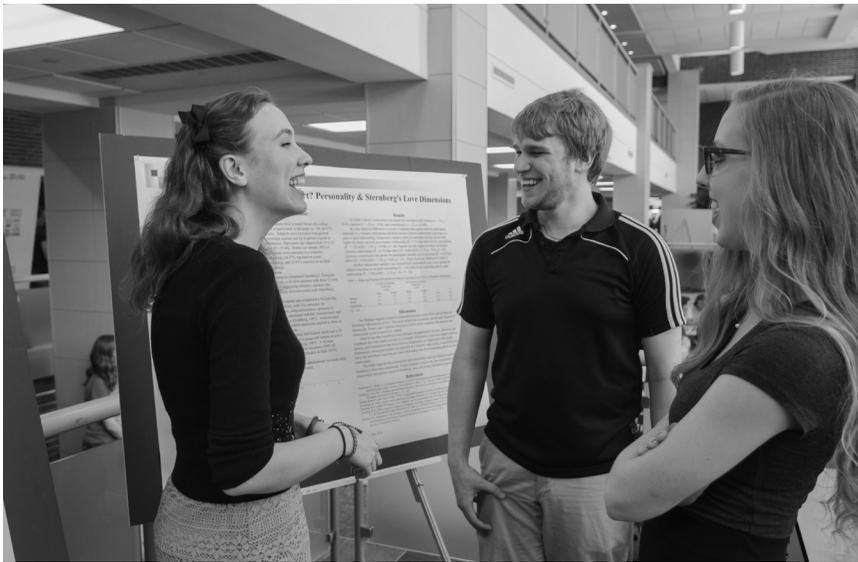
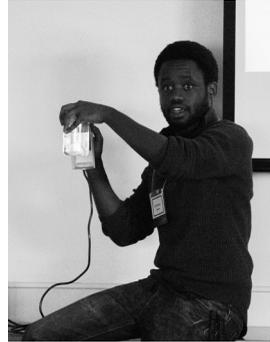


Student Research Symposium

Friday, May 5, 2017



To the Luther Community:

Welcome to the annual Student Research Symposium at Luther College, one of the highlights of our academic year. The day will be filled with oral presentations, posters, and performances that demonstrate the life of discovery, reflection, and creation that Luther students pursue under the inspired and skillful guidance of our faculty.

At the day's opening session we will hear from two outstanding seniors who were chosen to reflect on their research experiences. The projects undertaken by these two students, Pablo Lopez Alonso and Sheri Schwert, represent the kind of complex learning—rooted in both disciplinary and inter-disciplinary approaches—that Luther fosters to help our students and our society identify, understand, and address significant issues in our world.

Following the opening session, the day will unfold with multiple sessions of talks, posters, and performances by many of the top students at Luther in majors across the college. What you will see and hear is the culmination of long hours of thought, experimentation, practice, vision, and revision, offered now to our students' peers, mentors, families, and friends. Session topics and descriptions of each presentation are included in this program. In addition to these sessions, please see also the separate brochure listing sessions that feature the top research papers from our common first-year spring course, Paideia 112: Enduring Questions.

The day will conclude with two evening performances performed by students in our music program's opera workshop and in our theatre program in the visual and performing arts. We are delighted that you have joined us today to see the fruits of our students' labors this academic year.

Sincerely,

A handwritten signature in black ink that reads "Kevin Kraus". The signature is written in a cursive, flowing style with a large initial 'K'.

Kevin Kraus
Dean of the College

DAY-AT-A-GLANCE

SESSION I: 9:00–9:45 A.M.

OPENING EVENT: CELEBRATION AND KEYNOTE ADDRESS

Center for Faith and Life Main Hall

- Introit: Luther College Trumpets (John Cord, conductor)
- Invocation: Michael Blair, campus pastor
- Welcome: Rachel Brummel, assistant professor of environmental studies
- Research Reflections: Sheri Schwert '17 and Pablo Lopez Alonso '17
- Recognition of Symposium Participants: Laurie Zaring, associate professor of linguistics and French
- Aurora and Norsemen (Jennaya Robison and Andrew Last, conductors)
- Benediction: Michael Blair
- Postlude

SESSION II: 10:00 A.M.–11:15 A.M.

<i>Dahl Centennial Union, Mott-Borlaug</i>	<i>Olin 101</i>	<i>Olin 102</i>	<i>Preus Library, Hovde</i>	<i>Valders 262</i>	<i>Center for the Arts, Studio II</i>	<i>Valders Classrooms</i>
Sex, Sexuality, and Gender	Software Development	Biological, Mathematical, and Physical Investigations	Meeting the Needs of People - I	The Local Environment	Performance	Paideia 112 Research (see separate brochure)

LUNCH BREAK: 11:15 A.M.–12:30 P.M.

Community Dessert Gathering with music provided by Collegium Renaissance and Baroque Ensemble (Kathy Reed, conductor): Complimentary ice cream novelties, Bentdahl Commons, Central Campus

SESSION III: 12:30–1:45 P.M.

<i>Dahl Centennial Union, Mott-Borlaug</i>	<i>Olin 101</i>	<i>Olin 102</i>	<i>Preus Library, Hovde</i>	<i>Valders 262</i>	<i>Jenson-Noble Recital Hall</i>	<i>Valders Classrooms</i>
Human Impacts on Living Organisms	Finding and Making Meaning	Policy Analysis	Music for Everyone	Community Based Methodologies Across the Curriculum	Art in Life	Paideia 112 Research (see separate brochure)

SESSION IV: 2:00–3:15 P.M.

<i>Dahl Centennial Union, Mott-Borlaug</i>	<i>Olin 101</i>	<i>Olin 102</i>	<i>Preus Library, Hovde</i>	<i>Valders 262</i>		<i>Valders Classrooms</i>
Individuals Interacting with Society	Use of Language and Who We are	Ourselves and Others in a Politicized World	Meeting the Needs of People - II	Human Interacting with Humans and the Natural World		Paideia 112 Research (see separate brochure)

SESSION V: 3:30–5:00 P.M.

Poster Session in Sampson Hoffland Laboratories Carlson Atrium/Valders Hall of Science Concourse (with refreshments)

EVENING EVENTS: 7:30 P.M.

- 7:30 p.m. Opera Performance: *The Gondoliers* by Gilbert & Sullivan (Center for the Arts Jewel Theatre)
 7:30 p.m. Theatre Performance: *Becky Shaw* by Gina Gionfriddo (Storre Theatre)

SYMPOSIUM SCHEDULE

9:00–9:45 A.M.
SESSION I

Center for Faith and Life Main Hall
**Opening Convocation Celebration and
Keynote Address**

- Introit: Luther College Trumpets (John Cord, conductor)
- Invocation: Michael Blair, campus pastor
- Welcome: Rachel Brummel, assistant professor of environmental studies
- Research Reflections: Sheri Schwert '17 and Pablo Lopez Alonso '17
- Recognition of Symposium Participants: Laurie Zaring, associate professor of linguistics and French
- Aurora and Norsemen (Jennaya Robison and Andrew Last, conductors)
- Benediction: Michael Blair
- Postlude

10:00–11:15 A.M.
SESSION II

CFA Studio II
Performance

Faculty moderator: Dan Davis

- Deveny Miles '17**
By Sharing Nothing We Reveal Everything
- Elaena Hoekstra '17**
Emma Brashear '18, Gillian Constable '17,
Colin Eral '17, Mathew Espey '18, Eva
Gemlo '17, Adrienne Lee '18, Erik
Muetherthies '18, Laila Sahir '17
Exploring "Eurydice": Reclaiming Myths and
Stories through Sarah Ruhl's "Eurydice"

Preus Library, Hovde

Meeting the Needs of People - I

Faculty moderator: David Thompson

- Miriam Sellers '17**
Opposing a Muslim Ban in Spain: Moriscos
and Crypto-Muslims on Trial before the
Spanish Inquisition
- Meredith Bruster '17**
Impact of Spirituality, Meaning in Life
and Forgiveness on Psychological Distress:
Research within Dakar, Senegal
- Marlene Jones '17**
French Attitudes toward Special Needs
Education and Therapies

Eva Peterson '17

The 1848 Abolition of Slavery in French
Senegal

Dahl Centennial Union, Mott-Borlaug
Sex, Sexuality, and Gender
Faculty moderator: Stephanie Travers

Bernarda Kaculete '17

Female Participation in Politics and Labor
Force and Its Impact on Gender Inequality

Genevieve Kalland '17

Sexual Education: A Call to the Church

Jacob Cole '18

No Homo, Bro: Sexuality and Its Perception
in the High School Environment

Shasa Sartin '19

Sex Worker Humanization Curriculum

Olin 101

Software Development

Faculty moderator: Kent Lee

Jonathan Opdahl '17

Kyle McNeese '17, Aidan Schmitt '17
Luther Course Proposal

Evan Berg '17

Connor Fitzpatrick '17, Matthew
Smith '17, Eshetie Tarekegn '17
Ultistats

Kyle Mahlkuich '17

Clinton Akomea-Agyin '17, Andrew
Loutfi '17, Lam Nguyen '17, Josh
Vannatter '17
TEXchange: A Decentralized Online
Textbook Marketplace

Jonathan Springer '17

Gifty Ama Dua Arthur '17, Fatimetu
Bachir Jatri Emhamed '17, Philani
Mbongiseni Mkhwanazi '17
NorseHorse: A Ride-Sharing App

Isaiah Mayerchak '17

Ihab Saud '17, Zechariah Smith '17
Luther College Room Draw

Olin 102

**Biological, Mathematical, and Physical
Investigations**

Faculty moderator: Olga Michels

Marta Williams '19

Leah Barkema '17
PI3K/Akt Signaling Influences Neuronal
Function in *C. elegans*

Grant Myres '17

Analyzing the Binding Relationship between Curcuminoids and HSA by Steady-State Fluorescence Spectroscopy

Erin Ellefsen '17

Extending a Catalog of Quantum Modular Forms to an Infinite Class

William Imoehl '17

An Analysis of the Radiative Decays of the Y(2s) State of Bottomonium

Valders 262

The Local Environment

Faculty moderator: Eric Baack

Shannon Meehan '18

Monarch Butterfly (*Danaus plexippus*) Egg-Laying and Caterpillar Feeding Preferences on Five Species of Milkweed (*Asclepias* sp.) in Winneshiek County

Isaac Jensen '17

Bee (*Hymenoptera: Apoidea*) Diversity and Floral Use in Remnant and Planted Tallgrass Prairies of Northeast Iowa

Sheri Schwert '17

Characterization of Water Movement from Sinkholes to Two Springs in Decorah

Kayla Ingvalson '17

Joel Denney '17, Max Eness '20, Luke Voneschen '18

Bacteria Levels and Drug Resistance in Decorah Area Springs and Streams

12:30–1:45 P.M.
SESSION III

Preus Library, Hovde

Music for Everyone

Faculty moderator: Jill Wilson

Aidan Spencer '18

Documenting Luther's Choral Tradition

Sylvia Kaare '17

Incorporating Composition in the K–12 Music Classroom

Elena Zarecky '17

Instrument Gender Associations: Tuba Is Not For Girls

Kierra Blackstad '17

Music in Silence: Creating a Meaningful Experience for Deaf Students in Music Education

Jenson-Noble Recital Hall

Art in Life

Faculty moderator: Anne-Marine Feat

Hunter Prueger '18

Video Game Music: Synthesis, Composition, and Scoring for Interactive Media

Zane Larson '19

Musical Machinery: The Intersection of Synthetic and Man-made Music in the Movie *Tron: Legacy*

Savannah Horn '17

Giving Visible Form to the Invisible: Art-making as Ritual, Revelation, and Obscuration

Kyla Grau '17

“Traduire, C’est Trahir”: A Case Study of Philippe Boesmans’ *Au Monde*

Dahl Centennial Union, Mott-Borlaug

Human Impacts on Living Organisms

Faculty moderator: Victoria Christman

Rachel Stoddard '17

Ironman Ada Hand

Mary Eve Iralu '17

For Our Health or Animal Protection?

A Case Study on Effective Methods against Concentrated Animal Feeding Operations in Iowa

Andrew Carlson '17

Bioethics in Virginia

Isaac Jensen '17

Impacts of Early Snow Removal and Frost on the Reproductive Success of *Delphinium nuttallianum*

Olin 101

Finding and Making Meaning

Faculty moderator: Amy Weldon

Sarah Owens '17

Sin, Contraries and the Self as Explored by Blake, Milton and Pullman

Anastasia Hafner '17

The Oracle

Joel Murillo '17

“Cracker Jack”: A Work of Fiction

Kristen Carlson '18

The Freedom of Nietzsche and DuBois

Olin 102

Policy Analysis

Faculty moderator: Ramona Nelson

Betsy Fawcett '17

Fear Appeals to an Anxious Electorate: A Case Study of Immigration and Economic Policies in the 2016 Election

Megan McCready '17

Defusing America's Ticking Time Bomb: Reforming the Social Security Program

Emily Alcock '17

Commodifying Care: A Case for Peruvian Domestic Workers in Chile

Maria Victoria Torrillas Pizzorno '17

An Analysis of the Brexit Vote

Valders 262

Community Based Methodologies Across the Curriculum

Faculty moderators: Maryna Bazylevych and Angela Kueny

Deanna Grelecki '19

On the Dance Floor: An Ethnographic Investigation of Changing Gender Norms in Ballroom Dancing

Elise Heiser '17

Deanna Grelecki '19, Coltan Jacobson '17, Hannah Sutcliffe '18, Abby Vidmar '19
Community Assessments in Indigenous Peruvian Communities

Coltan Jacobson '17

Deanna Grelecki '19, Hannah Sutcliffe '18, Abby Vidmar '19
Nutrition Deficiencies in Zorrillo, Mexico

Abby Vidmar '19

Deanna Grelecki '19, Coltan Jacobson '17, Hannah Sutcliffe '18
The Bonds of Song: Musical Agency in Aurora Choral Ensemble

Hannah Sutcliffe '18

Deanna Grelecki '19, Coltan Jacobson '17, Abby Vidmar '19
Mainstreaming "Fresh": Improving Access to Local Food in Communities

2:00–3:15 P.M.

