

ABSTRACT PROGRAM

MAY 3, 2004



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AFTERNOON CONCURRENT SESSIONS

Art	PAC D-3	4:00-5:00
Business Administration/ Sociology/Social Work	BAC-44	2:40-4:00
Biology	PAC A-7	2:00-4:40
Chemistry/Physics/ Engineering	PAC A-9	2:00-4:20
Christian Studies/ Communication Arts	JEN 325 JEN 225	2:00-4:20 2:00-3:00
Computer Science	PAC C-24	2:00-4:45
English/International and Intercultural Studies/	PAC D-53	2:00-4:20
Language Creative Writing Readings	Outside SUB (patio) (C-6 if raining)	3:00-4:00
History/Political Science	PAC C-16	2:00-4:00
Music	Hartley Hall (Jennings Hall)	2:00-3:00
Poster Presentations	Library	2:00-5:00

RECEPTION FOR PARTICIPANTS, FACULTY & OUTSIDE GUESTS

Coburn Dining Room

5:00-6:00 p.m.

KEYNOTE ADDRESS: President David S. Dockery

Coburn Dining Room

5:30-6:00 p.m.

FACULTY PEW PRESENTATIONS

Harvey Hall
6:30 p.m.

TABLE OF CONTENTS

Department	Page
Art	2
Biology	3
Business Administration	6
Chemistry	7
Christian Studies	8
Communication Arts	10
Computer Science	11
Engineering	13
English	15
History/Political Science	15
International and Intercultural Studies	17
Language	19
Music	19
Nursing	20
Physics	20
Sociology/Social Work	22

ART

"Senior Exhibition"

Presenter: Rebecca Phillips Faculty Advisor: Lee Benson

PAC D-3; 4:00 p.m.

Rendering portraits is not enough for me, though portraiture is a foundation for what my art is about. The outer physical body—though lovely—is only the casing for the volatile, terribly beautiful spirit that is often tucked away and ignored. I am fascinated by this duality: the mind repressing what the being is dying to scream out, stifling the spirit so that all that escapes is a gasp. I want to hear that gasp and find a way to sculpt it. It is because of my own struggle with physical versus spiritual that I take such an interest in this battle within all people. My work recreates the human structure and skin so that the interior, the spiritual, the *essence* becomes the physical appearance. Specifically my senior exhibition shows the Bride of Christ, which all Christians are, standing at the edge of decision—to commit to Him and meet Him at the altar, or to allow her history and burdens pull her back.

"Developing Forms in Clay

Presenter: Brian G. Bain Faculty Advisor: Lee Benson

PAC D-3; 4:20 p.m.

My work in clay began with formal compositions. The forms were loosely based on the human figure, flowing and organic. I then adapted the forms towards a narrative. The forms became representations of marriage, both physical and spiritual. The intertwining of two forms into one was both the actual physical object and the metaphor for marriage itself. Alongside developing narrative ideas, the work grew in scale. I then began to approach the surface of the work. Color is the newest pursuit in my work. The texture of the forms is now fairly flat, the remaining textures serve to enhance the surface and aid in the patina process. I am currently returning to the form as a beautiful object. If there is narrative in the work, it is the narrative inherent in beauty and in man's desire to create beauty, a divine spark in the soul put there by God.

"Round the Table"

Presenter: Tesha Goodgine Faculty Advisor: Lee Benson

PAC D-3; 4:40 p.m.

The works that will present for the symposium are pieces that are part of my senior exhibition. For the symposium, I will present 3-5 pieces of my 8 piece formal dinnerware set. Within this dinnerware set, the form was very important. For the form I chose the authentic, elegant bulbous form. The never ending curves of roundness seem to offer a pleasing and peaceful visual experience when brought to the table. The authentic beauty of this form brings life to functional pottery. The greatest part of creating these particular pieces was the challenge it presented. Within most of the objects, the round form was stretched and manipulated to create a form that recreates the curves of the sphere and female figure. Depending on the object, the curvy roundness takes on different forms, creating a unique look for every pot created. What these pieces capture about my personality is the attraction to natural beauty. The round, bulbous forms reflect this beauty. The softness of the curves presents such elegance, which is a very important detail revealed through my work.

BIOLOGY

"The Effect Of Water Temperature On The Oxygen Consumption Of Goldfish (Carassius Auratus)"

Presenter: Jeremy DeMoss

Faculty Advisor: Wayne Wofford PAC A-7; 2:00 p.m.

Numerous variables contribute to the rate that a fish will consume the available oxygen in its habitat. The water temperature is one of the major factors affecting the oxygen consumption of fish. In this study, the effect of increasing water temperature on the rate of oxygen consumption of the goldfish (*Carassius auratus*) was examined. Goldfish are known to be very tolerant of a relatively large range of water temperatures. However, increased temperatures and/or temperature fluctuations can often produce stress for organisms. The higher the rate of oxygen consumption, the more work an organism has to do to obtain the oxygen it needs. Thus, it is important to know an ideal temperature range for goldfish. The results of this study indicate that as the water temperature increased, the rate of oxygen consumption of goldfish increased. The lowest rate of oxygen consumption (0.217 mL $O_2/g/h$) was obtained at the lowest temperature (21.5°C) measured, while the highest rate of oxygen consumption (0.397 mL $O_2/g/h$) was obtained at the highest temperature (33.2°C) measured. The results of the study clearly show that the rate of oxygen consumption by goldfish is affected by temperature.

"Surface Antigen Spb1 Enhances Uptake And Intracellular Survival Of Group B Streptococcus Serotype Iii-3 In J774 Macrophages"

Presenter: James R. Layton

Faculty Advisor: Wayne Wofford PAC A-7; 2:20 p.m.

Group B *Streptococcus* (GBS) is a gram positive bacterium that causes more invasive bacterial infections in neonates than any other type of bacteria. Initial infection of neonates often occurs in the lungs, where alveolar macrophages play an important role in protecting the neonates from microbial infection via non-opsonic phagocytosis. However, following non-opsonic phagocytosis serotype III-GBS is able to survive inside macrophages for an extended period of time. This intracellular existence protects them from antibiotics, antibodies, neutrophils, and other potentially harmful factors. Since serotype III-3 causes the majority of GBS infections, virulence factors unique to it have been sought. Two such factors are surface proteins spb1 and spb2, which promote invasion of epithelial cells. To investigate the role of restriction digest pattern type and spbl/spb2 in GBS-macrophage interactions, homologous recombination was used to construct spb1- and spb2- deficient mutants of III-3 strain 874391. The parent strain and mutants were then compared in various macrophage uptake and survival assays. This study identifies spb1 as a virulence factor in serotype III-3 that both promotes non-opsonic phagocytosis and increases survival inside J774 macrophages. Spb2 did not appear to have a role in GBS-macrophage interactions. This research was supported by Public Health Service Grant CA21765 and the American Lebanese Syrian Associated Charities (ALSAC).

