

STUDENT RESEARCH SYMPOSIUM

SESSION I: 9:00–10:00 A.M. OPENING EVENT: CELEBRATION AND KEYNOTE ADDRESSES

Center for Faith and Life main hall

“Maasai Traditional Medicine: Preserving Indigenous Knowledge,” Sylvie Hall '11, Kia Johnson '11

“Namibian and South African Choral Music Transcription and Arranging,” John Stender '12

COMMUNITY GATHERING 10:00–10:30 A.M. INTERLUDE AND REFRESHMENTS

Center for Faith and Life lobby

Musical Interlude

CHAPEL: 10:30–10:50 A.M.

Center for Faith and Life main hall

Speaker: Jeffrey Wilkerson, associate professor of physics

SESSION II: 11:00A.M.–NOON

<i>Center for Faith and Life recital hall</i>	<i>Center for Faith and Life main hall</i>	<i>Dahl Centennial Union, Mott-Borlaug</i>	<i>Dahl Centennial Union, Peace Dining Room</i>	<i>Valders 206</i>	<i>Valders 262</i>	
Friction, Stars, and Sound	Making the Play	Challenges in Elementary Education	Bacteria—Friend or Foe?	Environmental Studies: Gender, Energy, and Ethics	Social Issues in Central America and Haiti	

COMMUNITY LUNCH: NOON–1:30 P.M.

Bentdahl Commons, Central Campus

SESSION III: 1:30–2:30 P.M.

<i>Center for Faith and Life recital hall</i>	<i>Center for Faith and Life main hall</i>	<i>Dahl Centennial Union, Mott-Borlaug</i>	<i>Dahl Centennial Union, Peace Dining Room</i>	<i>Valders 206</i>	<i>Valders 262</i>	
Body, Movement, and Culture		Religion and Society	Personal and Social Change	Oil and Fire	Exploring Place through Literature	

SESSION IV: 2:45–3:45 P.M.

Poster Session in Sampson Hoffland Laboratories Carlson Atrium/Valders Hall of Science concourse (with refreshments and musical interlude)

SESSION V: 4:00–5:00 P.M.

<i>Center for Faith and Life recital hall</i>	<i>Center for Faith and Life main hall</i>	<i>Dahl Centennial Union, Mott-Borlaug</i>	<i>Dahl Centennial Union, Peace Dining Room</i>	<i>Valders 206</i>	<i>Valders 262</i>	
Learning in Action		Birds, Sunflowers, and Fungi	Finding Voice, Claiming Identity	Families and Society		

EVENING EVENTS: 7:30 P.M.

Opera Workshop Performance: *Street Scene* (*Center for Faith and Life main hall*)

Theatre/ Dance Performance: *The Assemblage Point* (*Center for the Arts, Jewel Theatre*)

DAY-AT-A-GLANCE

	Valders 362	<i>Preus Library, Hovde Lounge</i>	<i>Jenson-Noble, Noble Recital Hall</i>	<i>Center for the Arts, Studio 1</i>	Olin 102	<i>Olin classrooms</i>
	Studies in British Literature	Philosophy in Context			Beyond Words	Paideia I Research (see separate brochure)
	Valders 362	<i>Preus Library, Hovde Lounge</i>	<i>Jenson-Noble, Noble Recital Hall</i>	<i>Center for the Arts, Studio 1</i>	Olin 102	<i>Olin classrooms</i>
	Visual Arts and Perception	Language and Education	Music and Culture		Fertility and Reproduction Studies	Paideia I Research (see separate brochure)
	Valders 362	<i>Preus Library, Hovde Lounge</i>	<i>Jenson-Noble, Noble Recital Hall</i>	<i>Center for the Arts, Studio 1</i>	Olin 102	<i>Olin classrooms</i>
	Crunching the Numbers	Two Wars and a Flood		Performance and Spirituality	Film and Literature	Paideia I Research (see separate brochure)

SYMPOSIUM SCHEDULE

9:00–10:00 A.M.
SESSION I

Center for Faith and Life main hall
Opening Event: Celebration and Keynote Addresses

Maasai Traditional Medicine: Preserving Indigenous Knowledge: Sylvie Hall, Kia Johnson

Namibian and South African Choral Music Transcription and Arranging: John Stender

Celebrating the Performing Arts: Jazz Orchestra, Tony Guzmán, conductor

10:00–10:30 A.M.

Center for Faith and Life lobby
Community Gathering
Interlude and refreshments

10:30–10:50 A.M.

Center for Faith and Life main hall
Chapel
Jeffrey Wilkerson, associate professor of physics

11:00 A.M.–NOON
SESSION II

Center for Faith and Life recital hall
Friction, Stars, and Sound
Faculty Moderator: John Jefferson

Donald Lee-Brown
A Statistical Test for Stellar Variability on Timescales of Weeks to Years

George Zacharakis-Jutz
Blind Tip Reconstruction: Determining the Shape of an Atomic Force Microscope Tip

Tyler Zey
Material Does Matter: An Exploration of the Clarinet Barrel

Center for Faith and Life main hall
Making the Play
Faculty Moderator: Lisa Lantz

Matthew Imhoff
Theatrical Creativity: Dramatic Necessity, Directorial Intent, and Artistic License in Scenic and Costume Design

Ashley Wright
The Role of a Successful Production Manager

Dahl Centennial Union, Mott-Borlaug
Challenges in Elementary Education
Faculty Moderator: Bill Fordice

Courtney Gill
Immersion Schools: A “Better” Language Model?

Emmalee Johnson
The Professional Development Model—Connecting Theory and Practice in Music Teacher Education

Emily Kilgore
Challenges of Inner-City Teaching: Looking Through a Lens of Experience

Dahl Centennial Union, Peace
Bacteria—Friend or Foe?
Faculty Moderator: Jodi Enos-Berlage

Lisa Hieb, Mary Beth Cannon
Calcium Controls Gene Activity in the Bacterium *Vibrio parahaemolyticus*

Chelsea Weiss, Jacob Seibert
Investigating Water Quality in the Dry Run Creek Watershed

Valders 206
Environmental Studies: Gender, Energy, and Ethics
Faculty Moderator: Jim Martin-Schramm

Jason Hagemeyer
Harvesting Prairie Biomass: How Luther College Can Advance Its Clean Energy Portfolio and Promote Landscape Sustainability

Ella Orngard
Emancipating “Mother Nature”: A Malagasy Makeover of the Exploitative Paradox Paralleling Women and Nature

Charlie Rasmussen

An Ecological Interpretation of Martin Luther's Theology

Valders 262

Social Issues in Central America and Haiti

Faculty Moderator: Don Jones

Chloe Gumpert

Interactions Between Western Medicine and Vodou in Haiti: The Importance of "Healthy" Relationships in the Medical Field

Michael Hart

Moving Lives Forward in Guatemala Through Land Ownership

Nathan Hecht

A Comparison of the Impact of Conventional and Organic Potato Farming on Leafminer and Parasitoid Populations; Cerro Punta, Panama

Valders 362

Studies in British Literature

Faculty Moderator: Robert Larson

Erik Halvorson

Ivanhoe: The Shaping of the English National Identity

Tonya Tienter

Mockery and Mirrors: The Role of the Clown in Shakespeare's *The Winter's Tale*

Preus Library, Hovde Lounge

Philosophy in Context

Faculty Moderator: Todd Pedlar

Alex J. Anderson-Kahl

Sartre's Influence in Modern Cinema

J. Dewitt

Genealogy as Anamnesis

Douglas Hamilton

Textbook Science

Olin 102

Beyond Words: Film Adaptations of Literature

Faculty Moderator: Anne-Marine Feat

Lauren Haefemeyer

Absence in Adaptation: Omission and Argument in the Translation of Texts into Film

Julia Walk

Issues of Adaptation in *The Color Purple*

Camille Welter

Beyond Words, Beyond the Stage, and Into the Classroom: How to Make Shakespeare's *Romeo and Juliet* Come to Life

Madeline Jungbauer

How *Cold Mountain's* Words About North Carolina Were Adapted to Film in Romania

Hannah Crippen

Adaptation and Mutation: Postmodern and Darwinian Themes in Charlie Kaufman's *Adaptation* and Susan Orlean's *The Orchid Thief*

Olin Classrooms

Paideia I Research (see separate brochure)

NOON-1:30 P.M.

Bentdahl Commons, Central Campus
Community Lunch

1:30-2:30 P.M.

SESSION III

Center for Faith and Life recital hall

Body, Movement, and Culture

Faculty Moderator: Kate Elliott

Anne Proescholdt

Peripersonal Space: How We Become "One" with Our Environment and Each Other (and Why We Can't Afford Not To)

Meghan Pedersen

A Phrase for Butterfly Movement

Amber Hendricks

Gyaru: Japan's Living Dolls

Dahl Centennial Union, Mott-Borlaug

Religion and Society

Faculty Moderator: Robert Christman

Rachel Barclay

And Other Duties as Necessary: Saint Sebastian and the Late Medieval Church

Rachel Bruns

Spiritual or Religious? How the Spirituality Movement is Shaping Christianity in the United States

Anna Looft

Polar Opposites, and Yet Right Next Door: The Contrasting Reactions of Poland and the Czech Republic to Secularization in Post-Communist Europe

Dahl Centennial Union, Peace

Personal and Social Change

Faculty Moderator: Michael Engelhardt

Mara R. Dobervich

Mindful Forgiveness Through Dance:
The Contagion of Letting Go

Justin C. Marschall, Leah Gates, Dan Baldwin

Dear Heavenly Father: Can a Brief Prayer
Enhance Forgiveness for a Romantic Partner?

Kathryn Trigger

Theatre and Social Change: Ariel Dorfman's
Death and the Maiden as Immersive
Experience

Valders 206

Oil and Fire

Faculty Moderator: Laura Peterson

Luke Arthur Krystosek

An Exploration of Different Methodology
for Testing Antibiotic Efficacy Using Eugenol
and Its Derivatives

Chris Nevala-Plagemann

A Late-Holocene History of Fire and Drought
at Cheney Lake: Has Local Climate Affected
Fire Regimes in Northwestern Wisconsin?

Samantha Stykel

The Effect of Localized Oil Spills
on the Atlantic Loggerhead Turtle
Population Dynamics

Valders 262

Exploring Place through Literature

Faculty Moderator: Lori Stanley

Chris Bartels

1/4 Mile

Christine Kennedy

Italo Calvino's *Invisible Cities*: A History-
Inflected Postmodern Fairy Tale

Valders 362

Visual Arts and Perception

Faculty Moderator: Stephanie Travers

Ryan Nord Kitchen

Authenticity in Art

**Liz Smith, Natalie Baudler, Emily Kittleson,
Libby Dahms, Sam DePagter**

Visual Perception and Newspaper Page
Design

Preus Library, Hovde Lounge

Language and Education

Faculty Moderator: Rebecca Bowman

Hannah Berlin-Burns

Music in Foreign Language Education:
A Comparison of American and French
Programs

Jennifer Paulson

Exploring the Bilingual Mental Lexicon
with Models as Maps

*Jenson-Noble Hall of Music, Noble Recital
Hall*

Music and Culture

Faculty Moderator: Laurie Zaring

Taylor Grutzmacher Bergen

Vocal Music's Role in Ending the Apartheid
Struggle

Jon Lueck

Musical Transcription: From White Mensural
Notation to Modern Notation

John Stender

Namibian and South African Choral Music
Transcription and Arranging

Olin 102

Fertility and Reproduction Studies

Faculty Moderator: Maryna Bazylevych

Jenna Yeakle

Females' Reproduction and Fertility Rituals
in the Ancient World and Medical America

Katelyn Bottem

Polygyny as a Reproductive Behavior
and Its Effect on Fertility in Senegal

Rachel Albert

Effects of Waist-to-Hip Ratio on Dress
Behaviors Across the Ovulatory Cycle
and Men's Ability to Detect Ovulation
Using Visual Cues

Olin Classrooms

Paideia I Research (see separate brochure)

2:45–3:45 P.M.
SESSION IV

*Sampson Hoffland Laboratories Carlson
Atrium/Valders Hall of Science concourse*

**Poster Session (with refreshments
and musical interlude)**

Rachel Albert

Berlin Divided and Reunified as Expressed
Through Literature

Morgan Ames

The Effects of Competitiveness and
Perfectionism on Eating Disordered
Behaviors and Attitudes in Athletes Versus
Non-Athletes

Sonja E. Arneson-Ecklund

Creative Inspiration in Fashion Design

Ryan Bouslog, Jake Larkin

The Effectiveness of the Current NCAA
Wrestling Weight Certification Program
on Body Fat Composition and Dehydration
Throughout the Collegiate Wrestling Season

Alyse Carlson

The Effect of Chronic Cytochrome P-450
Inhibition on Heart Rate and Mean Arterial
Pressure of Spontaneously Hypertensive Rats

Mitchell Demers

Growing Friendships: Using Horticulture
to Build Community

Braulio Dumba

Development and Analysis of MatLab-Based
Blind Tip Reconstruction Algorithms

James Feinstein

The *New York Times* and the Decision
to Invade Iraq

Hannah Haas

The Politics of Water: Challenges Between
Costs, Laws and Education in French
Agriculture