SESSION IV

Preus Library, Hovde

Meeting the Needs of People - II

Faculty moderator: Megan Strom

Amelia Scarbrough '17

Undermining Education Readiness: Assessing the Effects of Cognitive Impairment in Refugee Children with Post-Traumatic Stress Disorder

Agenda Nawa '17

Refugee Crisis: A Business Opportunity

Tiffany Cassmann '18

The Need of Veterinary Medicine to Provide Language Services for Latinos in the United States

Trever Schwichtenberg '17

Female Genital Cutting: Biomedicine and Consequences of Globalization

Emily Osborne '18

Resisting the Rest Cure: The Erasure of a Misogynistic Medical Practice

Dahl Centennial Union, Mott-Borlaug

Individuals Interacting with Society

Faculty moderator: Anita Carrasco

Linnea Peterson '18

Ashleigh Bunkofske '17
Computational Modeling of the Macroeconomy with Directed Graphs

Joshua Gonzalez '18

Uncovering Racial Microaggressions at a Liberal Arts College: Experiences and Strengths of Black and Middle-Eastern Undergraduates

Mary Eve Iralu '17

Fear As a Way of Life: The Risk of Sexual Violence and Women's Coping Strategies

Mark Gasner '17

America's Housing/Rental Affordability Crisis: Losing the Unalienable Right to Property in Urban America

Olin 101

Use of Language and Who We Are

Faculty moderator: Laurie Iudin-Nelson

Jamie Linert '17

Language Development, Narrative Production, and Morphosyntax in a Young Adult with Smith-Magenis Syndrome

Erin Steward '17

To Teach or Not to Teach: Student Identity Formation through Heritage Language Instruction

Pablo Lopez Alonso '17

German Particle Verb Structure

Charles Ian Ces '20

The Meat of the Myth of Er

Olin 102

**Ourselves and Others
in a Politicized World**

Faculty moderator: Brian Caton

Betsy Fawcett '17

Why are Far-Right Political Parties Effective?
A Case Study of the Norwegian Progress Party and the Swedish Democrats

Sarah Sturm '17

Preemptive Prosecutions: How Fear of the Religious "Other" Drives Us to Abandon Constitutional Values

Maria Victoria Torrillas Pizzorno '17

Bernarda Kaculete '17
Presidential Image Before and After a Crisis: Examining Cross-National Media Portrayal of Dilma Rousseff in Latin American Newspapers in 2013 and 2015

Elizabeth Wiebke '19

Refugee Rhetoric: Newspaper Portrayal of Hmong Refugees

Valders 262

**Humans Interacting with Humans
and the Natural World**

Faculty moderator: Dawn Reding

Cassandra Peterson '17

Design of a Molecular Sex Identification Test for Three Bat Species

Allie Martin '17

Incentivizing Sustainability: Evaluating the Effectiveness of Renewable Energy Tax Credits

Elle Ross '18

Hawaiian Wellbeing and Healthcare

Matthew Peterson '17

Effect of Prescribed Fire in Woodlands on Ground Beetles (*Coleoptera: Carabidae*)

3:30–5:00 P.M.

SESSION V

SHL/Valders

Poster Session

Faculty moderator: Kirk Larsen

Lillian Brondyke '17

Using Microsatellite Markers to Study Population Genetics of Gray Fox

Mitchell Gage '19

Censorship and Self-Censorship in Opera: The Suppression of the Creator

Tanner Gibbons '18

Trevor Kao '18

Cataloging Metabolic Activity and Oxidative Status of PI3K/Akt Pathway Mutants in *C. elegans*

Anika Hansen '17

Nicole Weber '17

Walking Direction and Gaze Cue Effects on Predator Avoidance Behavior in Eastern Grey Squirrels

Marlene Jones '17

Dyslexic Complexities Between Native English and Native French Students

Alahna Keil '17

Do Positive Coping Tendencies Mediate the Parental Attachment and College Adjustment Relationship?

Selena LeGarde '17

Chewing Gum to Promote Recovery of Gastrointestinal Motility After a Cesarean Section

Jamie Linert '17

Blue Jays and the SNARC Effect

Maddie McLean '19

Pollinator Policy Implementation in the Driftless

Bethany Noltner '17

Liberal Arts Tuition

James Ostlie '17

Tree Species Composition of Old-Growth Sugar Maple-Basswood Forests in Northeastern Iowa

Margaret Priola '17

Senior Project in Music Education: Music Teacher Preparation for Students with Special Needs

Jessica Skjonsby '17

Major Life Events, Daily Hassles, and Social Support in the College Student

Marshall Stay '17

Geophysical Investigations at the Heritage Valley Mound Site (13AM129) in Allamakee County, Iowa

Anna Wehde '17

The Impact of Mood on Executive Functioning in College Students

Additional poster displays presented by students from the following classes:

Bio 112: Insects, Humans and the Environment
Bio 232: Microscopy
Bio 239: Molecular and Cellular Biology
Bio 354: Evolution
Bio 367: Endocrinology
Nursing 490: Senior Project
Physics 182: Classical Physics II
Physics 238: Statics (Bridge Breaking)
Psychology 352: Cognitive Processes

7:30 P.M.

**Opera Performance: *The Gondoliers*
by Gilbert & Sullivan**

Center for the Arts, Jewel Theatre

Imagine expecting to inherit your family's fortune, but discovering that your parents are in financial trouble and your future hangs in the balance. Not only that, but your parents also reveal to you that they married you off to the heir to the throne of Barataria when you were just a baby! Your family vacation to Venice has turned into a visit to the Grand Inquisitor of Spain, in order to discover which of two unsuspecting gondoliers is your long lost husband! And so begins *The Gondoliers*, one of Gilbert and Sullivan's beloved operettas. As this confused family attempts to solidify its future, two modest gondoliers unsuspectingly ascend the throne of Barataria. The gondoliers must journey to their recently acquired kingdom, separate from their new wives, and adjust to the fact that one of them was promised to marry another. Who is actually married to whom? Who is the true King of Barataria? Find out the answers to these questions and more with Luther's electrifying production of *The Gondoliers*.

Visiting assistant professor of music Nicholas Shaneyfelt serves as conductor, accompanist, and vocal coach; stage direction is by associate professor of music Andrew Whitfield; musical direction and preparation is by professor of music Edwin Andereck; scenic design is by professor of theatre Jeff Dintaman; lighting design and technical direction is by theatre and dance technical director Tom Berger; choreography is by professor of dance Jane Hawley; Donalee Burns is costumer; alumni guest lecturer in music Jill Phillips is assistant stage director; and Elaena Hoekstra '17 is stage manager.

The cast and ensemble of *The Gondoliers* includes Luther students Brandon Whitish, Avery Mossman, Kaitlyn York, Christy Emanuelson, Hannah Leeper, Jaime Webb, Parker Fretheim, Aaron Shouse, Isaiiah Cammon, Grant Holsinger, Max Rooney, Mason Montuoro, Josh Vidervol, Mitchell Gage, Emily Dirks, Katie Stuelke, Natalie Rumer, Aidan Spencer., Kelvin Li, Kurt Anderson, Nathan Baldwin, Stephen Holkesvik, Noah Lauer, Xavier Conzet, Scott Kleeman, Becca Buse, Marie Sauze, Kia Feia, Libby Fischer, Emily Chlapik, Alijah Goetting, Gabrielle Laske, Melissa Kirby, Mayalyn Cott, and Zane Larson.

7:30 P.M.

**Theatre Performance: *Becky Shaw*
by Gina Gionfriddo**

Storre Theatre

After a blind date goes disastrously wrong, five characters must reevaluate their relationships with themselves and each other. Chaos, drama and heartbreak ensue. A play of razor-sharp wit, delicate attention to detail and deep humanity, "Becky Shaw" keeps comedy and tragedy dancing too close for comfort, challenging easy answers and sentimentality at every turn.

The play is directed by Jennifer Thomas, the Robert Larson Theatre/Dance Endowed guest artist and assistant professor of performance and communication arts at St. Lawrence University. The cast includes Luther seniors Eva Gemlo, Ryan Pierce, Jake Porter and Josh Weisenburger; Luther sophomores Gracie Griffiths and Steffi Sea; and Luther first-year Carrie Pint.

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)

EMILY ALCOCK '17

Commodifying Care: A Case for Peruvian Domestic Workers in Chile

Across the globe, single young men have traditionally been migrants that leave the home in search of work. However, in a more globalized world, this phenomenon has shifted to women. Women are shedding the traditional role of working in the home to migrate to new countries so much more that they have become the demographic most likely to move. This gendered shift in migration trends has sparked changes in economic, social, and political systems, particularly in the domestic work markets in Latin America. While on the surface it may seem that migrating women are being empowered by becoming the new breadwinners in their families and working outside of the home, they often face discrimination and exploitation in their new countries, which hinders their success. Through a case study of Peruvian domestic workers in Chile, I explore the following research questions: What are the social and economic forces driving Peruvian women to migrate when, traditionally, men have migrated? And how do the social and political situations of these women's new countries affect their quality of life after they have migrated? As Peruvian domestic workers in Chile, their opportunities to successfully provide for their families are diminished through discrimination and exploitation. As a result, the empowerment of becoming migrating, working women is mitigated by violence, exploitation, and fear.

Faculty Sponsor: Victoria Christman

EVAN BERG '17

CONNOR FITZPATRICK '17, MATTHEW SMITH '17, ESHETIE TAREKEGN '17

Ultistats

Unlike many other sports, there is currently no simple way for Ultimate Frisbee teams to keep track of statistics for games and easily look back at results from previous games. The go-to method has historically been a pencil and paper, but that is not a great option due to the fast-paced nature of the game and the variability in the weather. In an attempt to create a better

solution, we have developed a mobile app with which teams can quickly and easily record stats during a game and a website that allows people to view past stats and results at a later time.

This will help captains and coaches keep track of playing time, as well as how efficiently their team is working. Meanwhile at home, parents and friends can follow the games and see how their team is doing. In addition, a Twitter stream automatically updates whenever a point is scored. Our presentation demonstrates our project, explains its value, and further describes the tools used to create it.

Faculty Sponsor: Kent Lee

KIERRA BLACKSTAD '17

Music in Silence: Creating a Meaningful Experience for Deaf Students in Music Education

Although music is usually thought of as an art experienced primarily through sound, those who experience sound in various ways or do not hear sound at all often find value in creating and listening to music. This qualitative research project explores how deaf students experience music and how music teachers can best capitalize on their interests and strengths. In analyzing data collected from interviews with a purposeful sample of American Sign Language interpreters, music teachers, ensemble directors, and deaf adults, three main themes emerged: (a) aspects of music that are most valued by the deaf community; (b) teaching methods from stories of successful deaf music students; and (c) finding meaning in music if a student cannot hear what is being played or sung. The researcher presents ideas of pedagogical supports that make it possible for students to experience auditory musical sensations through sound and touch, and that allow music educators to better understand and value music from a deaf perspective. Included in the project are discussions of classroom arrangements, helpful visual aids, descriptions of the role that interpreters and aids can have in music classes and ensembles, and how specific instruments influence the experience of deaf students.

Faculty Sponsor: Jill Wilson

LILLIAN BRONDYKE '17

Using Microsatellite Markers to Study Population Genetics of Gray Fox

Subspecies reflect the ecological uniqueness and evolutionary potential within a species, and conservation biologists are often interested in delineating and protecting these units of biodiversity. However, subspecies can be difficult to define and are often based on subtle morphological differences that may or may not match up well with the actual population structure. Gray foxes are a good example of this, with several subspecies documented throughout North America but little genetic data available to validate these groups. Although most gray fox subspecies are stable, the Midwest prairie gray fox subspecies has been declining and is being considered for listing under the Endangered Species Act. It is unclear, though, whether the prairie gray fox is actually a genetically unique, valid subspecies that warrants special protection, or if it is simply an extension of the more common eastern subspecies. I am developing a panel of nuclear genetic markers called microsatellites to investigate population structure of gray foxes. I am genotyping 100 samples from several states and calculating estimates of genetic diversity and population differentiation. These data will be useful in determining whether the shrinking Midwest population is a unique lineage, which would suggest protection may be warranted.

Faculty Sponsor: Dawn Reding

MEREDITH BRUSTER '17

Impact of Spirituality, Meaning in Life and Forgiveness on Psychological Distress: Research within Dakar, Senegal

In the absence of readily accessible modern mental healthcare, spirituality, meaning, traditional medicine, forgiveness, social support and offer impactful alternatives for treating modern mental healthcare. This two part-study further explores mental healthcare alternatives in Dakar, Senegal. The Part I sample consisted of 80 Senegalese individuals ages 18–52, who completed paper or online surveys. Participants completed four self-report questionnaires, which measured spirituality, forgiveness, psychological distress, meaning in life, and access to modern mental healthcare. Bivariate correlational analysis found that daily spiritual experiences were negatively linked to psychological distress and lasting resentment negatively impacted

presence of meaning in one's life. Additionally, no significant relationship was identified between daily spiritual experiences and presence of meaning in life. Study II explored constructs of spirituality, psychological distress, meaning in life, and alternative medicine within nine qualitative interviews. Supplementary measures used to reduce psychological distress include traditional medicine practices with herbal remedies administered by guérisseurs. Alternative medicine and social support may reduce and treat psychological distress, among other mental health concerns. Most consistent societal and professional recommendations encouraged an integrative approach, which combines social support with traditional and modern medicine.