3

"A Comparison Of Insect Populations In Tilled Versus No-Till Cotton In West Tennessee"

Presenter: Spencer Lowery

Faculty Advisor: Wayne Wofford PAC A-7; 2:40 p.m.

This project dealt primarily with insect numbers and types found in cotton fields cultivated with different tillage methods. Cotton grown in conventionally tilled ground was compared to that grown under soil conservation guidelines for no-till agricultural row crops. The two types of cotton were sampled using a sweep net to ascertain the impact of tillage method on the populations of both harmful and beneficial insects. The samples were taken at random from six different fields and at two different sites (edge and middle) in each field on three separate days. The effectiveness of the sweep net method in sampling of insects as well as the impact of tillage method on the insect populations in cotton fields in West Tennessee were assessed.

"The antimicrobial effect of allicin extracts of garlic (Allium sativum) on Staphylococcus epidermidis"

Presenter: Robert Cusanelli Faculty Advisor: Elsie Smith

PAC A-7; 3:00 p.m.

The medicinal properties of garlic (*Allium sativum*) have been to known to man for centuries and recent research on this herb has been focused on its antibacterial properties. In this study, the herb's antimicrobial activity against a microbe commonly found on human skin, *Staphylococcus epidermidis*, was examined. Allicin extracts were prepared from garlic cloves by homogenizing in ethanol. These extracts were then used in assays focused on determining zones of inhibition of growth of the bacteria. An ethanol solution served as the control in the assay. No zones of inhibition were observed in the control assays and an average zone of 7.6 mm (6.0 mm being the minimum) was observed in the experimental assays. The largest observed zone was 12.0 mm in diameter. The results to this study indicate that *Allium sativum* does indeed have an antimicrobial effect on the growth of *Staphylococcus epidermidis*.

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"Development Of An Elisa For The Detection Of Soluble Lag-3"

Presenter: Stefani Martin

Faculty Advisor: Wayne Wofford PAC A-7; 3:20 p.m.

The immune system must be kept in an equilibrium state in order to avoid diseases, such as autoimmunity. One possible molecule involved in the down regulation of the immune system is the Lymphocyte Activation Gene-3 (LAG-3) protein product, first described in 1990 by Fredrich Treibel. Since its initial characterization, this T cell and Natural Killer (NK) cell surface marker has also been shown to exist as a soluble form. However, the exact function of both forms remains unknown. In this study, an Enzyme Linked Immunosorbent Assay (ELISA) was developed for the detection of the soluble form of LAG-3 (sLAG-3). The ELISA proved to be both sensitive and specific for sLAG-3. *In vivo* experiments with the blood sera of mice revealed a concentration of approximately 1.0 µg/ml of sLAG-3 in naive wild type mice as well as RAG knockout mice, which lack T cells. Activation with a superantigen resulted in an increase in the amount of sLAG-3 found in the blood. This research was supported by NIH (A1 39480) and the American Lebanese Syrian Associated Charities (ALSAC).

"The Effects Of Caffeine And Nicotine On The Heart Rate Of *Daphnia Magna* Using A Stroboscope"

Presenter: Tiffany Windall

Faculty Advisor: Wayne Wofford PAC A-7; 3:40 p.m.

This study was performed to determine the effects of nicotine and caffeine on the heart rate of *Daphnia magna*. As the species has a naturally rapid heart beat, stroboscopic analysis was determined to be the most accurate and efficient method to determine the rate. Three test groups and one control group, containing ten *Daphnia* each, were tested. The *Daphnia* were exposed to solutions with concentrations as follows: 5.0 mg/500 mL caffeine, 50.0mg/ 500mL caffeine, and 4.95μg/ 500 mL nicotine. The organisms were introduced to the respective treatment and allowed adequate time for the toxins to take effect prior to observation. The organisms were observed using a stereomicroscope, and the heart rate was determined by adjusting the stroboscopic frequency until the heart appeared to be still. Results for the trials showed the average heart rates for the control group, 5.0mg/500 mL caffeine, 50mg/ 500mL caffeine, and 4.95μg/500 mL nicotine were 239.5 (+/- 8.0), 233.3 (+/- 7.5), 279.8 (+/- 8.1), and 282.3 (+/- 21.8), respectively. After an Analysis of Variance, the mean of the heart rates in the 5.0mg/ 500mL caffeine solution was not significantly different from the the control group, but those of the 50mg/ 500mL caffeine and 4.95μg/500 mL nicotine were significantly different.

"An Immunohistological Method For Determining The Presence Of Lt-11 In Benign And Metastatic Carcinoma Cell Lines Using The Cancer Recognition (Care)Y Antibody"

Presenter: Michael Kieffer

Faculty Advisor: Wayne Wofford PAC A-7; 4:00 p.m.

Current research into tumor markers has led to the discovery of an antigen designated as LT-11 which has been found in ovarian, colon, breast, endothelial, as well as other carcinomas. A method has been developed which identifies the presence of this antigen by using an IgM binding epitope, henceforth designated as the Cancer Recognition (CARE) Y antibody. Sections of paraffin embedded tissue were cleared of paraffin and hydrated prior to microwave antigen retrieval. The tissues were submersed in 3% hydrogen peroxide followed by a Tris-buffer solution. Then, 3% goat serum and the CARE Y antibody were applied. Subsequently, a HRP-conjugated second antibody was added to visualize the locations of antibody binding. The samples were counterstained with Mayer's hematoxylin solution, dehydrated, and covered with a glass coverslip. Microscopic examination of the stained samples showed clear resolution for either the presence or absence of LT-11.

"Effects Of Maternal Alcohol Consumption On The Growth Rate Of Mice (Mus Musculus)"

Presenter: Aldo Dinan

Faculty Advisor: Wayne Wofford PAC A-7; 4:20 p.m.

