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**20<sup>TH</sup> ANNUAL  
CELEBRATION OF  
STUDENT RESEARCH,  
SCHOLARSHIP  
& CREATIVE WORK**

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**JANUARY 24, 2020 | WABASH COLLEGE  
DEATCHON CENTER**



## Welcome and Introduction

Welcome to the 20th Annual Celebration of Student Research, Scholarship, and Creative Work at Wabash College. For the past 19 years, the College has recognized in a proud and public way the creative accomplishments of Wabash students. We celebrate not only the particular achievements of individual students, but also a deeply embedded ethos of the College. The impressive breadth and quality of student creative work is evidence of the challenge and change that marks the Wabash experience.

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

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

A conference of this size and scope would not be possible without the dedicated work of many people. I want personally to express my thanks to the planning committee: Chair Lon Porter, Jeff Beck, Bradley Carlson, Sara Drury, Michelle Janssen, Damon Mohl, and Erika Sorensen-Kamakian. Aaron Elam and ETS students contributed to the poster production, as have other ETS and IT Services staff; Becky Wendt formatted and prepared the program for printing; Mark Siegel authored the online event presentation application system; Natalie Hurt and Beverly Cunningham coordinated keynote logistics; Rhetoric tutors, Ben Manahan, Hunter Seidler, and Brent Strahla, assisted with student keynote auditions; Campus Services, and Mary Jo Johnston and her Bon Appetit staff make the logistical support appear effortless. Finally, we are grateful to all of you whose attendance supports this community Celebration.

—Scott Feller, Dean of the College

### Schedule for Oral Presentations

Oral presentations will begin at 1:30 p.m. and continue every 20 minutes with a ten-minute break at 2:30 p.m. The last sessions begin at 3:20 p.m. In general, students will present information for 12-15 minutes with a few minutes for questions and passing time. Please see the following three pages for a list of oral presentations by room location and time slot. Names of the presenters, as well as their sponsors and abstracts, are listed in alphabetical order beginning on page nine.

### Schedule for Posters and Exhibits

Students will present and discuss their posters and exhibits in 90-minute increments beginning at 1:15 p.m. across Detchon International Hall. You will find a list of presenters and their locations — sorted by poster number—beginning on page seven. Names of the poster presenters and co-presenters, as well as their sponsors and abstracts, are listed by poster number beginning on page 16.

## Keynote Presentations

Friday, January 24th, 12:10 pm

	<b>Student Keynote Speakers (15 min): Student Research</b>	<b>Alumni Keynote Speakers (20 min): Wabash Reflections</b>
Korb Classroom	<b>Aaron Webb '20</b> Managed Care's Threat to Patient Autonomy	<b>Greg Castanias'87</b> Jones Day
Hays 104	<b>Benjamin Grubbs '20</b> Observing the Crystallization of Agrochemical Active Ingredients Directly on Leaf Surfaces with Second Harmonic Generation Microscopy	<b>W. Richard McCombie '77</b> Cold Spring Harbor Laboratory
Baxter 101	<b>Vincent D'Angelo '20</b> Hull House and Community Involvement	<b>John Deschner '97</b> Condé Nast

## Schedule of Oral Presentations by Time Slot and Location

### Detchon 109

1:30	Simon Hacker	Academic Rhetorical Criticism of Tucker Carlson's "Why No One Ever Makes the Economic Case for Mass Immigration" Jennifer Abbott (Rhetoric)
1:50	Eric Murphy	Analyzing the Effects of National Identity on International Cooperation: Strong senses of National Identity in South America and the failure of the Union of South American Nations Shamira Gelbman (Political Science)
2:10	Trey Barton	Vote Centers and Voter Turnout Shamira Gelbman (Political Science)
2:30	Break	-----
2:40	Christopher McNally, Mohammad Adnan, Christian Redmond, & Charles Esterline	Student Government Voter Turnout Shamira Gelbman (Political Science)
3:00	Nathan Biggs	Wabash College Men and Voting Shamira Gelbman (Political Science)
3:20	Samuel Phillips	The Natural Home: A Home Design for Community Jeffrey Gower (Philosophy)

