



# WABASH COLLEGE

**14th Annual Celebration of Student  
Research, Scholarship, and Creative Work  
Friday, January 24, 2014 • Detchon Center**

## Welcome and Introduction

Welcome to the 14th Annual Celebration of Student Research, Scholarship, and Creative Work at Wabash College. For the past 13 years, the College has recognized in a proud and public way the creative accomplishments of Wabash students. We celebrate not only the particular achievements of individual students, but also a deeply embedded ethos of the College. Student engagement stands at the center of the Wabash mission to change lives. The impressive breadth and quality of student creative work is evidence of the challenge and change that marks the Wabash experience.

This program is dedicated to the memory of Paul Caylor McKinney, '52, who passed away in 2003 after a courageous battle with cancer. Dr. McKinney proudly served the College for more than half a century as chemistry teacher, department chair, division chair, and Dean of the College. He was an exemplar of the liberally educated person whose interests ranged from quantum mechanics to Plato, from playing the piano to pondering Nietzsche. He acted in Wabash College Theater productions and was often found backstage working on difficult equations in his notebook. Among Wabash men, he would well understand and appreciate everything presented today; he would be the first to celebrate the successes of Wabash students and faculty members.

Close collaboration between Wabash students and faculty across the College is a hallmark of our culture, a labor of pedagogy and love that makes a difference for our students. It is a special pleasure to introduce some of the results of that collaboration in these presentations. Our thanks go to the students who are prepared to teach the Wabash community about their good work and to the faculty and staff members who have devoted considerable time helping students in their research and creative productions.

A conference of this size and scope would not be possible without the dedicated work of many people. I want personally to express my thanks to the planning committee: Chair Lon Porter, Jim Amidon, Jeff Beck, Preston Bost, and Peter Hulen. Scott Feller and Jamie Ross have contributed to the poster production, as have other Media Center and IT Services staff, including Mike Heinold and Kitty Rutledge; Ed McGaughey and his Campus Services colleagues, and Kecia Tatman and Mary Jo Johnston and her Bon Appetit staff make the logistical support appear effortless. We also extend gratitude to Kitty Rutledge and Chris Duff for their help. We are grateful to all, and especially to Lilly Endowment Inc., whose grant to the College to fund the Center of Inquiry in the Liberal Arts helped begin this community Celebration.

— Gary A. Phillips, Dean of the College

### Schedule for Oral Presentations

Oral presentations will begin at 1:10 p.m. and continue every 20 minutes with the last sessions scheduled to begin 3:40 p.m. In general, students will present information for 12-15 minutes with a few minutes for questions and passing time. Please see the following two pages for a list of oral presentations by room location and time slot. Names of the presenters, as well as their sponsors and abstracts, are listed in alphabetical order beginning on page 8.

### Schedule for Posters and Exhibits

Students will present and discuss their posters and exhibits in 90-minute increments beginning at 1:00 p.m. across Detchon International Hall. You will find a list of presenters and their locations — sorted by poster number and alphabetically by lead presenter — beginning on page six. Names of the poster presenters and co-presenters, as well as their sponsors and abstracts, are listed by poster number beginning on page 21.

## Schedule of Oral Presentations by Time Slot and Location

### Detchon 111

1:10	David Gunderman & Ashish Baiju	Adaptively Weighted Numerical Solutions to Partial Differential Equations
1:30	Xidian Sun	On Curves and Polygons with the Equiangular Chord Property
1:50	Jia Qi	Reduced Order Modeling for Gravitational Waveforms
2:10	Yunan Wu	Why is it Hard for Children to Understand What You are Saying?
2:40	Lu Hong	Psychopathy as a Moderator of the Attitude-Behavior Relationship
3:00	Jingwei Song	Age-related Changes to VGluT2 protein in Rat Medial Geniculate Body
3:20	Wes Hauser	Finding a Home Where Tree Kangaroos Roam: A Spatial Analysis of Habitat Requirements using ArcGIS
3:40	Kalp Juthani	Does Coffee Cause Cavities?

### Detchon 112

1:10	Ryan Guerrettaz	<i>Carpe Diem: A Timeless Motto</i>
1:30	Nikolas Jones	Expatriate in Paris: A Reading of Poetry and Novel Excerpts
1:50	Ian Artis, Jr.	<i>Quarry Hills</i>
2:10	Scotty Cameron	Readings from <i>Bucolic Routine</i>
2:40	David Myles	<i>Your Body Strikes Back</i>
3:00	Chet Turnbeaugh	<i>JUMP!</i>
3:20	Stephen Batchelder	Poetry Reading
3:40	Nikolas Jones	<i>N'k Stretching</i> and Other Poems

### Detchon 209

1:10	Nathaniel Chapman	Classical Antiquity through English Eyes: A Study of the European Grand Tour
1:30	Derek Andre	The Portrayal of Violent Masculinity in <i>Fight Club</i>
1:50	Seton Goddard	Norman Maclean's <i>A River Runs Through It</i> : A Critique of Natural Masculinity
2:10	Josh Lutton	Be A Man: Representing Masculinity on Stage
2:40	Scott Morrison	Female Subjectivity in Colonial Sexual Relationships
3:00	Ryan Horner	Icons and the Artist: Joyce's Hypocritical Idealism in <i>Ulysses</i> and <i>Portrait</i>
3:20	Christopher Donahue	The British Musical Invasion
3:40	Yiyuan Zuo	Western Classical Music and Chinese National Music: An Analytical Discussion of their Similarities and Differences

### Detchon 211

1:10	Oral Exhibit	A Gentleman's Mind: Exploring the Mental Health of Wabash Men <i>Adam Burtner, Cole Crouch, Felipe Cuatecontzi, Anthony Douglas, Isaac Empson, Mazin Hakim, Mohammed Hasnat, Taner Kiral, Kyle Stucker, &amp; Thahn Tran</i>
2:10	Nathan Manning	Media and the Zimmerman Trial: Risks in Trial Framing
2:40	Nate Scola	Repairing an Image: A Rhetorical Analysis of Tiger Woods's Apology
3:00	Noah Eppler	The Intersection between New York City and the Work and Philosophy of Martha Graham
3:20	Han Nie	The History and Rise of Stage Director
3:40	David Gunderman	Mathematics in Popular Fiction: An Analysis of the Character of Carl Friedrich Gauss in Daniel Kehlmann's <i>Die Vermessung der Welt</i>

### Detchon 212

1:10	Ben Cook	An Analysis of Standard Oil Job Applicants from 1877-1890
1:30	Adam Alexander	The Cuban Embargo: How Cultural Hardliners Can Perpetuate the Status Quo
1:50	Matthew Binder	Exploiting Gendered Stereotypes: Cuban Women and the Special Period
2:10	Bailey Combs	Cubans in Crisis
2:40	Jacob Burnett	Lucrative Lullabies: The Baby Market and Illegal International Adoptions
3:00	Jeremy Wentzel	Built to Last: A Glimpse into the Wabash Vision of Eric Gugler, Architect
3:20	Andrew Powell	Is Bipartisanship Still Possible?
3:40	Kyle Morgan	Leaks in Wartime

### Detchon 220

1:10	Patrick Stroud	<i>The Cántigas de Santa María</i> : A Genre Study
1:50	Thomas Brooks	The Chamulan and Zinacanteco Religions
2:10	Mark Riffle	Putting the Qin in China: The Qin's Barbaric Rise and Fall 771 BCE-206 BCE
2:40	Patrick Singleton	John Dillinger: Public Enemy Number One, Hero or Myth?
3:00	Neil Wichlinski	The English Reformation: A Legal Movement
3:20	Andrew Dettmer	Please Sir, May I Have Some More: The History of Anglo-American Adoption and its Impact on Gay Marriage
3:40	Patrick Stroud	Civil and Common Law in Colonial Canada

## Schedule of Poster Presentations and Exhibits

### Session 1 — 1:00 p.m. to 2:30 p.m.

No	Presenters	Title
1	John Vosel	Surreal Hand Narratives
3	Kendall Baker	Underwater in Mozambique
5	Ye Yuan	Credit Default Swaps and Capital Structure
7	Adam Togami	Identification of Genes Targeted by the Wnt Pathway in <i>Nematostella vectensis</i> during Regeneration
9	Cameron Waller	The Necessity of Cell Proliferation in Oral and Aboral Regeneration of <i>Nematostella vectensis</i>
11	Wes Hauser	The Secret Life of Orchids: Endohyphal Bacteria Brought to Light
13	James Boyer	Preliminary Investigation of Potential Zoonotic Disease and Egg Dispersal at Crawfordsville
15	Jackson Schroeder	Helminths of Bluegills, <i>Lepomis macrochirus</i> and Longear Sunfishes, <i>Lepomis megalotis</i> from a West-Central Indiana Creek
17	Austin Althoff, Adam Pagryzinski, Cole Chapman, & Ivan Koutsopatriy	Functionalization of Photoluminescent n-type Porous Silicon with Aldehydes via Hydrosilylation Reactions: Oxidation & Degradation Monitored via Transmission Mode Fourier Transform Infrared (FTIR) Spectroscopy