Maternal alcohol consumption has been proven to cause numerous abnormalities to the fetus. This has been termed as Fetal Alcohol Syndrome (FAS). Mice are frequently used as a model to study these effects. Most research on this subject is focused on physiological aspects of the fetus. In this study, we wanted to see if the growth rate of the new generation is affected at all by alcohol intake of the mother. Pregnant mice were given solutions of 7.5% ethanol, while the control group received only water. The mice were checked for any obvious abnormalities and weighed at least once a week to establish a pattern of growth. No large differences were detected in the means of the two groups.

BUSINESS ADMINISTRATION

"An Analysis of *The Economic Consequences of the Peace* based on Keynes' 'True Beliefs' Established During His Formative Years'

Presenter: Justin Butcher

Faculty Advisor: Howard Newell BAC-44; 2:40 p.m.

John Maynard Keynes has been recognized as the founder of the economic principles that support the current capitalistic structure. His most famous book, *The General Theory of Employment, Interest and Money*, often overshadows the book that this paper will seek to evaluate, *The Economic Consequences of the Peace*. Keynes' place in the history of economics sometimes hides his fascinating life, his deviances into politics, and his hand shaping some of the less noticeable, though certainly not any less important, affairs of state. The *Economic Consequences of the Peace* was one such moment. In all the triumph and sorrow surrounding World War I, few people stopped to notice the thin man advising those at the Treaty of Versailles. When Germany was soundly routed and punished, precious few listened to the man that predicted that the Treaty of Versailles would do more harm than it did good. It was not until his predictions came true, and World War II had begun in full earnest, that his small book jumped to the forefront of literature. Even the first biography of his life failed to give an accurate portrayal of John Maynard Keynes. Finally, almost 40 years after this man died, his true life, his true beliefs, and his true passion for life exploded onto society. In all honesty, it is rather startling and unnerving the impact Keynes had on society.

The purpose of this paper is to examine John Maynard Keynes' early or formative years. As an older gentleman, he wrote a paper entitled *My Early Beliefs*, and this is the main focus of my paper, not so much the actual paper, as what Keynes actually believed. I have identified many areas where Keynes seems to firmly base not only his lifestyle, but also his writings. These "true beliefs," as they will be referred too, will be dissected, examined, and evaluated, not for their validity, but more for their influence on *The Economic Consequences of the Peace*. Each belief seems to base itself in another person that Keynes admired, and who usually also wrote extensively. All of these beliefs stem from his formative years, what shall be defined in this paper, as his time at Eton and Kings College at Cambridge, and not surprisingly, all of them find their origin in an elite group called the Apostles, of which Keynes was a part of while at Cambridge. Once each belief has been understood, I will painstakingly evaluate *The Economic Consequences of the Peace* for each belief's influence in this work. Then I will turn to those beliefs that seem to have perished along the road to the writing of *The Economic Consequences of the Peace* and examine the rest of Keynes' life to determine what changed, when it changed, and why it changed. Before delving into his beliefs, the next section of the paper explores how Keynes grew up and illuminates how he was born for greatness.

"Accounting Confidence For The Not For Profit Entrepreneur

Presenter: Stephanie R. Tocci Faculty Advisor: Walton Padelford

BAC-44; 3:00 p.m.

This study and additional research reveals basic accounting skills and a few checklists useful for minimizing some frustrations in starting a new not-for-profit (NFP) organization. The research is a case study of Indigenous Outreach International (IOI), a small NFP mission agency. The first phase identifies the regulatory requirements necessary to establish and maintain a small NFP organization. In addition, the case study reveals procedures for maintaining the records needed to produce accurate financial statements, including a variety of affordable and user friendly software programs. Next, the research highlights the impact of FAS 117 (Federal Accounting Standard 117), which covers asset classification for NFP organizations, and FAS 116, which dictates reporting of monetary and non monetary contributions. The research emphasizes the importance of the budgeting process to effectively utilize financial assets and plan strategically. This study covers the impact of the Sarbanes-Oxley Act of 2002 and the Statement on Accounting Standards (SAS) No. 82 on auditor independence, internal controls and fraud detection. For future growth, this study presents a four step process, tested by the Christian Children's Fund, to assist the entrepreneur in measuring performance. Ideally, this research should help an entrepreneur turn a great idea into a great organization.

CHEMISTRY

"Determining Reactivity Ratios Of A Silicone Acrylate In Various Copolymer Systems"

Presenter: John Mark Belew

Faculty Advisor: Charles M. Baldwin PAC A-9; 2:00 p.m.

The goal of this project was to determine the reactivity ratios of silicone acrylate with several different monomers. Before determining reactivity ratios of the desired molecule, reactivity ratios were calculated for a known system of methyl methacrylate and styrene whose reactivity ratios have previously been determined. After polymerization, the copolymers were collected and analyzed by infrared and UV-visible spectroscopy. From these spectra, the reactivity ratios were calculated by use of the standard copolymerization equation.

"Correlation Of Silicone Surfactant Structure And Performance In Polyurethane Foam Production"

Presenter: Megan M. Ellis

Faculty Advisor: Charles M. Baldwin PAC A-9; 2:20 p.m.

It was shown in a preliminary study that the silicone surfactant used in foam production influences the characteristics of the final product. Five silicone surfactants were tested, resulting in foams with varying characteristics. The structural and compositional differences of the surfactants may account for the variations. To expedite the path to determining the success of a surfactant, a method of prediction based on structure and composition could be valuable. Analysis and comparison of the structure and composition of surfactants and the characteristics of their foam products were performed. The primary focus was upon the structure of the silicone copolyol of each surfactant. Significant factors have been identified in an effort to develop a method of predicting the viability of a specific silicone surfactant in the production of polyurethane foam. The status of the method development and its usefulness will be discussed with strategies for improving the performance of the method.

"Synthesis Of A Calixarene Ligand System As A Mimic For Non-Heme Oxygen Binding Proteins"

Presenter: Emily R. Bland

Faculty Advisor: Michael Salazar PAC A-9; 4:00 p.m.

Metalloproteins are interesting biomolecules in living systems that contain one or more metal atoms. One subgroup of these proteins is the non-heme iron containing enzymes. Current research has been focused on understanding and creating mimics of these enzymes. Using calixarene chemistry, it is hoped that a suitable mimic can be synthesized so that the mechanisms and properties of these proteins can be better understood. By complexing iron to a calixarene backbone, three different ligand systems were synthesized in an attempt to mimic methane monooxygenase or ribonucleotide reductase. Microcrystals were obtained of the first three products. Proton NMR spectra of the crystals were utilized in this study in order to determine the structure and position of iron in the three complexes.