Faculty Sponsor: Loren Toussaint

ANDREW CARLSON '17

Bioethics in Virginia

Throughout my academic journey at Luther, I have found that rigorous inquiry of biomedicine's moral dimensions empowers me to reflect deeply on a physician's professional habits and how they relate to deeper concerns of justice, virtue, and authenticity. The Imagine Fellowship program provided a next step in this journey of discovery. It allowed me to pursue an internship in the University of Virginia Bioethics Department during January 2017. This experience involved shadowing clinicians, participating in ethics-based administrative meetings, observing the bioethics consultation service at UVA hospital, and continuing my personal research. Some of the most unexpected experiences involved getting to know medical students and Ph.D. nursing students during classes on Literature and Medicine, as well as Research Ethics and Regulation. I was also fortunate to learn about moral distress consulting—a new and exciting example of biomedical ethics in practice. The UVA bioethics faculty and staff were enthusiastically welcoming, and afforded me access to intimate conversations that will be important to the continued formation of my vocational self. Such a rich experience would not have been possible without their support, and the backing of an Imagine Fellowship from Luther College.

Faculty Sponsor: Victoria Christman

KRISTEN CARLSON '18

The Freedom of Nietzsche and DuBois

Freedom is a concept that is critical to thinkers such as Nietzsche and DuBois and central to their work. Nietzsche denies the possibility of traditional free will in his polemic, but still claims the presence of human freedom. On the other hand, DuBois articulates freedom clearly in his writings and attempts to present what a new human identity within this framework looks like. By looking at the intersection of these two philosophers and interpreting DuBois' understanding of freedom through Nietzsche, the practical effects of such philosophy is revealed. This intersection between Nietzsche and DuBois displays a shared interest in freedom with consideration to historical context and the interest of the collective. The very freedom that Nietzsche once argued for manifests itself within the work of DuBois in his advocacy of freedom for the Afro-American community. Within these shared interests of freedom, and the effects that are produced by them, a similarity is seen between the philosophy of Nietzsche and DuBois.

Faculty Sponsor: Holly Moore

TIFFANY CASSMANN '18

The Need of Veterinary Medicine to Provide Language Services for Latinos in the United States

Hispanics are 17.6 percent of the United States population as of July 2015. Human medicine has responded to this change in clientele by implementing language services while veterinary medicine is just starting to consider this change. Many Latinos own pets, but due to language barriers in veterinary medicine, their animals don't receive the health care they need. This presentation seeks to discover ways that veterinarians in the U.S. can better serve Latinos who own pets. To address this question, information was compiled from articles in veterinary medicine, animal welfare, and human medicine journals. Past research suggests that bilingual personnel, interpreters, advertising in Spanish, and providing educational opportunities from veterinary services would be good steps in improving the care provided for Latinos' animals. With these changes, companion animals will have the opportunity

of a healthier and a happier life, and Latino owners will have the opportunity to learn how to take care of their animals and be able to enjoy their pet's company longer. Thus, I recommend that United States veterinary clinics provide Spanish language services and direct their business towards Latinos in order to promote the veterinary care of Latinos' animals.

Faculty Sponsor: Megan Strom

CHARLES IAN CES '20

The Meat of the Myth of Er

Plato's *Republic* represents eclectic approaches toward achieving justice, freedom, virtuous life, and, in the last book, a meaningful life. In Book X, Socrates displays his disagreement on poetry for presenting images and ideas that distort entities found in the physical world. However, in the second half of Book X, he utilizes the myth of Er to emphasize the disadvantages of being a tyrant and the advantages of being a philosopher. If Socrates believes that poetry corrupts the society then why does he presents a myth, a type of poetry, to his audience? How does Socrates using a myth differ from poets making poetry? My research aims to find possible explanations to these questions through analyzing the *Republic*, and scholarly publications about Socrates and the myth of Er, and incorporating distinct parts of my biography such as the establishment of my own charity and my transition to becoming an international student. My research suggests that Socrates utilizes the myth of Er to connect our lives to our purpose on Earth. Ultimately, Socrates emphasizes that leading one's life to goodness will always be fruitful once one reaches the destination. These findings will serve as a reminder and a guidance that can be incorporated into our daily lives.

Faculty Sponsor: Holly Moore

JACOB COLE '18

No Homo, Bro: Sexuality and Its Perception in the High School Environment

The LGBTQ+ community gained significant attention through events such as the Supreme Court ruling on marriage equality and the massacre at Pulse, a gay nightclub in Orlando, Fla., a year later. This raised nationwide questions about LGBTQ+ rights; within education, people ask how educators and society can better provide for LGBTQ+ students. This

study looks at perception of sexuality in the high school environment, considering both how this perception affects students and what teachers can do to create inclusive classrooms for LGBTQ+ students. Interviews were conducted with 14 students, selected through snowball sampling, asking them to reflect on their high school experience and how sexuality and its perception played into that experience. I built the analysis and presentation of the material on common themes found in interviews and shaped the research with frameworks of queer theory. While sexuality is not a frequently discussed topic, I found its implications run deep and affect students' perceptions of themselves and others. Additionally, location and religion influence perception of sexuality and how students, both LGBTQ+ and straight, view themselves and others. This data will be useful in future classrooms to create an accepting environment for LGBTQ+ students while recognizing that sexuality is not their defining characteristic.

Faculty Sponsor: Jill Leet-Otley

ERIN ELLEFSEN '17

Extending a catalog of quantum modular forms to an infinite class

Modular forms are a class of complex-valued functions defined on the upper half of the complex plane that have been of interest to the mathematical community. In particular, they were used to prove the famous Fermat's Last Theorem in 1994. Quantum modular forms, which behave similarly to modular forms, have fascinated some mathematicians since their discovery by Don Zagier in 2010. In 2016, Folsom, Garthwaite, Kang, Swisher, and Treneer gave a catalog of 59 examples of quantum modular forms. The quantum modular forms from this paper arose from functions called mock modular forms which have eta-theta function shadows. In this joint research project with Brian Diaz and Holly Swisher, we describe the differences and similarities between quantum modular forms and modular forms, and investigate the catalog of 59 quantum modular forms. We introduce a generalization of their functions, which we prove represents an infinite class of quantum modular forms.

Faculty Sponsor: Mike Johnson

BETSY FAWCETT '17

Why are Far-Right Political Parties Effective? A Case Study of the Norwegian Progress Party and the Swedish Democrats

Scandinavian countries Norway and Sweden are often praised for their full democratic states and their focus on human rights. But, these characteristics do not inoculate these countries from the rise in far-right political parties that is occurring across the world. In research conducted through personal and informational interviews with politicians, young voters, and scholars in Norway and Sweden, I examine the impact that far-right parties in Norway (The Progress Party) and in Sweden (The Swedish Democrats) have on their electoral politics. I compare the two parties, their immigration policies, their electoral tactics, and their effectiveness to date. By examining these two parties, one which has been extremely effective in gaining electoral power and the other that remains a marginal power (but is growing), we can better understand the appeal that far-right parties present voters.

Faculty Sponsor: Victoria Christman

BETSY FAWCETT '17

Fear Appeals to an Anxious Electorate: A Case Study of Immigration and Economic Policies in the 2016 Election

Traditionally, scholars have assumed that voting decisions are made and should be made based on rational thought, commonly understood facts, and cost-benefit analyses of the candidates and their policies. But more recent research argues that voting decisions are not solely based in rationality, but rather, that emotional processing directly impacts how voters process information. My research examines how the emotions of fear and anxiety impact rational thought processes and the decisions made in the voting booth. Using the case study of the 2016 election of President Donald Trump, I observe how President Trump utilized fear-based rhetoric on the campaign trail, especially when he discussed immigration reform and the future of the American economy. I look at how Donald Trump utilized fear-based rhetoric to mobilize voters but I also argue that the fast-changing world we are living in has created a political space where Mr. Trump's rhetoric can be especially effective. I conclude that these appeals mobilized a different subset of the electorate that other Republicans and Democrats have not

mobilized in recent elections, and that in turn, helped Donald Trump win the Presidency.

Faculty Sponsor: Paul Gardner

MITCHELL GAGE '19

**Censorship and Self-Censorship in Opera:
The Suppression of the Creator**

From the time opera took flight at the beginning of the 17th century in Italy and spread to the rest of Europe, censorship, political agenda, and popular opinion have all been tied to the creation of new works in the artform. The influence of censorship in opera has had an ever-changing role from its beginnings to the present. This study focuses on how censorship in opera changed, including its impression upon works within the genre. Comparing examples from 17th through 19th century France to contemporary American opera, my findings show that censorship and self-censorship of opera suppress the composer and librettists' creativity and content. The reception, production, and potential art can be affected as a result. It is apparent that censorship has had a significant impact on the development of composer and librettists' works, such as Jean-Baptiste Lully and Pierre Quinault. Comparing this to current censorship trends in American opera, it is clear that censorship has undergone change in opera, and understanding this can help shape future works of the operatic genre.

Faculty Sponsor: Anne-Marine Feat

MARK GASNER '17

**America's Housing/Rental Affordability Crisis:
Losing the Unalienable Right to Property
in Urban America**

In recent years, there has been a shift in the housing environment of America's biggest cities. Millennials are delaying the purchase of their first home and renting apartments longer. The new housing trend is due to a variety of factors, including mortgage barriers and rising student debt. This study will investigate the reasons housing markets in urban America have shifted to increased rental demands. It will also address the consequences felt by those affected. My research question is: How has the housing environment changed in urban America since the subprime mortgage crisis, and what effects are felt by millennials? This is valuable information to non-homeowners, especially college students soon to enter the housing market. Using simple economic models

and statistics, the results illustrate why prices for housing rentals continue to climb in America's largest cities, as well as why millennials have very little chance to build home equity in today's financial environment.

Faculty Sponsor: Ramona Nelson

TANNER GIBBONS '18

TREVOR KAO '18

**Cataloging Metabolic Activity and Oxidative
Status of PI3K/Akt Pathway Mutants
in *C. elegans***

Altered energy metabolism and oxidative stress have been observed in many neurological diseases such as Parkinson's Disease and ALS. A particular cellular pathway of interest in this association is phosphatidylinositol 3-kinase (PI3K)/Akt signaling which is also altered in these diseases. It is a regulatory pathway influencing cellular metabolism, structure, and gene expression in response to nutrient availability, growth factor signaling, and overall energy levels. It is unknown if altered energy metabolism and oxidative stress are connected to PI3K/Akt activity in neurologic disease. To better elucidate the relationship between metabolic output and oxidative state to PI3K/AKT signaling activity, this study used wild type and mutant *Caenorhabditis elegans* (*C. elegans*), a small non-parasitic soil nematode containing homologs of most PI3K/AKT components. ATP, glutathione, and reduction potential were assessed in wild type and PI3K/Akt mutant *C. elegans*. Preliminary results indicate that decreased PI3K/Akt activity resulted in elevated ATP levels while increased PI3K/Akt activity decreased ATP levels. Furthermore, both increased and decreased PI3K/Akt activity altered glutathione and reduction potential. Together these observations suggest an inverse relationship between PI3K/Akt activity and ATP concentration and that any abnormality in PI3K/Akt signaling can alter the oxidative status in *C. elegans*.

Faculty Sponsor: Stephanie Fretham

JOSHUA GONZALEZ '18

**Uncovering Racial Microaggressions at
a Liberal Arts College: Experiences and
Strengths of Black and Middle-Eastern
Undergraduates**

With a plethora of recent research regarding racial microaggressions (RMAs), it has become apparent that we do not live in a post-racial

society. The purpose of this qualitative research is to uncover the racial microaggressions experienced by Black and Middle-Eastern undergraduates at a liberal arts Predominantly White Institution (PWI) in the Midwest. Data for this research was collected through seven qualitative interviews, which were then transcribed from their recordings. The emic perspective provided by my role as an undergraduate researcher and scholar of color yielded a depth and richness to the interviews and analysis. A diligent and critical coding of the transcripts presented a variety of recurring themes. Drawing on Black Critical Theory to analyze lived experiences points toward coping strategies that lead to strong black identity. Findings clarify that this particular institution does not support an inclusive community as stated in its mission statement. Instead, it promotes a strictly statistical diversity by not implementing policies that deliberately bring together people of all colors and creeds. Findings reveal the need for deliberate conversations regarding issues faced by students of color. The acknowledgment and understanding of these issues will allow for the initial step in developing into a safer and more culturally aware community.

Faculty Sponsor: Jill Leet-Otley

KYLA GRAU '17

“Traduire, C’est Trahir”: A Case Study of Philippe Boesmans’ *Au Monde*

To make opera more accessible to a wider audience, many have been translated into the vernacular, resulting in new interpretations of the composer’s work. For instance, composer Igor Stravinsky argues that in translating, the meaning is distorted, thus “betraying” the original work and its creator. The translation of operas is somewhat controversial because of numerous problems that may arise, such as fitting a foreign text into a melodic contour that was intended for the nuances of the original libretto, technical restrictions of musicians, and timing of important events, jokes, or surprises in the plot. (Helen Julia Minors, *Music, Text, and Translation*). Many scholars, including Michael Chanan, Kenneth Chalmers, and Lucile Desblache, acknowledge these issues and ultimately suggest the idea that a translated work may challenge the composer’s original intention. In this study, I examine the methods, challenges, and outcomes of translating opera

and propose my own interpretation and translation of Philippe Boesmans’ *Au Monde*. In this presentation, I focus on describing my approach to translating scene 11 of *Au Monde*, showing the necessary balance between respecting the original version and creating a new interpretation of the work that suites the intended audience. This project ultimately shows why the translation of opera is necessary to increase accessibility, even if the translation “betrays” the original work.