## Schedule of Poster Presentations and Exhibits

### Session 2 — 2:30 p.m. to 4:00 p.m.

No	Presenter	Title
2	Lu Hong	Modelling the Generation and Propagation of Action Potentials
4	Cole Hruskovich & Jacob Caddick	Indoor Track and Field Indexing
8	Ryan Snyder	The Dimerization Free Energy between Helical Peptides in Saturated and Polyunsaturated Lipid Bilayer Membranes
10	Clarke Remmers	Gelatin as a Way to Increase Transformation Efficiency of Plasmid DNA into Bacterial Cells
12	Brent Ledford & John Davis	Synthesis of Rhodamine-B Sulfamide Derivatives and UV-Vis Spectroscopy Testing of Rhodamine Dyes
14	Ryan Cloyd & Austin McCauley	Synthesis and Testing of a Library of Fluorescein Diether Cytochrome P450 Substrates
16	Adam Pagryzinski, Austin Althoff, Ivan Koutsopatriy, & Cole Chapman	Comparing the Binding Efficiency and Stability of Organic Monolayers Covalently Bound to Hydride-Terminated p-Type and n-Type Porous Silicon
18	Jackson Schroeder	Helminths of Bluegills, <i>Lepomis macrochirus</i> and Longear Sunfishes, <i>Lepomis megalotis</i> from a West-Central Indiana Creek



## Oral Presentations (Alphabetical by Presenter)

**Presenter:** Adam Alexander  
**Sponsor:** Ethan Hollander (Political Science)  
**Title:** The Cuban Embargo: How Cultural Hardliners Can Perpetuate the Status Quo

When the United States first imposed an embargo on Cuba, President Barack Obama was not yet born – and neither was a large majority of the current population of Cuba. Times, attitudes, and policies have changed since 1960. But one thing has remained strangely consistent: the Cuban embargo. Noting that the embargo failed its primary objective of ousting Fidel Castro, an increasingly larger majority of Americans want to see the embargo gone, but a small hardline minority is keeping it in place. Many argue that structural (economic) and institutional (political) issues have kept the embargo in place, but the real root of the problem is the Cuban American culture. While some businesses have an economic interest in pursuing the embargo, far more businesses have an interest in seeing it gone. While the institutional argument that the embargo is dependent on electoral politics has merit, it ignores the fact that without the Cuban Lobby, no group could utilize mobilizing incidents. The true reason that the United States still has an embargo against Cuba is because the Cuban-Americans make up a politically fearsome group that has mastered the technique of contributing money to campaigns and pressuring congressmen to stick to the status quo.

**Presenter:** Derek Andre  
**Sponsor:** Warren Rosenberg (English)  
**Title:** The Portrayal of Violent Masculinity in *Fight Club*

Since its initial printing in 1996, and the 1999 film adaptation, much has been made of the representation of masculinity in the *Fight Club*. Much of the discussion about understanding these works' takes on masculinity has turned to what *Fight Club* is attempting to say about the violent component of masculinity that is present in the film and novel. This component of masculinity is one that sees violence and the ability to exert said violence as an integral part of masculinity. Both works seemingly support this component of masculinity for a variety of reasons, including that the central characters find a sort of Zen-like state when they participate in violent activities. Thus, many see *Fight Club* as a work that advocates a level of violence as being necessary for the preservation of pure masculinity. The problem with this stance, however, is that it completely discounts the endings of both works. Although it may seem contrary to the vast majority of the storyline and the way most men interpret it, both the novel and film *Fight Club* are, in fact, scathing critiques of a violent masculinity.

**Presenter:** Ian Artis, Jr.  
**Sponsor:** Eric Freeze (English)  
**Title:** Quarry Hills

The setting is the fictional city of Quarry Hills, Colorado, where majestic panoramic views of mountains and picturesque nature reserves rule the land. Pam, a 28-year-old uneducated and homely woman, decides to pick herself up and return to school at a local community college. Soon thereafter, she becomes enraptured by her professor and adviser, Dr. Roman Cowers. Although he's married, the feelings are mutual. Downcast, emotionally abused, jealous and envious, Pam ventures into realms unknown in order to sate her deepest, hungriest desires: intimacy and status. This is what happens when lust and the desperate need for self-actualization goes wrong. Using self-destructive methods of action to satisfy carnal, fleeting, and misplaced desires have consequences and psychological implications sometimes beyond our understanding. Speaking to the nature of love, self-hate, pain, and emotional sadism, this short story works to throw light on the inside of a reasoning to break a hallowed promise. Set against the sweeping landscape of the Centennial State, I present to you my first work, *Quarry Hills*.

**Presenter:** Stephen Batchelder  
**Sponsor:** Marc Hudson (English)  
**Title:** Poetry Reading

I am delighted to present a selection of poems that I have spent the past semester writing under the guidance of Professor Marc Hudson in his Poetry Workshop. My poetry is centered on home and family and the strong farming vocation that, in a sense, is the working metaphor for my family. As a child of divorce I think the farm, in particular themes of taming and remaking from devastation combined with landscapes of intense (California) winter or intense summer, is a suitable metaphor for how my family functions. There is a deep sense of connection to each other in spite of our brokenness that correlates with the imagery of the Sacramento Valley. For a family connected to place there is always the next steer to halter-break, the next heifer that needs to be inseminated, and the color of leaf in the walnut and almond orchards that remind us daily of the tasks of the season. It is the progression of the seasons in this landscape that helps sustain our small and wounded farming clan. My creative work has helped me begin to deal more directly with the relation of family and work in a particular place.

**Name:** Matthew Binder  
**Sponsor:** Ethan Hollander (Political Science)  
**Title:** Exploiting Gendered Stereotypes: Cuban Women and the Special Period

The collapse of the Soviet Union in the early 1990s unleashed a tide of economic crisis in its former Communist ally Cuba. This Special Period forced a number of changes on the island nation as the American dollar was legalized for the first time and the Cuban government officially condoned small capitalist reforms. One segment of Cuban society whose struggles during the Special Period have attracted particular attention from scholars is women. The two most visible signs that Cuban scarcity affected women are the emergence of *jineterismo*, a uniquely Special Period Cuban form of prostitution, and an increased emphasis on a woman's domestic work. An analysis of these two manifestations of the Cuban woman's fight to survive in 1990s Cuba reveals that while Fidel Castro and those loyal to him have achieved tremendous progress for women under the Revolution, Cuban women have yet to break free of traditional notions of the erotic "Other," the nurturing wife and mother, and the caretaker of the household. Cuban women of the Special Period and its aftermath actually exploit such conceptions to their, sometimes great, economic advantage as they fill the roles of both *jinetera* and loving mother.

**Presenter:** Thomas Brooks  
**Sponsor:** Ivette Wilson (Modern Languages & Literatures)  
**Title:** The Chamulan and Zinacanteco Religions

The pueblos of Zinacantan and San Juan de Chamula are located in the highlands of Chiapas, the southernmost state of Mexico. Through an internship I had last summer in San Cristobal de las Casas I observed and studied these descendants of the Maya first-hand. I worked with a non-profit called ProNatura Sur A.C. and my job was to help convert a donated estate into a museum for the ritual and medicinal plants of the indigenous. I was able to study the culture and religious practices of Chamulans and Zinacantecos. Their religion is a syncretistic blend of Catholicism and pre-Columbian traditions. For example, three crosses is a familiar symbol in Christianity to represent Calvary hill, however to the indigenous of the highlands, the crosses create a portal to the divine realm, through which they communicate and make offerings to the gods or saints. The most common offerings are lit candles which they believe provide tortillas for the gods to eat. Other offerings are libations of cane liquor or soda pop which similarly serves to refresh the gods. Though these practices are seemingly pagan, they still occur in Catholic churches because the rituals are still Catholic in name. Supplications are commonly offered to the Father, Jesus, the Earth lord, mountain spirits, or the myriad saints, some local, others officially recognized. Syncretism is an anthropological phenomena where two belief systems are blended into one. The Chamulan and Zinacanteco religions are interesting cases of syncretism. In my presentation I would like to share my observations and research on these two indigenous groups and their peculiar religion.



**Presenter:** Jacob Burnett  
**Sponsor:** Michael Burch (Political Science)  
**Title:** Lucrative Lullabies: The Baby Market and Illegal International Adoptions

Since the mid-1990's, the number of recorded international adoptions each year has doubled from 22,200 in 1995 to just under 40,000 in 2006. Americans make up more than half of those adopting. In 2005, Americans adopted roughly 21,500 children mostly from countries swamped with orphans and vulnerable populations. With an unquenchable demand for babies in a complicated and regulated system with limited supply, an illicit market has sprouted for the commodification of children. In this paper, I deconstruct numerous facets of the crime itself to fully understand its mechanisms. I also hypothesize that baby trafficking will most likely occur in countries that experience an increase in orphans while state capacity and support decreases or stagnates. In effect, exogenous shock factors such as civil war, disease, natural disasters, etc. will drastically impact a state's population and resources. The ability of a state to absorb or respond to that shock will indicate how likely the illicit baby market will materialize.

**Presenters:** Adam Burtner, Cole Crouch, Felipe Cuatecontzi, Anthony Douglas, Isaac Empson, Mazin Hakim, Mohammed Hasnat, Taner Kiral, Kyle Stucker, & Thahn Tran  
**Sponsor:** Sara Drury (Rhetoric)  
**Title:** A Gentleman's Mind: Exploring the Mental Health of Wabash Men  
**Note:** *This presentation will be an hour-long collaborative conversation. Attendees are encouraged to arrive on time and stay for the duration of the program.*

Over the course of our freshman tutorial, we have discussed many issues faced by our 21st century society. For college students our age, mental illness is one of the most prominent public problems. The age range of 18-25 years old is the time that one is most likely to begin to suffer from mental illness. However, during this age, it is the most important for one to be mentally healthy and productive in order to secure better long term personal development. Per President Obama's national initiative on mental health awareness, we will lead interested students, faculty, staff, and visitors through a collaborative process known as dialogue. The aim of this activity and our research is to share ideas and information so that college students our age can become aware of what, how, and why these issues come to be and how to promote mental health on our campus.