CHRISTIAN STUDIES

"Quest for the Historical Augustine - From Rhetorician to Theologian"

Presenter: Nicholas Ellis Faculty Advisor: Brad Green

JEN 325; 2:00 p.m.

This project will carefully analyze and critique the works of Augustine of Hippo especially in *The Confessions* through the perspective of rhetorical criticism. Augustine, a brilliant scholar and writer, did by no means operate from within a vacuum, and his thoughts, ideas, and purposes of writing need to be clearly defined both literarily and theologically, especially considering their key role in the development of Western Christian thought. As a rhetorician of the highest order, Augustine wrote in a manner that was both provocative and suggestive of his presuppositions. We believe that it is imperative, both for our own integrity and for those whom we would one day teach, to approach such seminal theological works as *The Confessions* with a clear understanding of both its backgrounds and its intended purposes. Our hopes is that we might build a more solid interpretive foundation upon which it is possible to construct normative principles of theology and dogma, while still retaining the respect and honor that is due a man of St. Augustine's stature. This project's purpose is to establish the correct hermeneutics for literary interpretation with proper acknowledgment of issues such as genre, style, and purpose.

"Why Impassibility Prevailed: An Analysis Of The Rise Of The Doctrine Of The Impassibility Of God In The Early Church"

Presenter: Kevin Minister Faculty Advisor: Brad Green

JEN 325; 2:20 p.m.

This essay details the development of the doctrines of the passibility of God and impassibility of God in the early Church by tracing these two lines of thought through the writings of the significant theologians on both sides of the issue up to 451 A.D. Particular focus is given to how the controversy over passibility and impassibility influenced the first four major Christological councils. The philosophical, biblical, and theological factors that influenced the development of each doctrine are considered in order to explain why the doctrine of the impassibility of God was established as orthodox. The basis for the acceptance of the impassibility of God as an orthodox doctrine is evaluated and conclusions are drawn concerning the significance of the early Church's thought on the relationship of God to the world for the revisiting of the doctrine of the passibility of God that is occurring in current theological developments.

"J. Gresham Machen, Defender Of The Faith: A Study Of His Critique Of Protestant Liberalism And Its Significance For The Church Today"

Presenter: Kelly Krebs

Faculty Advisor: Greg Thornbury JEN 325; 2:40 p.m.

J. Gresham Machen was one of the foremost defenders of Christian orthodoxy during the rise of Protestant Liberalism in the early twentieth century. This paper will begin by looking at Machen's life and the historical context in which he lived, and will point out some of the historical developments that led to the rise of Protestant Liberalism. The paper will then focus on several aspects of Machen's critique of Liberalism which are still relevant today. The research for this paper will focus primarily on his works *Christianity and Liberalism* (1923) and *What is Faith?* (1925), and will also draw from several biographies as well as some more recent books on the controversy in order to demonstrate the contemporary significance of Machen's critique.

"An Evaluation And Application Of Augustine's Just War Theory"

Presenter: Hanna Miecznikowski Faculty Advisor: Brad Green

JEN 325; 3:00 p.m.

Almost as long as there have been men, there have been wars. Nearly as long as there have been wars, there have been questions of just war. When is it appropriate for people or countries to use violence to defend the causes they believe in, and what type of violence is acceptable? Is violence ever acceptable? Who decides? Because these questions and many like them have traditionally caused great controversy, a significant number of individuals and groups throughout history have attempted to answer them. One answer to the question of just war comes from St. Augustine, Bishop of Hippo at the beginning of the fifth century. Augustine offers a thorough evaluation of just war theory, and many of his ideas have been repeatedly applied to wartime situations throughout the ages. This paper seeks to evaluate Augustine's position on just war by examining several critiques and commentaries on the subject that come from various authors and also to understand the best applications of Augustine's teachings in light of contemporary issues.

"Augustine on The Trinity"

Presenter: Meredith Williams Faculty Advisor: Brad Green

JEN 325; 3:20 p.m.

This paper will cover the basic teaching of Augustine of Hippo on the Trinity. The form of this paper will be summary and critique. First, there will be a summary of Augustine's main work on the subject: *De Trinitate* (The Trinity). Then, there will be a critique where Augustine's conclusions will be examined and discussed. The paper will seek to reach a conclusion on whether the suggestion offered by Augustine in the end: the image of the Trinity in man is the mind remembering, understanding, and loving God is a satisfactory biblical answer. Briefly, it will also examine the idea of whether Augustine asks the right question in seeking to find an image of the Trinity within man and whether or not this question can be asked at all.

"A Proposal of the Conscience"

Presenter: Brian Chastain Faculty Advisor: Brad Green

JEN 325; 3:40 p.m.

This paper will seek to explore the paradox of St. Augustine's theology concerning original sin as it pertains to infants. To accomplish this goal, the intricacies of original sin, creation, and grace as they relate to the conscience will be examined. Moreover, there will be strong focus on the meaning of the conscience and its purpose in moral responsibility and salvation. Material will be gleaned from Augustine and other philosophers. The goal is also to argue the point that moral law must be acknowledged as innate to mankind, that is, fixed indisputably in the very nature of humanity; a concept that is clearly seen universally throughout the fabric of mankind. It is the simple logic that bears witness of the fact that it is self evident that man bears moral responsibility only for those actions which he/she commits in a conscious condition, being free in the carrying out of those actions.

"Augustine on the Will"

Presenter: Lance Parrott Faculty Advisor: Brad Green

JEN 325; 4:00 p.m.

Augustine is one of the seminal thinkers on the doctrine of the will. His view of the will, that man is inherently bent on choosing sin, has shaped the history of the church for the last century and a half. In this paper, one will hear a brief account of Augustine's doctrine. This will include the position of the will of Adam, fallen man, and the glorified state of man. In the end, one will be able to see how Augustine's doctrine shaped the people in his day, as well as, how this doctrine has shaped the church following the fifth century up until the present day.

COMMUNICATION ARTS

"Within a Room Somewhere"

Presenters: Trae Cadenhead, Mark Vanderharr, Drew Holladay, April Hogan, Allie Patrick, Zach Delph,

Ross Kyzar

Faculty Advisor: Chris Blair JEN 225; 2:00 & 2:40 p.m.

A year after her husband's death, a woman returns to the hotel room where it all occurred. With a gun on the bed and thoughts running through her head, she decides to call an old friend. The conversation brings everything back in her mind causing the woman to face the harsh reality of what really happened the night her husband died. The struggle between guilt and retribution brings everything to a head as she is forced to decide what to do with her life and the life of someone else.