Faculty Sponsor: Anne-Marine Feat

DEANNA GRELECKI '19

On the Dance Floor: An Ethnographic Investigation of Changing Gender Norms in Ballroom Dancing

Traditionally in the ballroom dancing community, leads are males and follows are females. With the growing non-binary gender politics and increasing support for non-binary gender expression, I looked at the ballroom community to see if such a clearly segmented society was following the same movement of inclusivity. This led me to ask in what ways is the ballroom community changing with the growing non-binary gender politics, investigating whether or not traditional views of male and female roles are reinforced or resisted and challenged on the dance floor. I investigated the Luther College Ballroom & Swing Team through the means of unobtrusive and participant observation, unstructured and semi-structured interviews, and photography. To assist my research on the ballroom community, I also utilized literature review on ballroom dancing. My results show that within the ballroom community traditional gender roles are still being reinforced through the feelings dancers experience while dancing, dress stipulations for ballroom competitions, and the aesthetic preference of traditional couples, however the gender roles are starting to be challenged through an increased number of same-sex couples as well as a deeper respect for the other side’s role in the partnership. Ultimately, there is room for improvement in exploring non-binary gender roles within the ballroom community.

Faculty Sponsor: Maryna Bazylevych

ANASTASIA HAFNER '17

The Oracle

"The Oracle" is a work of fiction from the perspective of Cassie, the prophetess of a long-forgotten, malicious god intent on causing suffering in the universe and eating the souls of non-believers. Influenced by my major in English and minor in Classics, my readings of Marcus Aurelius' "Meditations" and Robert Penn Warren's *All the King's Men*, and my experiences with religion, the themes within the story largely deal with guilt, belief, and Midwest isolation. In an attempt to express the conflict between fate and consequences, the story follows Cassie's past, her struggles with the god's control of her life, and her visions of a group of teenage South Dakotans on their first real road trip to save the world.

Faculty Sponsor: Amy Weldon

ANIKA HANSEN '17

NICOLE WEBER '17

Walking Direction and Gaze Cue Effects on Predator Avoidance Behavior in Eastern Grey Squirrels

Studies have suggested that animals habituated to high levels of human presence have decreased predator avoidance behaviors compared to animals exposed to lower levels of human presence. This can be measured by when an animal becomes altered to an approaching human, the distance the human is allowed to approach, and how far the animal flees as a response. Some animals can also use gaze information to determine if another organism is a threat or not. Two research students worked with students in the Animal Cognition course to collect data on Eastern grey squirrels on the Luther College campus by approaching individual squirrels either directly, or walking past at a 45-degree angle. Squirrels were also exposed to humans walking who looked at the subject directly, looked at a cellphone, or looked up. The results indicated that squirrels showed more predator avoidance behaviors when approached directly. The three gaze conditions did not seem to have an effect on predator avoidance behaviors. These results were different from previous studies in which similar manipulations were used, however they were fairly consistent with data collected the previous year with Luther College squirrels.

Faculty Sponsor: Kristy Gould

ELISE HEISER '17

DEANNA GRELECKI '19, COLTAN

JACOBSON '17, HANNAH SUTCLIFFE '18,

ABBY VIDMAR '19

Community Assessments in Indigenous Peruvian Communities

Community assessments identify a community's health and ability to deal with health needs. During a health fellowship through the FIMRC Organization in La Merced, Peru, our community assessment model focused on indigenous communities' health needs. An integral part of community assessments includes identifying and collaborating with stakeholders, individuals who live, work, and interface with the community, and have a vested interest in the life, health, and maintenance of the community. The purpose of this presentation is to describe the community assessment process with an indigenous community in Peru, specifically how stakeholder involvement in the assessment, planning, and implementation can build successful educational programs. Based on our collaboration with stakeholders such as teachers, students, and a project coordinator/firefighter, we developed an education group that worked with the children of Chalhupuuio Middle School. We launched an educational program entitled "La Mini-Socaristas" (or the mini-life savers) that provided instruction on basic first aid. Lessons were tailored to the local environment and resources. Through our community assessment and health education program, the students were empowered to manage their own health and well-being.

Faculty Sponsor: Angela Kueny

ELAENA HOEKSTRA '17

EMMA BRASHEAR '18, GILLIAN

CONSTABLE '17, COLIN ERAL '17,

MATHEW ESPEY '18, EVA GEMLO '17,

ADRIENNE LEE '18, ERIK MUETERTHIES

'18, LAILA SAHIR '17

Exploring "Eurydice": Reclaiming Myths and Stories through Sarah Ruhl's "Eurydice"

The story of the doomed love of musician Orpheus and his wife, Eurydice, is ingrained into our subconscious. The image of heroic Orpheus turning around to look at his dead wife has been recreated throughout history. How does Ruhl's telling of the story from Eurydice's perspective reclaim and reshape the myth? What classical and contemporary lessons can be taught in this new form? Through developing and performing

the piece as a theatrical production, this study hopes to reconnect audiences to classical mythology, and the relevance it can offer in contemporary society.

Faculty Sponsors: Robert Vrtis and Dan Davis

SAVANNAH HORN '17

Giving Visible Form to the Invisible: Art-making as Ritual, Revelation, and Obscuration

For centuries, artists have attempted to give material form to the immaterial, reaching toward the Divine. My current body of work joins this artistic trajectory. In this artist talk, I detail the historical and current use of gold leaf, translation of religious text, writing as a ritualistic act, and the intersection of these topics within my own artistic practice. This body of work focuses on the materiality of gold leaf and its reflective quality, reaching toward a reflection of the Divine, simultaneously revealing and obscuring that reflection through the act of writing.

Scratching passages of the Bible into a gold-leafed surface, I repeatedly overlap, obscure, and reveal language. The ritualistic act of writing is inscribed onto the surface without specifics. The remnant of writing remains, obscuring the specifics of any one religious text, thus widening the entry point for reaching the Divine. This talk addresses the question: Does translation, my practice, or any attempts to represent the immaterial come remotely close to revealing the Divine ... or do they merely obscure further that unspeakable, unfathomable Ultimate Reality?

Faculty Sponsor: Ben Moore

WILLIAM IMOEHL '17

An Analysis of the Radiative Decays of the $Y(2s)$ State of Bottomonium

Bottomonium is a bound state of a bottom quark and an anti-bottom quark that provides a rich hydrogen-like spectrum of decays. This analysis investigates radiative decays of the $(2S)$ state of bottomonium using data collected by the Belle experiment at KEK in Japan. This project will measure the branching fraction of the decay $(2S) \rightarrow (1P) + \gamma$, which is the rate at which the $(2S)$ state decays to the $(1P)$ triplet states by emitting a photon. In addition, this analysis will measure the branching fraction for the decay $(2S) \rightarrow \gamma + \gamma(1P) \rightarrow \gamma + (1S) \rightarrow l^+ l^-$, where $l^+ l^-$ indicates a pair of leptons. This project also explores the angular distributions of the two photons produced in the latter decay, by which

we will be able to determine if the magnetic moment of the bottom quark is consistent with the value that is predicted by theory. This talk will cover these measurements and the methods used to obtain them.

Faculty Sponsor: Todd Pedlar

KAYLA INGVALSON '17

JOEL DENNEY '17, MAX ENESS '20,

LUKE VONESCHEN '18

Bacteria Levels and Drug Resistance in Decorah-Area Springs and Streams

Many Iowa rivers and streams are impaired due to high bacteria levels, particularly following heavy rain, and higher bacteria levels are linked to increased risk of illness. The water around Decorah is particularly vulnerable due to the sinkholes that rapidly connect soil bacteria to springs. We investigated levels of drug resistance in *E. coli* and *Staphylococcus* bacteria found in streams in springs in northeast Iowa. *E. coli* counts frequently exceeded recommended limits in springs around Decorah after summer rainfall events. *Staphylococcus* resistant to methicillin were commonly found in the summer, and many of these were resistant to other antibiotics, including vancomycin. Levels of multi-drug resistance varied among springs in the Decorah area. We are continuing work to identify the species of *Staphylococcus* present in our samples, and determine potential causes for the variation in multi-drug resistant bacteria.

Faculty Sponsor: Eric Baack

MARY EVE IRALU '17

Fear As a Way of Life: The Risk of Sexual Violence and Women's Coping Strategies

In her work, anthropologist Tine M. Gammeltoft has found that many women react to gendered violence through silence. Her research explores both social and psychological influences that keep women's voices quiet. Building on her work, my research aims to understand how Luther College female students experience the "what if" of sexual assault. Engaging in ethnographic inquiry in locations that are perceived as danger zones like bars, house parties, and the gym, I interview several women to learn about their strategies for minimizing uncalled-for sexual approaches. My hope is to spread awareness of the constant threat of harm to our bodies and psychological well-being to empower women to demand that our community

make a bolder effort to ensure our safety as women by breaking the silence around sexual assault.

Faculty Sponsor: Anita Carrasco

MARY EVE IRALU '17

**For Our Health or Animal Protection?
A Case Study on Effective Methods against
Concentrated Animal Feeding Operations
in Iowa**

In a society that celebrates the mass consumption of nonhuman beings, we have lost sight of the value of lives that are not our own. My research functions as an argument in favor of treating other bodies with compassion. Though the focus is on the position animals have in concentrated animal feeding operations (CAFOs), this research touches on other aspects of our society where there are clear indications of intersection in terms of race, class, and gender. Following the theoretical ideas of Michael Foucault, we will explore how surveillance, secrecy, and distance are the tools used to maintain systems of oppression. This exploration holds the key to explaining why people do not seem to care about the quality of lives around them until they experience direct consequences themselves. The necessary connection with nonhumans will come as a result of building relationships with them, with each other, and in using alternative farming practices that avoid stripping other entities of their dignity. Considering the evidence of CAFOs' association with respiratory, bacterial, and environmental challenges, I examine how CAFOs' threat to human health is eliminated when it is accompanied with compassion and a realization of the interconnections of all life forms.

Faculty Sponsor: Scott Hurley

COLTAN JACOBSON '17

DEANNA GRELECKI '19, HANNAH
SUTCLIFFE '18, ABBY VIDMAR '19

Nutrition Deficiencies in Zorrillo, Mexico

Children in rural Zorrillo, Mexico, are at high risk for obesity and other lifelong conditions due to poverty, remote location, and limited access to healthy foods. The school-based program in Zorrillo provides children with supplemental food programs and needs support to identify the most needed nutrients to prevent future poor health outcomes. The purpose of this study

was to describe children's food/nutrient intake over the course of three weeks. Food logs were distributed to 29 children ages 5 to 15 years old who were enrolled at the school. Children self-reported intake from the previous day's dinner, drinks, snacks and the current day's breakfast. Reported food and serving sizes were entered through the web application fitday.com from each 24-hour period. Daily intakes were aggregated and compared across age and gender groups. Basic findings include >75% of the children were deficient in calories, fiber, iron, and calcium, and vitamin D. In addition, >75% of children were over nourished in carbohydrates and protein. These deficiencies and surpluses place children at risk for obesity and diabetes. This information will be shared with the school program to further plan food programs to support children's health and prevent lifelong health conditions.

Faculty Sponsor: Angela Kueny

ISAAC JENSEN '17

**Bee (*Hymenoptera: Apoidea*) Diversity and
Floral Use in Remnant and Planted Tallgrass
Prairies of Northeast Iowa**

Within tallgrass prairie ecosystems, bees play a significant role in providing the important ecosystem service of pollination. However, land use changes have severely reduced the availability of floral resources upon which native bees depend. We investigated the factors that impact bee community diversity and abundance in tallgrass prairies of northeast Iowa, comparing remnant and planted prairies, measuring the effects of landscape heterogeneity and floral resource. Bees were collected and plant-pollinator interactions were recorded in four remnant and four reconstructed prairies during the summer of 2015. Floral resources were measured by calculating floral area and recording flowering plant species richness at each site. Landscape diversity was analyzed in a 1 km radius area around each site. In total, 887 bees representing 80 species were collected. Bee abundance and species richness was similar in burned and unburned prairies, but surprisingly, both species richness and abundance were lower in remnant than planted prairies. Between prairie sites, bee abundance was strongly correlated with the diversity of the surrounding landscape. Bees were collected from 81 species of flowers, but the most commonly visited 12

species accounted for two-thirds of all plant pollinator interactions.

Faculty Sponsor: Kirk Larsen

ISAAC JENSEN '17

Impacts of Early Snow Removal and Frost on the Reproductive Success of *Delphinium nuttallianum*

Anthropogenic climate change is causing a global rise in average temperature, changes in seasonality, and altered precipitation patterns, leading to range shifts, population declines, and phenological changes in a wide array of species. This study examines the impacts of changes in snowmelt date and episodic frost on the reproductive success of a subalpine wildflower in the Rocky Mountains of Colorado, USA. *Delphinium nuttallianum* (Two-lobed larkspur) plants were exposed to early or natural snowmelt, reduced or natural frost, and natural or supplemental pollen treatments. Reproductive success was measured to analyze the effects of climate change on plants' reproductive fitness. While plant density within a plot and pollinator visitations were significantly higher in early snowmelt treatments, there was not a significant difference in reproductive fitness between any of the climate change related treatments, indicating that snow melt, frost exposure, and differences in pollination did not significantly impact the reproductive success of *D. nuttallianum* in 2016. This may be due to dry conditions which caused many plants to abort a substantial portion of flowers and fruits, diluting the effects of climate-related variables. These data indicate a complex and variable relationship between climate change and plant reproductive fitness.