Kirsten Indrelie and Mary Crumley

Detecting Trace Amounts of Environmental
Pollutants via Fluorescence Spectroscopy

Erik Johnson

Running Economy Is Correlated with
Training Volume in Female Runners

Alla Makoveeva

Socio-Cultural Errors in the Business
Correspondence of English, Japanese
and Russian Language Learners

Emilia McVey

Safety of Organic Fertilizer: The Effect
of Rotenone Application on Biomass-
Decomposing Redworms

Christopher M. Schaupp

Sea Surface Temperature Evolution
in the Southwest Pacific Over the Past
11 Million Years

Kristen Schultz

Discovering France's National Identity
Through Gastronomy

Leah Walters

Stability Evaluation of [18F]FDG at High
Radioactive Concentrations

Kevin Wenger

Crime Novels and Cultural Portrayals

Tyler Zinnecker, Fran Fairfield

Insect and Plant Communities in a New
Roadside Prairie Planting

**Additional poster displays presented by
more than 55 students from the following
classes:**

Biology 232: Microscopy

Biology 253: Invertebrate Zoology

Biology 354: Evolutionary Biology

Chemistry 490: Chemistry Senior Project

Honors 320: Modernity: Natural Sciences

Math 452: Partial Differential Equations

Physics 114: Sound and Musical Acoustics

Physics 182: Classical Physics II

Psychology 353: Social Psychology

4:00–5:00 P.M.
SESSION V

Center for Faith and Life recital hall

Learning in Action

Faculty Moderator: Steve Holland

**Douglas Hamilton, Timothy Sauerbry, Ryan
Kuhn, Allison Kirkvold, Andrea Berven**
Winifred's Wait: A Dramatic Portrayal
of a Medical-Ethical Dilemma

**William Montoya, Abhra Biswas, Junette
Maxis, Ufra Mir**

Clinton Global Initiative: Putting Ideas
Into Actions

Dahl Centennial Union, Mott-Borlaug
Birds, Sunflowers, and Fungi

Faculty Moderator: Eric Baack

Paul Atkins

Cytoneuclear Interactions and Speciation
in Sunflowers

Katrina F. Freund

Diversity and Host Specificity of Fungal Endophytes from a Tallgrass Prairie in Northeastern Iowa

Karl Gilbertson

Avian Spatial Memory in Relation to Hippocampal Cell Density in Addition to Basic Neuromorphology Trends Within the Avian Hippocampus

Dahl Centennial Union, Peace

Finding Voice, Claiming Identity

Faculty Moderator: Amy Weldon

Allison Croat

“Bare Feet”: Scenes from San Lucas Tolimán, Guatemala

Rachel Johnson

Ashes in a Tea Cup: Glimpses of Genocide

Danielle Koch

Clinging to Memory

Valders 206

Families and Society

Faculty Moderator: Ginger Meyette

Ana Cristina Avelar-Cabrera

Un Vistazo en la Experiencia de la Separacion Familiar (“A Glimpse into the Experiences of Family Separation”) in the Lives of Immigrants from El Salvador

Katie M. Deaver

Clergy Marriages in Reformation Germany

Keagan Goetsch

Parenting and LGBTQ Families

Valders 362

Crunching the Numbers

Faculty Moderator: Jeannette Pillsbury

Sabrina Hawkinson, Brian Doudna, Emily

Kilgore, Emily Schmitt

Assessment in the Mathematics Classroom

Preus Library, Hovde

Two Wars and a Flood

Faculty Moderator: Brian Caton

Laurie Medford

Who Were the Company C Eighth Wisconsin Infantry Volunteers? The Social Profile of a Union Company

Kirsten Jacobson

The Evolution of Diversity at Luther College: the Impact of September 11,2001

Andrew White

From Chaos to Community: Cedar Rapids and the Floods of 2008

Center for the Arts, Studio I

Performance and Spirituality

Faculty Moderator: Erin Flater

Calli Micale

Dualities of Human Nature and the Ultimate Catharsis

Kathryn Trigger

Transforming the Eucharist: An Exploration in Ritual and Embodied Value

Alex Lange

They Will Appear, Behold

Olin 102

Film and Literature

Faculty Moderator: Laurie Iudin-Nelson

Alison Blake

All for One and One for All: Hero or Not?

Samuel E. Oines

The Witches of Karres: An Adapted Screenplay by Samuel Oines

Justin Tigerman

Jesus and Christianity on Film: An Examination of Image, Message, and Appeal of a Cinematic Christ

Olin Classrooms

Paideia I Research (see separate brochure)

7:30 P.M.

OPERA WORKSHOP

PERFORMANCE

Center for Faith and Life main hall

Street Scene

7:30 P.M.

THEATRE/DANCE

PERFORMANCE

Center for the Arts, Jewel Theatre

The Assemblage Point

PARTICIPANTS AND ABSTRACTS

Arranged alphabetically by student last name, and for presentations involving more than one student, arranged by lead student's last name (alphabetically within presentation)

RACHEL ALBERT '11

Effects of Waist-to-Hip Ratio on Dress Behaviors across the Ovulatory Cycle and Men's Ability to Detect Ovulation Using Visual Cues

Evolutionary models hypothesize that genes increasing reproductive success will have become common over human history. Humans differ from many mammalian species in that ovulation is considered to be "cryptic" as it is not overtly displayed, which causes an adaptive problem for males attempting to determine the fertility status of females. However, previous studies have shown that females seem to be aware of their ovulation at an unconscious level, as demonstrated by changes in dress behavior across the ovulation cycle. Studies have found that women tend to dress more provocatively (showing more skin) when they are ovulating than at any other point in the menstrual cycle. This study examines the effects of waist-to-hip ratio (WHR), sociosexual orientation, religiosity, and attachment quality in women as moderators of dress behaviors across the ovulation cycle, as well as men's ability to detect ovulation in women using only visual cues. Women with lower WHRs tend to be more fertile than women with higher WHRs, so I predicted that women with low relative WHR will dress more provocatively during peak fertility than women with higher relative WHR, as they would be inclined to display their body shape as an honest indicator of fertility.

Faculty sponsors: David Bishop, Eric Baack

RACHEL ALBERT '11

Berlin Divided and Reunified as Expressed Through Literature

From 1961 to 1989, Berlin existed as a divided city. This division was not only a physical one; it was reflected in all aspects of Eastern and Western culture, including literature produced from both sides of the Berlin Wall. Perspectives of shared events were markedly different from one side of the wall to the other – even the reactions to the reunification of Berlin differed depending on which side of the rubble one stood behind. Though Westerners tend to assume that everyone living in East Berlin was unhappy and

all attempts to cross the wall came from the East, there were people happy with life in the East and people unhappy with life in the West. My poster will show the progression of the history of Berlin from the construction of the wall to the reunification as portrayed through literature using photographs, maps, and a timeline supplemented with translations of a few short pieces of literature representing East, West, and reunified Berlin.

Faculty sponsor: Ruth Kath

MORGAN AMES '11

The Effects of Competitiveness and Perfectionism on Eating Disordered Behaviors and Attitudes in Athletes Versus Non-Athletes

Eating disorders have become a growing concern in Western society today and the impact of both social and biological cues are now being more extensively explored. One population showing an increasing trend toward eating-disordered behaviors is athletes. The athletic triad documents the cycle of disordered eating, amenorrhea, and osteoporosis. Studies looking at differences in eating disordered behaviors in athletes versus non-athletes often find conflicting results and thus more research in this domain is necessary. This study looks to investigate the issue and to determine the prevalence of eating disorders in athletes versus both lean sport (e.g., running and dance) and non-lean sport athletes (e.g., golf and tennis) and also to look at the influence of competitiveness and perfectionism, two personality factors often linked to eating disorders such as anorexia and bulimia nervosa. This study further explores possible interaction between these personality characteristics and the different groups of athletes and non-athletes.

Faculty sponsor: Kristy Gould

ALEX J. ANDERSON-KAHL '12

Sartre's Influence in Modern Cinema

Freedom, responsibility, passion versus reason, the other, anguish, and bad faith are all vital elements of Sartre's existentialist views. They are the base pillars from which Sartre went on to write his plays and novels. These ideas were incorporated in all of Sartre's works in varying

degree. They have also been incorporated into many modern films. *The Box* plays with Sartre's ideas of freedom and responsibility and the role of anguish. *Equilibrium* explores Sartre's views of passion versus reason, as well as the role of the others. *American Beauty* examines what it means to be in bad faith. These films act as examples of how the existentialist movement has lived on in modern society. I will attempt to demonstrate that Sartre has had a direct impact on these films and modern cinema.

Faculty sponsor: Holly Moore

SONJA E. ARNESON-ECKLUND '11
Creative Inspiration in Fashion Design

The principle objective of this directed study project was to experiment with various forms of inspiration in the creation of an artistically inspired fashion design line. The project was largely inspired by a collection of photographs taken during a backpacking trip through Ireland in the early spring of 2010. The selected photographs were then used to inspire both the initial design aesthetic and the physical creation of the fashion line. Meaningful music and memories from the trip also served as catalysts in instigating the creation of the preliminary garment design sketches and were later used to encourage the construction of the pieces. To maintain the integrity of the natural beauty and organic landscape of Ireland, all of the fabric, notions, and materials used in the construction of these garments were salvaged. Materials were either taken from preexisting clothing pieces or from discarded household items, which drastically reduced the cost and the environmental impact of this project. Finally, the project serves as an example of the ways in which discarded garments can be reinvented with the help of creative inspiration.

Faculty sponsor: Lisa Lantz

PAUL ATKINS '12
Cytonuclear Interactions and Speciation in Sunflowers

Speciation, the evolutionary process by which new biological taxa arise, is the ultimate source of biological diversity. In allopatric speciation, parts of a single population are geographically isolated from each other, and over time genetic differences in populations accrue due to drift and differing selection in the two environments. The result of these differences is that, should the geographic separation no longer be a factor, the

two populations will have barriers that reduce hybridization and hybrids will have reduced survival and reproduction. *Helianthus annuus* and *H. petiolaris* are two sunflower species native to the southwestern United States. These species diverged 60,000 to 210,000 generations ago and now inhabit very similar habitats that commonly overlap. They share pollinators and frequently hybridize so that many parts of their genomes appear very similar. Despite this, the two species remain morphologically distinct with different habitat requirements. Although the molecular mechanisms affecting the fitness of hybrids are not fully understood, a possible explanation is that genes in the nucleus and in the organelles (mitochondrial and chloroplast) evolve to work together, and the new combinations found in hybrids lead to reduced fitness. This study examined the chloroplast genomes in both species using small sequence repeats and found that there are differences. This means that there is chloroplast genome differentiation between the two species, and cytonuclear interactions are a possible hybridization barrier.

Faculty sponsor: Eric Baack

ANA CRISTINA AVELAR-CABRERA '11
***Un Vistazo en la Experiencia de la Separacion Familiar* ("A Glimpse into the Experiences of Family Separation") in the Lives of Immigrants from El Salvador**

This study explored the motives immigrants from El Salvador had when immigrating and the impact family separation had on both the parent and the child during reunification. Semi-structured qualitative interviews were conducted with 3 undocumented immigrants and 6 documented immigrants. Participants immigrated to Southern California between 1991 and 2007. The experience of family reunification was described as beautiful. The impact family separation had on families at reunification was described as a loss of parental roles, respect, and trust. Some participants of this study risked their lives in order to find work so that they could provide for their families. Some of the participants risked their lives to reunite with their families.

Faculty sponsors: Craig Mosher, Ginger Meyettte

RACHEL BARCLAY '11
And Other Duties as Necessary: Saint Sebastian and the Late Medieval Church

The Black Death ravaged Europe from 1348–52, affecting all aspects of life and prompting a

response from the late medieval church. The church did not alter core theologies to meet the changing and often disastrous circumstances of the 14th century but rather altered certain existing practices to better provide comfort to the suffering masses. The cult of saints was a hallmark of late medieval Christianity, and individual saints were interpreted in new ways in response to the plague. This paper explores how the role of Saint Sebastian—a third-century martyr saint—was expanded in the years following the Black Death. Sebastian came to be regarded as a plague saint, and this paper particularly focuses on the development of his four distinct roles within the late medieval church. Paintings created after the Black Death clearly illustrate that Saint Sebastian's role in late medieval Christian piety expanded in response to the challenges of the pestilence. These changes and developments show that late medieval Christianity was not stagnant; the church and its followers were actively examining the ways in which they understood and interpreted the world.

Faculty sponsor: Robert Christman

CHRIS BARTELS '11

1/4 Mile

This collection of nonfiction essays began with an exploration of the freedoms and logics of fiction, straying back to the realm of truth in prose. In a series of selections which explore the possibilities of identity through childhood, place, and culture, the audience will see the “narrative-I” step into and out of the prose. Essays wander from sexuality to Sesame Street, the literature and criticism of Italo Calvino, phenomenology of Gaston Bachelard, 9/11, masculinity, and grammatical peccadilloes which resonate in syntax like cosmic caesura. Hopefully, the audience will experience the accumulation of striking images which entertain, inform, and deepen their relationship with language.