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### Detchon 111

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1:30	Charles Bock	Catholics Changing Lives Agata Szczeszak-Brewer (English)
1:50	Renzo Loyola	No Space and Only Silence Agata Szczeszak-Brewer (English)
2:10	Henry Egan	Spies and Bi Guys: The Men Who Do Exist Crystal Benedicks (English)
2:30	Break	-----
2:40	Cesar Mares	Transnational Feminism in Puerto Rico Adriel Trott (Gender Studies)
3:00	Benjamin Manahan	Understanding Lethal Injection: The History of Capital Punishment, Death Penalty Legislation, and Pharmaceutical Influence Sabrina Thomas (History)

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### Detchon 112

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1:30	Wade Haesemeyer	Rescue or Theft: A Podcast about the History of the Acropolis Museum and its Missing Marbles Bronwen Wickkiser (Classics)
1:50	Christian Gosser	Science vs. Religion: Evolution Bridging the Two Worlds David Blix (Religion)
2:10	Nathan Young	<i>Cataluña y Pompeyo Gener: los orígenes del independentismo hasta el post-franquismo en España</i> Gilberto Gómez (Modern Languages & Literatures)
2:30	Break	-----
2:40	Eric Murphy	<i>Pachakutik</i> and the Role of Indigenous Groups in Ecuadorian Politics Daniel Rogers (Modern Languages & Literatures)
3:00	Christopher Barker, Samuel Henthorn, Joseph Ballard, & Ian Gale	Cultural Awareness: A Daily Research on Living Abroad María Cristina Monsalve (Modern Languages & Literatures)

## Schedule of Oral Presentations by Time Slot and Location

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### Detchon 211

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1:30	Joseph Ballard	Biology Independent Study: Fertility, Worms, and Public Health Erika Sorensen-Kamakian (Biology)
1:50	Eric Lakomek	Expanding the Scope of Traditional Healthcare Roles to Address the Shortage of Rural Healthcare Providers Jill Rogers & Eric Wetzel (Global Health Initiative)
2:10	Chaz Rhodes	The Belly of the Forest: Consumption and Production of Methane in Soils Across a Range of Forest Diversity Bradley Carlson (Biology)
2:30	Break	-----
2:40	Thach Huynh	Relationship between Obesity Dieting Success and Measures of Decision-Making Neil Schmitzer-Torbert (Psychology)
3:00	Michael Reising & James Chedid	Is Being a Good Father a New Privilege? Eric Olofson (Psychology)

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### Detchon 212

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1:30	Marlon Lewis	aworldapart Annie Strader (Art) & Damon Mohl (Art)
1:50	Student Films from the Film & Digital Media Immersion Program	“I’ve Twisted My Shoulder,” dir. Atanacio Hernandez James Cherry (Theater)
2:10	(same as above)	“SquirrelBoy,” dir. Austin Rudicel James Cherry (Theater)
2:30	Break	-----
2:40	(same as above)	“Moondogs,” dir. Austin Yeomans James Cherry (Theater)
3:00	(same as above)	“New Student Orientation: Millennial Style” dir. James Williams James Cherry (Theater)

## Schedule of Poster Presentations and Exhibits

(Detchon International Hall)