Faculty Sponsor: Victoria Christman

MARLENE JONES '17

French Attitudes toward Special Needs Education and Therapies

This presentation examines the current education system in France and evaluates how well it caters to special needs students from primary schools through their high-school equivalent. I am inspired by my field study during J-term of 2016 where I saw how Tours, France, encouraged segregating special needs children from the majority of their middle and high school classrooms (Armstrong et al, 2000). Special needs "trade schools" are a common

practice in France; students are taught trades like sewing, cooking, and gardening in order to successfully integrate into society, yet these students are completely separate from more comprehensive schooling, curriculum, and social circles throughout their education (Vislie, 20003). In this study, I ask: Does this separate education provide the necessary tools for future integration of students in the community? Implementing social science methods of communication theory, special education, and intercultural communication, I examine the cultural aspects of education through qualitative interviews with French and American special education professionals and an analysis of scholarly journals. My findings conclude that a more inclusive curriculum among diverse students is more important to the education of a special needs student rather than the complete segregation seen in France.

Faculty Sponsor: Anne-Marine Feat

MARLENE JONES '17

Dyslexic Complexities Between Native English and Native French Students

This study analyzed the difference between consistent and inconsistent orthographies to predict how easily a dyslexic student can learn to accurately write. Orthography refers to the spelling system of a written language: if each letter in an alphabet stands for one specific sound and no others, and that letter always maintains its sound throughout all possible words in the language, then it is considered to be orthographically consistent. Numerous studies have discovered that languages with inconsistent orthographies, such as English, pose more problems for students learning to map between the sounds of words to how they are written. In this study, I examine findings for French, with a similar inconsistent orthography to English, in hopes of aiding French learners. I ask: What are the obstacles English and French dyslexic students face? Drawing on the findings of Ziegler (2005) and Goswami (2002), I provide an analysis of dyslexia across languages to conclude what strategies work best for educators of the French language. This study demonstrates that mapping between sounds to words in French and English dyslexic brains requires memorization strategies to compensate for the inconsistent spellings in the languages.

Faculty Sponsor: Laurie Zaring

SYLVIA KAARE '17

**Incorporating Composition
in the K-12 Music Classroom**

The new National Core Arts Standards (NCAS) divide music education into four artistic processes: creating, performing, responding, and connecting. Efforts have been made to prepare pre-service music educators to teach to standards in all four branches, but studies have shown that confidence and preparedness is lacking when it comes to helping students create music. While studies have displayed pre-service teachers' discomfort with teaching improvisation (Ward-Syeinman, 2007 and Bernhard, 2012), composition is another aspect of creating that may not be adequately addressed in teacher preparation programs. The purpose of this study is to determine pre-service teachers' perceptions of preparedness to teach to the Creating standards. A 10-question survey was sent to music education majors in the process of receiving their undergraduate degree. The survey helped determine that undergraduates' confidence in teaching composition decreases as the grade level of the standard increases. It also showed that while confidence increased between first-year to junior participants, senior participants showed consistently less confidence. In addition to the survey, ideas for integrating composition in a music classroom will be shared.

Faculty Sponsor: Jill Wilson

BERNARDA KACULETE '17

**Female Participation in Politics and Labor
Force and Its Impact on Gender Inequality**

Women have for centuries struggled to enter the public sphere. Some have shattered the glass ceiling and joined politics, and others have undertaken responsibilities as bread winners of families. In 2013, women made up 50.8 percent of population, occupied 18 percent of the seats in Senate, and 40 percent of the workforce in the U.S. Across nations, women are indulging themselves into more male dominated areas to voice their concerns. The presence of women in politics and the workforce has increased worldwide, which has spurred the interests of academics to examine the effect of such a trend on gender inequality. This research intended to find whether there was a significant correlation between the presence of women in politics and workforce, and gender inequality. Through the use of secondary data from the United Nation database 2013, relevant information was

collected using a random sampling which yielded 14 countries. To find the relation between the variables, a Chi-square test methodology was utilized with a significance level of 0.01. Our statistics analysis yielded the following results, chi square=0.525, which was far lower than the critical chi square value which was 6.635. Therefore, we should fail to reject the null hypothesis which stated that the variables were not correlated.

Faculty Sponsor: Victoria Christman

GENEVIEVE KALLAND '17

Sexual Education: A Call to the Church

By challenging the androcentric, adverse, and intersecting narrative expectations currently constructing idealized sexuality, I propose the need for comprehensive epistemological applications to be the groundwork for sexual education in church. Therefore, this presentation will draw attention to the urgency for implementing critical and comprehensive sexual education in churches. Through dissecting the damaging messages representing idealized sex in the Bible and in mass media, I shall compare, contrast, and connect Christian sacred and the secular messages about sex. How do we learn about sex? How are sexual relationships "supposed" to go? What is considered "normal" in sex? Who and what is deciding this for us? And lastly, Why sex ed. in the church? After addressing "law" and/or social order, I will claim a theological call to action through the acceptance and practice of Body Theology. Finally, I propose the engagement of sex ed. programs like Our Whole Lives. With an added epistemological push for constant questioning and engagement, comprehensive epistemology based sex ed. programs act as a positive way to encourage a mindset, linguistic, and active liberatory transformation of what is considered "idealized" sexuality in and out of the church.

Faculty Sponsor: . Wanda Deifelt

ALAHNA KEIL '17

**Do Positive Coping Tendencies Mediate the
Parental Attachment and College Adjustment
Relationship?**

Transitioning to college can be very challenging for many first-year college students. It is often the first time away from home for most students.

In fact, attachment researchers have speculated that the transition to college activates the attachment motivational system and simulates a “strange situation.” Previous research has indicated that parental attachment influences college adjustment. However, very few studies have analyzed the underlying mechanism that facilitates this relationship. The present study aims to examine positive coping tendencies as a possible mediator in this relationship. First-year college students (N=288) at Luther College in Decorah participated in this study. Students completed measures of parental attachment (Parental Attachment Questionnaire), positive coping tendencies (COPE), and college adjustment (Student Adaptation to College Questionnaire). Structural equation modeling was used to analyze the possible mediation for both mothers and fathers. Model fit indices were used to determine the outcome of the mediation. The results showed that positive coping tendencies mediate the parental attachment and college adjustment relationship for mothers, but not for fathers. The fit indices were good for both models, but the path coefficients for the mothers’ model was inconsistent with the hypothesized relationship. The fathers’ model showed that parental attachment and positive coping tendencies work independently to influence college adjustment. The implications of these findings are explored further.

Faculty Sponsor: David Bishop

ZANE LARSON '19

Musical Machinery: The Intersection of Synthetic and Man-made Music in the Movie *Tron: Legacy*

Film scores use intricate and strategic integration of music to assist the visuals on-screen to accurately express situations and moods presented. Modern styles of music and modern composition methods can help express situations and moods even clearer due to the rapid advancement in electronic music technology. Computer-generated imagery (CGI) has increased in popularity and complexity in films as well as the music used to accompany these visuals. In the CGI-dense movie *Tron: Legacy*, the film score written by electronic DJ duo Daft Punk juxtaposes synthesized elements (electronic music) and traditional elements (orchestra) in order to portray the overall theme of the movie, the intersection of humanity and

machinery. I will show that just as CGI is an effective technique for integrating live action and animation, the assimilation of synthesized music with traditional music is just as essential in film using analysis of the film *Tron: Legacy* as my case study.

Faculty Sponsor: Amy Engelsdorfer

SELENA LEGARDE '17

Chewing Gum to Promote Recovery of Gastrointestinal Motility After a Cesarean Section

Decreased gastrointestinal (GI) motility after invasive abdominal surgeries such as cesarean sections (CS) can result in complications including decreased time to lactation, GI problems, discomfort, or decreased healing time. With more than one million CSs performed annually world-wide, supportive nursing interventions to improve GI motility can work to better the outcomes in mothers post-CS. Research demonstrates that the simple administration of chewing gum after CSs may increase GI motility. Driven by providing quality care, nurses are in an opportune position to work directly with women after CSs to improve GI motility based on current evidence. This systematic literature review, including ten randomized controlled trials that fit inclusion criteria, reported primary outcomes of chewing gum on the following indicators of GI recovery: bowel sounds, flatulence, and defecation. Each study addressed the population of pregnant women post-CS, evaluating chewing gum as the nursing intervention. From these experimental studies, it was determined that chewing gum post-CS is effective in restoring GI motility more rapidly than usual post-operative care. Additionally, the rapid return of GI motility provided secondary benefits, improving mothers’ healing time and comfort. This research supports consideration of adding chewing gum as a nursing intervention to improve care for women undergoing CSs worldwide.

Faculty Sponsor: Angela Kueny

JAMIE LINERT '17

Language Development, Narrative Production, and Morphosyntax in a Young Adult with Smith-Magenis Syndrome

Smith-Magenis Syndrome (SMS) is a rare developmental disorder that is characterized by cognitive and linguistic delays, as well as

sleep and behavioral disturbances. Because of its rarity and relatively new discovery, there is comparatively little research currently published on SMS. Of the studies that have been done, many have focused on the genetic and behavioral aspects of Smith-Magenis; very few have investigated the linguistic and communicative delays that are common features of the syndrome. This study adds to the literature on language in SMS through a case study of a 19-year-old individual with Smith-Magenis Syndrome, whom I refer to as Sam. After comparing my analysis of Sam's speech and data gathered from her speech therapy evaluations to the previous SMS language studies, I find that 1) Sam's language development took the course one would expect given past research on SMS language development, 2) Sam's narrative production skills are weak compared to typically developing speakers but are unsurprising for an individual with SMS, and 3) Sam's morphosyntax, though ungrammatical for typically developing English speakers, is nevertheless indicative of a consistent internal grammar.

Faculty Sponsor: Laurie Zaring

JAMIE LINERT '17

Blue Jays and the SNARC Effect

In humans, it has been shown that there is a mental "number line" that is influenced by language and culture. People who have been raised in a culture whose language is written left to right tend to cognitively place low numbers on the left and high numbers on the right. Therefore, they are quicker to respond to smaller numbers when placed on the left and larger numbers when placed on the right. The opposite is true of cultures whose language is written right to left. This is called the SNARC (spatial-numerical association of response codes) effect. Recent studies with apes and pigeons show the SNARC effect still exists without language, but the favored direction seems to vary by individual. The current study looks for the SNARC effect in blue jays. The jays were trained to choose either a high or low quantity of dots from a pair that appeared simultaneously on a touchscreen, one on the left and one on the right. Reaction time was analyzed and compared to the results from apes and pigeons. These results, coupled with that in other animals, can

inform our understanding of human cognition before the influences of language and culture.

Faculty Sponsor: Kristy Gould

PABLO LOPEZ ALONSO '17

German Particle Verb Structure

Particle Verbs (PVs) are a syntactic phenomenon whereby a simple verb (e.g. put) is combined with a preposition (e.g. off) to create a new compound verb (e.g. put off the appointment). These verbs are characteristic of the Germanic family of languages, and thus occur in both English and German. However, the position of German PVs in a sentence is constrained in ways that English PVs are not. What accounts for these differences? I collected and analyzed data for German sentences with and without PVs. On the basis of the latter, I formulated a model of syntactic structure that captures the differences between basic German and English syntax. This model also provides an account for German PVs. I propose that German PV word formation occurs at the syntactic level and accounts for the restrictions on PV word order in German. This analysis provides insights on what a speaker of German subconsciously knows about their language. Moreover, it reveals the ways in which languages vary and thus informs us about the human capacity for language. Lastly, it allows us to make predictions about what we may find in other languages and why this remains a property of relatively few languages.

Faculty Sponsor: Laurie Zaring

KYLE MAHLKUCH '17

CLINTON AKOMEA-AGYIN '17, ANDREW LOUTFI '17, LAM NGUYEN '17, JOSH VANNATTER '17

TEXchange: A Decentralized Online Textbook Marketplace

When students get their textbooks today, they have limited options to choose from, mainly campus and online bookstores. According to Bureau of Labor Statistics data, over the last 40 years textbook prices have risen at more than three times the rate of inflation. The focus of our project was to develop a tool that would give consumers of textbooks (students) more buying choices. We developed a tool called TEXchange which is a cross-platform web application that serves as an intermediary, enabling students

to buy and sell their textbooks directly to and from each other. TEXchange is implemented with ease of access in mind so that it may be deployed quickly on any college or university campus in the United States. It is built on the cloud platform Dreamfactory that simplifies the building and maintaining of the three basic elements of a website: server, database, and user management.

Faculty Sponsor: Kent Lee

ALLIE MARTIN '17

Incentivizing Sustainability: Evaluating the Effectiveness of Renewable Energy Tax Credits

As the need for renewable energy sources has increased in recent years, the United States government has extended several incentives to expedite the growth of wind, solar, geothermal, and various other energy sources. Tax credits are one type of incentive and are offered on both the federal and state level to offset the costs of developing renewable energy. This study will assess the effectiveness of renewable energy tax credits as a way to promote sustainable behavior. Evaluating the impact on a national level through published journals, government information, and other quantitative data provides a broad perspective of the tax credits' effectiveness. To understand the effect on local communities, Luther College's development of solar photovoltaic systems will be used as a case study. The federal tax credits are set to be phased out over the next few years. This analysis will determine whether the renewable energy tax credits have accomplished desired incentives and deserve to be extended rather than phased out as planned.

Faculty Sponsor: Ramona Nelson

ISAIAH MAYERCHAK '17

IHAB SAUD '17, ZECHARIAH SMITH '17

Luther College Room Draw

Room draw at Luther has long been a stressful period during which decisions often had to change at the last minute. Over the last year our team built an online web application that is intended to replace how room draw currently works for Dieseth, Miller, Olson, and Larsen halls. Instead of physically attending a mass registration event for rooms in these buildings, at their designated time students use our web application to register for a room,

following a process similar to registering for classes. Students can find roommates using our application as well as navigate around campus in advance to find the rooms they wish to register for; they can even save a list of preferences for which rooms they would prefer. Our presentation includes a description of the final product and of our experience with the software development process, which included gathering requirements from the Resident Life Office, project management, scheduling, and the implementation of the room draw system.