**Presenter:** Scotty Cameron  
**Sponsor:** Eric Freeze (English)  
**Title:** Readings from *Bucolic Routine*

I will be reading a short story from my collection of short stories, *Bucolic Routine*, that I have been working on this semester in English 498. I would like to read for roughly ten minutes, and the rest of the time would be reserved for a question and answer session. My collection details events that occur in a small town and how these events shape the community as well as the individuals. The story that I will be reading, entitled *Village Pantry*, tells of two teenagers and their first close scrape with the law.

**Presenter:** Nathaniel Chapman  
**Sponsor:** Jill Lamberton (English)  
**Title:** Classical Antiquity through English Eyes: A Study of the European Grand Tour

A phenomenon that began in the mid to late 17th century, The British Grand Tour lasted in its original form until the mid-19th century, and still continues in many adapted versions today. The Tour became a tool, used by young, aristocratic Englishmen to provide a cultural finishing to their schooling and prepare them for life as members of the English aristocracy. I will begin my project with a basic background of the tour, based on journals and secondary sources, which will answer questions, such as: Who went on the Tour? How did they travel? What were their accommodations? Where did they go and what did they see? After providing my audience with this background, I

will explain how this research led to and connects with the miniature Grand Tour that I traveled over the summer, allowing for a comparison between aspects of the Grand Tour from both the past and present. Through this comparison of specific elements, such as travel methods, accommodations, and places/objects of interest, I hope to show the immense adaptations the Tour has undergone over time while still maintaining a link to its original purpose of providing a cultural finishing to one's education.

**Presenter:** William Combs  
**Sponsor:** Ethan Hollander (Political Science)  
**Title:** Cubans in Crisis

Schools in the United States often teach history as if there is only one historical narrative. However, history is not black or white. What is wrong with the historical narrative of the Cuban Missile Crisis in the U.S. is that it excludes the Cubans in two ways. First, the U.S. government did not see the Cubans as playing a crucial role in Soviet missile deployment and resulted in the exclusion of the Cubans from the missile negotiations. Second, the American historical interpretation of the Cuban Missile Crisis doesn't emphasize the Cubans' role. By accepting this interpretation of history, the roles that Kennedy and Khrushchev played in the crisis seem more significant than they really were. This begs the question; if Cuban involvement was included in the narrative of the Cuban Missile Crisis would it diminish or promote the importance of Kennedy and Khrushchev's roles in the crisis? I am certain that the inclusion of Cuban involvement in the Cuban Missile Crisis would significantly diminish the roles of Kennedy and Khrushchev. Recognizing Cuban involvement in the Cuban Missile Crisis is essential because they created and then escalated the situation in Cuba which made them the pivotal actors in it.

**Presenter:** Ben Cook  
**Sponsor:** Aminta Perez (History)  
**Title:** An Analysis of Standard Oil Job Applicants from 1877-1890

I analyzed 412 job application letters written to John D. Rockefeller to see what I'd discover. I discovered that Rockefeller's Standard Oil Company was so revolutionary that applicants often did not know what to apply for, that Christianity factored prominently into late 19th century culture, and that geography limited 19th century applicants.

**Presenter:** Andrew Dettmer  
**Sponsor:** Stephen Morillo (History)  
**Title:** Please Sir, May I Have Some More: The History of Anglo-American Adoption and its Impact on Gay Marriage

The intensity of the debate over gay marriage in the United States seems to grow with each passing day. Many argue that the U.S. is reaching a tipping point on one of the most passionate political debates of our time; a debate that so involves all of society that even Wabash College as an institution has gotten involved. However, many do not realize that many of the themes and arguments used in the debate over gay marriage played out in a different argument; the argument over adoption of children. This presentation will examine the history of adoption law in both the United States and England addressing everything from medieval adoption to the Dickensian world of adoption to the life of a modern adopted child like myself; and how this history should influence our positions and beliefs in the current gay marriage debate.

**Presenter:** Christopher Donahue  
**Sponsor:** James Makubuya (Music)  
**Title:** The British Musical Invasion

At the turn of the 1960's, music was changing vastly; western cultures throughout the world were about to embark

on a musical journey. This presentation came to be when I wondered, “Who started real ‘rock and roll’?” The Beatles served as the British carriers of new, upbeat tunes that struck cultures across many oceans and lands. In addition, I was concerned with which bands started the typical classic rock band that contained a couple of guitars or basses, microphones, and a set of drums. In my presentation, I will discuss how bands like The Rolling Stones emphasized cultural and social happenings that were affecting the era. Using audio and visual examples, I will further discuss how many other British invaders, including those two, mentioned above, applied homophonic textures along with lyrically significant meanings that were unleashed with their voices as they sung to the upbeat rhythms. I will finally use additional illustrations to conclude by certifying not only how the British Invasion continued to affect various countries’ music scenes for decades upon decades but also how it – the British Invasion - completely altered the course of popular music and popular culture.

**Presenter:** Noah Eppler  
**Sponsor:** James Cherry (Theater)  
**Title:** The Intersection between New York City and the Work and Philosophy of Martha Graham

Throughout the 20th century, choreographer and performing arts theorist Martha Graham reshaped the collective conceptions regarding dance. Deviating from the canon of classical ballet, Graham pioneered an entirely independent canon that redefined the up/down axis of performance space, the center of the performer’s body within a space, and the relationship between movement and how movement can express meaning. This presentation will explore the intersection between Martha Graham’s life in New York City and her philosophy and subsequent work. In the process, the presentation will delineate how Graham’s life in New York City, through the artists she came into contact with as well as through instilling a cosmopolitan spirit within her, played an extensive role in the development of Graham technique, and contributed to her becoming the “mother of modern dance.”

**Presenter:** Seton Goddard  
**Sponsor:** Warren Rosenberg (English)  
**Title:** Norman Maclean’s *A River Runs Through It*: A Critique of Natural Masculinity

In Norman Maclean’s novel *A River Runs Through It*, multiple scenarios throughout the novel and film serve as meaningful depictions of “masculinity” and issues related to gender. The phenomenon of “natural masculinity” manifests itself through the characters of Norman, Paul, Reverend Maclean, and Norman’s brother-in-law, Neil. Additionally, the emphasis on fly fishing and the Maclean family’s mutual love for it illustrates elements of “natural masculinity.” Both the novel and film versions of *A River Runs Through It* provide valuable insight as gender is explored and discussed, particularly in the context of masculinity.

**Presenter:** Ryan Guerrettaz  
**Sponsor:** Gilberto Gómez (Modern Languages & Literatures)  
**Title:** *Carpe Diem*: A Timeless Motto

One of the most commonly used mottos and slogans nowadays is *carpe diem* or the famous “seize the day” mentality. However, even though this slogan can be found throughout our culture today, this mentality actually can also be found throughout history as one of the most defining forces in the growth of various communities and cultures. Specifically, it has roots dating back to the early classical Roman Empire, through the Renaissance period, and especially throughout one of the most heavily studied and extraordinary eras in Europe: the baroque period. This age is usually referred to as an age of extreme growth and transformation in art and literature, and one of the driving forces behind this profound emphasis in art was this outlook of *carpe diem*. As an example, this mentality dominates some of the most well-known works of Spanish prose and poetry from this period. Therefore, in this presentation I will show how *carpe diem* not only stands as a highly-utilized outlook on life today, but that through authors such as Luis de Góngora, Francisco de Quevedo, and Sor Juana Inés de la Cruz, it is clear that *carpe diem* exists as a truly timeless aphorism.

**Presenters:** David Gunderman & Ashish Baiju  
**Sponsor:** Chad Westphal (Mathematics & Computer Science)  
**Title:** Adaptively Weighted Numerical Solutions to Partial Differential Equations

What are Partial Differential Equations (PDEs)? What kinds of problems can PDEs help us solve? What does it mean to solve a PDE “numerically”? Along with briefly covering these topics, we will also talk about the research that we conducted last summer, dealing with some irregularities that can occur when solving elliptic PDEs. Specifically, corner singularities, discontinuous coefficients, slit problems, and convection dominance in elliptic PDEs can make problems more ill-posed than desired and typical numerical methods often fail to converge to a solution at a reasonable rate when irregularities such as these are inseparable from the problem. Our research focuses on adaptively weighting the “Least Squares Finite Element Method”, a common method for numerically solving PDEs. By reducing the importance of irregular sections of the domain, the computational methods are able to more efficiently and more accurately solve the areas with no irregularities.

**Presenter:** David Gunderman  
**Sponsor:** Brian Tucker (Modern Languages & Literatures)  
**Title:** Mathematics in Popular Fiction: An Analysis of the Character of Carl Friedrich Gauss in Daniel Kehlmann’s *Die Vermessung der Welt*

In 2005, Daniel Kehlmann completed writing what is now the best-selling German language book since 1985, titled *Die Vermessung der Welt*. The novel, whose translated title is *Measuring the World*, follows the lives of two German scientists, Carl Friedrich Gauss, one of the greatest mathematicians of all time, and Alexander von Humboldt, a famous German explorer, as they each “measure the world” in their own very different ways. Gauss pushes the bounds of mathematical thought without ever leaving his corner of the world in the Duchy of Braunschweig, while Humboldt becomes the first European man to explore many regions of South America. What is truly impressive about *Die Vermessung der Welt* is the success that Daniel Kehlmann garners in spite of his topic. Intellectual themes, especially early 19th century scientists’ personal lives, do not generally lend themselves to popular consumption. In this presentation, I will particularly focus on Kehlmann’s portrayal of Gauss. I will explore how Kehlmann successfully depicts the world of mathematics as something that is both intriguing and engaging, even to non-mathematicians.