### Session 1 — 1:15 p.m. to 2:30 p.m.

No	Presenters	Title
1	Josh Garcia, Nolan Elsing, Harry Hallstrom, Devan Lucky, Cesar Martinez, Eddy Olvera, Grant Quackenbush, Tyler Rector, & Saul Villeda.	Experimental Animation Damon Mohl (Art)
3	Adam Berg	Complex Control of Essential Genes in <i>C. elegans</i> using the cODC Degron LOCKR System Walter Novak (Chemistry) & Erika Sorensen-Kamakian (Biology)
5	Alexander Pittsford	Measurement of Trace Crystallinity Using Second-Harmonic Generation Microscopy Paul Schmitt (Chemistry)
7	Austin Chivington, Andrew Jamison, & Chukwunalu Chukwuma	An Inquiry into the Formation of Bis-Spiropyrans and their Properties Laura Wysocki (Chemistry)
9	Joseph Kaefer	Design of a Novel Small-Molecule Initiated Caged Peptide System Walter Novak (Chemistry)
11	Zachary Myers & Christopher Wilson	N-Terminal Variation in Iron Dependent Regulators Walter Novak (Chemistry)
13	Spencer Shank & William Lillis	Automation and Machine Learning can Help you do More Physics Sooner James Brown (Physics)
15	Theodore Lupinski	An Arduino Based Constant Pressure Fluid Pump Nathan Tompkins & James Brown (Physics)
17	Tyler Richmond	3D Microfluidics in PDMS Nathan Tompkins (Physics)
19	Zachary Ostrowski	Linear Chemobrionic Membrane Formation Nathan Tompkins (Physics)
21	Michael Reising	Building an Economical Autonomous Underwater Vehicle James Brown & Nathan Tompkins (Physics)
23	Thach Huynh	Demeaning Homeless People's Needs Neil Schmitzer-Torbert (Psychology)
25	Chukwunalu Chukwuma, Andrew Jamison, & Austin Chivington	Synthesis and Testing of a Fluorogenic Acid Phosphatase Sensor Laura Wysocki (Chemistry)

## Schedule of Poster Presentations and Exhibits (Detchon International Hall)

### Session 2 — 2:30 p.m. to 3:45 p.m.

No	Presenter	Title
2	Alexander Goodnight & Robert Borland	The Role of Cell Proliferation During Tissue Regeneration in <i>Nematostella vecteggnsis</i> Patrick Burton (Biology)
4	George Azar	Depletion of lin-9 and mcm-6 Cell Cycle Genes Causes Notch Signaling Loss of Function Phenotypes Erika Sorensen-Kamakian (Biology)
6	Christian Gosser	Development of a GFP Reverse Genetics Experiment in <i>C. elegans</i> Erika Sorensen-Kamakian (Biology)
8	Connor Michael	Comparing Efficiency of Two RNAi Vectors in the Knock-Down of lin-9 and mcm-6 Gene Expression in <i>C. elegans</i> Erika Sorensen-Kamakian (Biology)
10	Alexandru Mircea Rotaru	Monitoring Public Health in Montgomery County using GIS Eric Wetzel (Global Health Initiative)
12	William Borland & Spandan Joshi	SWAT: Vector Control at The Montgomery County Health Department Jill Rogers & Eric Wetzel (Global Health Initiative)
14	Michael Tanchevski	Zoonotic Diseases Pose Public Health Risks Eric Wetzel (Global Health Initiative)
16	Devin Vanyo & Clarke Criddell	Archimedes' Proposition 10 (In Color!) Colin McKinney (Mathematics & Computer Science)
18	Mason Simmons	Crisis, Education, and Income Inequality in Latin America and Asia: A Panel Approach Peter Mikek (Economics)
20	Benjamin Kiesel	The Artificial Crisis: Analyzing the 2007-2008 Financial Crisis using David Hume's Moral Philosophy Matthew Carlson (Philosophy)
22	James Andry	3D Printing Models of Ancient Greek Art Bronwen Wickkiser (Classics) & Lon Porter (Chemistry)
24	Tyler Rector	Eleusis Amphora Creation Bronwen Wickkiser (Classics) & Damon Mohl (Art)



## Oral Presentations (Alphabetical by Presenter)

**Presenters:** Atanacio Hernandez, Austin Rudicel, Austin Yeomans, & James Williams

**Sponsor:** James Cherry (Theater)

**Title:** *Student Films from the Film & Digital Media Immersion Program*

In a new program supported by the CIBE and the Film & Digital Media Minor, Wabash students worked with professional filmmaker Jo Throckmorton '87 in a sequenced, on-campus immersion in film production techniques.