Faculty sponsor: Amy Weldon

TAYLOR GRUTZMACHER BERGEN '11 **Vocal Music's Role in Ending the Apartheid Struggle**

This presentation is an examination of the role music had in the struggle against apartheid by dividing the apartheid era into three musically and historically significant areas. In the presentation I show the mirrored evolution of political struggle and musical norms and how they could not have been successful without one

another. The presentation shows four musical examples performed with a choir.

Faculty sponsor: Juan Tony Guzman

HANNAH BERLIN-BURNS '12

Music in Foreign Language Education: A Comparison of American and French Programs

In foreign language classrooms in the United States, you may find music being used to improve comprehension, solidify grammatical concepts, and introduce cultural norms of a country or community. However, based on my teaching experience and interviews conducted at a high school in Nantes, France, I found that music is not a part of the curriculum, rarely existing at all in French schools. It is often seen only as a form of entertainment. French and American high school educators seem to have different views on the efficacy of using music in an academic setting. This can be explained by the historical development of each country's educational system and the disposition of teachers and the society toward education today. In this presentation, I will assess how music could be incorporated into foreign language classrooms for facilitating meaningful learning yet without compromising mutual philosophies of education. I will be demonstrating strategies from a guide that I am designing for educators to use in implementing musical activities in the foreign language classrooms. In creating this tool, my hope is that more educators will recognize music's potential for enhancing each student's educational experience and proficiency in learning a foreign language.

Faculty sponsor: Anne-Marine Feat

ALISON BLAKE '11

All For One and One For All: Hero or Not?

Despite the 28 films already in existence based on *The Three Musketeers* by Alexandre Dumas père, Summit Entertainment is set to release another in the fall of 2011. How is it that a popular adventure novel from 1844 still intrigues audiences over 150 years later? A comparison between the original book and three recent films from various cultures shows the importance of the antihero in contemporary literature and ideology. An antihero is a protagonist whose character is contrary to that of the archetypal hero. D'Artagnan is a young man who makes rash decisions that land him in many dangerous battles. Aramis is a restrained man, Porthos is full of bluster, and Athos is extremely quiet. None

of these men meet the standards for a hero, yet they complement each other in a way that makes them heroic. While many choose not to read the original book due to the excessive descriptions and long dialogues, *The Three Musketeers* has become a part of our collective imagination. This study helps to show that though there has been a general change in perspective by generation and culture, there are overarching ideas that remain constant and resist the passage of time.

Faculty sponsor: Anne-Marine Feat

KATELYN BOTTEM '12

Polygyny as a Reproductive Behavior and Its Effect on Fertility in Senegal

In this study, I analyze how polygyny affects fertility in Senegal. Within this topic I focus on the different influences of polygyny on gender and the relationship of polygyny to STI/HIV transmission. Currently, polygyny is a very common reproductive practice in urban areas of Sub-Saharan Africa. Men will take on multiple wives in order to produce many children who can carry on their family name and traditions. Through the influence of doctors, public health officials, and some NGO officials from Western societies, the practice of polygyny has been criticized as a major cause of high rates of STI and HIV/AIDS. The rates of infection have driven the ethnocentricity of Western societies to make a push to convert polygamist cultures to monogamy. This potential cultural change has created a large ethical debate as to how much influence Western societies should have on Third World societies like Senegal. By investigating literature-based evidence and media articles, I give a well-rounded evaluation on how polygyny affects fertility in Senegal and the ethical implications of attempting to eradicate polygyny. I give suggestions of potential safer ways to practice polygyny that Western officials can use to promote safe sex practices without changing the overall reproductive behavior.

Faculty sponsor: Maryna Bazylevych

RYAN BOUSLOG '11, JAKE LARKIN '12 The Effectiveness of the Current NCAA Wrestling Weight Certification Program on Body Fat Composition and Dehydration Throughout the Collegiate Wrestling Season

The purpose of this study was to analyze the effectiveness of the current method of weight certification in NCAA wrestling. This pre-season certification determines the lowest allowable

weight at which a wrestler may compete for the entire season. We were specifically interested in hydration levels, measured using a urine refractometer, and body fat composition, measured using skin fold calipers, of athletes throughout a full collegiate wrestling season. At the beginning of the season, urine specific gravity (measuring hydration) and body fat composition are measured for each wrestler to calculate the lowest allowable weight. Currently, in order to be certified to compete, athletes must have a urine specific gravity of 1.020 or lower, indicating that they are adequately hydrated. This value, in combination with body fat composition, determines the lowest weight in which they would maintain 10% body fat composition. We monitored this value throughout the season in order to find out if wrestlers ever dropped below this 10% threshold, while still maintaining their certified weight.

Faculty sponsor: Brian Solberg

RACHEL BRUNS '11

Spiritual or Religious? How the Spirituality Movement is Shaping Christianity in the United States

Religion and spirituality in the United States are central cultural forces that are continually changing. As people increasingly claim no religious affiliation and say they are spiritual but not religious, some believe religion is endangered in the United States. While religion is not in danger of disappearing, it is undergoing significant changes, and a movement toward spirituality is part of this process. In this paper, I identify the manifestations of these changes on an individual, communal, and societal level; examine the underlying reasons and causes; and investigate the implications for religious institutions and society as a whole, focusing specifically on modern Christianity in the United States.

Faculty sponsor: Jim Martin-Schramm

ALYSE CARLSON '11

The Effect of Chronic Cytochrome P-450 Inhibition on Heart Rate and Mean Arterial Pressure of Spontaneously Hypertensive Rats

The cytochrome P-450 (CYP) gene manufactures proteins like 20-hydroxyeicosatetraenoic acid that control vasoconstriction and vasodilation. Over-expression of this gene in spontaneously hypertensive rats (SHR) is a cause of hypertension. 1-aminobenzotriazole (ABT) was previously identified as a short-term CYP

inhibitor when administered in a bolus dose and monitored for 24 hours. Additionally, previous research has indicated that CYP over-expression in the systemic vasculature is responsible for elevated blood pressure. The purpose of this study was to test the effects on mean arterial pressure and heart rate of chronic cytochrome P-450 inhibition in SHR with ABT on rats in early-stage hypertension. Arterial pressure and heart rate were also monitored to determine the mechanism of CYP activity. It was hypothesized that if CYP contributes to hypertension by altering vascular resistance, then net water balance, baroreflex response, and sympathetic tone should not be significantly different between treated and untreated rats. It was found that over this time period, administration of ABT did not significantly reduce blood pressure or alter cardiac output; therefore, no conclusions could be drawn about the mechanism of CYP activity. A second study compared intravenous and intraperitoneal administration of ABT, finding that intravenous administration was more effective in reducing pressure.

Faculty sponsor: Scott Carlson

HANNAH CRIPPEN '11

Adaptation and Mutation: Postmodern and Darwinian Themes in Charlie Kaufman's *Adaptation* and Susan Orlean's *The Orchid Thief*

The film *Adaptation*, adapted from Susan Orlean's *The Orchid Thief* and written by Charlie Kaufman, is a postmodernist tour de force, using self-reflexivity and metanarrative in ways that are both artful and comic. By looking specifically at the elements of postmodernity present in the film and examining the ways it uses concepts of biological adaptation as a metaphor for film adaptation, it is possible to see *Adaptation* as an example of the way that literature and film are related. Kaufman's translation of the book goes beyond words, using literary concepts like self-reflexivity and metanarrative, but taking them beyond the linguistic space and into a complex, predominantly visual medium.

Faculty sponsor: Peter Scholl

ALLISON CROAT '12

"Bare Feet": Scenes from San Lucas Tolimán, Guatemala

My story is inspired from a mission trip I took to Guatemala last Thanksgiving. The experiences in Guatemala provided the basis for an examination

of life of someone other than me. I am intrigued by the question of writing about a culture different than my own and how to render it real without judging the people within the culture. The trip left striking images that I have molded together to create the fictional story "Bare Feet," which is a short story that explores the daily experiences of a Guatemalan woman. Grappling with how to immerse yourself in a culture not your own is a complex issue that can be entertained through fiction. "Bare Feet" is my own interpretation of how to be present in a life outside of my own.

Faculty sponsor: Amy Weldon

KATIE M. DEEVER '11

Clergy Marriages in Reformation Germany

Marriage and celibacy became pressing issues with the emergence of the Lutheran Reformation in Germany. Lutheran theologians argued against the idea that the celibate life of a priest, monk, or nun brought one closer to God. These theologians overturned this idea through a theology of justification that in part was actualized through the practice of clergy marriage. This paper will argue that the Lutheran Reformation in Germany was ultimately furthered by Lutheran clergy living out the ideals of the Reformation through abandoning the concept of celibacy in favor of marriage and the family. While clergy marriages initially met with some resistance from the laity, this resistance was short-lived, and clergy marriage came to be one of the defining features of the Reformation both within Germany and without.

Faculty sponsor: Todd Green

MITCHELL DEMERS '11

Growing Friendships: Using Horticulture to Build Community

Research suggests connecting with nature is essential for physical and emotional health. Current studies indicate these activities may even boost alertness and support memory. To further explore and extend previous studies, a pilot Horticulture Club was designed to bring green space and nature-based activities to elderly individuals with little access to such resources in a rural Midwest community. The purpose was to determine if horticulture activities significantly improved the overall well-being of participants over a 12-week period. More specifically, personal well-being and aspects of cognition were quantitatively assessed before and after the 12-week interactive program using five measures

to assess well-being, depression, attention, mood, and cognitive ability. Preliminary results suggest that participants in the program showed increased general attention and overall positive shifts in mood and attitude. These pilot data indicate that our Horticulture Club offered a holistic and sustainable means to empower individuals of varying abilities and to build caring communities. There is a potential use for horticulture activities to promote and maintain well-being in a variety of community and residential settings.

Faculty sponsor: Stephanie Travers

J. DEWITT '11

Genealogy as Anamnesis

What is the “will to power?” Friedrich Nietzsche’s famous concept is a tricky one to translate. Scholars have seen it as a flagship for Social Darwinism: down with the weak, up with the strong. Others have interpreted more complex implications: a metaphysical framework in which history is composed not of ideological events but voracious, indeterminate power struggles. But my yearlong study has brought me to a different conclusion, one that ties more closely to Nietzsche’s concepts of “genealogy” and “dithyramb.” Nietzsche’s “will to power” is neither an evocation for the oligarchic elite to rise forth nor a metaphysical description of the cosmos. “Will to power” is instead an act of memory. Through the “will to power,” we enter a creative, hermeneutical spirit that overcomes itself by diving deep into memory to re-will what was forgotten. In doing this, we re-see the world again. Memory then is key to understanding how the “will to power” operates. Hence, to comprehend the heart of Nietzsche’s philosophy, one must first answer the question “What is memory?”

Faculty sponsor: Holly Moore

MARA R. DOBERVICH '13

Mindful Forgiveness Through Dance: The Contagion Of Letting Go

Dance can be a catalyst for individual change. The purpose of this study was to measure whether watching a live dance performance based on the theme of forgiveness as well as participating in a short, directed movement would increase an individual’s levels of forgiveness. Thirty-one participants were asked to complete surveys before and after the performance which measured forgiveness in the subscales of avoidance, revenge, and benevolence toward someone who hurt them in the past. Other scales included measured

body awareness and emotional expressivity. Criterion validity analyses showed that in the three subscales measured, participants feelings of avoidance and revenge decreased, and feelings of benevolence increased towards the individual who had hurt them after watching and participating in the performance.

Faculty sponsor: Loren Toussaint

BRAULIO DUMBA '11

Development and Analysis of MatLab-Based Blind Tip Reconstruction Algorithms

The atomic force microscope (AFM) is commonly used to investigate the properties of nanoscale surfaces, including surface topography, adhesion, and friction through use of a sharp tip that interacts with the surface. This AFM tip can be damaged during the scanning process or broken upon arrival from the manufacturer, and this will affect significantly the quantification of the measurements. Therefore, knowledge of tip shape is important and can be used to correct the AFM image quality. Transmission electron microscopy can be used to address this problem but this technique is limited to a 2-D profile image of the tip. An alternative technique called “blind tip reconstruction” uses mathematical morphology to estimate the 3-D geometry of the tip, based on the principle that that AFM image is a convolution of both the surface and tip shape. This technique was developed by John Villarrubia. In this research, I used a MatLab-based algorithm based on Villarrubia’s blind reconstruction theory to produce AFM tip reconstructions. The goal of my research was to implement new analysis tools in this algorithm, as well as to make the algorithm user-friendly for future public use.