**Presenter:** Wes Hauser  
**Sponsor:** Amanda Ingram (Biology)  
**Title:** Finding a Home Where Tree Kangaroos Roam: A Spatial Analysis of Habitat Requirements using ArcGIS

Lumholtz’s Tree Kangaroo (*Dendrolagus lumholtzi*, hereafter: LTK) represents one of the largest, endemic arboreal folivores in the Australian Wet Tropics. Yet, relatively little research addresses the marsupial’s abundance, distribution, ecological services, or habitat requirements. In this study, 711 LTK sightings were compiled from a multitude of preexisting sources in Northeast Queensland in order to assess the current distribution of this species in relation to various climatic and habitat features. Using spatial autocorrelations, it was found that LTK sightings were non-randomly distributed. LTK sightings were then juxtaposed against habitat maps for vegetation type, base soil, elevation, maximal annual temperature, annual humidity, and annual rainfall. Spatial regressions in ArcGIS showed that LTK sightings were significantly correlated with vegetation type, elevation, and annual rainfall. LTK presence was strongly linked with Complex Notophyll and Mesophyll Vine Forest fragments (rainforest vegetation types 5 and 1b respectively), elevations between 700-900 m, and areas that received approximately 1600-2400 mm of rainfall annually. This information is of particular relevance for conservation efforts for LTK, and has implications for future surveys and habitat protection/restoration projects. As LTK acts as an umbrella species, research that promotes its conservation will also benefit other organisms within the rainforest ecosystems of Northeast Queensland.

**Presenter:** Lu Hong  
**Sponsor:** Robert Horton (Psychology)  
**Title:** Psychopathy as a Moderator of the Attitude-Behavior Relationship

Psychologists differentiate between explicit and implicit attitudes. Explicit attitudes are one's conscious judgment of an object, whereas implicit attitudes are one's automatic evaluation of an object. Both measures of attitude have demonstrated good predictive validity in different contexts, which suggests the existence of moderating variables that qualify their ability to predict behaviors. For example, past studies have shown that implicit attitudes, in comparison to explicit attitudes, are better predictors of impulsive behavior. Such results have practical implications as impulsivity is a common feature in several maladaptive personalities, especially psychopathy, a set of traits characterized by impulsive behavior, grandiosity, guiltlessness, delinquency and anti-sociality. The current study investigated whether psychopathy moderates the attitude-behavior relationship by measuring participants' explicit and implicit attitudes for fruit vs. chocolate and then measuring how many of each type of food they chose based on their preference. Preliminary results were consistent with expectation that implicit attitudes were a better predictor of behavior for those high, rather than low, in psychopathy. However, the extent to which psychopathy also moderates the predictive validity of explicit attitude is to be determined in future studies. The results of the present study add to our understanding of the dual-process model of cognitive functions.

**Presenter:** Ryan Horner  
**Sponsor:** Agata Szczeszak-Brewer (English)  
**Title:** Icons and the Artist: Joyce's Hypocritical Idealism in *Ulysses* and *Portrait*

Modern-day Ireland runs a substantial industry based on the histories and legends surrounding her famous artists, especially including author James Joyce. Beginning nearly a century ago, however, Joyce started to explore the phenomena of idealizing artists. In *A Portrait of the Artist as a Young Man*, Stephen Dedalus is an aspiring writer with romantic ideas about what that lifestyle includes, for him and for the established greats. Stephen recognizes the delusional idealizations of the Irish nation, and chooses to skirt the national rhetoric. *Ulysses*, however, sees him brought low; Stephen has become a cynic in the face of the faithful Irish public. In *Ulysses*, Joyce underscores the delusional Irish construction of the "artist" through Stephen's experiences. Despite the harsh reality faced by his semi-autobiographical characters, Joyce utilized the concept of the "ideal artist" to promote his own work and cement his place in literary anthologies and best-of lists. In this work I examine the "ideal artist" of Joyce's fiction and life in order to better understand the human tendency to idealize.

**Presenter:** Nikolas Jones  
**Sponsor:** Eric Freeze (English)  
**Title:** N'k Stretching and other Poems

I will perform poems written both independently and for various courses at Wabash over my three and a half years. I am currently compiling these poems for a manuscript in English 498/499. In the attempt to capture images and sound, I use poetry to reinterpret my surroundings. Many of the poems focus on the sensual experience of human interaction, while others on the spiritual and natural world with more political proclamations. Intermittently, I will discuss some of the thoughts, feelings and experiences that served as inspiration for the poetry. Whether it is through the audible reproduction of sounds and words by the tongue, or the use of the mouth as a tool for edible and sensual satisfaction, each poem is rooted in an "oral" sense of the world.

**Presenter:** Nikolas Jones  
**Sponsor:** Eric Freeze (English)  
**Title:** Expatriate in Paris: A Reading of Poetry and Novel Excerpts

I wrote sitting down in a compact studio apartment overlooking Montparnasse Cemetery, on the clean-cut grass of the



Luxembourg Gardens, the piss-stained banks of the Seine, and the maroon cushions of Shakespeare and Company Bookstore. Yet the inspiration for my writing stemmed from movement: stocking bookshelves with fellow artists and travelers, wobbling with every metro stop, busking for change with my guitar, or strolling across Paris, lost in the final hours before sunrise. I moved through Paris as an active participant in its pleasures, yet also an observer. In this city, tourism makes its bed amongst some of the greatest histories of art, religion and riches of Europe. This makes the fickle engagement between life as an artist and the desire for commercial sight-seeing a tough balance. Exploration and creation were the intent of my summer. By writing, I actively engaged my surroundings, looking for more out of Paris than a snapshot in front of the Eiffel Tower. During my presentation, I will briefly speak to particular events of a summer exploring France and Italy, and spend the rest of the time reading fiction and poetry based around my life as a writer this past summer.

**Presenter:** Kalp Juthani  
**Sponsor:** Amanda Ingram (Biology)  
**Title:** Does Coffee Cause Cavities?

The aim of the study was to determine the effects of *Coffea arabica* on the activation of Matrix metalloproteinases (MMPs) and the demineralization of sound enamel. When activated, MMPs are capable of degrading collagen and promoting caries formation. Multiple cariogenic substances contain compounds that are capable of initiating the caries process, including compounds found in *Coffea arabica*. In this study, Human Enamel samples and Human Gingival Fibroblasts were subjected to *Coffea arabica* exposure. The enamel samples were measured through hardness testing. Zymography assays were performed on the contents of the Human Gingival Fibroblast medium. The study found no substantial demineralization across the enamel and identified no latent forms of metalloproteinases with exposure to *Coffea arabica*.

**Presenter:** Josh Lutton  
**Sponsor:** Jessie Mills (Theater)  
**Title:** Be a Man: Representing Masculinity on Stage

Masculinity is a term which possesses many facets of characteristics and categories that explore different microcosms of manhood that are represented in today's culture. In the conceptual design of the costumes for the Student One Act plays, masculinity plays an important role in the visual look and function of each character within their respective plays, which, as the costume designer, is the main purpose of my work. Because these characters are so diverse, costume design cannot draw from one or two versions of masculinity, but must look at all the aspects of how the role of masculinity functions in each play in order to accurately portray the depth of these characters. Distinguishing and representing the different forms of masculinity are invaluable tools all designers must obtain in order to better develop the visual appeal and style of a play. In relation to Wabash College, this same concept can be utilized. We all can agree that the environment we have found ourselves in, an all-male institution is a strange place. Determining and understanding the various forms of masculinity and how they are presented on campus is vital for the enrichment of the "Wabash Experience."

**Presenter:** Nathan Manning  
**Sponsor:** Todd McDorman (Rhetoric)  
**Title:** Media and the Zimmerman Trial: Risks in Trial Framing

High-profile trials in the American judicial system have always garnered attention from network news corporations. The George Zimmerman trial in the summer of 2013 was one such trial from which controversy and popularity spouted. This analysis interprets transcripts of trial coverage from MSNBC, CNN, and FOX News through the use of pentadic criticism and demonstrates how two dichotomous ratios were presented to the viewers that resulted in a tragic framing of the trial. I contend that the two ratios in concordance with the tragic framing divided communities and resulted in social unrest and distrust in the legal system. As a possible preventative measure for this in future

instances of trial coverage, I posit comedic framing as an ideal candidate.

**Presenter:** Kyle Morgan  
**Sponsor:** Scott Himself (Political Science)  
**Title:** Leaks in Wartime

Leaking makes secret information public. This issue hits home because the Edward Snowden case has shown the impact of leaking continues throughout history. Edward Snowden has made headlines throughout the world and put the spotlight on the United States National Security Agency. Because the leaking continues, we do not know the full consequences of his revelations. During World War II, another major leak never truly came to light because three days later the unimaginable happened when the Japanese attacked Pearl Harbor. A newspaper article leaked the entire war plan for the United States military once it entered the war. What happened to the leaker? Moving to another generation, Daniel Ellsberg leaked the Pentagon Papers in 1971. Although the Papers included secrets, they did not include current war plans. It seems to me that if someone harms our national security through unpermitted revelations, we must punish them. However, some leaks provide a way to keep the government honest, especially if it infringes upon the rights of the United States citizens.