Over the course of the Fall semester, students received hands-on mentorship about basic digital cinematography, equipment, lensing, pre-production planning. We will screen the following new films to come out of this program during these sessions:

"I've Twisted My Shoulder," dir. Atanacio Hernandez

"SquirrelBoy," dir. Austin Rudicel

"Moondogs," dir. Austin Yeomans

"New Student Orientation: Millennial Style" dir. James Williams

**Presenter:** Benjamin Manahan

**Sponsor:** Sabrina Thomas (History)

**Title:** Understanding Lethal Injection: The History of Capital Punishment, Death Penalty Legislation, and Pharmaceutical Influence

This presentation provides a brief historical layout of capital punishment in the United States that has led up to the most common form of capital punishment seen today: lethal injection. The focus then shifts to an analysis of capital punishment Supreme Court Cases like the 1976 Gregg v. Georgia decision and how it created a loose regulation precedent regarding states' capital punishment and lethal injection procedures and protocols. This precedent combined with anti-death penalty lobbying by big pharma corporations had an adverse effect on the lethal injection drug market. My presentation argues that due to a precedent set by the Supreme Court for states and growing support against lethal injection by big pharma, the lethal injection drug market has dwindled forcing states to receive their drugs from less regulated compounding pharmaceutical companies. These more recent drug combinations, due to their unregulated creation and testing, has led to a violation of the 8th amendment right for many death row inmates as many endure a painful, intense death that is hidden under a cloak of invisibility through a paralysis drug. While my presentation doesn't take a stance on whether the death penalty is constitutional or not as an idea, it does aim to show how our current form of capital punishment is insufficient under the standards of the 8th amendment and more research and testing is necessary to bring lethal injection to the humane standards we strive to reach as a national and global community.

**Presenter:** Cesar Mares

**Sponsor:** Adriel Trott (Gender Studies)

**Title:** Transnational Feminism in Puerto Rico

Economic globalization, conditions of precarity for women in myriad countries, and gender-based oppression mandate a transnational organizing of women to combat global systems of oppression. Puerto Rico provides a case study of contemporary transnational feminist activism. The country's current political climate highlights the importance of intersectionality in the transnational feminist paradigm and also provides a blueprint for what transnational feminist projects could look like in the future. The questions addressed in this project are: What is transnational feminism? What is transnational feminism in the Puerto Rican context? What do current transnational feminist projects look like in Puerto Rico and what should they look like in the future? This project stems in large part from the work of transnational feminist activist Rocio Zambrana and her coverage on the Puerto Rican national debt.

**Presenter:** Charles Bock  
**Sponsor:** Agata Szczeszak-Brewer (English)  
**Title:** Catholics Changing Lives

The immigrant crisis along the US-Mexico border is a prevalent issue disputed among U.S. citizens. Many solutions to aid the intricate crisis have been presented and tried, but none have fixed the problem completely. Using the internet, I researched Catholic programs and organizations that are making migrants' lives healthier. I found the website Catholic Extension, which educated me on numerous organizations that have plans to help the immigration crisis. For example, some establishments give food, shelter, and clothes. Other organizations provide services that allow migrants to be linked with legal services. The immigration crisis is a complex subject that has no simple answer, but there are ways to assist the lives of immigrants by promoting the Catholic organizations and donating to their causes.

