO2 catalyzes the conversion of T4 to T3 and DIO3 inactivates both enzymes. The objective of this research was to determine whether the inflammatory stimulus lipopolysaccharide (LPS) regulates DIO3 and DIO2 proteins in MCF-7, RAW, and SH-SY5Y cell lines. This was performed primarily using the western blot technique to determine the concentration of DIO2 and DIO3 proteins in LPS treated and untreated cell-lines.

Measuring Heat Stress in Bluegill Sunfish Using Free Cortisol Concentrations

Presenter: Jacob Landfield  
Faculty Advisor: James R. Kerfoot, Jr.

Bluegill sunfish (Lepomis macrochirus) is a eurythermic freshwater species endemic to the United States. Some individuals are exposed to extreme temperatures which are known to cause stress, which may be related to cortisol release. The purpose of this study is to assess whether different temperatures affect bluegill cortisol levels. Bluegill from Chisholm Lake, Tennessee were randomly subjected to three temperatures: 5 ºC, 17.5 ºC, and 21 ºC each for 24 hours. Water samples of 500 mL were taken using airline piping and suction at 10:15 AM and every 24 hours for three days. The samples were filtered and free cortisol was measured using an Enzyme Immunoassay Kit (Assay Designs Inc., Ann Arbor, Michigan, kit number 900-071). The cortisol concentrations were compared across the temperatures using a repeated measures analysis of variance (ANOVA). No significant differences in the cortisol levels measured were found between the three temperatures tested (α=0.05).

Growth Factors in the Production of Hybirdoma Cells

Presenter: Heath Broussard II  
Faculty Advisor: Jennifer Gruenke

Generation of monoclonal antibodies is dependent upon the successful fusion and survival of activated B cells with myeloma cells. Activated B cells provide immunological activity for the production of monoclonal antibodies, whereas myeloma cells provide immortality. The fused hybridoma cells can theoretically produce monoclonal antibodies indefinitely. There is an increasing need to generate monoclonal antibodies as biomedical researchers and clinicians are using them more frequently. Growth-promoters of hybridomas can cause greater cell proliferation and therefore, greater numbers of hybridomas formed, with a consequent increase in monoclonal antibody production. This research compared the growth-promoting effects of dexamethasone and insulin-transferrin-selenium supplementation of cell culture media on the growth and formation of hybridoma cells.

The Effect of Immunosuppressants on Murine Anxiety Levels

Presenter: Alma N. Hernandez  
Faculty Advisor: Jennifer Gruenke

The effect of anxiety on the immune system has been observed and researched many times, however the effect of the immune system on anxiety is not as commonly studied. We hypothesized that immunosuppressant drugs, such as nonsteroidal anti-inflammatory drugs (NSAIDs) and disease-modifying anti-rheumatic drugs (DMARDs), would cause murine anxiety levels to decrease after intake. The elevated plus-maze (EPM) was used to test changes in anxiety levels in BALB/c mice after a week of treatment and the results were analyzed using Analysis of Variance (ANOVA). Naproxen had no significant effect on anxiety levels in male nor female mice and methotrexate results are pending.

Detection of Hydrogen Sulfide in Citrobacter freundii

Presenter: Cara Nance  
Faculty Advisors: Mark Bolyard and Cathy Huggins

A reliable method for testing hydrogen sulfide (H,S) production in a non-pathogenic bacterium, such as Citrobacter freundii, would be useful in the microbiology classroom laboratory, but there is no general consensus in previous research about which method is best. The goal of this research was to test and identify a reliable method for H,S production in C. freundii. Lead acetate strips were inserted into test tubes with triple sugar iron agar, peptone iron agar, Kliger iron agar, or SIM media for the testing of H,S production, and media was inoculated with C. freundii. A darkening of the lead acetate strips was indicative of H,S production. Lead acetate strips with TSI agar were the only results that had continual blackening from 48 hours to a week. These results indicate that TSI agar with lead acetate strips is the best H,S indicator in C. freundii for classroom laboratory use.
BIOLOGY

Regulation of Deiodinase Enzymes in Response to Oxidative Stress in Cultured Cell Lines
Presenter: Chance Mattox
Faculty Advisors: William Thierfelder, Lunawati Bennett, and James Mahan

The main two deiodinase enzymes used to regulate thyroid hormone levels are type 2 deiodinase (DIO2) and type 3 deiodinase (DIO3). If either enzyme is not expressed properly, hypothyroidism or hyperthyroidism could result. DIO2 transforms T4 into the more potent T3, while DIO3 deactivates both hormones. This research focused on the expression of each of the enzymes when an oxidative stressor was applied in cultured cell lines. Western blotting was used to show the different levels of expression of both enzymes compared to a control culture of each respective cell line. The ultimate goal was to see if there was any change in the expression of the enzymes and to conclude whether there were differences in their regulation between cell lines representing different tissues with diverse functions.

Inducing Anxiety in BALB/c Mice via Eliciting a TH2 Immune Response
Presenter: Tori Hill
Faculty Advisor: Jennifer Gruenke

Stress-related disorders may manifest as a result of prolonged immunoregulatory failure. It has been hypothesized that immune cytokines influence anxiety. In order to determine whether anxiety can be induced via immune stimulation, an experimental group of 15 BALB/c mice were given subcutaneous injections of alum adjuvant and ovalbumin (OVA/alum) and a control group of 13 mice were given sterile normal saline. An elevated plus maze was used to determine if anxiety was induced in the experimental group, in comparison to the control group. There was no interaction between grouping and gender factors (p = 0.515). Additionally, there was no significant difference between control and experimental groups (p = 0.349), nor was there a significant difference between males and females (p = 0.621). Contrary to our hypothesis and other research studies, based on this experiment, we find no evidence that immune stimulation by OVA/alum significantly increases anxiety in BALB/c mice.

The Effect of Water Chemistry on the Occurrence of Eustrongylides spp. in Freshwater Fish of West Tennessee
Presenter: William Pierce V
Faculty Advisors: James R. Kerfoot, Jr. and Marc Lockett

Eustrongylides spp. are potentially devastating to its definitive host, piscivorous birds, such as egrets and herons, especially young nestlings. Waterfowl feed on fish that are potential intermediate hosts to the parasite. Prevalence of Eustrongylides spp. in freshwater fish of West Tennessee was assessed, at 4 sites that branch from the Forked Deer River in Jackson, TN. Environmental parameters were tested to establish variation between sites to determine if there was a correlation between environmental parameters and parasite prevalence. A total of 393 fish were collected, of which 317 were western mosquito fish (Gambusia affinis), which was the only species collected to test positive for parasitic infection. While the pH, conductivity, temperature, and dissolved oxygen were different at each site, the differences did not predict the presence of the parasite. However, our data shows that the gender and length of the fish did predict the presence of the parasite.

Anti-inflammatory Effects of 17β-Estradiol in Male BALB/c Mice Using the Dextran Sodium Sulfate (DSS) Model of Inflammatory Bowel Disease
Presenter: Lauren Wilson
Faculty Advisor: Wayne Wofford

Colon cancer is considered hormone-dependent and is largely influenced by estrogen. Women experience protective effects against the cancer due to naturally increased levels of estrogen compared to men. Individuals with inflammatory bowel diseases have an increased risk for developing colon cancer. The objective of this study was to investigate the effects dietary estrogen exposure had on dextran sodium sulfate-induced colon inflammation in male BALB/c mice. Mice were weighed pre- and post-exposure and any health abnormalities were noted. Testing ran the course of 10 days and colons were collected. Weight to length ratios were calculated as a measure of inflammation. Although there did appear to be differences in experimental means, no statistically significant differences were found with regard to colon ratios across experimental groups.

An Evaluation of the Success of Lures in Attracting Bobcats to Scent-Stations
Presenter: Carter Mansolino
Faculty Advisor: Andy Madison

Bobcats (Lynx rufus) are secretive animals and assessing their population numbers in an area can be difficult. Traditional population estimation methods, such as mark-recapture, provide poor population number estimates. This study examined the efficacy of using scent lures to document at least the presence of bobcats at sites in West and Middle Tennessee. Twelve scent-stations were established, 4 baited with Carmen’s Gland Lure, 4 baited with Blackie’s Blend Lightfoot Lure, and 4 control sites that contained no scent. A trail camera was placed at each scent station from 5 October 2014 – 8 February 2015 and all animals photographed were recorded. A total of 4,451 photographs were examined, which recorded the following species: bobcat, white-tail deer, opossum, raccoon,
Only 7 bobcats were observed during the 4 months of the study: additionally, one was observed at the Carmen’s lure sites, and 1 was observed at the Blackie’s lure sites.

Taxonomic Assignment of Oak Species in Southern Tennessee Utilizing PCR Gene Sequencing
Presenter: Hannah Small
Faculty Advisor: Michael Schiebout

Taxonomy, the branch of biology dealing with naming and classification of organisms, is vital in determining the species present in a region. Morphological classification allows grouping of organisms by specific physical characteristics, but cannot provide definitive classification on its own. Thus, genotyping is a useful tool to determine the species of a particular plant. Recently, a population of sand post oaks (Quercus margaretta) was identified in southern Tennessee. As the location of this population of sand post oaks is unusual and undocumented elsewhere in Tennessee, the objective of this research was to determine the relationship of this population to other oak species by analyzing the genotypic relatedness of the DNA coding regions rbcl and matK. These genes were amplified through PCR, sequenced, and then analyzed for relatedness to other oak (Quercus) species. Overall molecular evidence based on phylogenetic trees, similarity trees, and similarity scores support the placement of this species in section Quercus.

Evaluation of Growth Regulators in Khaya Senegalensis Regeneration
Presenter: Kevin Luy
Faculty Advisor: Mark Bolyard

The African mahogany (Khaya senegalensis) does not reproduce well naturally and is threatened due to logging in its native range. Many native African people rely on this plant as a source of income. Regeneration of K. senegalensis will be attempted using plant tissue cultures. We used thidiazuron (TDZ) as the cytokinin to support regeneration, and 2,4-dichlorophenoxyacetic acid (2,4-D) as the auxin along with Phytoblend agar and Murashige & Skooge medium to provide the nutrients needed for growth. Varying levels of Murashige and Skooge vitamins and 2,4-D were used to determine the optimal environment for callus formation and regeneration. Shoots did not form but the potential for differentiation was present in the results.

Measuring Levels of Stress Induced by Varying Concentration of an Alarm Cue Analog, Pyridine-N-Oxide, in Blackstripe Topminnow
Presenter: Haaken Magnuson
Faculty Advisor: James R. Kerfoot, Jr.

Fish experience stress for a myriad of reasons. This study investigates the unknown relationship between shreckstoff concentration and stress level in blackstripe topminnow (Fundulus notatus). Shreckstoff is an alarm signal that warns conspecifics of predation. This alarm signal is released from epidermal club cells after a predation event, and allows other members of the species to detect danger. The primary chemical component of this alarm cue is pyridine-N-oxide (PNO). Cortisol is a stress hormone released to increase metabolic rate and give animals enhanced physical ability. Cortisol measurements effective quantify stress levels in fish. In this study, different concentrations of PNO were introduced into the water of blackstripe topminnows, and a non-invasive assay was employed to determine cortisol levels. Preliminary results show spectrophotometer readings within the expected values between 0.143 and 0.554, based on the calibrated control values. These results confirm that PNO induces cortisol secretion.

An Evaluation of the Effectiveness of Lures in Attracting Coyotes to Scent-Stations
Presenter: Katy Lynn Wade
Faculty Advisor: Andy Madison

Coyotes (Canis latrans) are heavily populated and elusive and assessing their population numbers in areas can be difficult. Traditional estimation methods provide poor population number estimates. This study examined the efficiency of scent lures to document the presence of coyotes in sites in Middle and West Tennessee. Twelve scent stations were established. 4 baited with Blackie’s Blend Gray Dog Lure, 4 baited with John Graham’s Wiley Coyote Lure, and 4 control sites that contained no scent. A trail camera was placed at each scent from 11 March 2015–mid-April and all animals photographed were recorded.
**BIOLOGY**

**Water Additive Effects on Cortisol Concentrations during Shipping Processes for Xiphophorus Helleri**  
**Presenter:** Mason English  
**Faculty Advisor:** James R. Kerfoot, Jr.

The shipping industry for fish is a process that annually transports billions of dollars in goods across the world. Stress that occurs during the shipping of fish has been previously linked to reduce survival rates and cortisol concentrations in the water are a good indication of these relative stress levels. This study sought to investigate shipping practices that are thought to reduce stress in fish. This was performed by adding either the sedative tricaine mesylate (MS-222) or activated carbon to the water of Swordtails in a simulated shipping environment in order to compare the mean cortisol concentration to the control group. Free cortisol was measured from the water. Compared with the control group, MS-222 increased the mean cortisol concentration while activated carbon maintained control group concentration levels of cortisol. Based on these results, shipping methods of fish should be potentially reevaluated.