**Presenter:** Scott Morrison  
**Sponsor:** Agata Szczeszak-Brewer (English)  
**Title:** Female Subjectivity in Colonial Sexual Relationships

A great deal of post-colonial studies has focused on the portrayal of the “other” and how those characters deal with their identities. Often, the black male is the focus, and many black male characters in post-colonial literature are portrayed as seeking relationships with white females to establish themselves as equal with white males. While this is a valid area of study, the white female and her role in these relationships has been largely overlooked. I argue, based on a close reading of Salman Rushdie’s *The Satanic Verses* as well as background research, that women are active participants in these relationships. The white female often embarks on a similar identity search to the black male, but she attempts to separate herself from her colonial heritage. In this attempt, the white woman exoticizes the non-white male and ends up becoming a colonizer herself.

**Presenter:** David Myles  
**Sponsor:** Eric Freeze (English)  
**Title:** *Your Body Strikes Back*

Creative Non-fiction seems like a contradictory genre. Often it requires relaying the truth in an interesting way, with the author using emotions to twist events for dramatic effect. Contemporary essayists David Sedaris and Brian Doyle share this trait, with their works serving as major influences on my own writing. In their confessional/self-deprecating/emotional style, I attempt to weave amusement parks, human anatomy, and existential wondering into one cohesive whole. *Your Body Strikes Back*, is a second-person exploration on the diagnosis of Crohn’s Disease, a common digestive and immune disorder. Mostly autobiographical, *Your Body Strikes Back* means to discuss disease as a catalyst for change. It may not be glamorous, but it should be interesting.

**Presenter:** Han Nie  
**Sponsor:** Dwight Watson (Theater)  
**Title:** The History and Rise of Stage Director

In this Senior Project, I explore the history and the rise of stage director. Even though the concept of the director did not take shape until the 19th century, a certain level of theatrical discipline has always been needed in theater. In Ancient Greek Theater, Aeschylus and other playwrights are said to have “directed” their own plays. Later, the power

shifts to stage manager who is responsible for various tasks like stage scenery, casting and managing rehearsal. In the Renaissance time, the so-called actor-manager often served as the director, such as Moliere. In the middle of 19th century, the Duke of Saxe-Meiningen, a German theater artist, is cited for his artistic vision and unity of theatrical elements. Subsequently, Andre Antoine, a French director near the end of 19th century, believed the setting had to be more than a harmonious functional background. Furthermore, the Russian director Konstantin Stanislavsky went beyond the realism to rediscover the “true nature” of theatrical art. As we can see, the leadership and power flow from playwright to senior actor, to stage manager, and eventually to the director. As the language of a play becomes less important, modern director like Robert Wilson even goes so far as to completely change the text or simply ignore the text, since the modern philosophy focuses mainly on the subject matter of the play and its effect on the audience produced by carefully designed sound, light, and movement. Most importantly, the great directors are not only able to create additional value beyond scripts, but also lead others into participating in the creative process.

**Presenter:** Andrew Powell  
**Sponsor:** Scott Himself (Political Science)  
**Title:** Is Bipartisanship Still Possible?

I believe that bipartisanship is still possible in America today. In America we have placed and continue to place too much emphasis on “toeing the party line.” But both former U.S. Senator Richard Lugar and 1940 Republican Presidential nominee Wendell Willkie personified bipartisanship in foreign policy while still maintaining their party’s conservative views. The problem is their party crucified and shunned them for working with Democrats to make the world a safer place. Our world needs more servant leaders like Willkie and Lugar. Politicians must heed their example and learn what true leadership is. It is service. We must redefine success to demonstrate that to serve others is to win. And if we do that we can be bipartisan again. Today, our politicians do not cooperate with each other. While Barack Obama reached out to Mitt Romney after winning the 2012 election, they were unable to establish a working relationship. But leaders have succeeded when they are bipartisan. Roosevelt genuinely valued Willkie’s help. And Willkie valued his country’s success more than his political success. Ultimately, Richard Lugar exemplifies Willkie’s servant leadership, and shows us that it is indeed possible to be bipartisan in modern-day America.

**Presenter:** Jia Qi  
**Sponsor:** Dennis Krause (Physics)  
**Title:** Reduced Order Modeling for Gravitational Waveforms

The upcoming generation of advanced-sensitivity ground-based gravitational wave interferometer detectors brings an increasing demand to accurately and efficiently represent gravitational waveforms from generic processing compact binary sources. Binary black hole, as the strongest known source for gravitational waves, is one of the most important subjects in the study of gravitational waves. However, due to the large number of parameters involved in a compact binary system, the number of waveforms templates from a binary black hole system can become extremely large. This makes gravitational wave searches, parameter estimation, and modeling prohibitively expensive and computationally unfeasible. To address this problem, the Reduced Basis method was introduced to gravitational wave physics. This method can efficiently compress the number of waveforms needed with an extremely small loss of accuracy. We take a further step towards applying Reduced Basis method. We tested the efficiency of representations between different orders of post-Newtonian expansion models and representations of inspiral stage waveforms to the whole inspiral-merger-ringdown waveforms. We found that a reduced basis generated by a lower ordered post-Newtonian model can efficiently represent waveforms templates of a higher ordered model. Also, reduced basis from inspiral waveforms can accurately represent inspiral-merger-ringdown waveforms. Those results suggest a possibility that we can use relatively simple model in the study of gravitational wave data.

**Presenter:** Mark Riffle  
**Sponsor:** Michelle Rhoades (History)  
**Title:** Putting the Qin in China: The Qin's Barbaric Rise and Fall 771 BCE-206 BCE

The 2002 Chinese film *Hero* tells a fantastical tale of a single man challenging a powerful Chinese warlord in pre-unified China. The film features fantastic set pieces, visually stunning fight sequences, and an inspirational story about the unification of China. My interests in the subject of pre-unification China grew further while attending Wabash College. Religion Professor David Blix taught an entry-level class about the various Chinese philosophies and religions over the years. Early in the class Dr. Blix gave a lecture about the First Emperor of China. I sat in awe, listening to Dr. Blix describe the fantastic tales of the Qin Dynasty, the unifiers of China. Now in my senior year, I've decided to use this subject matter as the topic of my senior paper. Many modern Americans, my entire family included, know little to nothing about Ancient China. When I mention the infamous terracotta warriors people vaguely know what I am speaking about, but they know nothing of their significance despite China's current political significance. I set forth to educate myself, and those around me, on a fascinating subject of Chinese, and human history. Using the few translated primary and secondary sources available to me through the Wabash College Lilly Library, and the tremendous inter library loan service, I embarked on a quest to discover how and why the Chinese state of Qin successfully conquered all opposing Chinese states and formed the Qin Dynasty, which lasted from 221-206 BCE. I also sought to discover why after only a few years of rule the Qin Dynasty collapsed.

**Presenter:** Nate Scola  
**Sponsor:** Todd McDorman (Rhetoric)  
**Title:** Repairing an Image: A Rhetorical Analysis of Tiger Woods's Apology

On February 9, 2010, Tiger Woods went from being one of the most iconic sports figures in the world, to one of the most controversial sports figures ever. Once a professional athlete makes a mistake, it generally becomes his or her duty to own up to that mistake in an attempt to restore his or her value as a credible athlete with high moral character. When an athlete violates societal values with poor choices, he or she sometimes takes the case to the public in the form of an apologia—a speech of self-defense. Woods provides a perfect example of someone who has violated a societal norm—infidelity—and, nearly three years after his public confession, is still trying to regain his ethos as a man and one of the greatest golfers in history. For this research presentation, I will demonstrate how Tiger Woods's apology speech after his infidelity scandal meets all the criteria of atonement rhetoric, a sub-genre of apologia. However, although Woods's speech content successfully meets all the criteria of atonement—"he checks off the boxes," I argue that he ultimately fails in his atonement efforts because his poor delivery of the apology indicates a lack of sincere contrition.

**Presenter:** Patrick Singleton  
**Sponsor:** Michelle Rhoades (History)  
**Title:** John Dillinger: Public Enemy Number One, Hero or Myth?

John Dillinger was a bank robber during the Great Depression and the banking crisis of the 1930s in the Midwest that was immortalized as a hero to the public. I have always questioned why a man that was robbing his own people could be respected and hailed as some sort of hero, so I decided to research the John Dillinger Gang. Why was it that the public could cheer for a criminal? The public was persuaded by popular culture and the notion that the bank was an enemy of the farmer into supporting a criminal like Dillinger. Drawing on the newspapers and FBI documents of the time, I saw that Dillinger had two faces. One face that was considered a desperado, cultural hero and another was seen as a dangerous criminal. Numerous documents concerning Dillinger's gang throughout history drove me to the conclusion that social pressures during the Great Depression and Banking Crisis culminated in the myth of Dillinger as a social bandit that he is notorious for to this day. Examining the FBI archives and looking at how the FBI saw Dillinger and the tactics they used to take him down easily exploit this myth.