Faculty Sponsor: Kent Lee

MEGAN MCCREADY '17

Defusing America's Ticking Time Bomb: Reforming the Social Security Program

America's Social Security program has provided funds for survivors, elderly, and disabled workers since its inception in 1935. In the last 82 years, the program has been formally amended five times, expanding the program's benefit payments immensely. America's age demographics continue to shift upwards, requiring additional outflows from the Social Security trusts to pay retirement benefits. Because the trusts are not generating sufficient inflows to counteract the additional outflows, experts forecast the program will fail to generate enough revenue to make its necessary payments within the next 20 years. The need for reform is evident. This study will analyze possible solutions for the coming Social Security crisis and determine essential elements of an effective reform policy. My research evaluates current financial information, census data, reform proposals and past plan amendments to determine how the program can best be reformed to meet both the financial and social demands of the American public. This study will result in arguments for elements and that should and those that should not be included in a reformed Social Security program.

Faculty Sponsor: Ramona Nelson

MADDIE MCLEAN '19

Pollinator Policy Implementation in the Driftless

Pollinator decline is an issue that threatens both ecosystem health and the agricultural industry, as pollinator services are worth an estimated \$14 billion per year in the U.S. This decline can be attributed to a combination of

factors including pesticide use, climate change, Colony Collapse Disorder, and habitat loss. In response to the alarming loss of pollinators, the White House released a strategic management plan to address the issue of habitat loss. This plan created new land management practices under both the Conservation Reserve Program (CRP) and Environmental Quality Incentives Program (EQIP) that address pollinator habitat loss through requirements, such as higher forb counts, on pollinator specific plots. This study is a qualitative analysis of how counties in the Driftless have been implementing these new policies, and where strengths and weaknesses within these programs lie. Based on interviews of 22 USDA employees from these counties, we concluded that these pollinator programs are being implemented and instigate awareness of the pollinator issue. However, weaknesses lie in the scarce monitoring of implemented sites and lack of diversity of those enrolled, as a general trend shows that no large agricultural operations are enrolling in the pollinator programs.

Faculty Sponsor: Rachel Brummel

SHANNON MEEHAN '18

**Monarch Butterfly (*Danaus plexippus*)
Egg-Laying and Caterpillar Feeding
Preferences on Five Species of Milkweed
(*Asclepias* sp.) in Winneshiek County**

The migratory population of the North American monarch butterfly (*Danaus plexippus*) has been declining and is threatened with quasi-extinction. One of the factors of this decline is believed to be the drastic reduction in milkweed availability in monarch breeding habitat. Because Decorah is located within monarch breeding habitat, we conducted a study to determine if monarchs in Winneshiek County express any preference towards certain species of milkweed. Five species of milkweed (*Asclepias* sp.) common to northeast Iowa were examined weekly from June through September 2016. Monarch eggs and caterpillars were counted from seven replicate blocks containing five plants of each milkweed species. Significantly more eggs were found on *A. incarnata* and *A. speciosa* when compared to *A. tuberosa* and significantly more caterpillars were found on *A. syriaca* when compared to *A. speciosa*. However, all five species of milkweed were used for monarch egg-laying and caterpillar feeding.

Faculty Sponsor: Kirk Larsen

DEVENY MILES '17

By Sharing Nothing We Reveal Everything

By Sharing Nothing We Reveal Everything is an investigation into the narrative connotations that arise from text and how movement innately infers meaning, a commentary on the rejection of characterization in 1960's dance and a re-engaging with artistic history, specifically Renaissance sculpture, to create new material. In the 1960's, dance became focused around the abandonment of previous forms, moving into work that explored location, audience involvement and unmatrixed performance. Despite this rejection of popular art forms, similarities between the 1960's and the Renaissance movement, particularly within sculpture, can be identified and defined through the lens of Laban Movement Analysis (LMA), a method and language for describing, interpreting and documenting movement. Both Renaissance sculpture and 1960's performance art connects Shape and Space as defined in LMA as well as a return to seeing the body as a primary source of knowledge and inspiration. This work was influenced by the use of narrative and characterization that prevailed in the Renaissance era and used in conjunction with the 1960's integration of other forms into dance. This piece explores the difficulty of removing emotion and narrative from dance and highlights that even simple connections to another experience prompts characterization.

Faculty Sponsor: Andrea Vasquez-Aguirre

JOEL MURILLO '17

“Cracker Jack”: A Work of Fiction

Throughout history, writers have addressed social issues through works of fiction. The creation of a world resembling our own enables readers to construct parallels, specifically analyzing how characters in the fictional world cope with conflicts we face in our reality. My work of fiction, “Cracker Jack,” addresses anxieties surrounding the exploitation of the masses at the hands of autocrats in a dystopian setting, pertaining specifically to social privileges exclusive to the upper echelons of society. The story follows Jack as he struggles to achieve freedom from a tyrant and his police force for himself and his sister. An array of works ranging from Kurt Vonnegut's short story “Harrison Bergeron” and Nick Flynn's memoir *Another Bullshit Night in Suck City* to Benjamin Percy's novel *The Dead Lands* combined with my

bi-monthly story edits helped me incorporate current societal concerns into my narrative. The product of my readings and edits allowed me to mold my story into a believable and realistic work of fiction. My story, presentation, and project reflection serve as a springboard to consider how fiction draws influence from and reflects prevalent topics of discussion in society.

Faculty Sponsor: Amy Weldon

GRANT MYRES '17

Analyzing the Binding Relationship between Curcuminoids and HSA by Steady-State Fluorescence Spectroscopy

Curcuminoids are a class of photoactive organic compounds that have been found to have practical application as photosensitizers in Photodynamic Drug Therapy (PDT). To better understand the practicality of a given curcuminoid in PDT the binding relationship to the transport protein Human Serum Albumin (HSA) must be identified. The complex formed between Curcuminoids and HSA is unique as both species are photoactive and the observed photoactivity of one species is dependent on the presence of the other. Although all curcuminoids share the same general structure, each derivative has subtle structural differences that impact the way in which it interacts with HSA. The aim of this study is to observe the interactions between curcuminoid derivatives and HSA through the use of various photophysical studies. Current photophysical analysis suggest that three different curcuminoid derivations can be differentiated given their unique interactions with HSA. For future studies the thermodynamics and the implication of alternative binding methodology are potential next steps in analyzing this relationship.

Faculty Sponsor: Olga Michels

AGENDA NAWA '17

Refugee Crisis: A Business Opportunity

The aim is to understand the refugee crisis and the efforts to combat it by providing employment to refugees. Chobani is a company that has adopted a concerned yet profitable approach to the crisis by providing refugees with work opportunities as opposed to giving monetary relief to refugee camps. It has since become a billion dollar company because it has given jobs to refugees which otherwise would not have been filled by Americans. This is all

possible because the refugee crisis has created an adversity that can be positively leveraged by businesses. Refugees are suitable candidates who possess perseverance due to their adversity; they increase ethnic diversity, they're eager to fill dirty, difficult, (relatively) dangerous, and dull (4D) jobs, and already have valuable expertise and skills. This research acknowledges factors such as language, refugee living conditions, qualification, and most importantly government legislation and policies that come into play before any commitment by businesses can advance. These factors pose drawbacks to businesses but once acknowledged and overcome, they can be proactive in retaining their employees. Chobani has already recognized some of the drawbacks and therefore reduced employment costs and uncertainty for any business that wishes to adopt this approach to combat the refugee crisis.

Faculty Sponsor: Alexandra White

BETHANY NOLTNER '17

Liberal Arts Tuition

In recent years, residential liberal arts colleges have been under the microscope regarding costs and benefits to students. Due to increased competition for students, many colleges introduced new educational programs (i.e. majors) to stay ahead and provide unique opportunities, which increases the cost of tuition. To be able to attract students, these colleges offer discounts (in the forms of scholarships) to make college more affordable. Over time, the tuition, less these scholarships, has come close to costs, limiting any "profit" the organization may have. Over the summer we selected liberal arts colleges in two categories: high tuition with high discount, and low tuition with low discount. We interviewed and surveyed both groups to understand the rationale behind their type of pricing method. We also considered a number of different metrics such as revenue, discount rate, and net tuition per student to try and identify key trends. While resetting tuition from high tuition with high discount to low tuition with low discount seems to increase enrollment in the short term, it is unclear if this trend can continue into the long run. This details the importance of marketing when students learn what the actual price is compared to the stated price.

Faculty Sponsors: Don Jones and Ryan Torkelson

JONATHAN OPDAHL '17
KYLE MCNEESE '17, AIDAN SCHMITT '17
Luther Course Proposal

Hidden from the general student population is the process by which courses are modified, added, and removed from the course catalog. However, the process is a well-known yet tedious endeavor for the faculty involved, involving the use of an antiquated web tool with the look and feel of something from the 1990s, but with none of the nostalgia. The Luther Course Proposal project is aimed at alleviating this pain by developing a new application for faculty to use during this process. Using modern software technologies—namely Angular JS, Mongo DB, CSS3, and Java—Luther Course proposal implements many of the missing features in the current application: automatically loading data, tracking approval progress, and upgrading look and feel, to name a few. This web-based application will allow Luther faculty to easily add, modify, and drop courses while monitoring their progress through the course approval process in a central application, thus facilitating the improvement of educational programs here at Luther.

Faculty Sponsor: Kent Lee

EMILY OSBORNE '18
Resisting the Rest Cure: The Erasure of a Misogynistic Medical Practice

In the 19th century, neurologist Silas Weir Mitchell developed the rest cure to treat women diagnosed with hysteria and other nervous diseases. This treatment demanded women to submit entirely to their male physicians. Feminist authors of the time, such as Virginia Woolf and Charlotte Perkins Gilman vociferously resisted the rest cure. While many scholars have examined how these writers depicted a 19th century woman's experience of mental illness and the rest cure, few have questioned how their fictional and personal stories collaborated with other social forces to end this form of treatment. I examine the impact of these feminist literary works, Mitchell's publications, and the nonfiction writing of physicians and patients against Mitchell's practice to explore how the feminist resistance to the rest cure eliminated this practice from Western medicine.

Faculty Sponsor: Maryna Bazylevych

JAMES OSTLIE '17
Tree Species Composition of Old-Growth Sugar Maple-Basswood Forests in Northeastern Iowa

This study was undertaken to determine the species composition and structure of two old-growth, sugar maple-dominated forest remnants in Winneshiek County. Unlike most mature sugar maple forests in the county, these stands are on relatively flat sites with thick silt loam soils. We measured the density and dominance of all trees >1.37 m tall in 20 150-m² plots. Plot locations were selected to sample across three topographic positions: sloping upland on Fayette/Dubuque silt loam, flat mid-slope on Fayette silt loam, and flat lowland on alluvial soil. The largest trees in these stands exceeded 75 cm dbh, suggesting these stands originated prior to European settlement on sites that were protected from fires. In all three areas, sugar maples had the highest dominance and density followed by American basswood and eastern hophornbeam. Sugar maple density was highest in the mid-slope plots. The alluvial site had higher densities of bitternut hickory and basswood than the other sites. Sugar maples were well represented in all size classes, suggesting recruitment will continue as long as environmental conditions remain suitable.

Faculty Sponsor: Beth Lynch

SARAH OWENS '17
Sin, Contraries, and the Self as Explored by Blake, Milton and Pullman

This project was built successively after exposure to different works and conversations. I was intrigued by John Milton's angle regarding the fall of Satan and humanity in *Paradise Lost*, and contemplated the right of a people to question, challenge and overthrow authority. This realm of thinking was expanded by reading *The Marriage of Heaven and Hell*, *Songs of Innocence and of Experience* and *Milton: A Poem* by William Blake. Blake explores the nuances of good and evil and what the world looks like before and after we become aware of those differing categories of behavior. Is being "experienced" bad? What ought humans do with this knowledge? Is society playing fairly within these realms? The unique worldview employed by these two poets' work has the power to shift personal paradigms. I became aware of a modern writer who has threaded thematic elements of Blake and Milton within his own work: Philip

Pullman. This study explores how Pullman inserts himself into this conversation regarding morality, innocence, authority, and contraries and how all of these necessary elements serve to define the self as an entity as well as a functioning part of society through critical analysis of his trilogy *His Dark Materials*.

Faculty Sponsor: Amy Weldon

CASSANDRA PETERSON '17
Design of a Molecular Sex Identification Test for Three Bat Species

Bats are ecologically important species that are experiencing threats from wind energy development. It is important know whether there is a species bias for turbine-associated fatalities. Although researchers are often able to identify the sex based on morphology, damage and decay of the carcasses can make this challenging. DNA-based tests provide an unbiased approach for identifying sex for even the most challenging carcasses. However, published tests currently work on a few species. The goal of my research is to design a working molecular sex test for three important bat species: Big Brown (*Eptesicus fuscus*), Little Brown (*Myotis lucifugus*), and Silver-haired (*Lasionycteris noctivagans*) bats. I used Polymerase Chain Reaction to amplify an intron region of the zinc-finger-X (*zfx*) and zinc-finger-Y (*zfy*) gene on known males using general mammalian primers. Molecular cloning techniques were used to isolate these fragments. For each species, I picked 10 clones to sequence. These DNA sequences were used to design internal, species-specific primers that allow for a quick and easy method of separating *zfx/zfy* bands via gel electrophoresis. These primers were tested on individuals of known sex to ensure accuracy of the test, which will provide a useful tool for studying bats.