**Presenter:** Chaz Rhodes  
**Sponsor:** Bradley Carlson (Biology)  
**Title:** The Belly of the Forest: Consumption and Production of Methane in Soils Across a Range of Forest Diversity

Greenhouse gasses such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) are large contributors to radiative forcing. Methane specifically, contributes ~20% of the radiative forcing that the world is experiencing today. Over the past 200 years, there has been a methane variation, which is believed to be due to an imbalance between methane sources and sinks. Currently, there has been a lot of work done looking at the troposphere as a sink for methane, but the troposphere is not the only sink. Many upland forest soils are also sinks for methane, but vary in their consumption of methane. For my experiment we looked at if tree diversity has an affect on the amount of methane consumed by forest soils. We found that the more diverse a forest was, the more likely methane was to be consume, and we also found that the more mature a forest was, the more methane was consumed. These results suggest that having a more mature and diverse forest increases methane consumption from the atmosphere, however, longer studies are being done to support this conclusion.

**Presenter:** Christian Gosser  
**Sponsor:** David Blix (Religion)  
**Title:** Science vs. Religion: Evolution Bridging the Two Worlds

Religion and science are currently fighting a multi-front war in society throughout all the modern world. The main fronts of this war include evolution, climate change, and this history of the Earth. What this presentation focusses on is religion and science on evolution and how the two can be bridged between one of their most conflicting ideas. This presentation serves as my explanation and research into how Evolution and creationism are different and how by breaking them both down into their most basic, primitive forms, a central idea about how the animal kingdom came to as we know of it today. This presentation does not serve as my opinion on if there is a God or not, but by bridging these two on Evolution, the two sides can start to come to the table and discuss academically the age old questions of the Earth.

**Presenters:** Christopher Barker, Samuel Henthorn, Joseph Ballard, & Ian Gale  
**Sponsor:** María Cristina Monsalve (Modern Languages & Literatures)  
**Title:** Cultural Awareness: A Daily Research on Living Abroad

This presentation will be an interactive panel discussion focusing on how to navigate life in a foreign country and how learning a language requires more than just vocabulary practice and grammar rules, but also an in-depth understanding of cultural insights.

**Presenters:** Christopher McNally, Mohammad Adnan, Christian Redmond, & Charles Esterline  
**Sponsor:** Shamira Gelbman (Political Science)  
**Title:** Student Government Voter Turnout

Over the past semester, my team and I have been studying a variety of political science scholars to determine why voter turnout in elections are what they are. This project was created because the student government elections last year at Wabash College was an extreme outlier compared to other universities. Throughout our project, we have been analyzing the voter turnout equation,  $R = PB - C + D$ . We have developed a research paper and plan to present it in Puerto Rico over winter break. For our presentation, our team plans on explaining the voter turnout equation in depth to illuminate what characteristics Wabash College contains that make our school an outlier. Lastly, we plan to offer our own input on how to increase voter turnout across other institutions.

**Presenter:** Eric Lakomek

**Sponsors:** Jill Rogers & Eric Wetzel (Global Health Initiative)

**Title:** Expanding the Scope of Traditional Healthcare Roles to Address the Shortage of Rural Healthcare Providers  
When looking into healthcare in rural America, there is a clear deficiency in treatment that many residents face. A lack of providers to treat patients for the conditions that may arise has many traveling to other counties to receive the necessary care. But what if there are barriers that prevent the patient from getting to a more populated place? To address this issue, places like rural Appalachia and the Crawfordsville Fire Department have implemented programs that bring healthcare to the patient. Throughout this presentation, I will be detailing the history of midwifery in the Southeastern Kentucky region and explaining how expanded roles have brought healthcare to the homes of mothers in the area. In addition, I will be discussing the expanded roles the paramedics have developed in Project Swaddle and its implications in addressing maternal health in Montgomery County. Together, the roles of midwives and paramedics in these areas have addressed the pressing issue of a lack of healthcare providers in rural locations.