**Presenter:** Jingwei Song  
**Sponsor:** Amanda Ingram (Biology)  
**Title:** Age-related Changes to VGluT2 protein in Rat Medial Geniculate Body

Auditory deficits are present in a growing population of millions of elderly listeners in the USA alone (NIDCD). Much of the research focus has been on understanding cochlear degeneration (peripheral), but the mechanism and consequences of age on central auditory structures are not nearly as well understood. This project examines the microscopic changes that occur in the medial geniculate body (MGB), which is the final and necessary processing station for auditory information which is destined for the cerebral cortex. We used immunohistochemistry and confocal microscopy to track the levels and distributions of candidate protein - VGluT2 (mainly targets the ascending excitatory terminals from *Inferior Colliculus*), and related those back to changes observed in auditory functions.

**Presenter:** Patrick Stroud  
**Sponsor:** Stephen Morillo (History)  
**Title:** Civil and Common Law in Colonial Canada

Legal historians divide European law into two families: common law (British law) and civil law (continental European and Catholic law). Common law judges love cases; courts “discover” law on a case-by-case basis, and those cases make precedents for future ruling. Civil law courts love codes; courts compare cases to existing laws, and those laws control judges’ rulings. The two rarely interact, and almost never get along, save one prominent example: Canada. When the British Empire annexed the final French pieces of colonial Canada, historians closed the book on civil law in Canada. The common law of the British supposedly whitewashed any French legal traditions. But is History so binary? Can we say that British common law “conquered” French civil law? Through analyses of Canadian legal history, Patrick Stroud, ‘14 will demonstrate that French civil law has been a part of legal development in Canada throughout its history, including its modern hybrid system.

**Presenter:** Patrick Stroud  
**Sponsor:** Ivette Wilson (Modern Languages & Literatures)  
**Title:** The *Cántigas de Santa María*: A Genre Study

Written during the reign of Alfonso X, king of Castile-León (1221-1284), the *Cántigas de Santa María* is a collection of 420 medieval songs and poems devoted to Mary, the mother of Jesus in the Christian religion. In these Galician-Portuguese holy songs, the listener hears presentations of daily life in the Iberian Peninsula: stories of miracles, acts of love, stories of gambling, and much more. The fact that this mix of ideas all appear in one holy book shows the centuries of cultural influence that impacted the *Cántigas*; literary traditions from the Muslim world, hymns from Catholic Europe, medieval theatre, and love songs from Provence all play a role in the *Cántigas*. In this presentation, Patrick Stroud ‘14 will explore how the text’s presentation of its two main characters--Alfonso X, the narrator, and the Virgin Mary--reflects the genres that inspired the court of Alfonso X to write the *Cántigas*.

**Presenter:** Xidian Sun  
**Sponsor:** Robert Foote (Mathematics & Computer Science)  
**Title:** On Curves and Polygons with the Equiangular Chord Property

This presentation concerns the following problem: Consider a closed convex curve such that two points,  $x$  and  $y$ , can “chase” each other so that the angle made by the chord  $xy$ , with the curve at both end points has a constant value. For example, a circle has this property, for any value of  $\alpha$ . What values can  $\alpha$  have if the curve is not a circle? In the Euclidean plane, this problem was solved by E. Gutkin, who showed that a necessary and sufficient condition is that  $\alpha$  satisfies the equation,  $k \tan \alpha = \tan k\alpha$  for some  $k \geq 2$ . We generalize the result in spherical and hyperbolic geometry, and in discrete polygonal system.



**Presenter:** Chet Turnbeaugh  
**Sponsor:** Eric Freeze (English)  
**Title:** *JUMP!*

*JUMP!* Is a screenplay that shows how brave human beings can be in the face of adversity. Truly life-changing moments only come with great action, which must come face-to-face with great risk. The script follows multiple characters, along multiple plotlines—all of which deal with the difficulties of change and becomingness, and the necessity for each character to “jump” when faced with major risk, in order to be met with major reward. From drug addiction to recovery, from morbidly obese to marathon-material, from financial and familial upset, to empowered lives beyond your wildest dreams, these characters’ stories offer powerful examples that encourage and inspire us to put our dreams ahead of our fears, our hopes above our doubts, and our willingness to lead and be led before anything else. This screenplay comes at a time in our world where our global vision is shifting into a framework where humans are becoming more self-actualized, more self-aware, and more willing to be brave to achieve the impossible. *JUMP!* and the safety net, will appear. This project is part of Chet Turnbeaugh’s Senior Capstone in Creative Writing. This is his first feature-length screenplay.

**Presenter:** Jeremy Wentzel  
**Sponsor:** Alexandra Hoerl (Political Science)  
**Title:** Built to Last: A Glimpse into the Wabash Vision of Eric Gugler, Architect

The legacy of Eric Gugler, architect, is unavoidable at Wabash College. During the Trippet and Sparks presidencies, one man designed nearly half the current sizable buildings on campus. Gugler’s legacy is built to last. It’s visible in customized campus buildings we’ve spent hours within and around. This presentation explores research from archive visits at the Smithsonian Archives of American Art as well as Georgia Hall at the Roosevelt Warm Springs Institute in Warm Springs, Georgia. The focus will be Gugler’s interactions with the Roosevelt family, and why that is important in considering the historical significance of Wabash campus buildings. As the College sets strategic plans with building projects, this presentation begs the question: restore and re-purpose, or build anew?

**Presenter:** Neil Wichlinski  
**Sponsor:** Stephen Morillo (History)  
**Title:** The English Reformation: A Legal Movement

The English Reformation is widely known as a religious movement in which Henry VIII cut ties between the Church of England and Rome. An examination of the period reveals Henry VIII’s grievances with the Pope were legally based, not religious, and the actual religious practices of the Church of England did not significantly change immediately. However, England simplified legal practices by eliminating papal influence. Additionally, England changed faiths several times following Henry VIII’s rule, while the legal system sustained the adaptations from the Reformation. The English Reformation compelled Parliament to correct inefficiencies in England’s legal system caused by conflicts between secular and ecclesiastical supremacy. Though commonly referred to as a religious movement, England’s separation from Rome impacted The Common Law more than the Church of England. Therefore, the English Reformation was a legal rather than a religious movement. My argument will begin by examining the relationship between Common and Canon Law prior to the Reformation. I will depict the state of the English legal system, as well as the Canon Law’s influence on English Law. These factors will be related to Henry VIII’s decision to separate English Law from Canon Law. I will then discuss the immediate changes to religious and secular law, and how these changes were more significant to the Common Law than the Church of England. Finally, I will show how the Common Law was continued under the Tudor dynasty, while demonstrating how the legal reforms outlasted the religious.

**Presenter:** Yunan Wu  
**Sponsor:** Karen Gunther (Psychology)  
**Title:** Why is it Hard for Children to Understand What You are Saying?

In the present study, we investigated why some ambiguous sentences are harder for children to understand than for adults. We predicted that the deficit in children is due to their underdeveloped executive function. People encounter a lot of ambiguities as we hear sounds, words, and eventually a whole sentence. Previous research has indicated that executive function is involved in resolving these ambiguities, and adults are more proficient in ambiguity resolution than children because their executive function abilities have matured. In the present study, instead of directly running children and adults, we recruited bilingual and monolingual children because bilingual children are found to have more advanced executive function abilities and other variables like language experience and intelligence can be controlled. Participants have to complete 2 sessions of the study. The first session tests their executive function. Each participant then completes the second session which includes ambiguity resolution tasks such as garden-path sentences (e.g. “put the frog on the napkin in the box”). An eye-tracker is used during the second session to reveal how a sentence is processed by recording the eye gazes. The study is currently ongoing, and the data will be presented at the event.

**Presenter:** Yiyuan Zuo  
**Sponsor:** James Makubuya (Music)  
**Title:** Western Classical Music and Chinese National Music: An Analytical Discussion of their Similarities and Differences

In this presentation, I am going to talk about the similarities and differences between the Western Classical Music and Chinese National Music. The major points for the analysis will focus on the western classical music ranging from the Baroque to the Classical Eras and the Chinese National Music from the Tang Dynasty to Modern Chinese Pop Music with national musical elements. The three major perspectives on which I will base my analysis will include: the origins and use of different musical instruments, the various recital forms of musical pieces, and the fundamental differences in culture backgrounds. As part of my presentation, I will use the audio and visual materials to better illustrate my topic. Please come and enjoy this great analytical presentation featuring both the Chinese national music and Western classical music.

## Poster Presentations (Listed by Poster Number)

### Poster #1

**Presenter:** John Vosel  
**Sponsor:** Doug Calisch (Art)  
**Title:** Surreal Hand Narratives

The artwork I have created this semester has shown a gradual change in its overall theme and context but I believe that my experimentation has enabled me to determine what I enjoy as an artist. I began the semester fascinated with kinetic (moving) art, until realizing there was much more that interested me. Therefore, I transitioned to surreal and more realistic sculptures. Artists such as Morgan Herrin and Daniel Arsham are a large inspiration for me, with emphasis on their focus on surrealism and use of non-traditional materials. In my sculpture I work with balancing the human form (mainly hands) with found and built mechanical objects. The overall layout and composition of each piece creates a number of provocative concepts related to the passage of time, entropy, mechanization of our society, and several others. The narrative aspect of my work allows room for the audience to make their own opinion or assumption about the work's overall message, given there can be multiple. I have created a body of work that resembles these ideas while also exploring a series of techniques such as casting, woodworking, welding, and assembly.