With its moving story and building suspense, *Within a Room Somewhere* promises to engage the viewer and not let go.

COMPUTER SCIENCE

"Letting Your Fingers Do Too Much Walking: The Distance Traveled While Typing"

Presenter: Allen Smith
Faculty Advisor: Jim Kirk
PAC C-24; 2:00 p.m.

When Christopher Latham Sholes invented the typewriter, he found the machine's type hammers jammed when people typed nearby letters too fast. Unable to improve the machinery with the tools available, Sholes rearranged the letters on the keyboard to make sure nobody could type fast enough to produce a jam. The resulting "Qwerty" keyboard is still used today, despite its counter-ergonomic design. In 1932, Dr. August Dvorak introduced a new keyboard layout designed to minimize finger motion. Though obscure, the Dvorak layout has a small contingent of ardent devotees who swear by its comfort.

Very few well-designed studies have been conducted into Dvorak's efficiency claims. This project fills some of that void by creating a computerized simulation of typing which will calculate the distance traveled by one's fingers. The program will be capable of analyzing long text files to identify trends, and will employ a graphical user interface to make the study accessible to hobbyists.

Writing this program will require a knowledge of C++ class structure, the Mac OS X Cocoa framework, and the Objective-C language on which Cocoa is based.

"Computerized Card Catalog for Church"

Presenter: Clint Peery

Faculty Advisor: James Kirk PAC C-24; 2:30 p.m.

My project entails the creation of a small scale card catalog for a local church, storing a suggested maximum of a thousand books and contact information for around a hundred individuals. This database should have the capability to work on and offline. The client expects the database to update upon checkout, storing customer name and phone number. Expectations also include the ability to look ahead to see when books are due back, and a notification on the due date. The book's author, title, and type should also be stored.

The tools required include PHP instructional books, Dreamweaver, and internet sources. I have no previous experience with the PHP language. My previous experience with HTML will be advantageous to this project's success. The only difficulties I anticipate are learning PHP and possibly making the database updatable without an internet connection, depending on the quality of the host computer.

11

"A Shopping Cart and Invoicing System for Foodservice Products"

Presenter: Justin Snyder Faculty Advisor: James Kirk

PAC C-24; 3:00 p.m.

I am developing an online shopping cart for Snyder Wholesale, INC. This will be done using ASP, Photoshop, Access, and PHP programming. I plan, given time, to redesign the layout of previous website to make the appearance more professional. The shopping cart will be developed using a subset of different items from the database at first until implementation when all items from Snyder Wholesale will be entered into the fully functional system. There will be a backend for adding new products and deleting old products from being sold. It will have an invoice system that will keep track of current and past orders and be able to pull up these past invoices quickly.

The problems that I anticipate are learning some Visual Basic along with the ASP since the two are intertwined languages. Another problem is going to be using Photoshop because of the time constraints of Photoshop projects.

"Troubleshooting Your Health: Automate a Nursing Process"

Presenters: Justyn Hunter and Milan Zivkovic

Faculty Advisor: James Kirk PAC C-24; 3:30 p.m.

Our goal is to create a web-based database application which will automate a nursing process that has always been done by hand. This will direct nursing students toward the correct diagnosis and treatment, saving them time and making the process more convenient for them and their professors. Some sort of permanent server will be needed for this system to run. We will have to determine whether this can be run on a university server or if the nursing department will need their own server. The project requires the design of a large relational database and the development of web-based applications that will interact with the database. These applications will be developed using PHP, Cold Fusion, or ASP. The only difficulty we expect is in the actual implementation of the system and possible integration within the university's network.

"Hypercube Display and Manipulation"

Presenter: David Criswell Faculty Advisor: James Kirk

PAC C-24; 4:15 p.m.

The largest problem in studying higher dimensions is being able to visualize an object at those dimensions. Human limitations mean that we can only project a four dimensional object into our three dimensional world. I wish to write a program that displays a hypercube. The hypercube will be rotated on all four of its axis, sliced, and folded out in order to give novices to n-dimensional space a more thorough understanding of what a four dimensional hypercube should look like. In addition to this, I will color parallel edges the same so that the viewer can get a feel for what the object really looks like because parallel lines in four-space are not necessarily parallel in three-space. I am working with Dr. Riggs to create this program for his web page. Java will be used to code the program in order to embed the applet in the page.

ENGINEERING

"Revisit the Vapor Compression Refrigeration Cycle for Efficiency Enhancement"

Presenters: Steve Yzaguirre & Christina Johnson

Faculty Advisor: Doanh Van PAC A-9; 3:00 p.m.

The refrigeration system can be made into a less expensive operation by improving the efficiency. The system consists of four components, a compressor, condenser, expansion valve, and an evaporator. In this system the expansion valve is used to lower the refrigerant pressure, losing useful energy. To this energy going to waste we propose to replace the expansion valve with a turbine. The turbine will continue to lower the pressure while the shaft work will run an electric generator. This electricity will be used to help partially run the compressor, lowering the work input required and decreasing the overall cost to run the system.

This work will cover a discussion concerning

- 1. An analysis of possible savings
- 2. A prototype of an Ac generator was built to learn how it works
- 3. An investigation of a way to increase output voltage with out slowing down the rotor
- 4. An investigation of material compatibility of R-134a and PVC
- 5. A selection of turbine to maximize the work output
- 6. An construction of a prototype for a demonstration of results

"Recording Chapel Attendance using Digital Logic"

Presenters: Alan Baker, Kolo Goshi, and Joseph Hall

Faculty Advisor: Jeannette Russ PAC A-9; 3:20 p.m.

In recent years, a steady increase in the number of students attending chapel at Union has caused a corresponding increase in the amount of time needed to record required chapel attendance. The length of time involved has become a problem for the university's community, resulting in agreement among administration, faculty, staff, and students that the entire process needs to be revamped. After studying principles of digital logic, we investigated methods of applying digital logic circuitry to design a faster, more efficient, accurate, and economical solution to this problem. Our research resulted in a design that is similar to the existing system, without the tremendous initial and annual costs. Our design consists of a basic keypad encoder, a seven-segment LED display, and a local area network connection.

"Fatigue of Metals"

Presenters: Joseph Hall, Kolo Goshi, Alan Baker, Steve Yzaguirre

Faculty Advisor: Walt Winterbottom PAC A-9; 3:40 p.m.