**Preparing Green Fluorescent Protein for Isolation through Affinity Chromatography Using a Streptag Affinity Tag**  
**Presenter:** Nathan Peace  
**Faculty Advisor:** Mark Bolyard

Blood clots stemming from various injuries and diseases are a major problem in modern healthcare. Identification of new anticoagulating agents would benefit many patients suffering with blood clots. In order to identify new anticoagulants, a marker to distinguish them from other proteins would be a useful tool. We sought to create a green fluorescent protein (GFP) that can be easily purified so that it can be used in anticoagulant research. The protein was modified through polymerase chain reaction (PCR) mutagenesis conducted on the pGlo plasmid, which contains the GFP gene. We attempted to add a Streptag affinity sequence to either the N or C terminus of the protein and then express it in *E. coli* bacteria. Initial mutagenic PCR showed amplification, but further diagnostic techniques checking for addition of Streptag after obtaining fluorescent bacterial colonies have shown our attempts to not yet be successful.

**Development and Incorporation of Affinity Tags to Green Fluorescent Protein for Isolation Via Affinity Chromatography**  
**Presenter:** William Tucker  
**Faculty Advisor:** Mark Bolyard

This project involved the development of genetically altered *Escherichia coli* expressing modified green fluorescent proteins (GFP) to indicate presence of new anticoagulants. Successful implementation of this tool requires an efficient isolation technique for recombinant GFP. This involves the incorporation of a polyhistidine tag at the C or N terminus of GFP to facilitate isolation of modified GFP following cell lysis. Mutagenic polymerase chain reaction (PCR) was attempted with custom designed primers to create an altered pGLO plasmid. Modified pGLO was re-circularized and inserted into *E. coli* where it should have produced modified GFP. Sequenced DNA from modified *E. coli* revealed no match with the desired sequence. Dysfunction of the polymerase enzyme during diagnostic PCR demanded for new primer design with additional inherent security measures. A unique NheI restriction enzyme site in pGLO was eliminated as a means to remove unmodified plasmids before transformation and to identify modified plasmids before transfection into *E. coli* bacteria.

**Testing Hepatic Deiodinase Activity Using a Non-Radioactive Assay**  
**Presenters:** Matthew Burkett, Eli Hurt, and Jenna Ward  
**Faculty Advisor:** William Thierfelder

The thyroid is an endocrine gland which is involved with metabolism. There are three key enzymes that are involved in the regulating the hormones that thyroid produces: deiodinase (DIO). DIO 3 inactivates T4 which is the inactive form of the hormone but it is involved in activating T3. DIO2 helps activate T4 into T3. We are asking how stress affects the activity of DIO2 which then affects the thyroid and the regulation of the hormone. We set out to use a newly published assay to determine the intensity of DIO1 expression in a liver cancer cell line that was stressed through the use of LPS, lipopolysaccharide. We predicted that this assay will indicate an increase in intensity of DIO2 levels when the liver cell is stressed.
Are Christian Initiatives Perceived Differently in the Online Format Across Cultures?: A Comparison of American and Brazilian Students
Presenter: Camila Simas
Faculty Advisor: Brooke Emery
This study is intended to give an overview and analyze online courses and their effectiveness in portraying the religious symbols and faith-based associations of a Christian institution. As distance courses (i.e. online classes) increase as an alternative to physical classes, universities may have greater difficulties displaying their mission and symbols without the tangible contact present in physical class settings. Therefore, this study surveyed a sample population of approximately 150 students at a faith-based university. The study presents several manners in which a religious message may be conveyed on the online forum, and asks the participants to analyze the effectiveness of each option. Moreover, this study take in to consideration the international element of higher education by extending the survey to university students in Brazil as a comparison. This comparison also analyzes how the religious symbols conveyed through online venues can be noticed differently given different cultural and religious factors.

Improving Restaurant Service Using Simulation Modeling
Presenter: Cody Mitchell
Faculty Advisor: Andrew Tiger
Process simulation allows modeling stochastic systems over time. Simulation has been used successfully in manufacturing systems, supply chains, and traffic management because it accurately demonstrates the effects of uncertainty such as demand rates, service times, and customer behavior. In this research, a restaurant simulation model demonstrates that too many choices often negatively impacts service. The model represents customers arriving to a restaurant and ordering menu options. In addition, the kitchen operations are also modeled such as food preparation. As more choices are offered, additional capacity is needed. When capacity limits are reached, shortages occur resulting in service problems. The simulation can provide insight into how many choices to offer; thus, offering variety without negatively impacting service. The restaurant evaluated in the research is Panda Express, but the model is structured to allow representing any restaurant.

To Make Us Truly Human: Does a Humanities Undergraduate Education Impact Corporate Social Responsibility?
Presenter: Caitlin Roach
Faculty Advisor: Daniel Slater
This study explores the impact of humanities undergraduate degrees on CEOs who chose to study these disciplines during college, with a particular focus on their firms’ levels of corporate social responsibility (CSR). Using a sample of 404 S & P 500 CEOs, this study empirically tested if and how CEOs’ undergraduate fields of study influence their firms’ CSR. The results determined a positive relationship between a CEO’s decision to study the humanities while in college and his or her firm’s level of CSR, even after industry, firm size, firm performance, and CEO tenure were taken into account. This study also divided CSR into seven sub-domains in order to determine if the people-focused domains of CSR were more important to CEOs with humanities degrees than the domain of corporate environmental performance. The sub-domains of community and diversity were found to have positive relationships with humanities-educated CEOs.

Productivity Benefits of Applying the Knapsack Model in Banking Using MS Excel
Presenter: Madeleine Hemphill
Faculty Advisor: Andrew Tiger
The knapsack problem is a well-known optimization problem with many successful applications. In this research, two new and successful applications are presented. The applications are in the areas of banking and accounting, and the primary benefit of both are increased productivity. In the banking application, the knapsack problem is applied to quickly bundle auto loans for selling to another financial institution. The accounting application of the knapsack problem involved mapping transactions to specific accounts when transaction information is lacking. Both applications reduced the time and effort from days to minutes. Additionally, the models run in a MS Excel spreadsheet; therefore, continued use and transfer of technology to others employees should be successful.
CHEMISTRY

Determination of the Anticancer Effects of the Chemically Derived Natural Compound Aloe Polymannose

Presenter: Alex Taylor
Faculty Advisor: Jerry Thornthwaite

Polymannose is a chemically derived compound from the plant Aloe vera, or Aloe barbadensis, that has demonstrated several medicinal capabilities. This research focused on determining if polymannose was a successful anti-cancer agent. The target cancer cell line was a K562 erythroleukemic cell line. Polymannose was mixed with the K562 cells and left to incubate for 72 hours at 37.2 °C with 5.0% CO2. After the incubation period samples were combined 1:1 with a propidium iodide based viability stain and analyzed by flow cytometry. The viability stain allowed for the viable cells to be distinguished from the dead cells. Through a comparison with the control's viability, the percent inhibitions were calculated for each concentration tested, and the results were graphed with the PSI-PLOT program. Polymannose inhibited approximately 85-100% of the K562 erythroleukemic cell growth in vitro after the 72 hours of incubation at the higher concentrations tested, 7.3-9.1 mg/mL of polymannose.

Completing a Green Chemistry Laboratory Manual for General Chemistry

Presenter: Kelsie Wood
Faculty Advisor: Sally Henrie

Green chemistry is the philosophy of designing safer chemical products and processes from the beginning. Greener laboratory procedures reduce or eliminate hazardous materials and hazardous waste. These procedures are typically safer for the environment as well as students. There is a need for educational laboratory materials that not only make labs greener, but also teaches students how to implement Green Chemistry. This research involved completing the writing of a Green Chemistry laboratory manual for the general chemistry level that provided greener labs and taught the principles of Green Chemistry.

Thermostabilization of Water Soluble Variants of the Human β2 Adrenergic Receptor

Presenter: Phillip Kurtzweil
Faculty Advisors: Michael Salazar and Abby Parrill-Baker

G-protein coupled receptors (GPCR) comprise the largest family of cell-surface receptors, and their important role in physiology makes them the frequent target of therapeutic drugs. Due to a number of challenges involved in producing diffraction quality crystals of GPCR, the structural characterization of these molecules has been slow. The Parrill lab has been working on a strategy of introducing a transferable set of mutations that will render GPCR water-soluble with the aim of accelerating their structural characterization. Thus far, collecting data on the structure and function of the water soluble mutants has proved difficult, presumably due to lack of thermostability. This poster presents preliminary efforts to introduce previously published thermostability mutations into water soluble constructs of the human β2 adrenergic receptor (hβ2AR). Trial expressions of the thermostabilized mutants showed that they expressed at approximately equivalent levels to the original water soluble construct.

Designing an Undergraduate Lab Procedure for the Synthesis of [R,S]-Boc-Phenylglycyltryptophan Methyl Ester

Presenter: Tyler Smith
Faculty Advisor: David Wing

The overall goal of this research was to design an undergraduate lab experiment to use in the biochemistry curriculum at Union University that uses amide-coupling reactions to synthesize [R,S]-Boc-Phenylglycyltryptophan methyl ester and to analyze the resulting peptide by 1H-NMR to determine the epimer formation of the product. Proteins are formed when different amino acids are linked together by amide-coupling reactions. When two amino acids are linked a dipeptide is formed. In chemical synthesis of peptides, two epimers of the product may be formed. Analysis of the product by 1H-NMR was used to determine which epimer was synthesized. Epimers are compounds that have multiple chiral centers but ultimately differ from each other in conformation at only one of these chiral centers. One purpose of this research was to evaluate the protocol laid out by Fray1 and determine if it was appropriate for our students and facilities, which it was. We followed Fray’s protocol but substituted Tryptophan methyl ester in place of Valine methyl ester as the main target compound. We found that the synthesis of [R,S]-Boc-Phenylglycyltryptophan methyl ester was a better choice of a target compound for us.

Separation of Alpha and Beta Sodium-Glucoheptonate

Presenter: Evan Lewoczko
Faculty Advisor: Michael Hayes

Approximately five-million tons of alpha-glucoheptonate crystals are produced at the largest plant in the United States every year through the Kiliani-Fischer Mechanism. A side product of this reaction is alpha-glucoheptonate’s isomer companion beta-glucoheptonate. While alpha-glucoheptonate is a white crystal, beta-glucoheptonate has been described as non-crystalline material contained in the mother liquor of the reaction (US Patent 3679659 A). This presentation outlines the findings of a summer’s research on beta-glucoheptonate.
Determining the Anti-Cancer Effects of Known Indian Herb Ashwagandha
Presenter: Cameron Faulk
Faculty Advisor: Jerry Thornthwaite
Ashwagandha is an Indian herb which has the potential to be an anti-cancer agent. The main component of Ashwagandha is Withaferin A, a withanolide. Withaferin A was previously shown to induce PCD, programmed cell death. Through an apoptotic process, Ashwagandha was shown to kill K562 cancer cells in vitro with great efficiency. K562 cells are leukemia cells, a common cell line for pharmaceutical research. The ashwagandha was mixed with K562 cancer cells and incubated for 3 days at normal human conditions, 37°C and 5% CO₂. A viability stain and flow cytometer were used to analyze the number of viable or healthy cells present in each well after treatment. The results showed that ashwagandha, after 3 days of direct contact, killed almost 100% of the cells in each well with concentrations of 9.09mg/mL or higher.

Determining Formation Constants of Sodium Glucoheptonate for Metal Ions: Exploring Its Potential in Foliar Fertilization as a Metal Chelator
Presenter: Lang Van
Faculty Advisor: David Wing
Studies have shown that sodium glucoheptonate, a monodentate chelator, is able to bind a variety of metal ions, in particular, the micronutrients and the macronutrients that are essential for plant growth. This research investigates sodium glucoheptonate’s ability to complex with an assortment of metal ions by determining its formation constants for several metal ions. Additionally, the research explores the potential of utilizing sodium glucoheptonate as a metal chelator in foliar fertilizers to optimize nutrient uptake in plants. Despite being unable to determine the formation constants because of impure product, sufficient data was collected to support the hypothesis that sodium glucoheptonate could theoretically improve nutrient uptake for certain metal ions.