Faculty Sponsor: Dawn Reding

EVA PETERSON '17
The 1848 Abolition of Slavery in French Senegal

France has formally abolished slavery in her colonies twice, once in 1792 and again in 1848 in response to the various French revolutions. The abolition of slavery is normally seen as a progressive step in modern history, however, what is not often discussed is the unrest it actually created within African

communities whose economic, political, and social systems were built off the slave trade. For French Senegal, slavery was seen as a “natural institution” that the community had prospered from for centuries (Dorigny). Through scholarly articles as well as historical and primary texts on the French slave trade and Senegalese history, I have analyzed how European and Senegalese communities in 1848 worked together to rebuild the foundation of the colony so it would not completely collapse due to the removal of slavery. In my presentation, I focus on the various conflicts that arose between the social groups involved during this transition such as the French administrators, métis communities, merchants and traders, neighboring territories, and enslaved communities.

Source: Dorigny, Marcel. *The abolition of slavery: from Légér Félicité Sonthonax to Victor Schoelcher, 1793, 1794, 1848*. New York, NY: Berghahn. 2003. Print. 321

Faculty Sponsor: Anne-Marine Feat

LINNEA PETERSON '18
ASHLEIGH BUNKOFSKE '17
Computational Modeling of the Macroeconomy with Directed Graphs

The purpose of our project was to create an accessible computerized model of the United States macroeconomy. We drew on the methodology outlined in Geoffrey Wyatt's book *Macroeconomic Models in a Causal Framework*, which illustrates the traditional Investment/Savings-Liquidity Preference/Money Supply (IS-LM) model of the macroeconomy as a dynamic system, specifically a directed graph. We implemented this theoretical schema in Python, and it served as a framework for applying a theoretical graph of the macroeconomy to actual data. We ran multiple linear regressions comparing data that were theoretically related, offset by one year to investigate the causal links and accommodate the limitations in the computational framework. We then ran simulations using actual economic data from the 1980s and 1990s, garnered from the Bureau of Economic Analysis and the Federal Reserve. While far from perfect, the program was able to simulate 1990s economic data to a reasonable degree of accuracy when using relationships found in the data from the 1980s. We hope that further research in this vein could be used to investigate and challenge causal relationships posited by macroeconomic theory.

Faculty Sponsor: C. Nicholas Gomersall

MATTHEW PETERSON '17

Effect of Prescribed Fire in Woodlands on Ground Beetles (*Coleoptera: Carabidae*)

Prior to European settlement, fire was a common natural disturbance that recycled nutrients in both prairie and oak savanna ecosystems. Luther College has implemented fire regimes for their prairies and woodland natural areas that surround campus. Prior research on the effects of fire on ground beetles in prairies has shown a mixed impact of fire on carabid beetle diversity. However, the effects of fire on woodland ground beetles has not been documented. In the fall of 2015, a prescribed woodland burn took place in Flying Squirrel Forest. This study aimed to see what effect this fire had on ground beetle abundance and species richness. Pitfall traps were used to collect ground beetles on a biweekly basis in both burned and unburned forest plots from May 23–September 29, 2016. Leaf litter, and temperature data were both collected to observe habitat differences between burned and unburned plots. Percent plant cover between treatments was collected as well as plant species richness. Beetles were pinned, identified to species, and counted for further analysis between treatments. Both species richness and beetle abundance showed no significant differences between burned and unburned treatments one year after the application of fire. This suggests that there is no negative effect of fire on ground beetle communities.

Faculty Sponsor: Kirk Larsen

MARGARET PRIOLA '17

Senior Project in Music Education: Music Teacher Preparation for Students with Special Needs

A content analysis methodology was used to explore undergraduate music education programs and their offerings in regard to preparing pre-service music education teachers to teach students with special needs. The results of an analysis of the music education curriculum requirements at ten of the top undergraduate programs for music education will be reported using descriptive statistics. Ten institutions were chosen for their reputation for excellence and to gain a diverse geographical representation. The study includes a literature review of several scholarly sources in music education that demonstrate the lack of preparation for

students to work with students with special needs. The research question is what is being done to prepare pre-service music teachers for students with special or diverse learning needs? The results showed that only one of the ten colleges and universities studied in the content analysis required their music education majors to complete a course in special education specific to music as the content area. Only one ten colleges and universities studied is teaching their future music educators the educational implications and strategies for teaching students with special needs.

Faculty Sponsor: Jill Wilson

HUNTER PRUEGER '18

Video Game Music: Synthesis, Composition, and Scoring for Interactive Media

Music for media is in demand and the video game industry is booming. Original music and sound design is essential for studio, indie, and app developers alike. The composer plays an important role in crafting the atmosphere and environment of video games. However, video game music contrasts from classical music. A different set of skills and techniques are required to create a successful video game score. After a period of observation, research, and consultation from professional game composers, I created and scored an original video game with the goal of learning how game music composition differs from classical composition, and how game composers create effective video game scores. This project resulted in a video game with a score nearly an hour in length that utilizes a retro style of sound synthesis involving analog, wavetable, and multi-oscillator synthesizers.

Faculty Sponsor: Brooke Joyce

ELLE ROSS '18

Hawaiian Well-being and Health Care

Hawaii is often seen as a place of relaxation and well-being. The purpose of this research is to evaluate this impression by studying the health care system in Hawaii. Through observational experiences shadowing an elementary school health aide, shadowing a physician at an urgent care clinic and a disability evaluation center, perusing scientific articles, and conversing with Hawaiian citizens and immigrants, it is evident that the health care delivery in Hawaii has major discrepancies compared to the mainland. Research concerning well-being/health care in

Hawaii revealed that immigrants from Asia/Pacific Islands to Hawaii and migrants from the Republic of Marshall Islands (Compact of Free Association [COFA] migrants) impact health care delivery. Researching the Hawaii Prepaid Health Care Act (PHCA), the severe homelessness issue in Hawaii, the high cost of living, and the effect of Westernized nutritional intake by native Hawaiians showed extensive grounds for well-being/health care concerns. The nursing role in health care delivery and overall well-being issues in Hawaii is essential yet lacking. The Hawaii State Department of Health and other specialty areas of nursing provide education on wellness initiatives, can advocate for clarity in the PHCA, and can become involved at the policy level to promote health care access/alternatives to under-represented populations: COFA migrants and homeless individuals.

Faculty Sponsor: LaDonna McGohan

SHASA SARTIN '19

Sex Worker Humanization Curriculum

Prostitution dates back 4,000 years in Mesopotamia, and has been found in most civilizations worldwide. It is surprising that for something so commonly shared among people groups, it is so highly stigmatized in our country. The erasure of sex workers as contributing citizens in the United States is harmful. This erasure negates their humanity, promotes shaming, and causes violence against sex workers to become normalized. I chose this topic for a curriculum building project in my Sexual Ethics course. I sought out to create a seven-week survey course on the history of sex work utilizing psychological literature, ethnography, and personal account based curriculum material. The target audience is third- and fourth-year college students. Learning about sex work humanizes sex workers in the students' eyes and brings forth discussion about bodily autonomy—specifically for women, gender nonconforming, and transgender people. I assume that increased knowledge about this form of work and this demographic of people will lead to more scrutiny when encountering news. Sex workers are often victims of violent crimes, but people often choose to pay no mind as they have already cast them away in their minds. This curriculum seeks to decrease that apathy.

Faculty Sponsor: Natalie Williams

AMELIA SCARBROUGH '17

Undermining Education Readiness: Assessing the Effects of Cognitive Impairment in Refugee Children with Post-Traumatic Stress Disorder

Recent political events in Syria have caused over 4 million Syrians, nearly 40 percent under age 12, to flee the violence and poverty of their homeland. This literature review compiles recent studies of trauma-related issues to explain why refugee children struggle to learn in school. For refugee children, the most common psychological disorder is Posttraumatic Stress Disorder (PTSD). PTSD may occur when individuals have experienced life-threatening traumatic events, including political violence. Individuals with PTSD relive horrors through flashbacks, nightmares, and other disruptive difficulties. Psychological stress negatively impacts children's relationships, correlates with changes in brain structure, and impairs cognitive functioning. Secure attachment, the security of ties with primary caregivers, provides emotional security. Without this support, refugee children become hesitant, withdrawn, and fearful of new experiences including attending school. Children experiencing PTSD are in a constant state of stress; responding by releasing stress hormones like cortisol. These elevated cortisol levels directly change brain structures like the hippocampus, which enables us to permanently store newly-learned information. Continued exposure to stress hormones decreases the size and shape of the hippocampus, impairing the ability to process and store new information. Such memory impairments undermine education readiness and may cause over-representations of refugee children in special education programs.

Faculty Sponsor: Stephanie Travers

SHERI SCHWERT '17

Characterization of Water Movement from Sinkholes to Two Springs in Decorah

Nearly 80 percent of Iowans depend on groundwater for their drinking water. Karst topography, defined by easily eroded rock and high volume water movement, makes keeping pollutants away from groundwater aquifers difficult. With over 12,700 sinkholes and nearly uncountable springs mapped in northeast Iowa, research into the detailed and complicated paths of water through these features has been sparse. To determine whether water follows a path from a sinkhole to a nearby spring, fluorescent

powder dye is mixed with water and poured into the dry sinkhole before a predicted rain or snowmelt event. Receptors are placed at the head of the predicted springhead and water samples are taken from the spring as well. Dye is detected using chemical spectrometry. Trials of dye injection and sampling have already been completed at two different sites. Results from the summer of 2016 were in the form of water samples only, whereas results expected from late winter 2017 will be backed up by receptors tested by a professional lab. Connections between sinkholes and springs are important to any future pollution of the local karstic aquifers.

Faculty Sponsor: Eric Baack

TREVER SCHWICHTENBERG '17
Female Genital Cutting: Biomedicine and Consequences of Globalization

Physicians around the globe who work in biomedical facilities have until recently rarely come into contact with the practice known as female genital cutting (FGC). FGC is done in the name of a particular interpretation of one's cultural and religious background. Mass migrations have brought patients who have experienced FGC to physicians who know very little about the practice. These doctors must now address patients and a society where the practice is sometimes deemed acceptable. By conducting a literature review, I have found research that investigates what health-care workers do know about the practice, as well as what methods are best in ending FGC. The research conducted supports educating health-care workers about the practice. Most importantly, the research indicates that cross-cultural understandings are key to ending the practice. Only through knowledge of why societies practice FGC can anyone accomplish successful campaigns to end it.

Faculty Sponsor: Maryna Bazylevych

MIRIAM SELLERS '17
Opposing a Muslim Ban in Spain: Moriscos and Crypto-Muslims on Trial before the Spanish Inquisition

This research focuses on the Spanish Inquisition, which was intended to extend the power of the Catholic Church by trying and sentencing Christian converts accused of practicing other religions. The Catholic monarchs ordered many people, including Moriscos (Spaniards of Arab-

Muslim heritage converted to Christianity), to appear before the Tribunal of the Holy Office of the Inquisition. The purpose of this research is to determine which factors helped certain Moriscos receive lighter sentences when they defended themselves before the Tribunal. Muslims who understood the objectives of the Inquisition decided to use the strategies of demonstrating loyalty to Catholicism and confessing or repenting their heretic acts because they knew that these tactics would reduce the severity of their sentences. This conclusion is based on the cases of Diego Diaz, Floriana de los Reyes, Andrés Ximénez and Mari Gómez. As these examples show, Moriscos that understood the Inquisitional system stood the greatest chance of saving themselves from the harshest sentences. This research thus illuminates certain strategies employed by religious minorities in a repressive environment in order to preserve their identities and cultural practices.

Faculty Sponsor: David Thompson

JESSICA SKJONSBY '17
Major Life Events, Daily Hassles, and Social Support in the College Student

College is a time for change and transition, where many students experience major life events and daily hassles that may alter their worldview. Major life events are defined loosely as events that disrupt daily routine, whereas hassles are minor irritants. This study will examine whether the more major life events and/or daily hassles an individual experiences have any impact on the amount of physical activity an individual engages in. The role of social support as a moderator will also be evaluated. A series of questionnaires was administered to individuals of traditional college age (18–22), regarding the facets stated above. A quantitative analysis will be conducted on all data gathered. I predict a negative correlation between the amount of major life events and/or daily hassles experienced, and the amount of physical activity. However, I predict that social support will act as a buffer on this correlation, thus decreasing or negating the harmful effects of many major life events. This data may offer insight into how college officials can better help students adapt to the college transition, find ways to alleviate unnecessary daily stressors, and guide implementation of potential education programs for students.

Faculty Sponsor: Rita Dykstra

AIDAN SPENCER '17

Documenting Luther's Choral Tradition

Aidan Spencer and Jacqueline Wilkie have spent the last three years conducting oral history interviews and archival research on the first Nordic Choir international tour that took place in 1967. The purpose of this research was to collect information regarding the tour to preserve its history. We've conducted over 20 interviews, collected memorabilia, reviewed scrapbooks, translated letters in Norwegian and German, and processed audio recordings, slides, and 8mm film footage from the tour. Based on these materials, an hourlong documentary film and accompanying pamphlet will explore the import and impact of the tour to all those involved. Because of the interdisciplinary nature of this research, both Aidan and Jacqueline have been challenged to develop new skills. One of the key findings of this work has been the degree to which projects of this nature require a large collaborative team. This presentation will focus on what we've learned through our research, the process of putting together a coherent documentary, and balancing the written record with the memories of those involved.

Faculty Sponsor: Jacqueline Wilkie

JONATHAN SPRINGER '17

GIFTY AMA DUA ARTHUR '17, FATIMETU BACHIR JATRI EMHAMED '17, PHILANI MBONGISENI MKHWANAZI '17

NorseHorse: A Ride-Sharing App

NorseHorse is an intuitive web application that matches up students who do not have access to vehicles with students who have cars on campus. This ride-sharing app allows Luther students to post and request rides, both for long-distance trips and rides right here in Decorah. Our application was born from the desire to help foster a closer community on campus by matching people with similar needs in travel, as well as bringing people into contact with one another who might not otherwise get to know one another. The international student community on campus needs this service in particular, as many of those students are unable to drive and do not have easy access to transportation. As well as bringing communities of different people into greater contact with one another, we hope to be environmentally friendly by decreasing the overall driving time of our fellow Luther students. We hope to foster a more close-knit community using our application,

as well as provide a much needed platform to help students who do not have adequate transportation.