It is currently estimated that at least 90 percent of all service failures due to mechanical causes are caused by repeated loading and vibration². This type of failure is known as fatigue and occurs at a stress level much lower than that required to cause fracture on a single application of load. The most insidious fatigue type failure occurs at high cycles (> than 10^6 cycles) and can occur without warning.

Three basic factors are necessary to cause fatigue failure:

- i) a maximum tensile stress of sufficiently high value,
- ii) a large enough variation in the applied stress, and
- iii)a sufficiently large number of cycles of the applied stress.

The latest fatigue testing machines are powered electrohydraulically in which motors drive hydraulic pumps which provide service pressure for control of the motion and force of a hydraulic piston actuator. Controllers automatically initiate power, adjust and maintain the test parameters, and terminate the test at a predetermined condition. Sophisticated programming capabilities are available in servohydraulic closed-loop systems incorporating computer programming. Such machines are very expensive.

A research project being carried out in the Engineering Department is to build and operate a fatigue testing machine costing less than \$100 dollars. A rod shaped specimen is directly coupled to an electric motor shaft and rotated at a speed of 1725 rpm. A bending load is applied to one end of the cantilever specimen by means of a pillar-post bearing and the deflection is adjusted to give a calculated maximum tension and compression stress in the outer fibers of the cantilevered specimen. A photographic method is being developed to measure deflection along the full length of the specimen during the test. When the deflection measured along the length of the specimen changes by a specified amount as cracking takes place in the specimen, the test is to be terminated and the extent of fatigue is assessed by the amount of cracking and its location.

"Designing A Library Renovation To Facilitate Learning"

Presenters: Andy Robinette, Ben Frederick, Weston Gentry, Christina Johnson, Rob Krauss, and Josh Shrewsberry

Faculty Advisor: Jeannette Russ Library; 2-5:00 p.m.

The Emma Waters Summar Library at Union University is scheduled for renovation in the near future, and our team is investigating different library models that create a good learning environment. Because of rapid advancements in information technology in recent years, several publications and reports have been generated to explore the philosophy and logistics of library design. After researching available options, we will create two or three designs that optimize the existing space while adhering to a budget. These designs will be modeled as two-dimensional architectural drawings in AutoCAD, and areas that require major redesign will also be modeled as three-dimensional engineering drawings in ProlE. The results will be presented to the library director as an aid in selecting a renovation plan that provides an affordable, appealing space where students are motivated to study and learn.

ENGLISH

"'Speculum Principis': A Study of Beowulf"

Presenter: Jason Hance

Faculty Advisor: Roger Stanley PAC D-54; 2:00 p.m.

This paper, which was created for an upper-division English class under the tutelage of Professor Gavin Richardson and presented externally at the international Sigma Tau Delta conference in March 2004, takes an Anglo-Saxon literary classic and examines it from multiple perspectives. The title phrase, which translates as "mirror for princes," suggests that the title character can be profitably examined as a representative of royality. Via contrast with other key characters such as Grendel and Unferth, Beowulf is seen not only as high born, but also as a possible Christ figure. The paper uses references to classical literature by Homer and Virgil to examine such motifs as the descent into the underworld and the ascent toward heavenly realms. Using primary source quotes as well as secondary criticism by scholars such as Klaeber and McNamee, the paper ultimately seeks to place an early Middle Ages text within a larger frame of reference, that of the epic hero and his quest(s).

"Creative Writing Reading"

Presenters: Janae Daniels, Erin Hetzel, Drew Holladay, Amy Coxwell, Mariann Martin, Wendi Reed, Patrick Myers, Elizabeth Shackelford, Miranda Wallace, Jared New

Faculty Advisor: Patty Hamilton Outside-SUB porch (C-6 if rains); 3:00 p.m.

Students from the Introduction to Creative Writing course will read selections from their own work, including poetry, short fiction, creative non-fiction, and one-act dramatic works.

HISTORY/POLITICAL SCIENCE

"We Shall Overcome: A History Of Racial Desegregation Within The Catholic Church In The Southern United States"

Presenter: Kevin Vailes

Faculty Advisor: David Thomas PAC C-16; 2:00 p.m.

Beginning during the last decade of the 19th century the Catholic Church in the United States began to segregate itself along racial boundaries. This paper deals with the Catholic Churches actions from the beginning of segregation up until the present time in confronting and dealing with the issue of segregation and the eventual process of desegregation. Since the practice within the Church began in the South, I have chosen the focus my work, dealing only with states and cities in the Southern United States, and using the St. Mary's Parish located in Jackson, Tennessee for insight at the local level.

"Rebel Republicans: The Birth of the Grand Old Party in the Brand New South"

Presenter: David J. Patterson
Faculty Advisor: David Thomas
PAC C-16; 2:20 p.m.

An overview of southern electoral change from the 1960s until today, *Rebel Republicans* focuses on sources of political realignment in the South. First, the South's changing economy and civil rights issues are examined. Then a discussion of Republican Party's "Southern Strategy" sheds light on intentional efforts to woo southern voters and the subsequent consequences.

Additionally, an overview of the integration of faith and political action in the South explores the centrality of faith and worldview as a catalyst of southern political trends. Finally, the conclusion includes a brief exploration of Confederate symbolism in southern politics.

"New South Intellectuals: Toward a Clearer Historiographical Vision"

Presenter: Ian Crawford

Faculty Advisor: David Thomas PAC C-16; 2:40 p.m.

In the 1930s and 40s the South experienced an intellectual explosion recognized around the world and dubbed the Southern Renaissance by literary critics. Much attention and scholarship has been devoted to this period, however the span of time prior to it, the New South period, has largely been neglected by intellectual historians of the South. What began as a study of these intellectuals gave way to the need for an ordering of what scholarship had already been done on this period in an attempt to reconcile various perspectives and interpretive lenses. To this end, I have examined the prominent scholarship on intellectual history of this time and attempted to provide future researchers with a map with which they may unearth some of the valuable historical insight hidden within the intellectuals of the New South.

"Wade Hampton Bolton"

Presenter: Melissa Cartwright
Faculty Advisor: David Thomas
PAC C-16; 3:00 p.m.