Determining the Use of Na-glucoheptonate as an Anticoagulant
Presenter: Kimberly Van
Faculty Advisor: David Wing
Anticoagulants are a class of drugs that play a large role in preventing the clotting of blood. It is used in the laboratory to store blood in test tubes and transfusion bags. Anticoagulants are also used in anticoagulant therapy for patients suffering from congenital heart defects. EDTA and Acid Citrate Dextrose are two of the anticoagulants that prevent blood clotting by forming complexes with calcium. Calcium works together with fibrinogen and Vitamin K in the clotting cascade. Sodium glucoheptonate is a chelator that is capable of forming complexes with metal ions, including calcium. The sodium glucoheptonate is able to complex with calcium and has the potential to work as an anticoagulant. The scope of the research is to determine the formation constant of sodium glucoheptonate and to determine its effectiveness as an anticoagulant.
Developing a 2D Game in Unity Utilizing the Photon Unity Network for Multiplayer Capabilities
Presenter: Stephen Clement
Faculty Advisor: Jim Kirk

Initially announced in 2005, the Unity game engine was a groundbreaking achievement in enabling individuals or small teams to start developing their own games for little to no cost. The Unity game engine is highly capable and widely used for professional games on a wide variety of platforms. This project will be the first introduction of development using the Unity framework to the Union community. The focus of this project was to develop a rudimentary multiplayer game in Unity utilizing the Photon Unity Network, enabling players to join from multiple computers and play together. The game is a simple, top-down, 2D space shooter that will explore and demonstrate the capabilities of the game engine in an enjoyable and engaging experience.

Evaluating Commercial Web Application Security
Presenter: Aaron Parke
Faculty Advisor: Jim Kirk

In this project, Burp Suite software was used to test the security of web applications on several commercial websites of varying sizes. Burp Suite is a set of tools used to expose web application vulnerabilities, and includes scanning, spidering, and sequencing tools. Burp is able to expose many different vulnerabilities that can be exploited maliciously, including SQL injection and cross-site scripting. The goals of the project are to identify security issues on the sites, to evaluate their security in relation to one another, and to identify and present how issues could be remediated. The project also includes general web application security research and information.

UU Textbook 2.0: A Webpage for Union Students to Share Textbooks
Presenters: James Vo and Cody Tinsley
Faculty Advisor: Jim Kirk

In the past, Union students could join a Facebook group to find used textbooks. The focus of UU Textbook 2.0 is to create a fully featured website that will make the process of borrowing and sharing books a simpler and more efficient process. This system allows users to create posts on available textbooks, implements a key-word tagging system that allows users to quickly find and share textbook information, and uses a database to aid the search process. The students can create posts and tag key information which allows other students to quickly find the correct textbook for a specific class or professor. This project involves the creation of both a front end website and a database system to collect and organize information. The goal of UU Textbook 2.0 is to make selling and trading textbooks more user-friendly and efficient.

iLEAD: A Mobile Application for Student-Directed Individualized Education Programs
Presenter: Tom Trabue
Faculty Advisor: Jim Kirk

Students diagnosed with learning disabilities have benefited for years from specialized curricula known as Individualized Education Programs (IEPs). However, these programs are usually designed by educators, with little input from the students themselves. Research done by Dr. James Martin at the University of Oklahoma has demonstrated that students who had already created their own IEPs prior to their meetings dressed more professionally and spoke up more. Furthermore, the student-directed IEPs set the tone for the students’ meetings, allowing educators to create IEPs more suited to the students’ needs. The iLEAD mobile app is an educational aide designed to help students diagnosed with any type of learning disability by providing them with a simple, intuitive application that will both guide them through developing their own IEP, and provide them with a reference for successfully navigating a real IEP meeting with an academic advisor.

The Use of a Raspberry Pi in the Household Internet of Things
Presenter: Reed McLean
Faculty Advisor: G. Jan Wilms

The purpose of this project is to explore one of the many applications of the Raspberry Pi. The Pi is a small, cheap, and rugged computer that is bringing massive change to the computing world. With an emphasis on coding, computer education, and accessibility, the Pi Foundation is bring massive change to the tech world. This particular application of the Pi is one of convenience. The Pi serves as a bridge from the user's garage door to the internet, simply adding one more household appliance to ever-growing Internet of Things. With this project, the user can both read the state of the door and toggle it using their phone or computer (provided they have Internet access.) This research is meant to be a proof of concept of both the ability of this credit-card sized computer, as well as an exploration of the uses of the languages of Python, HTML, PHP, and Linux systems.
An Identity Guide for Kollabb: Where Blogs and Brands Collaborate
Presenter: Elizabeth Fletcher
Faculty Advisor: Chris Nadaskay

Every brand needs a guide. Identity guides serve to create a consistent image, voice and design so that the brand is never distorted. The goal in this project is to create a logo and identity guide for the business-to-business social media platform, Kollabb. Through researching the necessities of a brand guide, I have created a book to show what this brand is all about. This guide creatively outlines everything from the brand's personality and mission statement to the colors and typography that represent it.

Building a Business: From Concept to Production
Presenter: Luke Pennington
Faculty Advisor: Chris Blair

People often have ideas for different for a business, but do not know how to go through with them. This presentation explores what it takes to build a business; from the initial conception, the business plan, the branding, and the actual implementation of the business. This also explores the importance of digital media on creating a small business, since the rise of the internet has allowed anyone to start a business from wherever they are and create an international audience. This presentation will take the form of a case study of a t-shirt business wanting to start a business and create an audience.

The 2.5D Effect
Presenter: Peyton Penuel
Faculty Advisor: Chris Blair

I will be discussing the concept known as the 2.5D effect, also known as the parallax effect. 2.5D is a midrange between a 2nd and 3rd dimensional views of an object. It is the process of taking a two-dimensional image and manipulating it to give a three-dimensional appearance over time. Many people don't notice this effect when they see it, but it is all over television and film. My presentation will discuss the history and uses of the effect in today's market, and demonstrating its creation.
General Cable Automated Splice Detection Device
Presenters: Matthew Bentley, Will Duncan, Chris Lanham, and Eric Ramirez
Faculty Advisor: Randal Schwindt

General Cable is a manufacturer of copper, aluminum, and fiber optic wire and cable products for the energy, industrial, specialty, and communications markets. This project focused on designing an automated process to detect a cable splice during the manufacturing process using a Hall Effect Sensor. In order to keep the manufacturing line running continuously, an operator must periodically splice together two reels of wire, but this splice must be removed from the finished product. The splice removal process generates large amounts of scrap, and the automated splice detector helps to reduce this scrap by increasing efficiency through automation. This device also makes the operator’s job easier, allowing the splice to be cut more reliably.

Effects of Production Method and Feedstock on Biochar Quality for Sustainable Water Treatment
Presenters: Matthew Bentley
Faculty Advisor: Jay Bernheisel

Biochar is a sustainably produced, carbon-rich material produced through pyrolysis of biomass. It is a valuable soil amendment and carbon storage technology, and it has recently begun to be used as a sustainable water treatment method. Similarly to activated carbon, biochar has high surface area and porosity, allowing it to adsorb many pollutants that cause significant health problems throughout the developing world. The temperature of pyrolysis is related to the surface area and porosity of the char, which provides it with more adsorptive capacity and is indicative of its quality as a water treatment method. Pyrolysis temperatures in a Top-Lit Up-Draft Gasifier and Two-Barrel Retort are measured with different feedstocks to compare the quality of biochar produced as well as identify considerations for sustainably producing biochar in the developing world.

Characteristics of a Transmission Line Based Characteristic Impedance and Load Impedance
Presenters: Will Duncan and Chris Love
Faculty Advisor: Randal Schwindt

Transmission lines are used in everyday life to bring electrical power to all the plugged-in devices in everyday homes. However, besides the impedance of the load of the device the consumer wishes to power, the transmission line has an impedance of its own. Various characteristics of a transmission line are defined by the load and the characteristics impedance of the line, and the purpose of this project is to easily solve for all of them using MATLAB. The program calculates and displays the reflection coefficient ($\Gamma$), the voltage standing wave ratio (VSWR), the first distances that result in a minimum or maximum voltage ($d_{\min}$ and $d_{\max}$), and plots the magnitude of voltage ($|V(z)|$) as well as the time dependent voltage ($v(z,t)$) with respect to the distance.

Infinite Topologies
Presenters: Zachary Benson and Erin Picard
Faculty Advisor: Randal Schwindt

Our main purpose was to create a MATLAB script to match a transmission line’s impedance to a load using a number of different impedance matching topologies. These topologies include a quarter-wave transformer at the load for a purely real load impedance and at $d_{\max}$ and $d_{\min}$ (maximum and minimum voltage locations, respectively) for complex load impedances, a lumped element topology, a short stub topology, and an open stub topology. Impedance matching allows maximum power to be transmitted, which increases the efficiency of power lines. Another effect is that musical instruments produce less buzzing when impedances are properly matched. These applications, among others, make impedance matching an important aspect for infrastructure as well as our daily lives.

EGR 210’s Study of Smart Materials
Presenters: Rachel Brewer, Brady Chandler, Andrew Ford, Samuel Jeong, Paul Langford, John Villarreal, and Zach Wadley
Faculty Advisor: Georg Pingen

The EGR 210 class is studying the development of two “smart” materials and will be demonstrating the two materials during the UUSS poster presentation. Team A is looking into piezoelectric materials that produce a voltage in response to a stress being applied. There are many applications of piezoelectric materials including its use in high voltage and power sources, sensors and actuators. Team A’s goal is to show
the ability of a piezoelectric material to be used as a small-scale generator. Team B studies memory shape alloys, using the specific example of “muscle wire.” Memory shape alloys contract or expand depending on the temperatures or currents to which they are exposed. We investigate the possibility of using muscle wire as motors to simplify the design of mechanisms.

Implementing a Multigrid Solver for Flow Topology Optimization
Presenter: Chelsea Johnson
Faculty Advisor: Georg Pingen

Modeling, analyzing, and optimizing fluid flow is a complex and sometimes prohibitively costly procedure, involving the simultaneous solution of many equations. While typical iterative approaches lower the computational storage requirement, they often sacrifice accuracy or time to do so. The multigrid method is a solver that has been shown to decrease both time and storage cost of fluid problems while obtaining a sufficiently accurate solution. In our research, we investigate the implementation of a multigrid solver into an existing topology optimization program and will present the results of this work.

Matching Cost: The Cost of Resistance
Presenters: David Brewer and Beau Fant
Faculty Advisor: Randal Schwindt

The objective of this project was to create a program that solves for impedance matching network parameters by requesting key variables, such as frequency, wavelength, load impedance, and line impedance. This objective is met by solving for five different topologies. The necessity of finding matching impedance is to eliminate power loss due to reflection. This program is also supposed to not only help speed up impedance matching but to add another level of real world application. It adds in a factor of money, which allows the user to know roughly what it will cost for them to accomplish their goal. This should prove highly useful to anyone looking have an effective matched impedance and minimum cost evaluation.

Compressed Air Marshmallow Blaster: Effect of Varying Barrel Length and Projectile Size
Presenters: Ryan Harris, Joshua Guthrie, and Jonathan Vailes
Faculty Advisor: Ethan Wilding

Projectiles have been the subject of countless experiments in an attempt to better understand the factors that affect their flight. We decided to investigate how a marshmallow flies as it is launched from a compressed air cannon. To begin, we constructed a marshmallow cannon and decided to vary the size of marshmallows shot and the barrel length in an attempt to find the ideal combination to achieve the longest and smoothest flight of a marshmallow. The cannon was designed to be able to consistently fire marshmallows of different sizes using detachable barrels and a common air chamber. We also wanted to study the result of different air pressures used to launch the projectile and the effect that has on the different sizes of the marshmallows.

Savings from Solar Power: Solar Panel Station Experimental Review
Presenters: Chelsea Johnson and Andrew Smith
Faculty Advisor: Ethan Wilding

Last fall, a group of students installed a solar panel to power an instructor’s computer station. The project converts solar energy to electric power, saving the university several kilowatt-hours per week. We propose to conduct an experimental review of the project to determine its cost versus its benefit and calculate the efficiency of the system as installed. We propose to pursue the following three goals:
1) Calculate the average power stored daily by the solar panel;
2) Determine the average power used by the instructor’s station per week; and
3) Conduct a cost analysis and determine the overall benefit or cost of the system per semester.
The Union Central Fountain: A Space for Tradition and Community
Presenters: Shane Caver, Joshua Guthrie, Andrew Tan, and Zach Wadley
Faculty Advisor: Randal Schwindt

Two of Union’s strongest values are in its thoughtful traditions and its vibrant community. In 2014, we showed our welcome to the freshmen through a new tradition called “Lest We Forget,” in which they take a stone from the PAC fountain and walk it to Miller Tower while upperclassmen line the way with candlelight. This reminds us of Joshua’s story in scripture in which he set up twelve stones to remind Israel of God’s provision for them. For us here at Union, however, there is currently no set place to deposit the stones for the Lest We Forget tradition. Thus, in this, our engineering senior project, we have set out to design a new fountain and gathering space for Union University. The fountain is meant to be located to the East of Miller Tower at the end of the Great Lawn across the street from the Grant Center and it will accomplish two primary goals: to serve as a destination for the Lest We Forget tradition and to foster Union community through an inviting space. To communicate this design concept, we have produced construction documents using Revit software and a physical, scaled, functional mock-up of the area for further exploration and study.