Faculty sponsor: Erin Flater

JAMES FEINSTEIN '11

The New York Times and the Decision to Invade Iraq

“Any dictator would admire the uniformity and obedience of the U.S. media.” —Noam Chomsky
Andrew Bacevich (2010) argues that there was little opposition in the prelude to the 2003 invasion of Iraq. He hypothesizes that the mainstream media strongly favored an invasion and rarely published dissenting voices. If our democratic system is dependent on information representing all sides of an issue and what Dr. Bacevich argues is true, then this greatly hampers America’s ability to make informed decisions. The purpose of my research is to test Dr. Bacevich’s

hypothesis through a content analysis of *New York Times* coverage prior to the Iraq War. Did the *New York Times* provide overwhelming support for the invasion? The *New York Times* is considered the American newspaper of record, renowned for its investigative journalism and its unmatched number of Pulitzer Prizes, which should ideally constitute a paper with well-rounded and unbiased perceptions of potential war. It is also an influential source of information having more online readers than any other newspaper in the world. My focus is exclusively on articles published preceding the buildup to the Iraq War, specifically between January and June of 2002. I observe types of arguments used and general themes apparent in these articles. More specifically, I want to determine whether or not the *New York Times* published opposing viewpoints. As specific themes surface, they will be valuable for comparison with other conflicts, including Iran.

Faculty sponsor: Paul Gardner

KATRINA F. FREUND '11
Diversity and Host Specificity of Fungal Endophytes from a Tallgrass Prairie in Northeastern Iowa

An endophyte, from the Greek *endo* (inside) and *phyton* (plant) is an internal fungus of a host plant which occurs in the aboveground portion. The presence of endophytic fungi in plants is considered, by some, to be an economic problem, harming agronomic crops and livestock. However, endophyte infections are thought to benefit host plants by producing protective chemicals, increasing host growth rate, increasing drought tolerance of the host, and protecting the host from pathogens. Endophytes are thought to play an important role in ecosystem function. Research on endophytic fungi is a new field with many directions: growth and transmission of the fungi, fungal relationship and possible coevolution with host plants, and the role of infected plants in their ecosystem. An experiment was conducted by harvesting 27 different prairie plants and grasses from a prairie in northern Iowa, plating them, and observing them for fungal growth. Samples were assessed for the presence and diversity of endophytic fungi. Results suggest that there is a higher endophytic fungi biodiversity in non-grass plants, and that host plants are often infected with more than one endophyte.

Faculty sponsor: Eric Baack

KARL GILBERTSON '11
Avian Spatial Memory in Relation to Hippocampal Cell Density in Addition to Basic Neuromorphology Trends Within the Avian Hippocampus

Previous research has shown performance differences on laboratory spatial memory tasks between various species of birds in the Corvid family, which are correlated with differences in food storing behavior. Current research, however, has found no significant difference in relative hippocampus volume between Corvid species (Gould et al. 2009). We therefore looked for potential differences in how tightly packed neurons within the hippocampus are in five species of corvids, using MBF's Stereo Investigator. The Clark's nutcrackers had a significantly larger neuron density relative to body mass than blue jays, azure-winged magpies and pinyon jays, but not the Western scrub jays. The Clark's nutcracker stores the most food and relies on these stores to a larger degree than the other three species and performs well on spatial memory tasks. Therefore, neuron density may be an important contributing factor to the differences in spatial memory and food-storing that are seen within birds in this family. In addition, an exploratory study shows a positive correlation between neuron location (rostral to caudal and ventral to dorsal) and neuron volume in the hippocampus, which provides basic evidence pertaining to neuron organization in the avian hippocampus.

Faculty sponsor: Kristy Gould

COURTNEY GILL '11
Immersion Schools: A "Better" Language Model?

Over the years educators have continually faced the challenge of teaching students from different cultural backgrounds, dialects, and languages. Education researchers, practitioners, legislators, and parents have argued about the best way to reach across language barriers to give students quality education. Is there a "correct answer" in this discussion? In this presentation I will discuss primary and secondary discourses and research about the ongoing debate between bilingual and immersion education. I will present how research informs this debate and how this research informed and validated my own practice while teaching in an elementary Spanish immersion school. Finally, I will present the possible advantages and disadvantages of targeting young students as multiple language learners.

Faculty sponsor: Barbara Bohach

KEAGAN GOETSCH '14

Parenting and LGBTQ Families

In this paper, I will analyze the various aspects of parenting in families outside the gender dichotomy. I will examine the rewards, hardships, struggles, and structures of various types of relationships and parenting situations, including, but not limited to: Gay, Lesbian, Bisexual, Transgender, and Queer-Identifying couples. This paper will also include information on single parenting as a GLBTQ individual and how that further affects the lives of the children associated. Different types of parenting and methods of conception and reproduction will be discussed, including in vitro fertilization, adoption, the use of surrogates, self-insemination, along with their respective benefits and complications. A few opinions of children growing up in GLBTQ families will be discussed as well. As the political ramifications of being a GLBTQ family are also highly relevant, the policies affecting these respective families will be also included in the discussion. Lastly, I will touch on some different statistics regarding the outcome of these families and statistics regarding the makeup and interactions within the household.

Faculty sponsor: Maryna Bazylevych

CHLOE GUMPERT '14

Interactions Between Western Medicine and Vodou in Haiti: The Importance of “Healthy” Relationships in the Medical Field

This presentation aims to analyze the efficacy of ethnomedical systems in Haiti, focusing on systems that contain biomedical and folk religion components and patient-physician relationships. Haitian Vodou, a religion based upon the merging of the beliefs and practices of West African tribal religions and Roman Catholic Christianity, is the most common native religion practiced by Haitians. Those who practice Vodou in Haiti believe that illness may be caused by outside natural forces such as cold, heat, or humoral imbalance. In addition, illness may also be the result of weakening one's relationship with God and, thus, receiving punishment in the form of medical ailments. However, due to its lack of economic stability and extreme poverty, the medical systems in Haiti are primarily comprised of physicians from wealthier countries that practice biomedicine and are not accustomed to Haitian culture or Vodou. As a result, many cultural discrepancies, such as differing explanatory models, are encountered when

physicians treat Haitians. This presentation serves as a guide to building healthy patient-physician relationships, in which the patient and physician discuss and negotiate illness causation, diagnosis, and proper treatments and the physician is gradually accepted into Haitian culture.

Faculty sponsor: Maryna Bazylevych

HANNAH HAAS '11

The Politics of Water: Challenges Between Costs, Laws and Education in French Agriculture

In Brittany, France, intensive farming techniques have negatively affected the quality of the drinking water supply. Since the 1990s, regulations were implemented in order to improve the quality of water. Although the health of the water is now consistently compliant with European Union law and World Health Organization standards, the cost of enforcing regulation has become a financial burden on the French government and its taxpayers. This presentation will examine the constraints of enforcing environmental policy with the difficulty of measuring the value of communication and education. Based on data collected in January 2011 in Pont-l'Abbé, France, I will consider the successes and failures of regulation in comparison to nonlegislative programs and evaluate whether the benefits of such programs are worth the financial costs.

Faculty sponsor: Anne-Marine Feat

LAUREN HAEFEMEYER '11

Absence in Adaptation: Omission and Argument in the Translation of Texts into Film

When Michael Ondaatje released *The English Patient* in 1992, it garnered much critical acclaim, including the Booker Prize for fiction. The 1996 film adaptation of the novel (directed by Anthony Minghella) won nine Academy Awards, including Best Picture. Though the film was successful, it has been criticized for omitting much of the novel's postcolonial critique of the Allied powers in World War II. However, the very absence of this dimension in the film is perhaps an argument in itself. Minghella and many other filmmakers have used the medium of film to visually present themes that are often expressed more explicitly in their hypotexts; this is an issue which we must take into account in studying film adaptation in a critical environment.

Faculty sponsor: Peter Scholl

JASON HAGEMER '11

Harvesting Prairie Biomass: How Luther College Can Advance Its Clean Energy Portfolio and Promote Landscape Sustainability

Vast, sweeping prairies once filled Iowa's landscape with tall grasses, summer flowers, and now-vanishing animal species. In an age when global climate change and energy security issues pose unparalleled threats to our environment, a few remnant prairies have become rare patches among seemingly endless rows of corn and beans. Recognizing the need for healthier land stewardship practices, reductions in greenhouse gas emissions, and more sustainable energy sources, Luther College has already begun taking steps to address these challenges. Recent scientific studies and technological innovations suggest that burning pellets of diverse prairie grasses could become one part of Luther's clean energy portfolio in the long-term future and may simultaneously help return the Iowa landscape to its former sustainability. In hopes of laying out the benefits of a prairie grass energy model, this talk examines ecological health issues, energy security concerns, and the science behind the fuel potential of prairie grasses. Then, the various obstacles and costs that Luther may face in implementing this model are explored and evaluated in order to make specific recommendations to the college.

Faculty sponsor: John Moeller

SYLVIE HALL '11, KIA JOHNSON '11

Maasai Traditional Medicine: Preserving Indigenous Knowledge

The Maasai pastoralists of northern Tanzania have extensive knowledge of local plants and their potential for medicinal use. In the past, this knowledge was passed from generation to generation through a traditional system of education. Recently, this method of transmission has begun to decline due to an increased emphasis on biomedicine, as well as a higher percentage of students moving to boarding schools to pursue formal education. This presentation will explain the process and results of a research project conducted by Luther students in collaboration with a rural secondary school in northern Tanzania and the Tanzania National Institute of Medical Research. The project involved documenting some of the most common medicinal plants of the area, including physical characteristics and information on their preparation and use. Building on relationships developed during a study abroad course in January

2010, the project allowed Luther students Sylvie Hall and Kia Johnson to contribute something of value to their host community.

Faculty sponsor: Lori Stanley

ERIK HALVORSON '11

Ivanhoe: The Shaping of the English National Identity

What does it mean to be English? European countries in the 19th century found themselves absorbed in the definition of their own cultures and national identities, and England was no exception. England's muddled history of Germanic, Scandinavian and French influences, among those of other ethnic groups, forced England to look for a way to solidify what was specifically English. With his creation of *Ivanhoe*, the English historic romance novel of the 19th century, Sir Walter Scott attempts to define a Saxon English identity in a feudal French-controlled England. Through his invented historical details, the usage of English folklore, and the introduction of feudal England's Jewish population, Scott creates an English identity that is neither specifically Saxon nor Norman, but one rooted in the "record of difference" that exists within 19th-century English society.

Faculty sponsor: Nicholas Preus

DOUGLAS HAMILTON '11

Textbook Science

Karl Popper claims that the basis of scientific knowledge is falsification—according to this claim, science disproves hypotheses rather than proving them. Additionally, Popper views science as an unending process in which old theories and models are continually replaced by better models. The ways in which science textbooks communicate the scientific method provide some indication of the extent to which Popper's claim is accepted. This presentation will focus on the prevalence of Popper's claim in science textbooks, ranging from middle-school to college-level texts available through the Luther College library. The presence or absence of Popperian influence will be evaluated by authors' word choice when presenting the scientific method as well as the type of diagrams selected to visually represent the scientific method. Additionally, the extent to which texts prioritize introducing and clarifying science as a distinct discipline will be evaluated.

Faculty sponsor: Jeffrey Wilkerson

DOUGLAS HAMILTON '11, ANDREA BERVEN '11, ALLISON KIRK VOLD '11, RYAN KUHN '11, TIMOTHY SAUERBRY '11
Winifred's Wait: A Dramatic Portrayal of a Medical-Ethical Dilemma

Families frequently struggle with medical decisions involving the care of loved ones—a debate exists between the value of longevity and quality of life. Ethical theories provide a framework for making decisions, but conflict arises when individuals debate the proper course of action while ascribing to disparate ethical theories. *Winifred's Wait* is a short film portraying a family's struggle to reach a consensus regarding the medical treatment of Winifred, the matriarch of the family. The deterioration of Winifred's health due to liver failure and her recent diagnosis of pre-dementia Alzheimer's drives the family into conflict. The reflections of the family members incorporate the ethical theories of teleology, deontology, and feminist care ethics, as well as Kohlberg's stages of moral development.

Faculty sponsors: Don Jones, Jayme Nelson

MICHAEL HART '11
Moving Lives Forward in Guatemala Through Land Ownership

Guatemala faces land inequity problems that restrict the majority of the population from owning land. In a country and economy dependent on agricultural production, land ownership has the potential to help the impoverished produce a steady income and raise their standard of living. After the 1996 Peace Accords signed in Guatemala, the government created an organization called "*Fontierras*" assigned to face the problem of land inequity. The organization was created based upon a land reform theory called "market-assisted land reform." This discussion will examine the successes and failures of *Fontierras* as it relates to one specific coffee finca in Guatemala. The study focuses on the cultural and economic issues that cause land markets to distribute land in a manner that hampers economic growth and contributes to a low standard of living.

Faculty sponsor: Steve Holland

SABRINA HAWKINSON '11, BRIAN DOUDNA '11, EMILY KILGORE '11, EMILY SCHMITT '11

Assessment in the Mathematics Classroom

As an elementary teacher, one is required to be competent in a variety of subject areas. A common result of this and local, state, and

national standards is a teacher's need to teach to the test. Passing various standards puts pressure on teachers to develop assessments that don't complement their teaching or the needs of their students. To better the mathematics classroom, our presentation will focus on strategies to be used in the classroom for mathematics assessment, including what to listen and look for during math assessments. The first assessment strategy will involve students writing their own "test" which puts a focus on summative assessment. The second will include a hands-on activity using base-10 blocks, in which formative assessment will be highlighted. By analyzing these assessments, we will highlight the best ways to assess students.