This paper addresses the controversial figure of Wade Hampton Bolton. This prominent figure in Memphis' society was a slave trader who was loathed by many. He and six others were killed in the most famous feud in Memphis history. His will included a large amount of money for the erection of a school for the poor, white children of Shelby County. Recently a mural was painted in honor of Wade Bolton in Bolton High School, as a gift from the Class of 2003. Many have taken offense to this "glorification" of a man who sold people for a living. Still, many people in Shelby County believe Bolton High School has benefited the community in more ways than one. Those who are against taking money from Bolton's Trust Fund, claim that they refuse to take money from a slave owner. Since this debate has sparked such controversy, should the school honor Wade Bolton? From my perspective the school should use the money for the betterment of the students. This paper gives details about his personal and public life, the monies he left for the school, churches, and family members, and how the high school has helped Shelby County evolve into the metropolitan area it is today.

"Whither The Southern Republican: Republican Prospects At The Local Level In Tennessee"

Presenters: Rachelle Haskins, Jenny Buffington

Faculty Advisor: Sean Evans PAC C-16; 3:20 p.m.

Over the past thirty years, Republican presidential candidates have consistently won the South's electoral votes, but have continued to remain a minority at the state level. Why? This research paper examines why Republicans are more successful at the national level than the local level in the South. My hypothesis is that voters in the South prefer issues that favor Republicans on the National level while favoring issues that favor Democrats on the state and local level. Using a survey of citizens in Tennessee, I will identify the issues that voters consider important at the state and national level and determine which party voters trust to handle that issue.

"Assessing the Governor: Economic Performance and Gubernatorial Approval"

Presenter: Jenny Buffington Faculty Advisor: Sean Evans

PAC C-16; 3:40 p.m.

What affects gubernatorial approval ratings? Much research has been conducted on presidential approval ratings, but little research exists on gubernatorial approval. I hypothesize that gubernatorial approval is directly related to the individual's opinion of the state economy. Using a survey of voters in Tennessee, I test the impact that personal economic situation has on gubernatorial approval while controlling for partisanship of voters, presidential approval, and positive/negative media coverage.

INTERNATIONAL & INTERCULTURAL STUDIES

"Analysis of Civil Conflict in Sierra Leone"

Presenter: Aaron Jackson

Faculty Advisor: Cynthia Jayne PAC D-54; 2:20 p.m.

Sierra Leone provides an excellent example of the violent conflict that plagues many countries in Africa. Conflicts such as the civil war in Sierra Leone can be better understood if viewed along a continuum of the historical background of the conflict, the period of escalation leading up to the conflict and the series of key trigger events that led to the outbreak of actual armed conflict. The armed conflict continues until another series of key trigger events precipitates a cessation of armed conflict, a period of de-escalation follows and eventually a threshold for sustainable peace is achieved. The understanding of the trigger events that led to the outbreak of armed conflict in Sierra Leone is essential in order to avoid situations which could trigger the resumption of armed conflict. The focus of this project is to identify and describe these key trigger events.

"The Culture and Worldview of Third Culture Kids"

Presenter: Katie Sorrell

Faculty Advisor: Cynthia Jayne PAC D-54; 2:40 p.m.

Third Culture Kids (TCKs) are those from one culture who have been significantly exposed to a culture other than their own and therefore create their own culture between the two, a third culture. Each new generation of TCKs is unique. The current generation of TCKs live in a world that is radically different than that of their predecessors, and as a result, the challenges faced have also changed. In order to more adequately understand the culture of TCKs, a current examination of their worldview and experience is necessary. Through surveys and interviews with TCKs currently in college in the United States, whose parents have been employed by the International Mission Board, the researcher hopes to identify common trends and worldview and therefore propose an updated description of the culture of TCKs.

"Losing Minority Languages? The Impact of Neoliberalism"

Presenter: Suzanne Mosley Faculty Advisor: Cynthia Jayne

PAC D-54; 3:00 p.m.

The field of sociolinguistics has shown the inextricable link uniting the language and culture of a people. As language declines, culture declines. The decline of a language must be rooted in a cause. This paper is an exploration of economics as a potential cause of minority language decline. Specifically, I will exhibit how the current neoliberal economic philosophy of the United States is creating a global environment conducive to the decline and/or death of minority languages, and by default, minority cultures.

"The Cultural Effects Of Women Converting To Christianity From Other Religions"

Presenter: Ashli Sutton

Faculty Advisor: Cynthia Jayne PAC D-54; 3:20 p.m.

The families and lives of women who convert to Christianity from other religions are often profoundly effected by their decision. Their experiences may be examined through various disciplines including cross cultural communications, cultural anthropology, religion, and moral philosophy or ethics. This research has been based on two case studies. One woman converted to Christianity from Judaism as a senior in high school, while the other converted to Christianity from Islam in her mid-twenties. The research is based on extensive interviews with the women and review of literature written by the women. The study explores the effects of conversion on cultural identity by comparing aspects of each woman's former religion to Christianity. Finally, the paper examines the effects of conversion on the family unit.

"Approaches to Sports Business in China"

Presenter: Jennifer Pennington Faculty Advisor: Cynthia Jayne

PAC D-54; 3:40 p.m.

The 2008 Olympic win for China has created much excitement over national prestige and unprecedented business opportunities to develop a broader sports economy. With offers to sports businessman of equal treatment as any local Chinese businessman, 5 year visas with unlimited entries and exits it is and open door to the market and to facilitate sports development for China. The intent and purpose of this research is to take full advantage of the opportunity and develop a comprehensive sports business background which would include cross-cultural approaches to government and sports officials, political and social receptivity, Chinese business know-how, and historical context that has brought China to this place. Pulling from the theoretical background a strategic business plan and proposal will be the outcomes of the research. In application of the research a complete and credible sports business plan and proposal are necessary to compel the business and sports professionals needed to join the team in bringing this dream to realization.

LANGUAGES

"Monolingualism: Perceptions From The Other Side"

Presenter: Jennifer Downing Faculty advisor: Philip Ryan

PAC D-54; 4:00 p.m.

As a monolingual community, we often do not understand how a non-native speaker manages to function in society. This struggle to be a member of society has generated a set of perceptions about the Southern American community at large. What exactly are these perceptions? In order to gain an answer to this question, I will interview (at length over several sessions) two first generation Hispanic immigrants in Tennessee. That data I gain from this field research will then be integrated with research from a variety of fields, including but not limited to: linguistics, interpersonal communication, economics, cultural studies and psychology. This interdisciplinary approach is an effort to incorporate standing research with true experiences of individuals in the south as well as an effort to raise awareness concerning marginalized groups in America. The final product will be a presentation dealing with the research completed in this area framed around the perceptions of my interview candidates.