Smith Chart
Presenters: Shiva Hemmatian and Dillon Lisk
Faculty Advisor: Randal Schwindt

The Smith chart is a graphical tool used for analyzing electrical transmission lines and designing matching networks without having to use complicated formulas. When designing matching networks—circuits to ensure maximum power transmission between different impedances—it is necessary to locate a position along the line where the input impedance has particular characteristics dependent on the matching network type. By graphically transforming normalized impedances into reflection coefficients, the Smith chart allows identification of these points using compass and straightedge, after which relatively simple formulas can give the values of the components in the matching network.

Study of the Function and Use of High Pass, Low Pass, and Band Pass Filters
Presenters: Rachel Brewer, Sam Jeong, and John Villarreal
Faculty Advisor: Jeannette Russ

For our project we are showing the construction and physical use of high pass, low pass, and band pass filters in circuits. Each filter is itself essentially a small circuit that allows only certain frequencies through given an input signal. High pass filters allow higher frequencies through, low pass filters allow lower frequencies through, and band pass filters allow a band of frequencies through (they exclude both high frequencies and low frequencies). In our project we will study how different circuit elements affect the performance of the filters. That is, which frequencies are excluded given certain circuit conditions!

Audio Equalizer Using Filter Circuits
Presenters: Connor Bailey, Brady Chandler, and Levi Hartsfield
Faculty Advisor: Jeannette Russ

In EGR 262, we have been assigned the task of using a set of filters in a circuit, and we have been challenged to find an application of such filters. We have discussed the importance of high-pass, low-pass, and band-pass filters, and one application of these filters is to use them with audio and audio effects. There are two ways to do this that we have found. One way to do this is by using variable, sliding resistors to control sound frequencies. The other way, which we prefer, is to explore these filters and the union of music with an LED display. We will attempt to create a device that recognizes certain frequencies and turns on LEDs based on the frequencies heard. Namely, the circuit we have researched and are planning on implementing will be an audio equalizer.

Impedance Matching Using Matlab
Presenters: Chris Boccarossa and Emily Pace
Faculty Advisor: Randal Schwindt

One of the primary focuses in electromagnetics is the concept of impedance matching: matching a transmission line’s impedance to a load’s impedance to achieve maximum power transfer. This can be achieved a variety of ways, with a variety of electrical components. A program in Matlab was created that utilizes five of these methods, which are referred to as topologies. The program first prompts the user for the desired topology. Next, the user is asked to input the transmission line impedance and load impedance. The command window in Matlab then returns the parameters for the selected topology.
These parameters, when applied to the transmission line, cause the line impedance to match the load impedance. Electromagnetic applications rely on the strength of signals and therefore rely on maximum power transfer. The purpose of this program is to provide a quick and easy way to solve impedance matching problems.

**Analysis of Shrouds in UAV Design**

**Presenters:** Shiva Hemmatian, Michael Kelly, and Andrew Love  
**Faculty Advisors:** Don Van and Randal Schwindt

AgriImage is a developer and seller of Unmanned Aerial Vehicles (UAVs) meant to survey farmland. Their basic design is a quad-copter comprising of four arms each extending from a central body ending with an exposed propeller, but each exposed propeller can be potentially harmful for the users and bystanders. A solution to protect the customer and others from these blades can be found in a covering called a shroud. The overall goal of this project is to research shroud designs in order to provide a safer drone to the customer and while additionally researching the effects the shroud will have on flight dynamics. There are specific three goals of this project. The main goal of this project is to study the aerodynamics of an existing shroud design created by AgriImage. This will be done using Computational Fluid Dynamics (CFD), the use of which will shed light on velocity, pressure and direction of airflow at specific locations around the shroud in the design. The second goal of this project is to research and compile the necessary information needed for an effective shroud design. This compilation will be in the form of a paper detailing critical design parameters and each's effect on flight dynamics. The third goal of this project is to improve the camera functionality of a mounted GoPro camera that is included in the UAV setup. This improvement will enable the ability to remotely change from video to picture mode, or vice versa, while the UAV is in flight. Consequently, this improvement will provide a remote trigger to take pictures or record video.

**Lossless Lines: Voltage and General Considerations**

**Presenters:** Seth Guiler and Shane Caver  
**Faculty Advisor:** Randal Schwindt

Our project was to use the program MATLAB to examine the characteristics and related voltage of a lossless transmission line. We input a load impedance ($Z_L$), transmission line’s characteristic impedance ($Z_0$), and frequency into the program. From inputted information, the program finds the Voltage Reflection Coefficient ($\Gamma$), Voltage Standing Wave Ratio ($S$), First Voltage Maximum ($d_{max}$), and First Voltage Minimum ($d_{min}$) characteristics as well as determines and plots both voltage with respect to distance ($v(z)$) and animates voltage with respect to both distance and time ($v(z,t)$). This program facilitates the computation of the voltage at different points and times along an ideal transmission line along with other characteristics of the ideal transmission line. The purpose of this program is to significantly reduce the amount of time used to calculate transmission line characteristics.

**Frequency Isolation of Electronic Signals through Filters**

**Presenters:** Andrew Ford, Aaron Hively, and Samuel Mitchell  
**Faculty Advisor:** Jeannette Russ

The purpose of this project is to explore the function, construction, and application of electronic filters. Initially, PSpice analysis will be used for experimentation of various filter types, namely high-pass, low-pass, and band-pass filters. These filters will be further analyzed in hardware form using various electronic waveform frequencies. One potential application of filters, the band-pass filter in particular, is the isolation of particular frequencies. In utilizing this application, it is the goal of this project to produce a filter that isolates and emits, via a speaker, a single frequency. An example of a specific desired frequency could be the standard 440 Hz, A4, tuning note as well as other musical tuning frequencies.
Creative Writing: From Class to Crowd
Presenters: Amanda Vernon, Hunter Martin, Alexis Piscatello, Kristen Wilson, and Jonathan Wilson
Faculty Advisor: Christine Bailey
Although the process of writing often occurs as a solitary experience, the result of writing is often experienced by many. The students from this spring’s English 312: Creative Writing will share excerpts of their creative works written in various genres. This presentation will include pieces of creative nonfiction that reflect personal experience and reflection, as well as imaginative, convincing works of fiction and poetry. This cross-genre reading of honest, edgy, authentic writing is the end-result of a semester-long exploration of the literary art of writing.

Abraham and Isaac: A Reader’s Theater
Presentation of the Medieval Play from the Chester Mystery Cycle
Presenters: Lizi Frazier, Cole Langford, Eric Marcy, Andi Schnepper, Kara Glover, Michala Allen, Melissa Hardman, Brittany Hodge, Chelsea Fry, Megan Nesbitt, Katelyn Walls, and Hayley Johnson
Faculty Advisor: Gavin Richardson
This will be a “reader’s theater” presentation of the medieval play “Abraham and Isaac.” Students will read the play in Middle English from prompt copy. The star of the show is the language, but students will do some light performance. In addition to dramatizing the (near) sacrifice of Isaac by Abraham, the play also depicts the blessing of Abram (Abraham) by Melchizedek, and it literally performs exegesis, with an Expositor appearing to explain the typological significance of such an act. The Chester “Abraham and Isaac” offers fascinating insights into the way Biblical narratives were experiences and interpreted in the later Middle Ages. Running time is approximately 30-40 minutes.

Death and Suffering: Civil War Prison Camps in the North and South
Presenter: Faith Bagley
Faculty Advisor: Keith Bates
This research paper involves discovering how American Civil War prison camps were similar in the North compared to those in the South. The goal is to show that the prison camps on both sides of the war faced similar problems and responded to those problems in similar manners. This goal has been accomplished by examining information and statistics regarding two specific prison camps each in both the North and the South, as well as looking at the personal accounts of soldiers who were prisoners in these specific prison camps. My research shows that the prison camps in both the North and the South each faced varying degrees of the same horrific conditions due to many similar problems regarding a lack of resources and a lack of space.
Identity Development in Missionary Kids Repatriating to the United States for College
Presenter: Emilee Hartman
Faculty Advisor: Cynthia Jayne

Around the world there are people who spend or have spent a portion of their developmental years in a country different from their parents’ country of origin. Some call them Global Nomads, but they are most often referred to as Third Culture Kids. This research will examine identity in Third Culture Kids during the transition from overseas to college in the United States, analyzing this phenomenon through language, psychology, and intercultural studies. The focus will be a specific type of Third Culture Kid, known as Missionary Kids.

International Protection and Central American Child Refugees
Presenter: Adam Lang
Faculty Advisor: Cynthia Jayne

The summer of 2014 showed an unprecedented number of minors attempting to enter the U.S. both legally and illegally from Central America. This case study was the result of research through various media, humanitarian, and governmental sources located both in the United States and Central America to explore the nature of the child immigrant border crisis and the response of the United States government. This case study is predominantly historical in nature, designed to report on exactly what took place throughout the crisis. Information to aid in the understanding of the causes, responses, and consequences of this highly political crisis is discussed. Recommendations are also made for strengthening national frameworks in the U.S. for ensuring international protection for children affected by newly emerging forms of displacement in Central America.

Identity Negotiation of Third-Culture Kids in Their Own Words
Presenter: Anna Poore
Faculty Advisor: Cynthia Jayne

Third Culture Kids (TCKs) spend a significant part of their developmental years outside their parents’ culture, assimilating elements from multiple cultures while not having exclusive identity in any. This project uses textual analysis to apply Ting-Toomey’s Identity Negotiation Theory to writings by a wide variety of TCKs. Four major themes indicate ambivalence in identity. First, TCKs view the sending organization as an important part of their identity, even when they have ambivalent or negative feelings toward it. Second, they view themselves as open-minded, but have little patience with close-minded people. Third, they appreciate the benefits of living internationally, but struggle with unresolved grief and loss. Finally, they make friends easily, but relate best to other TCKs. Awareness of identity issues will be beneficial to both TCKs and those who work with them, especially as the number of children raised outside of their home culture increases.
Identity: An Interdisciplinary Understanding
Presenter: Paul Smith
Faculty Advisor: Cynthia Jayne

We’re told that we are created in the image of God. The creator of the heavens and the earth, who breathed life into us from the dirt, gave us the ability to communicate and think. Imagine the joy and experience of your children or grandchildren smile, the inspiration to create or appreciate the Sistine chapel, the universality of complex language that fills linguists with awe, or our innate nature to form relationships and understand who we are or who we were created to be. Our identities are not a cultural invention but the product of a complexified environment of the human condition. Besides living on the only known planet able to sustain humanity, what role do we and our innate qualities play in our identity? The purpose of this presentation is to explain this exploration as seen through the lens of culturalism and identity negotiation.

Community Art Centers in the Urban Environment
Presenter: Sierra Owens-Hughes
Faculty Advisor: Cynthia Jayne

Community art centers have become an integral part of many cities, and they continue to play important roles in the life of low-income urban communities. This research will explore the purpose of community art centers in urban America and the effects they have on their communities. This research explores the philosophies, methodology, process, and outcome of programs focused on community development and the arts. By focusing on the disciplines of psychology, sociology, intercultural studies, and arts, this literary research will answer questions concerning youth at risk, arts in culture, and intercultural communication. This research seeks to support the hypothesis that community art centers positively affect their communities by enabling their youth, rejuvenating public space in the neighborhoods, strengthening community morale, and unifying communities cross-culturally.

Do Disadvantaged Groups Effectively Help One Another?: A Survey of Female Leaders and Minority Rights in Asia
Presenter: Chelsea Meiss
Faculty Advisor: Cynthia Jayne

This research seeks to provide an explanation for the discrepancies between various Asian leaders’ rhetoric regarding minority rights and their actual treatment of said minorities. It specifically examines nations that are part of a greater regional pattern in which the daughters of assassinated former political leaders in Asia now hold positions of power themselves, including countries such as Pakistan, India, Bangladesh, Myanmar, the Republic of Korea, and the Philippines. It analyzes the tumultuous relationships between each female leader and various minorities within her own country through a framework of Western assumptions of equality, which present the strong belief that when women and minorities are in positions of power, they will advance each other’s claims. This research argues that frequent minority rights violations at the hand of these female Asian leaders, an occurrence often befuddling to Western thinkers, can be explained by certain cultural orientations towards power, authority, society, and family.