Faculty sponsor: Jeannette Pillsbury

NATHAN HECHT '11
A Comparison of the Impact of Conventional and Organic Potato Farming on Leafminer and Parasitoid Populations; Cerro Punta, Panama

Panama is first in all of Central America for the amount of insecticides used per cultivated hectare (Gutierrez 2001). This intense agricultural management can be attributed to the high levels of agricultural crop production in Panamá, especially in the Province of Chiriquí, which produces almost 80% of all produce in the country (Del Cid 2010). But improper approach has allowed for the development of pest problems, including pest resistance and reduction of natural biological control. The purpose of this study is to understand how potato-crop-insecticide use is affecting insect populations on a conventional potato farm as compared with an organic farm in Cerro Punta, Chiriquí. The specific focus of the study is the relationship between key potato insects on both farms: *Liriomyza* spp., a leafminer fly and potato pest, and its natural enemies, parasitic wasps. This study concluded that there was a significantly greater abundance, diversity, and evenness of insects on the organic farm compared with the conventional farm. There was also a significant difference in the ratio of parasitoids to *Liriomyza* spp. between both farms, with fewer parasitoids and more *Liriomyza* spp. on the conventional farm compared with the organic farm. As such, it seems as if the improper use of insecticides on the conventional farm is facilitating the development of ecological imbalances, which have environmental and economic implications for agriculture in Cerro Punta and Panama.

Faculty sponsor: Kirk Larsen

AMBER HENDRICKS '11

Gyaru: Japan's Living Dolls

The Japanese women's fashion style known as *gyaru* ("gal" in English) is known by its followers as an embodiment of a self-assured, confident woman, yet the women who follow this fashion movement fill a somewhat isolating role within Japanese society. For those who choose to take part, it must become a way of life. The framework of each style is so precise that what looks at first to be a means of self-expression is actually the face of disguised conformity within one's social group as each individual strives to adhere to the codes that make up her chosen fashion identity. The distinctive, over-the-top style variations of *gyaru*, ranging from the ornately feminine *hime-gyaru* (princess gal) to the bold and daring *manba* (a vibrant beach-inspired look), are far from what would be considered mainstream in Japanese society, despite their strong visibility in the media; even the identity that comes with the name *gyaru* carries its own negative connotations within the Japanese language on a linguistic level. As a result, the women of the *gyaru* fashion world create clear social identities and boundaries in their pursuit of becoming, essentially, living dolls.

Faculty sponsor: Benjamin Moore

LISA HIEB '11, MARY BETH CANNON '11

Calcium Controls Gene Activity in the Bacterium *Vibrio parahaemolyticus*

Relatively little information exists about the role of calcium in bacteria compared to that of animals and plants. The marine bacterium *Vibrio parahaemolyticus* serves as a promising model for the study of the function of calcium in bacteria. This organism naturally inhabits environments that differ in calcium levels and exhibits behavioral changes in response to calcium. Recent work in our laboratory has suggested that a significant number of *V. parahaemolyticus* genes are either turned "on" or turned "off" in response to calcium. However, growth conditions in these early experiments were limited in that they were unable to demonstrate if the effects on gene activity were specific to calcium. The goal of this project was thus to determine if the observed changes in gene activity were calcium-specific, or if other metals, e.g., magnesium, iron, and copper, had similar effects. To accomplish this goal, we monitored activity of all of the genes under a broader set of conditions. Our results have allowed useful subcategorization of the initial gene set. In particular, we have identified four classes of genes: those specifically turned

on in response to i) high calcium levels, ii) low calcium levels, iii) low levels of other metals, and iv) a combination of low levels of calcium and high levels of magnesium. These results have thus allowed us to narrow our focus to the genes specifically regulated by calcium. The functions of these genes are intriguing and suggest important clues as to the role of calcium in this bacterium.

Faculty sponsor: Jodi Enos-Berlage

MATTHEW IMHOFF '12

Theatrical Creativity: Dramatic Necessity, Directorial Intent, and Artistic License in Scenic and Costume Design

In designing for the stage, several factors must be taken into account: the dramatic necessity of the script and the playwright, the theatrical intent of the director, and the creative license of the artistic designer. Each informs the realized production in a network in codependent relationships. In design—or more accurately, deliberate and researched choices made to bring the written text to life—conscious awareness and study of these foundations is paramount. Historical references and accounts, in both written and graphic form, provide the theatrical designer with a rudimentary framework from which to create. With a comprehensive study of the script and subsequent personal reactions, creative freedom is given to the designer to implement characterization, humor, and personal commentary into the designs, using historical references only as a genesis from which discussions begin and decisions emerge. Upon joint consideration with directorial intent, informed and actualized designs arrive upon the stage. In this presentation on research and the creative process, two case studies will be discussed: Carlo Goldoni's mid-18th-century play *The Servant of Two Masters* will discuss creativity in costume design; Kurt Weill's 20th-century opera *Street Scene* will explore this process in scenic design.

Faculty sponsor: Lisa Lantz

KIRSTEN INDRELIE '11 AND MARY CRUMLEY '11

Detecting Trace Amounts of Environmental Pollutants via Fluorescence Spectroscopy

Dioxin-like compounds are carcinogenic pollutants that exist overwhelmingly by artificial production. Once they enter the body, they are hard to remove because of their preferential accumulation in fat cells. The purpose of this research study was to develop a means of detecting trace amounts of dioxin-like compounds

by fluorescence spectroscopy. Specifically, the goal was to detect furans, dioxanes, and polychlorinated biphenyls (PCBs) in water. A variety of probes (furans, dioxanes, and PCBs) were used in this research as well as two types of host molecules (micelles and cyclodextrins). Preliminary studies have indicated that micelles are more efficient hosts than cyclodextrins for an array of dioxin-like compounds. The pollutant molecules dibenzofuran-4-carboxaldehyde, PCB 14, PCB 77, and PCB 18 seem to be most strongly bound to the micelle SDS of all utilized probes and micelles. Future studies include modification of quencher in order to be able to use more micelles (both cationic and anionic), repetition of already performed experiments for consistency, determination of probe lifetimes in the absence of quencher, and analysis of water samples collected from nearby water sources.

Faculty sponsor: Olga Rinco

KIRSTEN JACOBSON '11
**The Evolution of Diversity at Luther College:
The Impact of September 11, 2001**

Impacts of the events of September 11, 2001, exist that are far less obvious and interwoven in everyday life than perhaps have been previously identified. By using the local history of Luther College and the Decorah, Iowa, area we may be able to discern an underlying effect of September 11, 2001, on the conversation and concentration on diversity at Luther. In my research process, I focus on oral histories, campus newspapers, petitions, and eventual strategic plans for the Luther College Diversity Center among other primary documents in order to further understand the shift in conversation about diversity. This shift will likely portray an adjustment from racially based notions of diversity to an expanded focus, including culture and religion particularly. Unearthing these changes will allow the Luther College example to become a window into similar subtle changes in the discussion and acceptance of diversity at other small colleges and on national and international levels. The implications of this project are significant as they are likely to promote a broader understanding of the concept of diversity and may suggest specific actions to promote this conversation to future students and staff of the college. Ideally, this research will provide a model for a broader societal conversation on issues of diversity and acceptance.

Faculty sponsor: Gregg Narber

EMMALEE JOHNSON '12
**The Professional Development Model—
Connecting Theory and Practice in Music
Teacher Preparation**

Current common practice in teacher education programs is set up in a way that separates theory and practice. "Methods" courses give students information on how to teach, but give no opportunity to use that information firsthand. Within the Professional Development School model (PDS), methods, practicum or student teaching experiences, and other courses can be put together strategically to connect theory and practice. The PDS takes place entirely in the area school with college faculty and school staff working as equal partners to design instruction for both the college and school students. With Professor Fordice, I have been researching the impact of the PDS model on teacher identity and its viability in the area of music teacher education. We have been exploring teacher education through the central contexts of teacher identity, the role of reflection, and the structure of the teacher preparation program. Stronger teacher preparation programs can produce stronger (and happier) educators and potentially contribute to solving the issue of teacher attrition.

Faculty sponsor: Bill Fordice

ERIK JOHNSON '11
**Running Economy Is Correlated with Training
Volume in Female Runners**

Running economy (RE), or the steady state oxygen consumption (VO₂) at a specific velocity, has been shown to be an important factor in running performance. Studies have shown that RE is a valid predictor of performance among elite athletes with similar VO₂ max. Few studies have looked at RE in female runners. In the present study, we looked at two groups of collegiate female runners, competitive females and recreational females. We determined RE at two different velocities and looked at a number of anthropometric and flexibility measures to determine relationships within and between the two groups. Statistical analysis showed no significant difference in RE between the two groups while running at 7mph. It was discovered that a significant correlation existed between mid-thigh circumference and RE in competitive females at both velocities. (What are these R values? R=-.524 @ 7mph and R=-.518 @ 8.3 mph.) No significant correlation between these same two measures was observed in the recreational group. Larger mid-thigh circumference could result from higher muscle

mass in competitive females compared with recreational runners as a result of the more intense training and lifting workouts with the more frequent structured workouts in the competitive group. Such an increase in leg mass for this group could provide performance benefits.

Faculty sponsor: Brian Solberg

RACHEL JOHNSON '11

Ashes in a Tea Cup: Glimpses of Genocide

The events of the Holocaust have presented the world with a unique set of questions, uncertainties, and sorrows. The people involved in the atrocities, whether perpetrators or victims, have been represented by many people after them in an attempt to understand these events. This project begins with the Holocaust and attempts to examine the tragedy through the medium of fiction. As a six-story collection, many different characters and experiences of the Holocaust are shown. Each story tries to speak to larger issues about guilt, tragedy, boundaries, genocide, death, and the blurred line of understanding that evil and its consequences create. When we participate in the world where the Holocaust happened, what do we do?

Faculty sponsor: Amy Weldon

MADELINE JUNGBAUER '11

How Cold Mountain's Words About North Carolina Were Adapted to Film in Romania

One answer to those who hold that films adapted from a literary text are less worthy because they are parasitic on their written source is that many if not almost all literary texts are also parasitic. In the case of *Cold Mountain*, Anthony Minghella's adaptation of Charles Frazier's 1997 novel of the same name, the presumptively more original work is itself a contemporary retelling of Homer's *Odyssey*. In both film and novel, it is Inman's (Jude Law)/Odysseus's journey back to his Ada (Nicole Kidman)/Penelope that occasions his varied encounters with the powerful forces of nature that delay but also enable his return. Minghella must go beyond the words of Frazier's intimate descriptions of North Carolina not only because he uses film instead of language to convey it, but also because he found it necessary to substitute Romanian fields and mountains.

Faculty sponsor: Peter Scholl

CHRISTINE KENNEDY '11

Italo Calvino's Invisible Cities: A History-Inflected Postmodern Fairy Tale

In his 1972 postmodern fairy tale, *Invisible Cities*, Italo Calvino creates a world of fantastical cities. These cities are described by Marco Polo, the traveler, to Kublai Khan, the great emperor. Each of the 55 cities contains historical, social, economical, and political references to Italian history and more specifically to the Roman Empire. By connecting all the cities to the distant, lost past, Polo reveals that Khan's empire is fallible. Yet Calvino's novel looks backward to history as well as forward. The novel is not tragic, nor does it fall into postmodern skepticism. At the end of the novel, Polo speaks of taking fragments from each of the cities visited and using them to create the perfect city within a divine empire. In my research and paper I read and analyzed both *Invisible Cities* as well as the original Italian work *Le Città Invisibili*. I explore how the political history of the Roman Empire interfaces with Calvino's novel. While Calvino's work is quite famous with critical literature, I am making an original scholarly contribution in examining this historically inflected fiction in the light of the contemporary postmodern theories and urban sociology.

Faculty sponsor: Lise Kildegaard

EMILY KILGORE '11

Challenges of Inner-City Teaching: Looking Through a Lens of Experience

In today's competitive world, it is nearly impossible to think about the future without considering our country's educational system. American students are expected to reach 100% proficiency in reading, math, and science by the year 2014 under the No Child Left Behind Act. This expectation is set regardless of outlying factors such as race, ethnicity, special needs, language barriers, and socioeconomic status. The schools struggling most to meet this expectation lie within the inner cities, where a quarter of all children born during this decade will start their lives in urban slums. By taking a firsthand look at one student's experiences teaching in an inner-city Boston public school—combined with the research of experts—participants will receive a glimpse of the challenges facing inner-city schools. The combination of research and experience develops a presentation that looks at the future of inner-city teaching as a whole. Only then can we begin to make strides in achieving proficiency and excellence for all.

Faculty sponsor: Jeannette Pillsbury

RYAN NORD KITCHEN '11

Authenticity in Art

Art is the personal manifestation, or externalization, of concept. Whether or not the artist is aware of the subjective foray into creativity, their products have the ability to illuminate and examine our world in ways our language cannot. The role of the artist is to create objects that externalize their own internal response to the external. These externalizations, of any sort, allow the viewer to apprehend part of the artist's reality and allow for comparison. This ability to highlight distinctions between subjective realities allows for a transcendence of thought and greater social unity. Art is no longer only a search for physical beauty but has grown to encompass conceptual motifs that allow for personal development. Art can now appear beautiful to our senses, as well as draw conclusions to universal themes of how beauty, or any concept for that matter, relates to our society. This presentation will explore what it means to make art in contemporary culture and will exhibit 12 of the presenter's own works.