MUSIC

"Give Me Jesus: A Study of an African-American Spiritual for Choral Rehearsal"

Presenter: Jeremy Warner

Faculty Advisor: Richard Joiner Hartley Hall; 2:00 p.m.

Jeremy Warner, a senior who is completing the Bachelor of Music in Music Theory, will provide a brief introductory study concerning the origin and development of the African-American spiritual and the major composers and arrangers of this genre. The contributions of Harry Burleigh, André Thomas, and Moses Hogan will be discussed, followed by a brief study of L.L. Fleming's arrangement, *Give Me Jesus*. The student will then lead the University Singers in a rehearsal of the piece, with direction and coaching in style and conducting gesture being provided by Dr. Richard Joiner, conductor of the Singers.

NURSING

"Does Smoking While Receiving Chemotherapy Affect the Remission Outcome of Adult Patients with Leukemia?"

Presenter: Karolyn K. Smith Faculty Advisor: Jill Webb

Studies have shown that cigarette smoking may be linked to some types of leukemia. The purpose of this study is to determine if active smoking while receiving chemotherapy affects the remission outcome of patients with leukemia.

The setting of this study will be a clinic that specializes in oncology/hematology in West Tennessee. The definition of leukemia and remission will be defined by laboratory values and by the physician. Adults with leukemia ages 18 to 54 will be selected using random sampling utilizing a retrospective study. Information will be collected with a data information tool composed by the researcher and analyzed by means of Chi-square statistical method. Chronic Lymphocytic Leukemia will be excluded in this study. According to the literature CLL occurs mainly in adults ages 55 and older.

PHYSICS

"The Brachistochrone Problem in an Inverse Square Force Field"

Presenter: Kolo E. Goshi Faculty Advisor: David Ward

PAC A-9; 2:40 p.m.

Library; 2-5:00 p.m.

In universities today, there are various branches of mathematics to which the average undergraduate mathematics major is not exposed. One such branch is an area of mathematics known as the calculus of variations. The calculus of variations is a mathematical field, which seeks to find the path, curve, surface, or geometric form for which a given function has a stationary value. In application, this branch of mathematics is most useful in physics, specifically mechanics. To the physicist, the calculus of variations is applicable in the typical **brachistochrone** problem, **brachistochrone** being derived from the Greek meaning "the shortest time". The classic problem assumes a particle in a uniform gravitational field moving between two fixed points. The goal is to find the path which minimizes travel time. This path is determined to be a cycloid. However, an atypical **brachistochrone** problem is one in which the attractive force is an **inverse square force field**, k/r^2 . Here k is a constant and r is the distance of the particle from the origin of the attractive force. This is a problem that has not previously been solved specifically employing methods only of variational calculus and one that presents a more complex solution than the traditional brachistochrone.

"Segmenting And Classifying Magnetic Resonance Images Of The Brain To Study Treatment Sequelae In Patients With Ependymoma"

Presenter: Brian A.Taylor Faculty Advisor: Kyle Hathcox

Library; 2-5:00 p.m.

All methods of cancer therapy appear to carry certain negative side effects. The nature and consequences of these side effects is of great interest to the medical community. Previous studies have shown that there is a decrease of normal appearing white matter (NAWM) in the brain following radiation cancer therapy. Studies are underway to determine whether this decease in NAWM can cause neurocognitive sequelae (side effects). At St. Jude Children's Hospital in Memphis, TN, fifty-nine young patients with ependymoma (a particular brain tumor) were placed on a protocol to study the effects of conformal radiation therapy. Innovative automated segmentation and classification techniques on transverse/axial Magnetic Resonance Images (MRIs) can accurately show any changes in the NAWM volumes over time. The results of this study can help coordinate the changes in NAWM to neurocognitive problems experienced by brain tumor patients due to radiation therapy.

"The Impact of High Wind Events on the Central Business District of Oklahoma City"

Presenter: Dustin Rapp

Faculty Advisor: Glenn Marsch Library; 2-5:00 p.m.

It is critical to understand airflow through cities due to the possibilities of biological and chemical terrorist attacks, pollution, and accidental chemical spills. Currently, few studies have used continuous field measurements of wind conditions within a city to study urban air flow. This paper investigates the airflow at specific locations within the central business district (CBD) of Oklahoma City during two synoptic high wind events and one convective high wind event using data collected at fifteen sites. For the synoptic cases, wind vector magnitudes and directions were averaged for each site before and after frontal passages that impacted the CBD. For all cases, wind speed and direction comparisons were made between the individual sites within the CBD. As a result, distinct wind flow patterns within the city were deduced. Possible reasons for these wind flows resulted from the analysis of building structures, site location, and street orientation. It was also found that while airflow through Oklahoma City is extremely complex, small and large scale wind flow patterns were identifiable. As a result, this study emphasizes the need for the further analysis of wind flows through cities during typical, but complex scenarios to better understand how pollutants and chemical/biological agents might flow through a city under a wide variety of weather conditions.

SOCIOLOGY/SOCIAL WORK

"Evangelical Perceptions of Social Inequality"

Presenters: Cynthia Coulston, Derek Jones, Rachel Ruckart, Andrea Smith, Ryan Donaldson Faculty Advisor: Toni Chiareli BAC-44; 3:20 p.m.

Using qualitative research methods of data gathering via intensive ethnographic interviewing, this research aims at better understanding the various conceptions evangelicals as a group have of the notion of social inequality. The premise of the study is that evangelicals struggle individually and corporately to reconcile personal, church, and societal roles when it comes to addressing and dealing with the reality of inequality in society. This difficulty seems to lead to paralysis and a sense of disenchantment with the scriptural mission to aid the oppressed. The goal in the study is to develop greater insights as to the nature of this difficulty and to entertain ideas about how the evangelical community can move beyond it. Due to the exploratory and tentative nature of the findings, perhaps all this research promises to do is to ask better questions for grappling with this social reality.

"Social Justice Research"

Presenters: Social Policy (SW 335) Class

Faculty Advisor: Terry Blakley BAC-44; 3:40 p.m.

Is social justice at the heart of social policy in America? For some, the answer to this question is a matter of life and death. Abuse, crime, poverty, and disease are factors that can potentiate the ruin of individuals, families, and communities. This research project examines critical social issues facing America's most vulnerable populations in light of just versus unjust social policies. Select policies will be explored in terms of risk and cost/benefit analysis, along with alternative policy solutions that may offer increased protections to those at most risk for harm.