Influences of Japanese History on Biracial Japanese Identity Development
Presenter: Yumi Miyazaki
Faculty Advisor: Cynthia Jayne

According to the Statistic of Bureau, 4.7 percent of marriage is international marriage in Japan. The number of international marriage is increasing every year. Those children whose parents are Japanese and non-Japanese are called “half” in Japan. They are not considered as full Japanese. Biracial Japanese may often struggle with finding their identity as they interact with normal Japanese and live in Japan.
**Gender and Language**  
**Presenter:** Hannah Chapman  
**Faculty Advisor:** Phillip Ryan  

In this project I will look at many factors that contribute to or interfere with one's ability to communicate well and I will examine the factors that can influence how one communicates. I will focus on gender and how the gender of those involved in a communicative exchange can influence speaking patterns and change the outcome of the interaction. I will also incorporate the factors of culture and identity. I will look at some of the main language theories about gender and language and specific aspects of communication, like conversational strategies and sentence patterns. I will explore how gender, and the gender roles given by society, affect language patterns and meaning in the context of interactions between men and women.

**French Wars of Religion (1562-1598): The Cause of a Threatened Identity**  
**Presenter:** Kayla Carruthers  
**Faculty Advisor:** Jean Marie Walls  

This project explores the Wars of Religion which occurred in France during the 16th century. The French Wars of Religion were fought between the Catholics and the Protestants soon after the Protestant Reformation began to sweep through Europe. The project analyzes the complexities of the institutional relationship between the church and the state from historical and literary perspectives. It explores the claim that these wars of religion were a direct effect of a threatened national and cultural identity and how both the Church and state responded to that threat.

**Math and Music: The Fractal Nature of Rhythm**  
**Presenter:** Vicki Searl  
**Faculty Advisor:** Matt Lunsford  

Spurred by the advent of Benoit Mandelbrot’s discoveries in fractal geometry, scientists of the 1970’s theorized about the existence of fractal music. In 1978, Richard Voss and John Clarke published a paper showing that the spectral density of fluctuations in the audio power varies with an inverse relationship to frequency. Often labeled as $1/f_\beta$ noise, this behavior has been found in such diverse places as nerve membranes, sunspot activity, and even flood levels of the Nile. Building on this pioneering work, Daniel Levitin et al. analyzed the predictability of musical rhythms, concluding that the music studied followed a $1/f_\beta$ power law. Findings have implications for our understanding of the aesthetic experience of music as well as similarities and differences between composers. This presentation will explore the various results and conclusions of Levitin’s paper using concrete examples.
Comparison of International Health Care Systems: United States
Presenter: Shari Wherry

According to Frank Newport (November 2013), “79% of Americans rate the quality of healthcare they personally receive as excellent or good, roughly at the average on this combined positive measure since 2001” on the Gallup's annual Health and Healthcare poll (“Americans’ Views of Healthcare” para. 3). The DNP class of Nursing Health Policy and Economics has examined the economic and political factors affecting health care in the United States. To compare the United States Healthcare to other nations, the class will present posters for Australia, Canada, China, Egypt, France, Germany, Japan, Mexico, United Kingdom, South Korea, Spain, Switzerland, and Russia that will include:

- Payer system
- Financing
- Reimbursement
- Provider Choice
- Challenges
- World Ranking
- Gross Domestic Product spent on Healthcare

Australian Healthcare System
Presenters: Josh Donnan, Jason LaSource, Paul Orman, and Ethan Simpson
Faculty Advisor: Shari Wherry

According to the Health Education and Training Institute (2015), the Australian health care system has been ranked considerably higher than the United States (U.S.) in quality, access, efficiency, equity, and healthy lives. The Australian system is a mixture of public and private sector health services that, together, effectively meets the needs of Australian health care consumers. As the United States moves forward with transformation of the U.S. health care system, it will be imperative to understand what makes other systems more effective than the U.S. This presentation will provide an overview of the Australian health care system. Furthermore, in order to assess for areas of improvement and for comparison with the U.S. health care system, information presented will examine the payer system, financing, reimbursement, provider choice, challenges, World Health Organization (WHO) ranking, and gross domestic product (GDP) spent on healthcare.

The Arab Republic of Egypt Healthcare System
Presenters: Ian Bicol, Pelu Ogunyemi, Cory Prewitt
Faculty Advisor: Shari Wherry

The World Health Organization (2013) describes the health care system in Egypt as quite complex involving numerous numbers of public entities involved in the management, financing and provision of care. The Ministry of Health and Population has the overall authority on health and population policies, delivery of public health services and regulation of health insurance providers. The United Nations Development Program (2014) ranks Egypt 112 out of 186 countries in Human Development Index. This poster presentation will exhibit the unique health care system of Egypt, specifically on the following: payer system, financing, reimbursement, provider choice, challenges, world ranking and gross domestic product spent on healthcare. Also, this presentation will be compared with other international healthcare system posters including Australia, Canada, China, France, Germany, Japan, Mexico, South Korea, Spain, Switzerland, Russia, United Kingdom and United States of America.

Switzerland Healthcare System
Presenters: Ashley Burdette, Lauren Hamrick, Haleigh Sligar
Faculty Advisor: Shari Wherry

In 2000, the World Health Organization ranked 191 healthcare systems around the world by looking at “level of health, health inequality, health system responsiveness, distribution of responsiveness, and financial fairness” (Henderson, 2012, p. 387). Switzerland ranked 20 in overall performance (Henderson, 2012). The Swiss spend a great deal of their Gross Domestic Product (GDP), 10.7%, on healthcare. The system is driven by a private payer system with no link between health insurance coverage and employment. While Swiss citizens are mandated to purchase health insurance, costing 8-10% of their income, they are compensated with great medical resources (Henderson, 2012). Key aspects of payer system, financing, reimbursement, provider choice, challenges, world rankings, and GDP spent on healthcare have been studied for Switzerland. A poster with this information is presented for comparison with the countries of Australia, Canada, China, Egypt, France, Germany, Japan, Mexico, United Kingdom, South Korea, Spain, Russia, and the United States.
Comparison of International Health Care Systems: Canada
Presenters: Brittany King, Stacey Ortiz, and Nikki Stivers
Faculty Advisor: Shari Wherry

According to Health Canada, Canada’s health care system is publicly funded leading to easier access to health care services and benefits for all Canadian citizens (Health Canada, 2015). The system is built around “10 provinces and three territories that finance a statewide health insurance program” (Kliff, 2012, p. 1). The DNP students of Nursing Health Policy and Economics will examine the economic and political factors affecting the health care in Canada. A poster will be presented focusing on the health care factors of Canada in comparison to the United States.

The Chinese Healthcare System
Presenters: Crystal Coulter, Sarah Spraggins, and Ashley Weiss
Faculty Advisor: Shari Wherry

The following presentation will discuss the current healthcare system in The Republic of China and the reformations altering access to care. The existing healthcare system is both complex and inconsistent in its delivery of care between urban and rural residents of China. To modify discrepancies in the present delivery model, diagnosis related groups and health technology assessments are proposed to merge reimbursements with specific disease processes, as well as, narrowing the gap between regions. These healthcare reforms are based on the United States and global recommendations (Boynton, Ma, & Schmalzbach, 2012). A thorough comprehensive understanding of global healthcare delivery systems is imperative to maintaining quality, cost-effective delivery within one’s home nation through comparative assessment. The purpose for this presentation is to educate audiences on The Republic of China’s healthcare model and to then assess the proposed changes for actual improvements in patient care.

Japan’s Healthcare System
Presenters: Chardae’ Edwards, Nan Henderson, Joyce Snyder, and Joy Thomason
Faculty Advisor: Shari Wherry

Compared to the U.S., Japan is leading in the global health community. Japan ranked 10th in the 2000 World Health Organization’s health systems ranking, compared to the U.S., which ranked 37th (WHO, n.d.). Japan spends 10.1% of the gross domestic product for their healthcare compared to the
Japanese government is advancing preventative strategies focusing on good health and longevity. In 2014, their women were first in longevity and men eighth (WHO, 2014). Japan’s healthcare system offers efficient billing practices and convenient services offered in central locations; however, they are challenged with quality issues due to lack of regulations and physician oversight. The average hospital length of stay is double compared to other countries (The Economist, 2011). This poster presentation will compare details of the Japanese healthcare system as compared to the U.S. healthcare system.

German Healthcare System
Presenters: Casey Ellington, Jancy John, Edwin Martinez, Manju Thankachan
Faculty Advisor: Shari Wherry

The German coordination of national social insurance began first in 1883 by Otto von Bismarck with its founding principles being solidarity, subsidiarity, and corporatism. Germany spent approximately 11.6% of its $3.73 trillion gross domestic product (GDP) in 2012 making it among the top ten biggest spenders on healthcare in the world (World Health Organization, 2015). The country has, in recent years, undergone changes in an attempt to improve competition among its health sector while decreasing skyrocketing government costs. It is required of all Germans to have health insurance. The method by which they acquire health insurance varies by income level (Green & Irvine, 2013). In an attempt to compare and contrast these data with other countries worldwide, the following will be examined: payer system, financing, reimbursement, provider choice, challenges, world ranking, and GDP spent on healthcare. This data will be presented via poster format for comparison.

The Russian Federation Healthcare System
Presenters: Lindsay Greenfield, Camillia Haddix, Kristen Hayes, and Susan Spencer
Faculty Advisor: Shari Wherry

The purpose of this presentation is to describe the healthcare economic structure of Russia. The Russian system has experienced great struggles as the Semashko model (central control) transfers delegation of health-care to the power of Russia's 88 territories. The high rate of poverty combined with the government's own economic struggles have greatly affected the health-care system. Both government and private sector payors are reviewed along with current supply and production concerns. The current woes of the nation's health-care system are evident in the World Health Organization's ranking of 130/190, a decrease in government funding of health-care, an insufficient health-care/GDP spending, and recent riots protesting the greater financial cuts to the system.

United Kingdom Healthcare System
Presenters: Ashley Craig, Gloria Michelle Patton, and Desiree’ Shammas
Faculty Advisor: Shari Wherry

The United Kingdom (UK) consists of four countries: England, Scotland, Wales, and Northern Ireland. The National Health Service (NHS) was founded in 1948 to ensure access to quality health care to all citizens in the UK. NHS provides universal health care that is free at the point of delivery and largely centrally funded via general taxation. This system is renowned as one of the premiere health care systems in the world and is ranked eighteenth by the World Health Organization (WHO). This presentation will discuss the following: overview of the health care system in the UK, the payer system, financing for
NHS, reimbursement, provider choice, per capita health care expenditures, per capita gross domestic product, and challenges faced by NHS.

South Korea Healthcare System
Presenters: Belinda Hilliard, Marshe Turner, and Rita Williams
Faculty Advisor: Shari Wherry
South Korea has merged into a single-payer program for its health care. This progression has been developing since 1977 when it was mandated health insurance for industrial workers and was extended to universal coverage by 1989 (Park, 2012). Within a span of 12 years, South Korea went from private voluntary health insurance to government-mandated universal coverage (Lee, 2012). The policies occurred in stages and were all mandates from the government. South Korea has adopted Japan’s model of health care. The DNP class of Nursing Health Policy and Economics has been divided into groups that will examine healthcare in the world. This group will examine the economic factors influencing South Korea’s health care system.

Mexico’s Healthcare System
Presenters: Mark Dunavan, London England-Lewis, and Denicia Rankin
Faculty Advisor: Shari Wherry
The effort to improve quality of health care is worldwide and all nations strive to apply new knowledge and enhanced technology for the health of their citizens. The population in Mexico is estimated to be 125.2 million and is equivalent to 1.71% of the total world population (Worldometers, 2015). According to the World Bank, Mexico’s total health expenditure was 6.32% of Gross Domestic Product (GDP) and health expenditure per capita was $603.7 in 2010 (Trading Economics, 2015). Public health care spending is expanding in Mexico, but it is still one of the lowest per capita expenditures among other countries. In Mexico, the cost of medical services vary by facility, physician and seriousness of illness, and health risks are more apparent and pronounced (Allianz Worldwide Care, 2015). Mexico’s health care system is steadily progressing to ensure quality of care to their populations, but concerns still remain. This poster presentation will examine the health care system to include payer system, financing, reimbursement, provider choice, challenges, world ranking and Gross Domestic Product spent on health care.