Faculty sponsor: Benjamin Moore

DANIELLE KOCH '12

Clinging to Memory

This J-Term, I wrote a novella within the genre of dystopian fiction. It centers on the experience of Denise, a retired librarian who now works at Babe's Pizza Emporium in Martinville. She cannot remember parts of days or whole years of her life, because Stein, her Deletor specialist, has selectively removed parts of her memory. Denise poses a major threat for Stein's project and to the rest of the army of Deletors, for if a single person can force themselves to remember their past, all of Martinville could collectively piece together their forgotten history. In this excerpt, Denise and Stein meet, Denise slowly reconstructs her past, and most importantly her relationship with her daughter, Lila, and the inner workings of the Deletor Plant are revealed.

Faculty sponsor: Amy Weldon

LUKE ARTHUR KRSTOSEK '11

An Exploration of Different Methodology for Testing Antibiotic Efficacy Using Eugenol and Its Derivatives

With the advent of new strains of bacteria that are becoming increasingly resistant to modern treatment methods, the development of new antibiotics is becoming ever more important.

New antibiotics can either be synthesized directly in a laboratory or built from compounds found in nature. To demonstrate the latter, eugenol, a compound in the essential oil of cloves, has a moderate anti-microbial effect. Through the use of different organic reactions, eugenol can be altered at different functional sites, which may lead to a compound with a greater anti-microbial efficacy. There are hurdles to using eugenol, however, as the non-polarity of eugenol prevents it from fully functioning in a polar medium, such as body fluids or laboratory bacterial broth. The end-goal is to not only overcome these challenges but to design an experiment that is repeatable in an undergraduate organic chemistry classroom setting. This is to show one application of organic chemistry and to perhaps inspire future students to pursue their own development of life-saving antibiotics. This paper will explore the effects of eugenol and its derivatives on different species of bacteria and ultimately present a methodology for future laboratory classrooms to use and build upon.

Faculty sponsor: Bradley Chamberlain

ALEX LANGE '11

They Will Appear, Behold

As a multimedia investigation of place, *They Will Appear, Behold* uses installation, movement, sound, and text to ask the audience to "Know Your Place." The work draws on the essays of Barbara Kingsolver and Rebecca Solnit and mingles conceptual ideas of place with the very personal experience of transition and migration that are a part of moving onto a new stage in life. This research became the basis for an artistic investigation of the various aspects of physical, emotional, and spiritual place as intimate/familial, communal, transnational, and migratory. The investigation of place not only asks the audience to witness the embodiment of various forms of place but asks them to participate and perform as they kinesthetically, as well as visually and intellectually, explore their relationship to their own place and the idea of "Know Your Place."

Faculty sponsor: Amanda Hamp

DONALD LEE-BROWN '13

A Statistical Test for Stellar Variability on Timescales of Weeks to Years

We have devised a statistical test that compares long- and short-term variances in measured brightness for stars in the field of view of open cluster M23 and have used the test to identify

stars in the field of the cluster that display long-term changes in brightness. Since 2003, Luther College's observing facilities have been used to collect luminosity data on around 1,500 stars in the field of open cluster M23, resulting in the acquisition of over 425,000 images of the cluster. Our test used this data to differentiate between stars whose brightness variation was due to signal or calibration noise and stars whose variation was due to an intrinsic luminosity change. Application of the test and period analysis resulted in the identification of 59 long-term periodic variable stars with periods ranging from roughly 15 to 500 days. Of these stars, 32 had already been flagged as suspected variables, while 27 were new additions to Luther's list of variable stars. In this talk the methodology and applications of the statistical test will be explored.

Faculty sponsor: Jeffrey Wilkerson

ANNA LOOFT '12

Polar Opposites, and Yet Right Next Door: The Contrasting Reactions of Poland and the Czech Republic to Secularization in Post-Communist Europe

From November 1989 to January 1990, five countries of the Eastern Bloc finally experienced liberation as the Soviet Union began to collapse. Organized religion was once again allowed to surface in society, and yet not all of these countries reclaimed their religious ties in the same manner. While the Czech Republic developed into the most secular country in all of Europe, Poland conversely became the epitome of resistance to secularization. Drawing on survey data, including the European and World Values Surveys, and on various sociological theories of secularization, this study examines the ways in which the Roman Catholic Church, once a dominant force in these two Eastern European nations, seemingly lost so much of its influence during and after the fall of Communist rule in the Czech Republic while simultaneously continuing to maintain a prominent place in Polish society.

Faculty sponsor: Todd Green

JON LUECK '11

Musical Transcription: From White Mensural Notation to Modern Notation

Musical notation has evolved several times since its inception, roughly 4,000 years ago. After careful study of the workings of the direct predecessor to modern notation, a system called "White Mensural notation," I put my research

to the test by trying my hand at transcribing elements of a 16th-century mass. Through visual aids and an informative lecture, this presentation will supply the audience with an opportunity to learn aspects of the workings of the white mensural notation system. Other topics that will be discussed include the life of the composer, Jean Mouton, and aspects of the venue and choir that the music would have originally been composed for. A short performance of the music that was recaptured from the past will conclude the presentation.

Faculty sponsor: James Griesheimer

ALLA MAKOVEEVA

Socio-Cultural Errors in the Business Correspondence of English, Japanese and Russian Language Learners

In current business practice, about 80% of the informational exchange is done via telecommunications, especially in the written form. In the modern world of international cooperation, business people often need to compose letters in foreign languages, and this plays a vital role in successful agreements. However, most textbooks provide only structural recommendations and clichés. Non-native speakers also bring to the correspondence features of their own cultures, which influences the effectiveness and adequacy of their discourse. This study presents an analysis of 30 business letters from second-language learners of English, Russian and Japanese which shows that they use grammar and vocabulary correctly but make mistakes caused by extra-linguistic factors. Detected errors were divided into five groups: misunderstandings of the communicative script of the culture, mistakes in using the linguistic units, failure to comprehend the authority hierarchy, differences in the system of expectations, and lack of background knowledge of culturally conditioned scenarios. The research also provides a variety of recommendations for second-language learners to improve their business writing skills, including a schema for analysis of business letters composed by a native speaker. This takes into account communicative intention, speech acts, authority hierarchy, perception of universal aspects (time, space, destiny, and others), and unique cultural features of the language, which reflect differences in cultural values that writers bring to their specific evaluation of the world.

Faculty sponsor: Laurie Zaring

JUSTIN C. MARSCHALL '12, LEAH GATES '12, DAN BALDWIN '12

Dear Heavenly Father: Can a Brief Prayer Enhance Forgiveness for a Romantic Partner?

Forgiveness research continues to be one of the rapidly emerging fields of health psychology. There have been considerable contributions to the knowledge base that empirically link forgiveness with health. One question, however, still remains: How does one become more forgiving? Modeled after Lambert et al.'s 2009 study, the present work seeks to explore the dynamic of prayer in stimulating higher levels of forgiveness. Participants who reported currently being in a romantic relationship were recruited from several general psychology courses and were randomly assigned into one of two conditions: prayer or control. Questionnaires were issued before and after completion of a three-minute prayer or control exercise. Analysis of data revealed statistically significant differences between Time 1 and Time 2 in the prayer condition, suggesting that prayer for the well-being of one's romantic partner can lead to higher levels of forgiveness. Further research should investigate potential health outcomes that may relate to prayer and forgiveness.

Faculty sponsor: Loren Toussaint

EMILIA MCVEY '12

Safety of Organic Fertilizer: The Effect of Rotenone Application on Biomass-Decomposing Redworms

As concern for the environment heightens, today the word "organic" is becoming an increasingly universal term yet one with variable definitions. Principally, the agricultural industry has fostered much debate over what it means to practice "organic" farming methods, including the application of organic herbicides and pesticides. Many of these applications are organic in the sense that they are naturally derived from biotic life, not chemically synthesized in a laboratory. In effect, their respective dangers are often underscored. Nevertheless, many organic applications possess considerable toxicity and potential for environmental degradation much like their chemically based counterparts. This experiment is designed to test for adverse consequences associated with the application of the organic pesticide Rotenone. Specifically, the generic organic pesticide Rotenone will be applied in varying concentrations to yellow dent maize throughout germination. The mature corn from each concentration level will then be decomposed

by redworms. Size and growth of the redworms following exposure to corn treated in respective concentrations of Rotenone will be assessed and compared to masses prior to decomposition.

Faculty sponsor: Mary Lewis

LAURIE MEDFORD '12

Who Were the Company C Eighth Wisconsin Infantry Volunteers? The Social Profile of a Union Company

At the outset of the Civil War in 1861, President Lincoln called on the states to provide volunteer soldiers. This sparked patriotic town meetings across the North, including in Eau Claire, Wisconsin. A growing frontier city, Eau Claire responded patriotically and raised several military units over the war's course. The first Eau Claire-based unit mustered into the army at Camp Randall on September 1, 1861, as Company C of the Eighth Wisconsin Volunteer Infantry. Through the members' shared experiences as soldiers on campaign in the West, Company C formed a group identity symbolized by its bald eagle mascot. Although Company C's war service is well-documented through reminiscences of its contemporaries, and noted in more recent publications, little is known about the individuals who composed the unit and their families. This paper uses original military records to examine the socio-economic characteristics of Company C's members to construct a social profile of the unit.

Faculty sponsor: Edward Tebbenhoff

CALLI MICALE '13

Dualities of Human Nature and the Ultimate Catharsis

In 1951, an apocalyptic prophecy, deemed the War Scroll, was discovered along with other Dead Sea Scroll manuscripts in a cave just outside of the ancient settlement of Qumran. The society that flourished there between 134–104 BCE considered the time of the apocalypse to be fast approaching. The fragments of the scroll detail instructions for a final battle between the "sons of light" and the "sons of darkness." This conflict concludes with the destruction of the sons of darkness, initiating a time of peace. War, however, necessitates dualism. The battle cannot persist without the existence of either side. Similarly, dualistic ideology manifests physically in the body through body-half connectivity, a constituent of Peggy Hackney's concept of "Total Body Connectivity based on Bartenieff Fundamentals." The right and left sides exemplify two extremes.

Yet they are necessary for and dependent on one another for the dance to subsist. Working primarily with homolateral patterning in the vertical plane, this solo dance will demonstrate eschatological war-dualism found in War Scroll as a wholly contingent relationship.

Faculty sponsor: Amanda Hamp

WILLIAM MONTOYA '11, ABHRA BISWAS '13, JUNETTE MAXIS '11, UFRA MIR '11
Clinton Global Initiative: Putting Ideas Into Actions

The Clinton Global Initiative University (CGI U) is a laboratory of ideas that hosts a meeting where students, national youth organizations, topic experts, and celebrities discuss solutions to pressing global issues. CGI U 2011 was held at the University of California at San Diego from April 1–3, 2011. At this meeting, nearly 1,200 attendees came together to make a difference in CGI U's five focus areas: education, environment and climate change, peace and human rights, poverty alleviation, and public health. Two projects led by Luther College students were featured on stage at the convention by former President Bill Clinton—"Practical Guides for Survival" (represented by Luther's Junette Maxis '11) and "I-ImpactNow" (represented by Luther students Kiflu A. Tesfaye '11, William A. Montoya '11, and Willamette University MBA student Ezra Mengistu). In this session, students who attended the conference will talk about the Clinton Global Initiative and about their own leadership initiatives.

Faculty sponsor: Greg Lonning

CHRIS NEVALA-PLAGEMANN '11
A Late-Holocene History of Fire and Drought at Cheney Lake: Has Local Climate Affected Fire Regimes in Northwestern Wisconsin?

The nutrient poor soils of the northwestern Wisconsin sand plain support a pine and oak ecosystem that has been historically dependent on fire. This region experienced a cool moist climate during the Little Ice Age (LIA; ~150–750 calendar years BP) and a warm dry climate during the Medieval Warm Period (MWP; ~800–1,400 calendar years BP). Within these time periods, severe droughts affected much of the Great Lakes region; however, little is known about the timing of droughts in the sand plain. In this study we attempt to understand how both long-term regional climate shifts and short-term local droughts affect fire regimes. We collected several

sediment cores from Cheney Lake, one from the deepest part of the lake and several along a transect near the shoreline. We reconstructed fire history using charcoal sieved from the deep water core and identified sand lenses in the shallow cores as evidence of drought. Radiocarbon dates were used to determine the timing of potential fire and drought events. Our results suggest fire frequency and charcoal influx increased during the MWP and decreased during the LIA. Our lake-level analysis suggests the occurrence of several major droughts that also appear to have affected the fire regime.