### Poster #2

**Presenter:** Lu Hong  
**Sponsor:** Chad Westphal (Mathematics & Computer Science)  
**Title:** Modelling the Generation and Propagation of Action Potentials

Action potentials, the rapid change in the voltage across the neuronal membrane along neurites, are considered to be the fundamental mechanism through which the nervous system transmits and processes information. The action potential is primarily mediated by the movement of the chloride, sodium and potassium ions in the cytoplasm and extracellular space due to the interplay between concentration and electrical gradients as well as the voltage-dependent conductance change of sodium and potassium ion channels studded on the plasmalemma. In this presentation we will investigate the RC circuit simplification of neurons in an effort to mathematically describe the generation and propagation of postsynaptic potentials at active dendritic arbors. Such models draw upon the cable theory, built from the prototype of the diffusion partial differential equations, as well as the model by Hodgkin and Huxley, a system of nonlinear first-order ordinary differential equations derived from their study of action potentials at on giant squid axons. This theoretical investigation eventually leads to what is known as the active cable equation. The solution to the equation, usually through the Crank-Nicolson method, allows us to fully capture the characteristics of action potentials and pave the way for higher-order models of neuronal systems.

### Poster #3

**Presenter:** Kendall Baker  
**Sponsor:** Adam Bowen (Media Center/Information Technology)  
**Title:** Underwater in Mozambique

I will present a poster and graphic display to visualize my 2013 summer internship, Underwater Photography in Mozambique. My presentation will include many aspects of the internship. I plan to present: how I found the internship, how I prepared for the internship, and my experience while abroad. A brief glimpse at the country's geographical features, history, and animals will be given. I will incorporate our lodging and the dive center at which our group dived. The main focus of my presentation will exemplify the skills I learned as an underwater photographer. The internationally published underwater photographer, Fiona Ayerst, led our group of interns. Fiona, and two other media specialist, focused on three major teaching points: photography editing software, marketing yourself, and how to shoot photos. Comparing an edited photograph with an original, I will go through the steps to accomplish the final product. To market myself, I am displaying my website and social media connections. As for underwater photography,

I am going to compare underwater to land photography, explaining the lack of light and the loss of colors underwater. In closing, I will share my photos and souvenirs as I take any further questions about my presentation or internship.

#### Poster #4

**Presenters:** Cole Hruskovich & Jacob Caddick  
**Sponsor:** Chad Westphal (Mathematics & Computer Science)  
**Title:** Indoor Track and Field Indexing

Indoor Indexing is a very controversial topic in Track and Field right now. Indexing involves converting times from the various types of indoor tracks which include flat 200 m, banked 200 m, undersized, and oversized tracks for national qualifying marks. These times are converted based on an advantage, or disadvantage, of the track. Many feel that the current conversions place too much of an advantage on running on a banked track. In this summer research project, we worked with Coach Busch and Professors Westphal and Thompson to study the methodology behind indexing and to explore alternative approaches. We have developed a physics based conversion tool that models overall performance based on running mechanics and the geometry of the different tracks. Our model is supported by experimental data collected over the summer from timed trials of the Wabash Track athletes.

#### Poster #5

**Preesenter:** Ye Yuan  
**Sponsor:** Peter Mikek (Economics)  
**Title:** Credit Default Swaps and Capital Structure

Using both macroeconomic and corporate level data, this study aims to find the role of Credit Default Swaps (CDS) in the Eurozone sovereign debt crisis and in corporate capital structures. To study the Eurozone sovereign debt crisis, I collected data from 16 nations from 2008 to 2013. Most of my data are retrieved from a Bloomberg terminal. These data include the last prices of the bid-ask spread of the sovereign debts and other leading indicators. As for the corporate level study, I take the financial data of Standard and Poor 500 (S&P 500) firms as my sample. I consider the single-name CDS spread of these firms and their leverage ratios, along with many other financials, in my quantitative analysis. In this study, I used pooled-OLS and latent class analysis as main research methodologies, the latter of which is a rather new statistical method for finance empirical studies. Although I implement different methodologies, all my findings are consistent with current literatures. My macroeconomic findings show statistically significant positive influence of higher debt-to-GDP ratio on CDS notional amounts-this is consistent with the findings of Baum and Wan (2010). My regressions with market indices show that the CDS spread is negatively influenced by market value index, and market leverage is negatively, but slightly, influenced by the CDS spread, which is consistent with the findings of Saretto and Tookes (2013) and Ashcraft and Santos (2009). Using a new methodology, my corporate level findings provide evidence for the results Saretto and Tookes (2013) provide.

#### Poster #7

**Presenter:** Adam Togami  
**Sponsor:** Patrick Burton (Biology)  
**Title:** Identification of Genes Targeted by the Wnt Pathway in *Nematostella vectensis* during Regeneration

The Wnt signaling pathway is a path of genes that are activated to stimulate regeneration. The genes that are ultimately responsible for regeneration are targeted by  $\beta$ -Catenin, the last gene in the Wnt pathway. By perfecting Wnt induction with alsterpaullone, RNA isolation protocol, cDNA synthesis, and qPCR reactions we were able to produce quality RNA being expressed at time points with different time exposed to alsterpaullone. The graphs compare expression of target genes across the different time points. The target genes are  $\beta$ -Catenin, Porcupine, fgfA1, and foxA.

**Poster #8**

**Presenter:** Ryan Snyder  
**Sponsor:** Scott Feller (Chemistry)  
**Title:** The Dimerization Free Energy between Helical Peptides in Saturated and Polyunsaturated Lipid Bilayer Membranes

Interactions between membrane proteins is a fundamentally important topic due to their role in controlling protein-protein association, which is required for numerous processes in cell signaling, as well as aggregation, which is associated with numerous pathologies. The goal of our project is to determine how the free energy of interaction between membrane proteins depends on hydrocarbon chain composition in a lipid bilayer. We used the molecular modeling program CHARMM to study a pair of transmembrane helices in a PDPC bilayer, having one polyunsaturated omega-3 fatty acid and one saturated palmitic acid chain. A second phospholipid (DPPC) with two identical palmitic acid chains serves as a control. By employing advanced sampling methods and long simulations, the calculations converged to a statistically significant difference in the dimerization free energy of PDPC and DPPC. A calculation finding the number of each chain of the PDPC lipid within 6 angstroms of each peptide showed that there was not a significant repulsion or attraction to one specific chain. A separate calculation which isolated the free energy contributions of each lipid demonstrated that the differences in free energy are largely attributed to the differences in the orientation of the peptides in the lipid bilayers instead of the direct interactions with the bilayer itself. The helix-helix interactions are attributed almost entirely to nonbonding forces between the peptides.

**Poster #9**

**Presenter:** Cameron Waller  
**Sponsor:** Patrick Burton (Biology)  
**Title:** The Necessity of Cell Proliferation in Oral and Aboral Regeneration of *Nematostella vectensis*

The current study describes the need for cell proliferation in oral and aboral regeneration of *Nematostella vectensis*. This species of sea anemone has been shown to undergo regeneration upon injury or bisection. BrdU staining technique was used here to test the necessity of cell proliferation during the regeneration process of various structures. It was observed that cell proliferation is necessary for regeneration of oral structures; however, it is not necessary for regeneration of aboral structures.

**Poster #10**

**Presenter:** Clarke Remmers  
**Sponsor:** Walter Novak (Chemistry)  
**Title:** Gelatin as a Way to Increase Transformation Efficiency of Plasmid DNA into Bacterial Cells

A common technique used in the study of genetics is the DNA transformation. Transformation is the genetic alteration of a cell resulting from the direct uptake, incorporation and expression of exogenous DNA from its surroundings. In this study we investigate a novel method for increasing the uptake and incorporation of plasmid DNA from TOP10 cells into bacteria by adding gelatin, a cheap reagent, to already purified DNA. Here the transformation efficiency for DNA purified using a common purification technique is compared between purified DNA that has gelatin added to it and purified DNA that has not. The gelatin-purified DNA sample is shown to have a positive effect on the number of colonies observed when the transformed bacteria was plated, suggesting that the gelatin increases the transformation efficiency of bacteria cells when combined with purified DNA.



**Poster #11**

**Presenter:** Wes Hauser  
**Sponsor:** Amanda Ingram (Biology)  
**Title:** The Secret Life of Orchids: Endohyphal Bacteria Brought to Light

The *Orchidaceae*, commonly known as the orchid family, represent nearly 10% of all known flowering plants on Earth. They possess a global distribution and lifecycles that are intimately tied to mycorrhizal fungi associations. These fungi form symbiotic connections with the roots of these plants to gain carbohydrates while providing nutrients to its host in exchange. Unlike most plants that participate in this symbiosis, orchids are obligately dependent on their mycorrhizal fungi to successfully germinate. Because early stages of these plants lack photosynthetic tissue, they are entirely reliant on their fungi for nutrients. In other plant/mycorrhizae systems, scientists have recently discovered bacteria within the fungi that mediate the formation of this mutualism. However, the presence and potential ecological implications of these endobacteria in orchid mycorrhizal fungi remains unknown. My summer research at the Smithsonian Environmental Research Center (SERC) addressed this gap in knowledge. I utilized SERC's extensive collection of orchid mycorrhizal fungi and a three-pronged molecular approach to successfully confirm the presence of endobacteria in these organisms. My work also identified the classes of these bacteria, and I designed several preliminary experiments to determine their ecological effects on the symbiosis.