Faculty Sponsor: Kent Lee

MARSHALL STAY '17

Geophysical Investigations at the Heritage Valley Mound Site (13AM129) in Allamakee County, Iowa

The internal structure of linear Native American mound sites is largely unknown as they represent a small proportion of mound sites overall and only a few have been thoroughly studied. Remote sensing is able to provide information on these details through the use of nonintrusive methods, a necessity for mound structures in many areas as they are protected as cultural monuments and cannot be excavated. This research highlights the utility of remote sensing methods for investigating these structures and alludes to construction practices. In June of 2016, the Heritage Valley site (site 13AM129), a singular linear mound on a terrace in the Upper Iowa River valley in northeastern Iowa, was surveyed using a Bartington Grad 601-2 fluxgate gradiometer. The data not only reveals the mound itself through differentiation in soil magnetism, but we are also able to determine potential construction techniques. This magnetic fluctuation within the mound could indicate the presence of subsurface features such as stone altars, pottery, fired earth, and human burials. The continued use of remote sensing techniques on a larger sample of linear mounds may display patterns of subsurface features that would provide insight as to the function and meaning of linear mounds as a whole.

Faculty Sponsor: Colin Betts

ERIN STEWARD '17

To Teach or Not to Teach: Student Identity Formation through Heritage Language Instruction

Irish Gaelic and Breton are two Celtic heritage languages that are slowly disappearing. This study addresses the history behind and laws specific to these languages as the main mode of instruction for elementary through high school students with a particular emphasis on factors that shape the fight for minority language educational rights and understanding whether these came from internal motivations (i.e., a desire to speak to individuals within

one's own community) or external impetuses (i.e., treaties from the United Nations or UNESCO). Therefore, my research question is: To what extent is the fight for minority language educational rights the result of a movement to construct student identity from an internal standpoint or an external standpoint? I used my Imagine Fellowship funds to travel to Ireland and France to conduct in-person interviews and research at schools and libraries in County Galway, Ireland, and Bretagne, France. My findings demonstrate that both internal and external factors play roles in students choosing to attend a school that instructs primarily via one of these two languages, which subsequently affects the construction of students' identities.

Faculty Sponsor: Anne-Marine Feat

RACHEL STODDARD '17

Ironman Ada Hand

During the summer of 2016, I was a recipient of a research grant from Luther College's Academic Honors committee to test the viability of 3D printed below-elbow myoelectric prosthetics in collaboration with a Luther College alumnus, Brandon Sampson, class of 1998. Sampson is a certified prosthetist/orthotist and cofounder of Limb Lab, a prosthetic and orthotic company based out of Rochester. In more common terms, we were testing whether a machine-printed prosthetic made of incredibly hard plastic that functions via electrical signals from a patient's muscles could potentially be marketed for amputee patients. The hand was affectionately named the Ironman Hand, and was originally designed for children. The intention of the Ironman design was to encourage kids to go to "superhero training" instead of "boring physical therapy." At the end of the summer, the Ironman Hand functioned optimally, by extending the fingers when detecting an extensor digitorum contraction, and flexed the fingers when detecting a flexor digitorum contraction. Despite the successful basic functionality, it was discovered that the Ironman Ada Hand was not durable enough for immediate patient use. Despite our conclusion, there was a patient trial and I wrote a paper discussing our findings and recommendations for further research.

Faculty Sponsor: Ellen Drewes-Stoen

SARAH STURM '17

Preemptive Prosecutions: How Fear of the Religious "Other" Drives Us to Abandon Constitutional Values

This project uses the preemptive prosecution of Muslim Americans to explore how religious minorities are "otherized" and subsequently denied their Constitutional rights pertaining to religious freedom. I do this in three steps. First, I identify and explore the existence of preemptive prosecutions as a governmental counterterrorism measure enacted after the events of September 11, 2001. Next, I demonstrate the process of religious "othering" as well as the role that fear of religious "otherness" plays in these preemptive prosecutions and their legitimization. Finally, I discuss the Constitutional implications of preemptive prosecution and what "otherization" can do to abridge the freedom of religion by comparing preemptive prosecution to previous instances of majority interference with minority religious views. Through these three parts, the study examines with particular attention to how an underlying Christian identity in the United States leads to the creation of religious "others" and how fear of that "other" can directly contribute to the abridgment of Constitutional freedoms. The study uses information drawn from a combination of interviews with persons who have had direct experience with the practice of preemptive prosecution, as well as an examination of media coverage, scholarly studies and constitutional history.

Faculty Sponsor: John Moeller

HANNAH SUTCLIFFE '18

DEANNA GRELECKI '19, COLTAN

JACOBSON '17, ABBY VIDMAR '19

Mainstreaming "Fresh": Improving Access to Local Food in Communities

The local food movement in the United States took root over 50 years ago in response to concerns over pollution, land management, and pesticide use in agriculture. Since then, the movement has become a multibillion-dollar industry, but has yet to become truly and fully local due to aggressive market practices, subsidized conventional agriculture tactics, and the resulting prohibitive cost of goods. The movement has been critiqued as a trend that perpetuates the formation of "white spaces" by excluding marginalized groups. My research

explores the questions of accessibility and justice concerning access to locally produced, organic foods, and examines social connections that are formed between producers and consumers. I conducted informal and semi-structured interviews with consumers and producers, worked alongside farmers, and studied interactions between participants in market settings in Minnesota and Iowa locations. I conclude that the local food movement is not defined by geographic limitations, but that it serves as a social facilitator by providing a unique space to forge community relationships. I believe that to improve pathways to access and integration, it is education, infrastructure, social programs, and personal changes that will prove effective. I propose that, while nothing can be mainstream until it is available for everyone, a combined effort can make it a possibility.

Faculty Sponsor: Maryna Bazylevych

MARIA VICTORIA TORRILLAS
PIZZORNO '17, BERNARDA KACULETE '17
**Presidential Image Before and After a Crisis:
Examining Cross-National Media Portrayal
of Dilma Rouseff in Latin American
Newspapers in 2013 and 2015**

Media portrayal of presidents plays a preponderant role in shaping the perception of constituents towards them. This paper analyzed the media portrayal of Brazil's first woman president, Dilma Rouseff, in the years of 2013 and 2015. We used a cross-national approach and an original dataset of newspaper articles from five different Latin American countries, seeking to investigate the connection between media portrayal (positive, neutral, or negative) of Dilma Rouseff, temporality, and country of publication. We concluded that the media portrayal of Dilma Rouseff was more negative in 2015 than in 2013 as Brazil was entering an economic and political turmoil and that the Brazilian newspaper coded in this research, *O Globo*, had a more negative outlook on the policies and political actions of Dilma Rouseff than other Latin American countries. This research is important as there have been no significant assessments of media portrayal in Brazil or the whole Latin America.

Faculty Sponsor: Pedro Dos Santos

MARIA VICTORIA TORRILLAS
PIZZORNO '17

An Analysis of the Brexit Vote

On June 23, 2016, the United Kingdom held a referendum—popularly called Brexit, for British exit—to allow citizens to voice their stance on leaving the European Union. The referendum was characterized by its complex voting behavior, which could be attributed to many factors: ethnic differences between different regions of the UK, rising euroskepticism, political discontent and the problematic approach to the EU refugee-settling programs, amongst others. However, I provide another framework to analyze voting behavior: structural and cultural violence faced by particular regions of the United Kingdom since the late 1980s. This research provides an interdisciplinary approach to understanding the Brexit vote by analyzing voting demographics and behavior through a feminist approach, and theorizing on national identity through the concepts of structural violence and cultural violence. I conclude that the strong support of leave came from years of systematic oppression of particular socioeconomic groups, and that it will have long-lasting consequences on British society, particularly women and minorities. This research has come to show that the United Kingdom has been divided since before Brexit, yet the vote only managed to uncover the public discontent and exacerbate their differences.

Faculty Sponsor: Pedro Dos Santos

ABBY VIDMAR '19
DEANNA GRELECKI '19, COLTAN
JACOBSON '17, HANNAH SUTCLIFFE '18
**The Bonds of Song: Musical Agency
in Aurora Choral Ensemble**

The Aurora Choral Ensemble at Luther College is an all-female, first-year, auditioned choir. It has ninety-seven young women and is conducted by Dr. Jennaya Robison. My research began with interest in the aspect of transition to college and agency in an all-female first-year choir. I narrowed my definition of agency to musical agency, which entails how music assists in individuals' ability to change their reality in the context of their socio-culturally mediated environment. My research paper asks: in what ways does participation in an all-female choir led by a woman, affect the participants' transition to college life and develop their agency more broadly? I completed choir rehearsal and

performance observations, conducted interviews, and took photographs and recordings. I coded and analyzed this information looking for recurrent words/themes. I argue that Aurora is an important place for first-year women to create bonds through song and activate their agency. Music has enhanced their ability to express their emotions about certain events and societal expectations and provided the tools to respond to them. Aurora members are active agents inspired through, and by, song to change norms and expectations placed upon them as first-year, young women.

Faculty Sponsor: Maryna Bazylevych

ANNA WEHDE '17

The Impact of Mood and Executive Functioning in College Students

College can be both exciting and stressful. As students grapple with demands on their time many also struggle with bouts of stress and anxiety. High levels of stress and anxiety have been shown to impair some basic cognitive processes, particularly executive control. Executive control refers to thought processes that are essential for college students such as attention, focus, and organization. Our goal was to determine if a relationship exists between students' mood and their level of executive control. Mood was assessed with the Depression, Anxiety, and Stress Survey (DASS21). Executive control was measured with the Stroop task, in which participants reported the color in which color words appeared (e.g., blue in blue). When the print color does not match the color word (e.g., blue in red) we rely on the executive control processes of attention and focus. We predicted that participants who scored high on the DASS would have poorer executive control and would be slower to report print color when the color word did not match compared to individuals who scored low on the DASS. This study will provide important information about how stress-related emotions affect executive control processes in non-clinical populations. In turn, these data may help clarify the impact of clinical-level depression and anxiety on fundamental cognition.

Faculty Sponsor: Stephanie Travers

ELIZABETH WIEBKE '19

Refugee Rhetoric: Newspaper Portrayal of Hmong Refugees

Following the Vietnam War, over 300 Hmong Refugees were resettled to northeast Iowa for over a decade beginning in 1975. Many Americans had never heard of the Hmong, or knew that they had fought on behalf of the United States military in the CIA's secret war in Laos. As a result, there was an influx of newspaper articles written about Hmong and other SE Asian refugees and their arrival to the Midwest. The goal of this pilot study is to examine the rhetoric surrounding refugee stories in Iowa newspapers in the late 1970s and 1980s using critical discourse analysis. The data set consists of 17 articles and/or photo captions from Iowa newspapers pertaining to refugee arrival stories spanning from 1975 to 1988. These newspapers are part of the Decorah Hmong Resettlement Archive Collection held by the Luther College Anthropology Lab. Using five linguistic aspects to examine the articles and photo captions—individualization, headlines, who speaks, program mentions, and word count/location in paper—this study will explore the positive and negative representations of refugees in print media, and the possible implications of their portrayal. This study is also important because of its relevance to the concerns of refugee rhetoric today.

Faculty Sponsor: Destiny Crider

MARTA WILLIAMS '19

LEAH BARKEMA '17

PI3K/Akt Signaling Influences Neuronal Function in *C. elegans*

The phosphatidylinositol 3-kinase (PI3K)/Akt signaling pathway integrates external and internal cues such as growth factors, nutrients, energy levels, and oxidative stress to regulate many important cellular functions necessary for growth, plasticity, and stress responses. PI3K/Akt signaling is altered in many different neurological conditions, although its role in these diseases is not clear. To better understand the how PI3K/Akt signaling contributes to neurologic disease, this study used *Caenorhabditis elegans* (*C. elegans*) to assess the influence of PI3K/Akt activity on neuronal function and overall organism health. *C. elegans* are small, non-parasitic nematodes with a well-characterized genome and nervous system

including homologs of the mammalian PI3K/Akt signaling and neurotransmitter systems. Wild-type and *C. elegans* strains with genetic mutations known to affect PI3K/Akt signaling were cultured on agar plates seeded with *E. coli* as a food source. PI3K/Akt mutants demonstrated an inverse relationship between pathway activity and lifespan, as well as altered expression of antioxidant and stress response genes consistent with previous studies. Of interest, dopamine and serotonin dependent feeding behavior was altered in PI3K/Akt mutants relative to wild-type animals, suggesting that the pathway may play a role in dopamine and serotonin production or uptake.

Faculty Sponsor: Stephanie Fretham

ELENA ZARECKY '17

Instrument Gender Associations:

Tuba Is Not for Girls

Throughout musical history, most instruments have gained gender associations. The most extreme associations can be seen on both ends of the instrument spectrum: flutes are for girls and tubas are for boys. But why have these instruments gained these gendered roles in society? What characteristics of these instruments make them specifically feminine or masculine and not gender neutral? While many instruments, not just flute and tuba, are gender associated, there are many instrumentalists who defy these instrument gender norms. These are the stories that are often unheard. For this research project interviews will be conducted to learn about these stories and how people's instrument choices align with or defy societal gender norms. Because of these gender associations society has placed on certain instruments, musicians who do oppose the standard confront many undeclared challenges from being the only male or female in their section. Many people think that these gender divisions are not a problem anymore. Yet, research over the past few decades has shown that instrument gender associations have not significantly shifted. According to much of the data, tubas are in fact still not for girls.

Faculty Sponsor: Jill Wilson

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