French Healthcare System
Presenters: Amanda Camp, Andrew Donadio, and Vashti Miller
Faculty Advisor: Shari Wherry
Ranking number one (in 2000) in overall efficiency of WHO member states (Tandon, Murray, Lauer, & Evans, 2000), the French Ministry of Health manages a universal system of healthcare for more than 65 million people (“France,” 2014). Combining a mix of public and private hospitals, the French system “delivers a higher aggregate level of services and higher consumer satisfaction with a significantly lower level of health expenditures, as a share of GDP, than in the United States” (Rodwin, 2003, p. 32). This level of care however does not come cheaply; 21 percent of all workers’ income is funneled into the
system to pay for care. Unlike other European countries, France's system of medicine is not 'socialized'. It is a hybrid system of private and public providers (Shapiro, 2008). As the United States changes its healthcare system, we must ask ourselves if there are aspects of the French system that can be utilized in the United States, or are the differences in the countries too vast.

### Bacteria Fighting Bacteria: An Integrative Research Review
**Presenters:** Kristen Beasley, Tiffney Boop, Alicia Hickman, Melissa McMackin, and Kayla Yates  
**Faculty Advisors:** Laurie Bagwell, Connie Cupples, and Zoila Sánchez

The purpose of this study was to determine the efficacy of the newly emerging fecal bacteriotherapy compared to the use of probiotics in the prevention of recurring *Clostridium difficile* infection (CDI). Clinical question: In patients diagnosed with recurrent CDI, how does fecal bacteriotherapy compared to the use of probiotics affect eradication of the bacteria?

**Method:** An integrative research review was performed using peer-reviewed journal articles selected from the electronic databases of EBSCOhost and PubMed. The synthesis method includes logical comparison of fecal bacteriotherapy to the use of probiotics related to the eradication of recurrent CDI's. Conclusions: Fecal bacteriotherapy is a valuable treatment option for patients with recurrent or resistant CDI's. The acceptance of this method of treatment could limit the effects of the *Clostridium difficile* epidemic. Further research regarding the use of probiotics with fecal bacteriotherapy in the efficacy of treating CDI's is warranted.

### Effect of Magnesium on Postoperative Pain: An Integrative Research Review
**Presenters:** Lauren Brown, Catherine Mask, Lucy Oliver, Ashley Rcecht, and Rachel Tonahill  
**Faculty Advisors:** Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Intravenous (IV) administration of magnesium sulfate has been used to minimize postoperative pain, but this analgesic effect has been inconsistent in clinical studies and magnesium administration has many adverse effects. The purpose of this integrative research review is to evaluate the efficacy of perioperative systemic magnesium administration on postoperative pain outcomes. Clinical Question: In adult surgical patients, how does IV administration of magnesium sulfate affect pain in the postoperative period? Databases used were Medline and EBESCO. Search terms were “magnesium sulfate” and “postoperative pain.”

**Findings:** Six studies showed decreased amount of cumulative analgesia required postoperatively with the administration of IV magnesium, and seven studies showed IV magnesium resulted in lower reported pain scores postoperatively. Conclusions: Perioperative systemic magnesium administration is an efficacious adjunct for postoperative analgesia. Further studies need to be done relating magnesium’s postoperative analgesic effects to specific types of surgeries, specific populations, and the optimal dose required.
Integrative Research Review: Ready or Not?  
Student Perceptions of High-Fidelity Simulation as Preparation for Clinical Practice  

Presenters: Leigh Holley, Jennifer Jones, Dawn Lattus, Alyssa Mitchard, and Lauren Williams  
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez  

High fidelity patient simulation (HFS) has become an extensively utilized teaching-learning methodology in nursing schools worldwide yet there remains a scarcity of research supporting implementation. The purpose of this project is to examine high fidelity simulation (HFS) as a factor in confidence and anxiety among nursing students. Clinical question: “How do undergraduate nursing students with high fidelity simulation experiences perceive self-confidence and anxiety in preparation to perform in a real clinical environment?”  

Studies reviewed included quantitative, qualitative, and mixed methods research. Preliminary review shows HFS provides a situational context for building self-confidence while decreasing anxiety among student nurses preparing to perform in a clinical environment.” Studies reviewed included quantitative, qualitative, and mixed methods research. Preliminary review shows HFS provides a situational context for building self-confidence while decreasing anxiety among student nurses preparing to perform in a clinical environment.”  

While the study examining the utilization of HFS initially appears to reinforce the link between nursing theory and actual practice, expansion of current research to further explore aspects of HFS is warranted.

The Efficacy of the Family-Based Intervention “Lifelong Eating and Activity Patterns©”: A Pilot Study  

Presenter: Jane Alison Walker  
Faculty Advisor: Kelly Harden  

Purpose: To evaluate the efficacy of a six week family based intervention revised from the Lifelong Eating and Activity Patterns (LEAP©) in a community setting by comparing the Block Dietary Data Sheet for Kids Yesterday Screener© and Block Kids Physical Activity Screener© overweight and obese children ages 6-11 pre and post intervention. Methods: The data from two instruments, the Block Dietary Data Sheet for Kids Yesterday Screener© and the Block Kids Physical Activity Screener©, were evaluated using the Wilcoxon signed-rank test. Pre and post intervention anthropometric and demographic measures were evaluated by descriptive statistics. Results: There was no statistical significance comparing the activity or eating behaviors of the child participants. Conclusion: Further research using longitudinal studies, while providing interdisciplinary interventions for families, could foster a decrease of childhood obesity in the United States of America, providing a healthier future for the nation.

An Evidence-Based Assessment of Urinary Tract Infections in Elderly Long-Term Care Residents Using the Society for Healthcare Epidemiology of America Criteria  

Presenter: Courtney Goode  
Faculty Advisor: Patsy Crihfield  

Antibiotic resistance has become a growing problem in long term care. Urinary tract infections (UTI) occur frequently in the elderly and unfortunately is commonly over diagnosed and over treated. The diagnosis of UTI in the elderly requires the presentation of new genitourinary symptoms. Due to the nonspecific clinical signs and symptoms of UTI in this population, asymptomatic bacteruria (ASB) is often confused with UTI. There is overwhelming evidence that ASB should not be treated. The purpose of this study was to examine the accuracy of diagnosis and treatment of UTI in elderly residents using the Society for Healthcare Epidemiology of America Criteria.
America criteria (SHEA). SHEA is a society of healthcare professionals who create evidenced based practice guidelines to prevent and control infection in healthcare settings. This was a retrospective study examining the health records of 100 residents over a 6-month period in a suburban nursing facility. Of all 100 residents studied, all were prescribed antibiotics despite symptomology. Evaluation of resident charts and clinician documentation demonstrated no use of evidence based practice guideline to order, evaluate and/or treat urinalysis test results. Statistical analysis of frequencies and percentages resulted less than half (16.7%) of included residents having had an actual UTI. It is hypothesized that this repeated occurrence is the result of lack of clinician awareness of the SHEA guideline.

Current Trends in Diagnosis and Treatment of Metabolic Syndrome in the Adult Population
Presenter: Phyllis Moore
Faculty Advisor: Melissa Swinea

Metabolic Syndrome is a disease process that refers to a combination of several characteristics that contribute to an increased risk for diabetes, as well as cardiovascular conditions. Obesity may lead to the development of this condition, which is a concern as the United States adult population continues to become more obese and unhealthy. Currently, there is not one specific recommended guideline for the diagnosis and treatment of metabolic syndrome, but several with varied recommendations. These differences in recommendations pose a challenge for the primary care provider striving to utilize the best evidence-based practice in determining existence of metabolic syndrome in patients, and treating metabolic syndrome once it is diagnosed.

An Integrative Research Review: All Tied Up: Should We Snip?
Presenters: Martina Ashmore, Nicole Baker, Mary Hardin, Sharon Hogue, and Graeme Parsons
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Ankyloglossia, tongue-tie, is a congenitally short lingual frenulum, limiting tongue mobility. It is noted to cause breastfeeding difficulty. Given the importance of breastfeeding during the first six months of life, this barrier must be addressed. Frenulotomy, or frenotomy, is a procedure that releases tissue, increasing tongue mobility. It may improve latch to nipple, improving breastfeeding. The aim of this
integrated research review is to determine if frenulotomy improved infant latch. Clinical Question: In infants with ankyloglossia, does frenulotomy improve infant latch onto breast post-procedure? A literature review was conducted using CINAHL, Ebsco, ScienceDirect, PubMed, and UpToDate. Keywords included: “tongue-tie,” “ankyloglossia,” “frenulotomy,” “frenotomy”, and “breastfeeding.” This is a work in progress. Synthesis methods include logical comparisons and clinical relevance. Conclusion: Findings indicated frenotomy did not always improve latch. However, this safe, minor procedure decreased maternal pain and increased confidence. Further research is needed due to lack of recent random control trials.

An Integrative Research Review: Use of Chlorohexidine Impregnated Tegaderm Dressings Versus the Biopatch in the Reduction of Central Line Infections

Presenters: Luqman Adeyemo, Nathaniel Crum, Mario Johnson, Alex Witcher, and Brandon Young
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Central line associated blood stream infection (CLABSI) is a predominate problem faced in the Adult Intensive Care Unit (ICU). The purpose of this study is to compare the effectiveness of Chlorhexidine Gluconate (CHG) Impregnated Tegaderm dressings to the Biopatch in reducing central line infections. Question: How does CHG Impregnated Tegaderm Dressings compare to the Biopatch in reducing CLABSI in the Adult ICU patients over a 7-day period? A review of literature using Ebsco Host, CINAHL and MEDLINE with search terms Cholorohexidine, Central line was performed. Currently a work in progress; however, findings reveal a reduction in gram positive, negative and yeast infections through CHG Impregnated Tegaderm Dressings utilization. It is the recommendation that additional data on the use of CHG Impregnated Tegaderm Dressings be gathered along with routine education to the bedside nurses. Preliminary findings indicate CLABSI’s reduction through implementation of CHG Impregnated Tegaderm Dressings.

Efficacy of Sonography in Pre-anesthetic Airway Evaluation

Presenters: Scott Awtry, Brad Beckstead, Chris Courtney, Mitch Frank, and Cory York
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Pre-anesthetic evaluation allows for the design and implementation of a patient specific plan for anesthesia administration. Airway assessment, in current practice, includes the compilation of clinical screening tests to differentiate between easy and difficult intubation. Due to subjectivity in performing these traditional methods, a more reliable and objective approach is needed. The purpose of this Integrative Research Review is to synthesize evidence to determine the efficacy of using sonography in accurately predicting a Cormack and Lehane laryngoscopic grade. Databases reviewed: Google Scholar, Pubmed, CINAHL, Medline, Ebsco Host. Search terms used: ultrasound, difficult airway, difficult laryngoscopy, sonography, and predicting Cormack and Lehane. This study is a work in progress. Based on preliminary review, the use of sonography is more sensitive in detecting a difficult intubation (predicting a Cormack and Lehane laryngoscopic grade).

Integrative Research Review: Peppermint Oil: A New Fad or Proven Treatment?

Presenters: Megan Chapman, Kellee Etghayi, Jennifer Ritchie, Tiffany Strickland, Katie Beth Wyatt, and Jessie Yu
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Introduction: “Irritable bowel syndrome (IBS) is one of the most common gastrointestinal disorders causing patients to seek medical treatment” (Wall et al., 2014, p. 8796). It is essential to understand pharmacological and complimentary methods of treatment, such as peppermint oil. Purpose: To identify the efficacy of peppermint oil on relief of symptoms for patients with IBS. Question: In patients with IBS, what is the effect of peppermint oil on symptoms within one month? Clinical Problem: With the growing popularity of essential oils, we wanted to evaluate the therapeutic use of peppermint oil in patients with IBS. Method: Group effort of conducting searches in multiple databases regarding peppermint oil and IBS. Findings: This is a work in progress. Results will be presented in the form of tables, logical comparison and reflection on practice. Hypothetical Conclusions & Recommendations: Peppermint oil as a complimentary therapy in patients with IBS will decrease symptoms.

Integrative Research Review: Animal Assisted Therapy Efficacy on Children with Cancer

Presenters: Lora Blann, Amanda Davidson, Xiaoli Liu, Virginia Mansel, and Mary Yoakum
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Animal assisted therapy has been used in hospital settings to help children with cancer. The purpose of this study was to explore the efficacy of animal assisted therapy to reduce stress and promote the well-being in children with cancer. Clinical
question: In pediatric patients living with cancer, will the inclusion of animal assisted therapy result in reduced stress as compared to medication alone? Methods: MEDLINE via PubMed, CINAHL, and Google Scholar were searched using the search terms animal therapy, children, and cancer. Findings: Preliminary review indicates that assisted animal therapy will be effective to reduce children’s distress associated with cancer. The synthesis method will include tables of findings before and after therapy, and reflection on practice. Conclusion: Animal assisted therapy will be an invaluable asset in treating children with cancer. It will help reduce the distress of the children and their family while improving their sense of well-being.