Faculty sponsor: Beth Lynch

SAMUEL E. OINES '11
The Witches of Karres: An Adapted Screenplay by Samuel Oines

Since its emergence at the end of the 19th century, film has become a dominant expression of culture, and film adaptation, beginning as early as 1901's *Marley's Ghost*, familiar to moviegoers of all ages. *The Witches of Karres*, written by Samuel Oines ('11), directly explores film adaptation through its full screenplay of the 1966 sci-fi novel by James H. Schmitz. Though nominated for a Hugo Book Award, Schmitz's novel quickly slipped into obscurity. It was revived again for this project. In adapting this novel for film, it was necessary to navigate the tension between textual fidelity and originality to reinvent Schmitz's work within the fresh artistic vision of a new art form. After introducing the novel, the presenter will explain the impetus for his creative project and the various challenges he faced in bringing it to its final form. An excerpt of the script will then be showcased through five minutes of storyboarded film, accompanied by score and voice actors.

Faculty sponsor: David Faldet

ELLA ORNGARD '11
Emancipating "Mother Nature": A Malagasy Makeover of the Exploitative Paradox Paralleling Women and Nature

The natural world has long been feminized in many cultural traditions. While essentially life-giving and sustaining, women and nature, contrarily, are often portrayed as wild and therefore in need of subordination and control. In a world where Mother Nature is becoming increasingly malevolent in her caprice, how are we to understand the relationship between women and the environment as well as our perceptions of the two? While studying in

Madagascar, I encountered this relationship in a new light: Malagasy women were often portrayed, ironically, as the greatest culprits of environmental degradation, that is to say, oppressors of that with which they are often paralleled. This paradox stems from the nature of the simile; as maternal figures, both women and the environment act as passive recipients of the exploitation of an unquestioned patriarchy. When void of maternal characteristics, they are wild and capricious. Both roles welcome subordination and exploitation, occasionally upon each other. In this presentation I will explore this problematic discourse through my personal research in Madagascar, a discussion of ecofeminist theories, as well as through analyses of Malagasy tradition, folklore, and literature.

Faculty sponsor: Anne-Marine Feat

JENNIFER PAULSON '13

Exploring the Bilingual Mental Lexicon with Models as Maps

The human ability to comprehend and speak several languages is a fascinating one. How, though, does the human brain organize these languages and their respective words? Does the bilingual's mind automatically categorize words into separate mental dictionaries (called lexicons) according to language? Or do bilinguals have one shared lexicon that contains words and information from both their mother tongue (L1) and second language (L2)? One helpful tool in answering these questions is looking at various models of bilingual word-recognition, including the Revised Hierarchical Model (RHM), which argues the idea of two separate L1 and L2 lexicons, and the BIA+ model, a computational representation of the bilingual lexicon. Through close analysis of these models, this presentation explores what insight each can contribute to understanding the bilingual mental lexicon.

Faculty sponsor: Laurie Zaring

MEGHAN PEDERSEN '12

A Phrase for Butterfly Movement

Peggy Hackney's *Making Connections: Total Body Integration through Bartenieff Fundamentals* analyzes and provides a guide for developmental movement and connective patterns in the body, allowing for neuromuscular re-patterning. Movement involved in swimming is similar to dancing. Swimming consists of phrases and technical skills that propel the body through the water. In the same way, dance extends the body through space. These movements work

at maintaining bodily momentum. Dancing and swimming share a relationship in body patterns because they are muscular movements within the body. This presentation will explore how Hackney's patterns of connectivity can improve performance of the butterfly, a particular swimming stroke. Specifically, core-distal, head-tail, and upper-lower relationships will be utilized. The swimmer can enhance swimming performance by exploring and engaging these patterns of connectivity on land and then applying them to the swimming stroke while in the water.

Faculty sponsor: Amanda Hamp

ANNE PROESCHOLDT '12

Peripersonal Space: How We Become "One" with Our Environment and Each Other (and Why We Can't Afford Not To)

Through nonverbal communication such as proxemics, haptics, gestures, eye contact, and facial expressions, the human body constantly sends, receives, and interprets messages. This information influences how we view and interact with the world. The concept of peripersonal space, the space directly around the body that the body annexes and considers a part of the body, suggests that citizens of the world are bound into a sort of shared body that can only survive in tandem with its distinct yet complementary parts. Through the lens of various bodily experiences in mother-daughter relationships, primate behavior, solitary confinement, bodily inscription, postmortem exhibitions, reproduction, Buddhist meditation, and first-person shooter video games, this paper explores how, as individuals seeking other humans for support and affirmation, our bodies compel us to act as ethical beings in mindful and compassionate ways—no matter the physical or perceived distances between one another.

Faculty sponsors: Amanda Hamp, Jon Wolseth

CHARLIE RASMUSSEN '11

An Ecological Interpretation of Martin Luther's Theology

This paper asks whether the theology of Martin Luther can guide Christian responses to the contemporary challenge of caring for and preserving the environment. I begin by examining the views of some contemporary interpreters of Luther's theology: Larry Rasmussen, Sallie McFague, and Paul Santmire. I then explore in depth Luther's *Sermons on the Catechism, Preface to Romans*, and *The Freedom of a Christian* to discern

whether and how they might contribute to an ethically responsible approach to contemporary environmental issues. I conclude that Luther's theology has a pantheistic theme that emphasizes God's involvement in creation along with human care, humility and the responsibility to the Earth. More specifically, the *Sermons on the Catechism* emphasize that humanity should adopt an attitude of humility toward creation. The *Preface to Romans* focuses on the nature of sin, which in our modern context should be viewed through the lens of consumerism and individualism because they both lead to the degradation of the environment. Finally, *The Freedom of a Christian* demonstrates that Christians are called, through spiritual freedom, to love the natural world as it exists and to cherish the interconnectedness of all life.

Faculty sponsor: Jim Martin-Schramm

CHRISTOPHER M. SCHAUPP '11
Sea Surface Temperature Evolution
in the Southwest Pacific Over the Past
11 Million Years

Understanding dominant trends and cycles throughout earth's climate history is important for helping examine present climatic cycles and temperatures, as well as predicting those that will occur in the future. Existing composite records of high-latitude climate show an overall cooling trend for the past 10 million years, with an increase in the rate of cooling around 3 million years ago (Ma), roughly corresponding to the emergence of permanent Northern Hemisphere ice sheets. To complement and shed light on existing high-latitude climate records, we investigate changes in subtropical temperatures over the same time interval. Using alkenone paleothermometry and oxygen isotopic data, sea surface temperatures (SSTs) during the last 10.8 million years were approximated for Ocean Drilling Project (ODP) Site 1125, which lies off the east coast of New Zealand. Previous studies at Site 1125 had not examined SSTs further back than five million years, and thus, though rough in resolution (~80,000 yrs.), this temperature reconstruction represents an important first inquiry into older marine conditions. Our data show that the southwest Pacific Ocean was ~11°C warmer (25.7°C) 10.8 Ma than it is today, with gradual cooling (~1°C/million years) occurring until the present, resulting in a modern-day SST of approximately 14°C. We compare our data to existing composite records of high-latitude climate and assess (1) a steady

decline in greenhouse gas concentrations and/or (2) expansion of Antarctic ice volume as possible dominant control(s) on SST in the southwest Pacific during the past 11 million years.

Faculty sponsor: Laura Peterson

KRISTEN SCHULTZ '11
Discovering France's National Identity
Through Gastronomy

Italians eat pasta and drink Chianti; French eat baguettes and drink Bordeaux; Americans eat cheeseburgers and drink Coke—or so state the stereotypes. As gastronome J.A. Brillat Savarin once said, "Tell me what you eat, and I will tell you who you are." Indeed, the food choices that we make define who we are individually and as a culture. Interestingly, in the 19th century, France began constructing a sense of national identity while the idea of French gastronomy was also being developed. In this poster, I will show how in French literary works, such as *Le Ventre de Paris* by Emile Zola and *La Physiologie du Goût* by Jean Anthelme Brillat-Savarin, there is more to gastronomy than what meets the mouth; gastronomy holds the power to not only intensify flavor, but also serve as a cultural marker. As current debates of genetically modified and local foods intensify, it is important to consider how what we eat really does portray who we are.

Faculty sponsor: Anne-Marine Feat

LIZ SMITH '11, NATALIE BAUDLER '11,
LIBBY DAHMS '11, SAM DEPAGTER '13,
EMILY KITTLESON '11

Visual Perception and Newspaper Page Design

A portion of this year's *Chips* editorial staff will share what they've learned in a year of conscious design overhaul. Representatives from the News, Features, Arts and Entertainment, and Opinion sections will explain how various aspects of visual perception can be utilized effectively in designing a strong page. The staff will share successes and failures in design from *Chips* and other award-winning college newspapers. Aspects of design such as type, white space, photography, color, and graphics are important tools in drawing readers into a page, and our discussion will include ways to put those elements into use most effectively. The advice and findings of this group were previously shared at the Associated Collegiate Press Best of the Midwest Conference in Minneapolis in February.

Faculty sponsor: David Faldet

JOHN STENDER '12

Namibian and South African Choral Music Transcription and Arranging

In January 2010, a Luther College chamber choir of 24 singers embarked on a journey to experience, share, and gain an understanding of choral music in Namibia and South Africa. During this trip we were guided by our Western musical tradition, the will to return and bring the African music we learned to a wider audience, and the nuances of cultural immersion. This year I have been working with Dr. Timothy Peter to transcribe this music for wider use. We first transcribed the songs using personal audio and video recordings made of local choirs as well as recordings of the Luther choir's performances. Our attempt to pin down original texts (in at least three native African languages) and provide usable English translations represents much international communication and further study. This requires respect for the source oral traditions and patience for their limitations. We were then able to arrange the music and interpret repeats, dynamics, and other expression marks to produce octavo-style choral scores. This simple music has a festive, communal quality, evoking joy and a tangible peace, and this project has led to a deeper realization of how music transcends culture and how the means of receiving it, whether orally or from the printed page, can be as challenging and informative as the humble act of singing. This presentation will include both commentary on the transcription process and performance of some of these works.

Faculty sponsor: Timothy Peter

SAMANTHA STYKEL '12

The Effect of Localized Oil Spills on the Atlantic Loggerhead Turtle Population Dynamics

The loggerhead sea turtle (*Caretta caretta*) is an endangered species with significantly different haplotype frequencies in the regional nesting populations of the Gulf of Mexico and the western North Atlantic Ocean. In this work, we analyze the population dynamics of loggerhead turtles affected by localized oil spill catastrophes. We develop a spatial, stage-classified matrix model and apply it to the three primary nesting regions in the area. Oil spills are simulated deterministically in each nesting region, with oil-induced mortality ranging from 25% to 100% and affecting stage classes either proportionally or equally. The results of this study are intended to provide insights into the population dynamics

of the Atlantic loggerhead turtles and suggest conservation techniques appropriate in each oil spill case.

Faculty sponsor: Eric Baack

TONYA TIENTER '12

Mockery and Mirrors: The Role of the Clown in Shakespeare's *The Winter's Tale*

William Shakespeare's 1610 romance, *The Winter's Tale*, paints the stage with themes of jealousy, betrayal, and, in the final acts, redemption. The play's two imperialistic protagonists turn on each other, yet amidst their serious conflicts appears the comedic figure "Clown." Some may assume Clown is included to add sheer absurdity, a distraction from the commanding characters and weighty themes. On the contrary, much of Clown's jesting parallels the play's jealousy, betrayal, and redemption; his comedy becomes the medium which reinforces the play's main themes. My research of Clown includes three different methods of inquiry: textual analysis of *The Winter's Tale*, published scholarship concerning the fool and the lower-class Clown figure, and, most distinctively, my experience acting the clown role in a course production of the play. The combination of these three modes of research, particularly the last, reveals an intimate relationship between performance and literary analysis that allows Clown's function to be more thoroughly explored and understood. This synthesis between text and production imparts a better understanding of the clown-like figure in many of Shakespeare's other plays as well, specifically the clown-like Porter in *Macbeth* which I saw performed at the Guthrie Theatre in Minneapolis, Minnesota. Like my modes of research, my presentation will combine literary analysis and brief moments of performance to illustrate the symbiotic lenses through which we can analyze the Clown.

Faculty sponsor: Mark Muggli

JUSTIN TIGERMAN '11

Jesus and Christianity on Film: An Examination of Image, Message, and Appeal of a Cinematic Christ

When conceptions of Christ come to our culture in the form of the silver screen, we become radically confronted in a religious way with our ideas about Jesus. We are now to the point where we must ask if those images are the images that we want of Jesus. The worldviews, ethics, and methods of the movies may end up moving us to reexamine who Jesus is in our 21st-century

culture, and perhaps even attempt to redefine who Jesus needs to be. With the release of *The Passion of the Christ* just seven years ago, an air of revivalism mirroring that of Whitefield's sermons consumed Christians across the nation. By this popular response there is still significant meaning in Jesus' message and in the way his meaning can be relayed to an audience. Our faith is formed on images of Jesus found in the Gospels; do films have a similar ability to, in some way, affect one's image of Jesus?