**Poster #12**

**Presenters:** Brent Ledford & John Davis  
**Sponsor:** Laura Wysocki (Chemistry)  
**Title:** Synthesis of Rhodamine-B Sulfamide Derivatives and UV-Vis Spectroscopy Testing of Rhodamine Dyes

Fluorescent molecules have had an impact in biology and chemistry in terms of probing large and even small biological macromolecules, creating better tracking systems for cancer, and for sensing certain compounds such as fluoride or palladium. Rhodamine B is a molecule that is known for its fluorescent characteristics, but many have found that Rhodamine B derivatives can be used for a variety of applications by manipulating the open closed state equilibrium. In this study, four Rhodamine B sulfonamide derivatives were attempted to be synthesized, isolated using column chromatography, and FTNMR was used to confirm that the Rhodamine B Sulfonamide derivatives were correctly synthesized. The FTNMR results revealed that the Rhodamine B sulfonamide derivative isopropylamine was correctly synthesized. The other Rhodamine B sulfonamide derivatives of tertbutylamine, aniline, and ethylamine showed evidence that the desired derivative was present, but due to their being many impurities it was very hard to isolate. In addition, numerous UV-VIS tests were performed on different Rhodamine derivative dyes using a Diode Array Spectrophotometer. The results from the tests revealed insights into the open state and closed state equilibrium and allowed for the different Rhodamine derivative dyes to be characterized different based on structure, sterics, and electron transfer.

**Poster #13**

**Presenter:** James Boyer  
**Sponsor:** Eric Wetzel (Biology)  
**Title:** Preliminary Investigation of Potential Zoonotic Disease and Egg Dispersal at Crawfordsville Community Parks

Neglected Zoonotic Diseases are transmitted infections from domestic/wild animals to humans that cause serious damage when larvae migrate through the tissues of major organ systems. This research aims to investigate the epidemiology of possible infective species (*Toxocara canis*, *Toxocara catti*, *Ancylostoma caninum*, and *Baylisascaris procyonis*) at local parks in Crawfordsville. We used a Modified Sheather's solution (specific gravity of 1.27) to float helminth eggs, which proved to be successful. Although the floated eggs were not identified as free-living or parasitic, average length and width measurements helped to distinguish four distinct species. Due to high abundance, the four species were used to examine egg dispersion at Milligan Park. The results suggest that there are significant

differences in egg abundance in open vs. equipment areas and shallow vs. deep soil depths. Factors such as rainfall, soil moisture, and play activity have potential effects in egg dispersion and future experiments must take these factors into consideration. Transitioning from soil samples at local Crawfordsville parks to fecal samples from domestic cats and dogs from the Animal Welfare League of Montgomery County will prove to be a promising step in identifying infection.

#### Poster #14

**Presenters:** Ryan Cloyd & Austin McCauley

**Sponsor:** Laura Wysocki (Chemistry)

**Title:** Synthesis and Testing of a Library of Fluorescein Diether Cytochrome P450 Substrates

A fluorescent xanthene dye like fluorescein can be used as a scaffold to create fluorogenic enzyme substrates, allowing careful study of the activity of an enzyme based on the overall fluorescence of a sample. We are investigating the selectivity of a particularly important family of enzymes, cytochrome P450, which is involved in metabolic pathways in the body. We are targeting some known cytochrome P450 substrates to probe the selectivity and activity of specific isozymes within the cytochrome P450 family. Fourteen derivatives have been synthesized. Previous work has attempted to prepare a stable yet sensitive fluorogenic probe for fluoride based on fluorescein. We have continued this work with three syntheses based on a common intermediate. While the synthesis was successful, testing has shown some promise for one derivative as a useful probe. Based on these results, we expect steric interactions to be a major contributor to efficiency of reaction.

#### Poster #15

**Presenter:** Jackson Schroeder

**Sponsor:** Eric Wetzel (Biology)

**Title:** Comparative Analysis of Mixed Deciduous Forest Tree Composition and Growth in Ravines versus Upland during 1961-2010 in West-Central Indiana

Tree species composition, biomass, and radial growth of three species (*Acer saccharum*, sugar maple; *Liriodendron tulipifera*, tulip poplar; *Quercus alba*, white oak) located in different topographic locations, ravine and upland, were analyzed using tree cores over 1961-2010 in a mature forest in west-central Indiana. Compositional data varied with a combination of two stands showing differences between ravine and upland and also for stand B trees greater than 10 cm at diameter breast height (DBH). Neither stand B trees greater than 50 cm DBH nor the size classes for stand C showed differences. Absolute and relative diameter and above ground woody biomass (AWB) were compared between ravine and upland sites, which yielded conflicting results. Relative data showed higher growth rates in the ravine area, and absolute data showed higher growth rates in the upland. Climate effects on annual growth was analyzed for the effect of a hot, moderate, and cool temperature year using ring width index (RWI). The hot and dry year showed the greatest relationship with RWI as species differed across the stand and in the two topographic locations. The results of this study suggest that the combination of hot and dry years causes differences in growth rates among species in different topographic locations.

#### Poster #16

**Presenters:** Adam Pagryzinski, Austin Althoff, Ivan Koutsopatriy, & Cole Chapman

**Sponsor:** Lon Porter (Chemistry)

**Title:** Comparing the Binding Efficiency and Stability of Organic Monolayers Covalently Bound to Hydride-Terminated *p*-Type and *n*-Type Porous Silicon

Porous silicon (*por*-Si), a substrate that exhibits vast surface areas on the order of 500 m<sup>2</sup>/cm<sup>3</sup>, is an attractive candidate for use in many applications. These include microelectronics, medical diagnostics, and drug delivery, among others. However, hydride-terminated *por*-Si is easily oxidized to silicon dioxide under aqueous and ambient environments. One method of chemical passivation involves the use of a selection of hydrosilylation reactions.

These reactions functionalize organic groups onto hydride-terminated porous silicon. The resulting monolayers, bound through direct silicon-carbon (via primary olefins) and silicon-oxygen (via aldehydes) bonds, are produced via thermal, carbocation, and Lewis acid mediated pathways. All of these wet, benchtop methods result in the formation of stable monolayers which protect the underlying silicon surface from ambient oxidation and chemical attack. This project compared the functionalization and stability of p-type and n-type porous silicon through surface characterization via transmission mode Fourier transform infrared (FTIR) spectroscopy. Surface degradation tests were performed by exposing *por*-Si to alkaline solutions (pH 14, NaOH). The functionalized samples oxidized and dissolved at a greatly reduced rate when compared to the deterioration rate of the silicon-hydride control samples. Bare p-type *por*-Si demonstrated greater stability than n-type *por*-Si, showing a slower rate of surface oxidation in air and pH 14 solution. Similarly, functionalized p-type *por*-Si proved more resistant to oxidation and organic monolayer degradation than the analogous n-type samples. Based on these initial results, the thermal reaction appears to yield the greatest efficiency and stability.

#### Poster #17

**Presenters:** Austin Althoff, Adam Pagryzinski, Cole Chapman, & Ivan Koutsopatriy

**Sponsor:** Lon Porter (Chemistry)

**Title:** Functionalization of Photoluminescent n-type Porous Silicon with Aldehydes via Hydrosilylation Reactions: Oxidation & Degradation Monitored via Transmission Mode Fourier Transform Infrared (FTIR) Spectroscopy

Interest in porous silicon (*por*-Si) substrates remains high due to their potential use in applications ranging from optoelectronics to chemical sensors. Previous work in our lab, and others, has explored the bonding of organic monolayers to p-type *por*-Si surfaces, via the hydrosilylation of olefins and aldehydes. In this project, we have adapted simple benchtop methodologies to functionalize photoluminescent samples of n-type *por*-Si using aldehydes. Light-promoted, thermal, carbocation-mediated, and Lewis acid catalyzed hydrosilylation reactions were all successfully employed to bind aldehydes to hydride-terminated, photoluminescent samples of n-type *por*-Si surfaces. The resulting organic monolayers, bound to the *por*-Si via covalent linkages, greatly decreased the rate of substrate oxidation and degradation when exposed to alkaline solutions (pH 14, NaOH). Monolayers prepared from aliphatic aldehydes provided greater substrate protection when compared to phenyl-terminated coatings. Additionally, we observed that monolayers prepared via thermal-facilitated hydrosilylation pathways resulted in the highest reaction yields and exhibited the most effective substrate protection. Evidence of this initial progress is provided primarily through characterization of surfaces via transmission mode Fourier transform infrared spectroscopy (FTIR).

#### Poster #18

**Presenter:** Jackson Schroeder

**Sponsor:** Eric Wetzel (Biology)

**Title:** Helminths of Bluegills, *Lepomis macrochirus* and Longear Sunfishes, *Lepomis megalotis* from a West-Central Indiana Creek

Twenty-four bluegills, *Lepomis macrochirus* and 51 longear sunfishes, *Lepomis megalotis*, were caught in July and August 2013 from two sample sites along a small Indiana river and were necropsied. Sixteen parasite species were found and among those, *P. minimum* had the highest prevalence, mean intensity, and mean abundance. *Spinitectus* and *monogene* were two other parasites that showed a high prevalence, mean intensity, and mean abundance. Only two significant differences were seen when comparing the two sites as the SC dam site had more *monogenes* than the SC 175E site and there were more *Spinitectus* at the SC 175E site than the SC dam site. There were several differences when comparing the two fish species, but the differences are sometimes only limited to one site, not both. Although there are numerous studies on parasite communities of bluegills and longear sunfishes, there are very few reports on them in Indiana and in stream habitats.