**Exploratory Analysis of Diagnosis Coding of Selected Redacted Health Records of Patients with Diabetes and/or Diabetic Neuropathy by Nurse Practitioners and Coding Professionals**

**Presenter:** Courtney S. Batey  
**Faculty Advisor:** Denise Thornton-Orr

Diagnosis coding is performed by multiple credentialed and non-credentialed professionals in the health care. This research study explores the correlation of ICD-9 code selection results of patients with Diabetes and/or Diabetic Neuropathy between Nurse Practitioners (NPs) and Coding Professionals (CPs). All participants in the study extracted ICD-9 codes from the same 20 electronic health records. There were 9 CPs and 7 NPs that completed the study. One-sided and 2-sided Pearson Chi-Square tests were used to compare the differences among the correct codes between the CPs and the NPs. The results between the CPs and the NPs data measured 87% accuracy among CPs and 42% among NPs. The Pearson Chi-Square value is 76.824. This value indicates there is a significant relationship between the professional performing the coding and the correct code. The data also indicates there are highly significant educational opportunities among nurse practitioners for coding guidelines and coding assignment.

**Difference in rate of Preterm Deliveries among Women with Short Cervix: Observation vs. Inpatient**

**Presenter:** Linda R. Billings  
**Faculty Advisor:** Cynthia Powers

The purpose of this presentation is to determine if there is a difference in the rate of preterm deliveries among women with short cervix, who are admitted for observation (24-48 hours, then send home on bed rest) and women with short cervix who are admitted to inpatient status greater than 48 hours. According to the Centers of Disease Control and Prevention, in 2009 preterm births accounted for 35% of all infant deaths (centers for Disease and Prevention, CDC, 2014). A short cervix places the mother at risk for a preterm delivery. This is a 5 year retrospective chart review of 66 charts in which pregnant women were admitted to a level 3 obstetrical care unit in Memphis, Tennessee with a diagnosis of a short cervix and delivered less than or equal to 37.6 weeks gestation. Twenty-six were originally admitted as outpatient while 40 were admitted as inpatient. A simple T-test was performed on those 66 charts. Results were inconclusive indicating the need for further research.

**The Effects of Light Aerobic Exercise on Depression in Adults Over Age 60**

**Presenters:** Renate Crone, Wanda Graupman, Corey Konemann, Tracy Pevahouse, and Heather Verduzco  
**Faculty Advisors:** Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Men and women aged 60 and over show an increased risk of developing depression symptoms. Many pharmacological treatments exist for depression. This study examines the possibility of using aerobic exercise as a non-pharmacological method of treating and reversing the symptoms of depression in ambulatory adults 60 years and older. Question: In older adults aged 60 and older, how does exercise compared to a sedentary lifestyle affect symptoms of depression? Methods: Several search engines were utilized, including CINAHL, MEDLINE, PubMed, PsycINFO, and EbscoHost. Findings: We analyzed a systematic review, RCTs, and cross-sectional descriptive studies to obtain our findings. Conclusion: Exercise of any type by those aged 60 and older who have depression should lessen symptoms of depression. Recommendations: Exercise in those
who are 60 and older and have been diagnosed with depression will lessen or eliminate symptoms of depression.

The Perceived Impact of Recognizing Temperaments, Personality Traits, and Coinciding Communication Styles on Information Exchange in the Emergency Department

Presenter: Jeannie Walker
Faculty Advisor: Denise Thornton-Orr

This research is designed to educate emergency department (ED) nurses about personality characteristics and how they influence the communication process. The aims are to have emergency department nurses complete a self-assessment of their conversational skills, complete the Keirsey Temperament Sorter II to become aware of their personality characteristics, and to utilize the Keirsey Temperament Personality descriptions in order to improve their communication skills. According to Cameron et. al (2010) the ED is a fast paced, high stress, unpredictable environment which leads to ineffective communication secondary to interruptions, maintaining the balance between the care of imminent life threatening situations and basic patient comfort needs, as well as personality conflicts. The American Association of Colleges of Nursing (2008) reported that effective communication is an essential skill for the professional nurse because they are heavily involved in every aspect of the communication process.

How Does Statin Therapy Compare to Fibrate Therapy in the Prevention of Cardiovascular Disease?

Presenters: Nicole Deline, Debbie Dickinson, Ashley Freeman, Drew Freeman, and Becca Guthrie
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Background/Introduction: Cardiovascular disease remains the number one killer of Americans. The purpose of this study is to determine the efficacy of statin therapy versus fibrate therapy in the treatment of hyperlipidemia and prevention of cardiac disease. Question: In patients with hyperlipidemia how does statin therapy compared to fibrate therapy affect incident rates of cardiovascular disease within five years? Methods: Literature review through databases including MEDLINE, Up To Date, and CINAHL were searched using terms: statins, fibrates, cardiovascular disease, myocardial infarction, and hyperlipidemia. Findings: This study is a work in progress; it will be presented in an evidenced-based poster presentation using tables, graphs, and illustrations. Conclusion: When compared to fibrate therapy, statin therapy remains the gold standard in treating hyperlipidemia and reducing cardiovascular disease rates. Recommendations: While statins are the agent of choice for hyperlipidemia, additional studies are needed on fibrates as lipid-lowering therapy and their effect on cardiovascular disease.

Evaluating Clinician Compliance with Guidelines in the Early Detection of Chronic Kidney Disease (Microalbuminuria) in Patients with Hypertension and Diabetes

Presenter: Carmetra Avery
Faculty Advisor: Shari Wherry

Chronic kidney disease is prevalent and increasing in frequency. It is the ninth leading cause of death and its prevalence has increased from 18.8% to 24.5%. The cost of CKD is rising exponentially due to more frequent hospitalizations and dialysis therapy in the later stages of the disease. A retrospective chart review was conducted to assess clinician compliance in detecting early CKD by measuring micro albumin levels in patients with Diabetes and Hypertension. Albuminuria is an early sign of vascular damage and is generally considered a forerunner of worse clinical outcomes in persons affected with DM and HTN. Descriptive statistics, Pearson correlation, Linear regression, and Clopper-Pearson were used to analyze the data. Clopper-Pearson was used to estimate noncompliance in measuring microalbumin. The sample for non-compliance was a 95 % CI. Clopper Pearson formula estimated an 87% noncompliance rate for the sampled population.

Integrative Research Review: Afrezza vs. Metformin in Reducing HbA1c I in Patients with Type II Diabetes

Presenters: Sarah Bowman, Carrie Cole, Lauren Cunningham, Lindsay Nixon, and Sarah Pulliam
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Patients with Type II Diabetes have a multitude of available treatment options. This study’s purpose is to explore the efficacy of Afrezza inhaled insulin compared to oral Metformin in lowering HbA1c in patients with Type II Diabetes to recommended range. In patients with Type II Diabetes, how does Afrezza compared to Metformin affect a patient’s HbA1c? The data will be synthesized comparing Afrezza to oral insulin products from research in PubMed, CINAHL, and Medline, utilizing search terms Afrezza, inhaled insulin and HbA1c. After preliminary review, findings indicate that Afrezza when compared to Metformin had an equally comparative reduction in HbA1c. Although Afrezza did not exhibit a clinically significant HbA1c reduction, it may provide an alternative for patients with Type II Diabetes interested in reducing systemic side effects from oral glucose lowering agents. This is a work in progress.
Comparing Treatment of Respiratory Syncytial Virus (RSV) in Pediatric Patients: An Integrative Review
Presenters: Elizabeth Fulmer, Jane Kile, Aspen McDonald, Anne Painter, Emily Pudlo, and Zoe Trent
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

Respiratory Syncytial Virus, is an inflammation of the bronchioles of the lower respiratory tract that affects approximately one in three infants making it the most common lower respiratory infection in pediatrics. The purpose of this project is to identify whether RSV is better controlled with medications, such as bronchodilators and steroids, or with non-pharmacological agents. In pediatric patients with RSV, how effective is using pharmacological agents in improving the patient outcomes compared to non-pharmacological treatment? Search engines including Google Scholar, PubMed, JAMA Pediatrics, Wiley Online Library, and the American Academy of Pediatrics were used. Preliminary findings indicate that bronchodilators and steroids do not improve oxygen saturation, reduce time to resolution of illness at home, or reduce hospital admission after outpatient treatment. It is expected a conservative approach to treatment will be adequate in the majority of cases. Suggested management of symptoms includes: hydration, supplemental oxygen, and mechanical ventilation when required.

Integrative Research Review: Comparison of Extubation Time and Occupancy of Operating Room Time of Desflurane and Sevoflurane
Presenters: Katherine Chapman, Ana Dragoiescu, Christian Haynes, Kalyn Thompson, and Britley White
Faculty Advisors: Laurie Bagwell, Connie Cupples, and Zoila Sánchez

General anesthesia violates the body’s airway reflexes and ability to breathe which requires mechanical ventilation. Attenuated airway reflexes carry complications of impaired oxygenation, physical airway trauma, and physiological stress responses. Prolonged extubation delays operating room availability, which significantly increases total hospital costs. Newer anesthetics, desflurane and sevoflurane, have markedly reduced the time required for extubation when compared to traditional agents. The purpose of this study is to assess the recovery profile of desflurane and sevoflurane during general anesthesia and determine which is more effective in reducing time to extubation, thereby reducing operating room occupancy. Electronic databases reviewed: CINAHL, PubMed, Medline, ScienceDirect, OVID, and Cochrane Library. Key terms: desflurane and sevoflurane, extubation time(s), emergence variability, prolonged emergence costs. Conclusion: Desflurane will show a reduced time to extubation, therefore a reduction in operating room occupancy time when compared to sevoflurane.

Prevalence of Compassion Satisfaction and Compassion Fatigue among Nurse Practitioners Who Provide Care to Residents of Long-term Care
Presenter: Kemi Douglas
Faculty Advisor: Shari Wherry

This descriptive survey was conducted among nurse practitioners who work in long-term care settings. The fourth revision of the 30-item Profession Quality of Life (ProQOL R-IV) scale was completed by 187 nurse practitioners. The ProQOL measures three subscales, compassion satisfaction, compassion fatigue and burnout. A series of analysis examined the relationship between the three subscales and the relationship between the three subscales and socio-demographic variables. The compassion satisfaction and burnout scores were similar to previous studies that utilized the ProQOL scale. Compassion fatigue was higher than previous ProQOL studies. The value of analyzing the prevalence of compassion satisfaction and compassion fatigue exists with impacting direct patient care and the resiliency of nurse practitioners. Having an understanding of needs of the nurse practitioners allows for development of interventional programs. Healthcare providers need to be better educated about recognizing and managing compassion fatigue.

Psychosis in the Intensive Care Unit
Presenters: Whitney Clark, Kendall Heyliger, Meredith McClain, and Sarah Moore
Faculty Advisor: Kathy O’Connor Wray

ICU psychosis is a dysfunction of the brain characterized by a change in the level of awareness or attention caused by a combination of precipitating factors while being treated in an intensive care environment. It is imperative for nurses to foster an awareness of this condition and its symptoms, understand proper assessment techniques, implement proper treatment measures, and prevent long term effects. This project explores the different types of ICU psychosis, screening tools used for assessment, and methods of prevention and treatment. Early recognition and treatment can reduce long term effects, which may persist in more than 95% of patients after their discharge from the hospital and can include manifestations such as PTSD, increased mortality, and decreased quality of life.
An Educational Strategy to Enhance the Intercultural Competence and Communication of Pharmacy Students

Presenters: Kelsey Turcotte, Erica Rogers, and Cynthia Jayne
Faculty Advisor: Sean King

Objectives/Intent: The purpose of this investigation was to evaluate the impact of an educational intervention, based on the social cognitive theory (SCT), on enhancing the intercultural communication competence, situational perception, outcome expectations, intercultural communication self-efficacy and behavioral capability of third-year pharmacy students. Methods/Process: This SCT-based intervention employed a pretest-posttest control group design. The intervention was administered to third-year pharmacy students (n=46) as part of a required Patient Assessment course. Pre and post-test data were collected one week prior to and one week following the delivery of the SCT-based intervention to the experimental group. First-year pharmacy students (n=50) served as the control group. Results/Outcomes: The two groups did not differ in the distribution of demographic or SCT variables at pretest. Analysis of covariance (ANCOVA) revealed significant differences between the groups on intercultural communication competence (p=0.020) and intercultural communication self-efficacy (p=0.011). Significant differences were not found to exist between the groups on the SCT constructs situational perception, outcome expectations or behavioral capability. Implications: The findings of this investigation provide evidence that perceived intercultural communication competence and intercultural communication self-efficacy are modifiable among pharmacy students through an educational intervention. These results may assist other schools of pharmacy in their efforts to incorporate cultural competence into their curricula. The intervention may be modified and implemented in advanced pharmacy practice experiences, residency programs and continuing education programs. The value of using a theoretical approach to focus attention on important concepts and skills to create a more efficient cultural competence learning process requires further evaluation.
PHYSICS

Calibration of Models to Predict Ignition Times
Presenter: Brittany Hagler
Faculty Advisor: Bill Nettles

Ignition time is an important quantity within combustion research. By definition, it is the amount of time it takes for the system to ignite after the reaction is initialized. This quantity is not only important for research applications, but also for safety considerations. Because of this, it is important to be able to control and predict ignition times for fuels being used. To accomplish this, an accurate model is needed. Ignition times depend on the rate of the reactions occurring in the combustion of the fuel, which can be determined from the Arrhenius equation. Given a set of rate constant data, the parameters of the Arrhenius equation need to be determined that best model the experimental data and therefore also minimize the error. This can be done using Maximum Likelihood Estimation and Bayesian techniques.