Faculty sponsor: Sean Burke

KATHRYN TRIGGER '11
Theatre and Social Change: Ariel Dorfman's *Death and the Maiden* as Immersive Experience

The realm of playmaking has long been a source of emotional response, beginning with the early Greek traditions of a cathartic experience drawn from theatrical productions. Modern efforts to use theatre as a form of activism, such as Applied Drama, tend to focus on nontraditional forms of presentation and role-play as the primary methods to initiate a catalyst for social change. However, the arts community must not lose sight of the role of the straight play within activism. The challenging nature of Ariel Dorfman's *Death and the Maiden* presents ample opportunity to elicit societal change without altering the form of theatre itself. Through the addition of installation art as environment, this presentation will document the process of achieving an empathetic environment for social change through the production of a traditionally structured play.

Faculty sponsor: Robert Larson

KATHRYN TRIGGER '11
Transforming the Eucharist: An Exploration in Ritual and Embodied Value

Originating in the Protestant Reformation in 16th Century Europe, the debate over the practices of the Eucharist in Western Christianity has long been fueled by disagreements over both theological and physical components to the ritual. The recent influence of feminist theologians, such as Rosemary Radford Ruether and Sallie McFague, as well as the sociological views of Catherine Bell and Pierre Bourdieu in regards to symbolic power structures, suggests that the roles of theology and physicality are intertwined in a much greater way than previously realized. The physical practices of the sacrament present embodied values which leave the participant as the carrier

of embedded theological meaning. The resulting perceptions of morality and social structure are often fraught with vertical hierarchies and systems of domination. By utilizing new texts and incorporating an understanding of Bartenieff Movement Fundamentals, this presentation will put forth a newly visioned Eucharist that is aimed towards the creation of an inclusive, earth-minded community. The audience will be invited to participate in this newly formed ritual.

Faculty sponsor: Amanda Hamp

JULIA WALK '11
Issues of Adaptation in *The Color Purple*

Steven Spielberg's 1985 filmic adaptation of Alice Walker's *The Color Purple* shifts the focus of Walker's novel and de-emphasizes its feminist message. In this respect, the film fails to go beyond the words of the novel that convey Walker's message. The three main female characters in the film do not portray the strong, independent females of the novel. Celie's story after escape from her abusive husband is all but eliminated, and the wild, promiscuous, and independent Shug Avery is made weaker in the film through the introduction of a new character, her preacher father. The paper also examines the way intertexts from the novel were adapted to film and how the use of certain intertexts emphasizes different themes in the film.

Faculty sponsor: Peter Scholl

LEAH WALTERS '11
Stability Evaluation of [18F]FDG at High Radioactive Concentrations

Due to recent influx in demand for positron emission tomography (PET) radiopharmaceuticals, increased concentration of F-18 FDG and longer stability is a necessity. The objective of our study is to determine the concentration of ethanol, a known radiolytic stabilizer, needed to maintain F-18 FDG stability for 12 hours at high radioactive concentrations. The formation of F-18 was by the O-18(p, n)F-18 reaction using a PETtrace cyclotron. F-18 FDG synthesis delivered up to 9.1 Ci at end of synthesis (EOS) using the FASTlab platform. A series of runs (533-610 mCi/mL) were completed with concentrations of 0%, 0.1%, and 0.2% ethanol. Quality control measurements were tested hourly for 12 hours evaluating radiochemical purity (RCP) and identity, appearance, pH, and residual solvents. The run without ethanol added failed RCP at one hour, those with 0.1% ethanol failed

after five hours, and those with 0.2% ethanol were found to maintain stability through 12 hours beyond EOS. The runs with 0.2% ethanol passed all stability parameters related to radiolysis and the radiolytic impurities were relatively constant at $6.1 \pm 0.7\%$ after three hours. These results show that it is possible for 9.1 Ci of F-18 FDG to maintain stability for 12 hours. This research is important clinically in order for the production of PET radiopharmaceuticals to keep pace with the increased patient demand.

Faculty sponsor: Marian Kaehler

CHELSEA WEISS '13, JACOB SEIBERT '12, WITH MARY BETH CANNON '11, SHARON HEYER '11, LISA HIEB '11
Investigating Water Quality in the Dry Run Creek Watershed

The quality of water in streams, rivers, and oceans is critical to maintaining ecosystem function and supporting animal, plant, and human life. The Dry Run Creek Watershed, a 20,172 acre sub-watershed of the Upper Iowa River, is located in close proximity to Luther College and drains into the Upper Iowa River at the Twin Springs Campground in Decorah. Significantly, Dry Run Creek has recently been designated as "impaired" because of elevated levels of *E. coli*, a fecal indicator bacterium. To improve the water quality in Dry Run Creek, a collaboration has been formed between multiple interested parties, including Luther College. The goal of this collaborative work was to monitor a variety of sites in the watershed using physical, chemical, and biological parameters, in order to determine if there were more prominent contributors. A total of 13 sites were monitored from April to November 2010, with samples being taken once a month and after heavy rains. Results from chemical parameter data revealed that five of the 13 sites displayed consistently higher levels of nitrites and nitrates, total phosphorus, total nitrogen, and ammonia. Results from biological data revealed that the same five sites exhibited higher levels of *E. coli* bacteria. Levels of all pollutants significantly increased in almost all of the sites in response to heavy rains. Experiments to examine macroinvertebrate biodiversity and potential human septic inputs were also performed. Collectively, these data have identified locations in the Dry Run Creek watershed that are contributing higher loads of *E. coli* bacteria and chemicals, providing valuable direction for watershed improvement projects.

Faculty sponsor: Jodi Enos-Berlage

CAMILLE WELTER '11

Beyond Words, Beyond the Stage, and Into the Classroom: How to Make Shakespeare's *Romeo and Juliet* Come to Life

Though some teachers are wary of de-emphasizing reading and live performance of Shakespeare's plays, film adaptations work well in the classroom to enhance and supplement the teaching of Shakespeare. Films such as Zeffirelli's *Romeo and Juliet*, Luhrmann's *William Shakespeare's Romeo + Juliet*, and Madden's *Shakespeare in Love* are not just a mere fall-back for teaching *Romeo and Juliet*. Each of these films reinterprets critical dimensions of the play and, therefore, when combined with other pedagogical methods, these films provide a contrastive perspective, which can enrich and enliven the learning experience of the student.

Faculty sponsor: Peter Scholl

KEVIN WENGER '13

Crime Novels and Cultural Portrayals

For an in-depth understanding of the differences and similarities between Spanish and North American culture, a study of written texts or other cultural products provides useful sources for comparative analyses. Mass media, because of its interest in appealing to a broad public, can offer one of the most direct paths to popular culture. I have chosen to focus on an example of popular crime fiction from each country. By studying *Night Prey*, a novel by John Sandford (John Camp), an author who was born and studied in Iowa and ultimately moved to Minnesota, and *La Hija del Canibal* by Rosa Montero, a native of Madrid, some cultural norms and processes become evident. Both are well-known and accessible authors whose crime novels highlight contemporary social issues. In this presentation, some of these issues and how they are presented in the novels will be highlighted.

Faculty sponsor: Virginia Gibbs

ANDREW WHITE '11

From Chaos to Community: Cedar Rapids and the Floods of 2008

In the summer of 2008, the city of Cedar Rapids, Iowa, experienced a disastrous flood of epic proportions. More than 1,500 homes were destroyed as the Cedar River came rushing over levees designed to protect against a flood only half as large. As the city began to recover from this disaster, its residents faced an uncertain future. Would their community return? What would it look like? For many residents, the

answers to these questions came not from the government, but rather from their neighbors. Based on personal interviews with Cedar Rapids residents, flood recovery workers, and government officials conducted during J-term 2011, this project tells the story of how many Cedar Rapids neighborhoods rebuilt in the aftermath of the flood. It highlights the role of Block-by-Block, a faith-based organization committed to helping neighborhoods rebuild themselves. The end goal of the project is to see what lessons can be learned from Cedar Rapids's example and to explore how a community-based model of disaster recovery may help future cities afflicted by natural disasters rebuild their communities in a just and sustainable manner.

Faculty sponsor: Jon Jensen

ASHLEY WRIGHT '13

The Role of a Successful Production Manager

This is a presentation on the role of the production manager within a theater company. It will look into the comparison between the role of the production manager and the stage manager, and it will examine where production management and stage management overlap as well as when they are completely separate. Included in the presentation will be a look into the different characteristics of people that production managers work with during a production, along with techniques and tips for working with all kinds of people. The presentation also will include a portfolio of necessary organizational materials needed to be a successful production manager. The research to be presented will be drawn from previous experiences related to the Luther College Theatre/Dance Department production manager, United States Institute for Theatre Technology workshops attended, Commonweal Theatre internship experience, and other readings related to production and stage management.

Faculty sponsor: Lisa Lantz

JENNA YEAKLE '12

Females' Reproduction and Fertility Rituals in the Ancient World and Medical America

Women's reproductive rituals and behaviors in the Near East and Mesopotamia as theological, cultural experiences can be compared to current Western ideology of the reproductive experience. An observation of rituals and behavioral social patterns in early Christianity and Judaism support and challenge the development of Western,

medicalized thought relating to current guides of appropriate female reproductive roles. By analyzing ancient texts describing the Goddesses' reflection on social roles and the context in which particular roles and tasks were shaped within a growing patriarchy, we can better understand and critique today's Western views regarding ethical issues of reproduction and fertility. Utilizing recent analytical texts will further questioning and criticism of the paradigm shift which stemmed from social control of the ancient feminine within the realm of reproduction and fertility.

Faculty sponsor: Maryna Bazylevych

GEORGE ZACHARAKIS-JUTZ '11

Blind Tip Reconstruction: Determining the Shape of an Atomic Force Microscope Tip

Friction is a commonplace, yet often overlooked, phenomenon that is important to understand in a fundamental way. Studying friction at the nanoscale requires the use of nonconventional measurement tools, such as the atomic force microscope (AFM). Determining nanoscale friction with the AFM requires accurate knowledge of AFM tip shape. Since the AFM tip apex is smaller than the resolution of optical microscopes, alternative methods, such as blind tip reconstruction, must then be used. Blind reconstruction utilizes the mathematical properties of dilation and erosion to estimate the tip shape from an AFM image. Using simulated AFM images with artificial noise, this research examines the reliability of blind tip reconstruction in determining an accurate reconstruction from images with noise present. Using MatLab algorithms designed and written by Luther students, we implement blind tip reconstruction with a type of thresholding to minimize the impact of image noise on reconstructions. Using the root mean square difference between the possible tip reconstructions relative to the known tip shape, we look for patterns that will allow a general user of these algorithms to identify the best estimate of tip shape without knowledge of the actual tip shape. These results will be applied to current friction research being performed in the Luther College Physics Department.

Faculty sponsor: Erin Flater

TYLER ZEY '12

Material Does Matter: An Exploration of the Clarinet Barrel

In theory the material that a clarinet is made of has no effect or only a negligible effect on tone quality, yet practice has proven that palpable differences exist for performers and listeners alike when comparing clarinets of different materials. The clarinet barrel is interchangeable provided that the length and bore characteristics of a replacement barrel complement the instrument. Here too it is well known in practice (if not in theory) that varying materials tends to vary tone color. In our research, we fabricated barrels and have been able to generate data in the form of fast-fourier transform analyses that document palpable differences in identically designed barrels that vary according to material. We also attempted to improve the barrel's design so that it performs its function with more efficiency.

To do so we applied known concepts related to wave formation, distribution of pressure nodes/antinodes, and fluid mechanics to design a bore with better tuning between registers, a more homogenous tone quality and more consistent playing resistance. With regard to the collection of data that demonstrates the effects of material on tone quality, tuning, and response, our work is ongoing. Unanswered questions have to do with the effects of hardness, modulus of elasticity, and density on the spectra generated by varying materials. In addition we would like to explain the improvements that our unique bore design imparts in terms of fluid mechanics, the effect of increasing or decreasing the bore's cross section at given nodal points within the barrel's bore, or both.

Faculty sponsor: Michael Chesher

TYLER ZINNECKER '12, FRAN FAIRFIELD '11

Insect and Plant Communities in a New Roadside Prairie Planting

In 2008, the Iowa DOT began a roadside revegetation project to establish native prairie plants along approximately 15 miles of highway US 52 right-of-way from Decorah, Iowa, north to the Minnesota border. The goal of this project was to reintroduce native vegetation to reduce maintenance costs and improve driver safety, while increasing biodiversity and restoring part of Iowa's natural heritage. One objective of this particular planting project was to compare the effectiveness of two planting methods: organic and spray. In October 2008, spray plots were

mowed, then sprayed with herbicides, then overseeded, while the organic plots were mowed and then overseeded. Both treatments were mowed regularly in 2009 and 2010 to reduce weed competition of native prairie plants during initial growth. Control sites outside the project area have been randomly mowed once in this period to control noxious weeds. Plant, butterfly, and ground beetle communities were monitored in the three replicate plots in each of the three treatments throughout 2010. Significant differences were found in plant community diversity and in ground beetle species richness between spray and organic planting treatments. Overall, although in its early stages, our results suggest that spray treatments are more effective for the establishment of more diverse plant and ground beetle communities.

Faculty sponsor: Kirk Larsen