Turbulent Transport of Dust in Planet Formation
Presenter: Ward Howard
Faculty Advisor: David Ward

Dust and gas revolve around a young star in the protoplanetary disk. Dust grain collisions result in loose aggregates. These aggregates, thought to be fundamental building blocks of planets, grow through further collisions and sticking. Barriers to sticking exist, slowing the aggregate growth rate. A potential barrier involves turbulent behavior of the disk. Gas in the disk experiences turbulent flow, affecting the velocities and collisions of the grains caught in turbulent eddies. We explore the effect of disk turbulence on the sticking rate of these dust collisions by importing a simulated turbulent flow into a numerical model of dust interactions in the disk. We modified the model to incorporate accurate motion of dust grains under turbulent gas drag. Grain velocities of individual grains demonstrate appropriate dependence on grain radius. Further work is needed in applying the modified model to systems of grains to observe the effect of turbulence on the overall sticking rate.

SOCIOLOGY AND FAMILY STUDIES

Norms and Deviance at Union University
Faculty Advisor: Phil Davignon

Social norms influence nearly every area of our lives. This study examines whether Union University students regard certain behaviors or perspectives to be normal or deviant. For instance, this study examines student views on topics such as traditional gender roles and swearing. In addition, this study explores several topics that are unique to Union University, such as whether students believe it is appropriate to be barefoot on campus, how being a student-athletes differentiates athletes from other students, and the extent to which students desire to be engaged before they graduate. The aggregate results from this study are examined to see whether there is a difference by gender, academic class, whether the respondent is a student athlete, and whether the respondent is currently in a relationship.
Greek Word Order in 1 Thessalonians 4:14-5:11
Presenter: Stephen Wunrow
Faculty Advisor: Mark Dubis

In New Testament Greek, the order of words in a clause often varies but most New Testament scholars do not take this variation into account in their exegesis of New Testament passages. In this project, I use Stephen Levinsohn’s basic word order framework to illustrate how word order does indeed affect exegesis and thus should be considered when interpreting the New Testament. The paper has two basic sections. First, I outline Levinsohn’s approach to Koine Greek word order, and second, I apply this approach to 1 Thess 4:13–5:11. These two sections will illustrate the usefulness of word order analysis for exegesis and also provide exegetes with some tools to perform such analysis on their own.

Youth Ministry: Young Believers and Doubt
Presenter: Christian Shipman
Faculty Advisor: James Patterson

Today’s youth are facing a wide spread epidemic of students who either do not know whether they are saved or what it means to be a Christ follower. This can be more commonly found in cities with big churches. Recently a church noticed that almost every Wednesday a number of the same students kept wanting to recommit their lives and go through believers’ baptism again. After many students had stated this was something they wanted, the youth minister and leaders realized there needed to be a restructuring of the way they presented their material. This paper is going to discuss the problems of why this is continuing to happen to many churches and how to approach this situation. First, the lack of biblical knowledge needs to be addressed. Why are these students frequently wanting to recommit and then believe that they need to be re-baptized? A common issue is that many of the students run off a “feeling” they received when they first prayed for salvation. Second, is once the lack of biblical knowledge is addressed, it is key that the Bible is presented to them. The basic foundations of the Christian faith needs to taught. In this section, the use of creeds will be addressed in how they were used to create affirmation universally on what the beliefs are for a Christian. Students will be taught about the differences between justification and sanctification.

The Parachurch Experiment
Presenter: Evan Kunz
Faculty Advisor: James Patterson

The proper relationship between the Church and the Parachurch has been in heated discussion for several decades. What is the role of the Parachurch? Can it be compatible with the Church? Are they two sides of the same coin? In this paper, I will attempt to put forward one theory of how the Church and the Parachurch should interact through an analysis of several primary sources and case studies of two well-known Parachurch ministries. The argument will focus on contending that the two are compatible on the basis that the Parachurch is supplementary to the Church, while also debunking the pervasive belief that the two are representative of two different aspects of the Church: missions and nurturing local body.

Sanctified Endurance: Lessons for Pastoral Ministry from 1 Thessalonians
Presenter: Caleb Valentine
Faculty Advisor: Ray Van Neste

This paper presents principles gleaned from a study of Paul’s pastoral ministry as seen in 1 Thessalonians. It includes detailed exegesis of relevant passages and four areas of application. The aspects of pastoral ministry that are addressed are: the primary pastoral goal, biblical definitions of success, proper manner of ministry, and the aim of preaching. Importantly, this paper does not speak exhaustively to these issues, but rather to explore how they are found in the text of 1 Thessalonians. Additionally, attention is given to classic works on pastoral ministry that deal with the lessons in the letter. The overarching theme of the letter is sanctified endurance, and should be the primary pastoral goal in all contexts. That is, pastors should shepherd their people so that they persevere in the faith and grow in holiness until the Lord’s return.

Vintage Discipleship: An Examination of Jesus’ and Paul’s Discipleship Methods in Light of Other Approaches in the Ancient World
Presenter: John Keller
Faculty Advisor: Mark Dubis

This research project is an examination on the discipleship methods used by Jesus and Paul. The discipleship methods of the Greco-Roman philosophers and the Jewish rabbis serve as an excellent backdrop to compare and contrast with the ministries of Jesus and Paul. Through carefully analysis, several principles of discipleship appear in Jesus’ method that correspond to these other circles of learning. However, Jesus’ discipleship process stands apart from those the rabbis and philosophers in his expectations and goals for his disciples. One can see Paul follows this pattern in his epistles and in the book of Acts. Paul’s...
continuation of the main principles of Jesus' discipleship in his own ministry should guide the church on how to make disciples themselves. This project offers several principles of discipleship for the church to consider applying within their own context.

The Satellite Church Model
Presenter: Jacob Hayes
Faculty Advisor: James Patterson

In this age of modern technology, churches have taken hold of advancements in society and leveraged them for running the church. With easy long distance transportation and live feed video and sound available, we can now be one unified church body in many local church locations. This has led to the disassembly of one mega church location, to branching out to a multi-site Satellite Church Model. This new development in the church has seen great results and also new difficulties. The question at hand has become this: Can one church body stay unified in many distant locations and be successful and in what ways can it complete this task?

Old Testament Evidence for the Resurrection of Christ
Presenter: Robert W. Pierson III
Faculty Advisor: James Patterson

This presentation will focus on mainly Old Testament scripture that supports the resurrection of Christ. As Christians we know that the whole Bible points towards Christ. This presentation will focus on specific scripture that supports Christ's resurrection. It will also draw from other scholars who have written on this subject as well. The goal is to show how the Old Testament foreshadows Christ's resurrection and how it supports the resurrection. It will help show evidence for the resurrection so that it will be useful in apologetic discussion. This presentation will give insight into the inspired words of God that foretold the death and resurrection of his Son.

Our Legacy of Grief
Presenter: Lisa Herod
Faculty Advisor: James Patterson

This presentation looks into the idea that all Christians receive legacies of grief from their families. As Christians our legacies should reflect a process of grieving that is biblical, but many times we see a process of grief that is emotionally and spiritually devastating. This problem has found its way into the heart of the church, as it is no longer a topic that is often discussed. We have become a culture that is afraid of feeling uncomfortable and in doing so we have separated ourselves from grieving well. The only two questions left to answer are: “What is your legacy?” and “Are you grieving well?”

A Hell of a Topic: A Study of Hell in the Bible
Presenter: Billy Dodd
Faculty Advisor: James Patterson

Hell, whether as a place or a concept, is a subject that is common to the minds of all Westerners in today's time. Unfortunately, however, this knowledge is typically very limited and any discussion of hell is usually brief and shallowly informed. Other than being transformed into an adjectival cussword or being referred to in passing as the bad place to which sinners go, there is little talk of Hell. This is true for both unbelievers and sadly, for believers, as well. Understandably, few want to speak of such a place, but it is a Christian's duty to study the Scriptures in all their glory (and this includes forming a Biblical understanding of the abode of the dead). As such, this essay will attempt to examine the many occurrences of “Hell” in the Bible and strive to form a deeper understanding of the topic.

The Impact of Traditionalism on Church Growth
Presenter: Andrew Denning
Faculty Advisor: James Patterson

Among the universal church in the modern era, there seems to be an issue that is increasing within the modern church today. This issue has been an issue for centuries, but it appears to be around the many different local churches, as well as destroy churches. This issue is called traditionalism, and this paper will discuss how it negatively affects church growth. One of the key elements that will be discussed throughout the paper is the concept and meaning of traditionalism, the reasons why many churches believe in traditionalism and its dangers, and how to properly handle traditionalism within a church. Each portion of the paper will deal with these three points in the paper and it will maintain an in-depth study upon the topic of traditionalism.

Compatibilism and Prayer: Do Our Prayers Influence God’s Will?
Presenter: Jordan Williams
Faculty Advisor: James Patterson

When looking at God, we recognize that he is all-powerful, all knowing, and ever present. However, Scripture tells us that we, as finite beings, have the gift of free will. Meaning, we will ourselves to either follow God's design for our lives, or we will ourselves in the opposite direction. Part of our liturgy as believers is to pray to God, whether it be for our own sake, or the sake of others. However, if we recognize that God’s will is fixed and immovable, what place do our prayers have in accordance with that will? Are our prayers influential or arbitrary in relation to God’s will?
RESEARCH GRANT RECIPIENTS  Fall 2014

Undergraduate

Jennifer Gruenke, Tori Hill and Alma Hernandez
“Testing the Effect of the Immune System on Anxiety in Mice”

Jennifer Gruenke, Heath Broussard and Spencer Rhodes
“Testing Four Potential Hybridoma Growth Enhancers”

Michael Schiebout and Hannah Small
“Taxonomic Assignment of Oak Species in Southern TN Utilizing PCR Gene Amplification and Sequencing”

Jay Bernheisel and Matthew Bentley
“Design and Optimization of a Top-Lit Up-Draft (TLUD) Biochar Gasifier for Soil Amendment”

Bill Thierfelder and Taylor Mattox
“Regulation of Thyroid Hormone Deiodinating Enzymes in Response to Oxidative Stress”

Bill Thierfelder and Stephen Luyakoh
“Regulation of Thyroid Metabolic Enzymes DIO2 and DIO3 by Inflammatory Molecules”

James Kerfoot and Haaken Magnuson
“Measuring Levels of Stress Induced by an Alarm Cue Analog, Hypoxanthine-3-N-oxide, in Blackstripe Topminnow”

Mark Bolyard and Nathan Peace
“Preparing Green Fluorescent Protein for Isolation through Affinity Chromatography by Modifying DNA to Contain An Streptag Affinity Tag”

Mark Bolyard and Will Tucker
“Development and Incorporation of Polyhistidine Tags to Green Fluorescent Protein for Isolation Via Affinity Chromatography”

Georg Pingen and Chelsea Johnson
“Fluid Design Optimization Using Multigrid Solvers”

G. Jan Wilms and Reed McLean
“Remote Garage Door Controller App”

Graduate

Sean King, Erica Rogers and Kelsey Turcotte
“An Educational Strategy to Enhance the Intercultural Competence and Communication of Pharmacy Students”

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