**Presenter:** Eric Murphy

**Sponsor:** Daniel Rogers (Modern Languages & Literatures)

**Title:** *Pachakutik* and the Role of Indigenous Groups in Ecuadorian Politics

On an immersion trip to Ecuador this summer, our group spent time interacting with indigenous groups and studying literature that recounted some of the histories of indigenous people in Ecuador. Through these encounters, I became interested in taking a closer look at the legal status and political power of indigenous groups throughout Ecuadorian History as well as their role in Ecuadorian Politics today. Upon learning about *Pachakutik*, the political party that represents the interests of indigenous groups in Ecuador, a few questions occurred to me. These were: Does *Pachakutik* have enough political influence to address the problems of poverty, poor education, and poor access to healthcare that plague these groups? Furthermore: Given that there are many distinct indigenous groups, how well does *Pachakutik* represent all of their interests? Or does it only serve the biggest and most powerful indigenous groups?

In answering these questions, my research includes an analysis of recent election results and the Ecuadorian electoral system, a look at the new Ecuadorian Constitution, and interviews of Ecuadorians with indigenous backgrounds to gain a better understanding of the specific challenges that indigenous groups face in the political sphere.

**Presenter:** Eric Murphy

**Sponsor:** Shamira Gelbman (Political Science)

**Title:** Analyzing the Effects of National Identity on International Cooperation: Strong senses of National Identity in South America and the failure of the Union of South American Nations

Over the last year, eight of the twelve member countries of the Union of South American States (USAN), a regional international organization, withdrew their membership from the international governing body. Some scholars have characterized the broader project of regional integration in Latin America as a failure and others have looked at the conglomeration of overlapping international organizations meaningless and ineffective. Furthermore, despite being united by a common language, research shows that South American countries have very high senses of individual autonomy and country-specific national identity. In light of the high concentration of nationalism in Latin America, this project evaluates the possibility that high levels of national pride may be an obstacle to the project of integration in Latin America. In doing so, this paper seeks to answer the question: Did a strong National Identity affect South American Countries' decisions to withdraw their membership from USAN? My research analyzes newspaper articles and government statements on the topic of leaving USAN, looking for patterns in states' purported reasoning for leaving the international body. Furthermore, the paper draws on public opinion data to evaluate the degree to which self-reported national pride might be connected to a distrust of International Organizations.

**Presenter:** Henry Egan

**Sponsor:** Crystal Benedicks (English)

**Title:** Spies and Bi Guys: The Men Who Do Exist

Representation of gender and sexual minorities in media is an issue of increasing importance and advocacy. Out of all these groups, one of the least represented are bisexual men. My presentation focuses on Robert Karjel's Swedish spy novel "My Name is N", a rare example of mainstream genre fiction that features, without fanfare, a bisexual male protagonist. The mixed response to the novel through Amazon reviews provided insights into how readers respond to representations of bisexual men in mainstream media. This question leads me to examine articles and other limited research on this topic to get a grasp on why bisexual men face stigma from both within and outside the LGBT community. Using the critical lens of Queer Theory, I also examine what the novel tells us about writing good representation and compare it with other examples of representation to illustrate why accurate representation is important.

**Presenter:** Joseph Ballard

**Sponsor:** Erika Sorensen-Kamakian (Biology)

**Title:** Biology Independent Study: Fertility, Worms, and Public Health

I've spent one summer and six semesters working on biology research at Wabash. We use microscopic worms, *C. elegans*, as our model organism in the lab to study fertility. *C. elegans* is a powerful model used to study genes important in human biology and disease because many genes that function in known biological signaling pathways are conserved between worms and humans. Given their small size, rapid life cycle, and transparent body, *C. elegans* provides an excellent system to rapidly and more easily discover genes important for biological processes like fertility. We study the Notch Signaling pathway, which has been implicated in mammalian fertility, highlighting the importance of our work at a time when US infertility rates are on the rise. In addition to lab work, I interned last summer with the Perú Global Health Initiative. Public health is a perfect example that illustrates the importance of a Liberal Arts education. Exploring the underlying biology is essential to addressing larger issues, but it must be combined with understanding the social setting, political factors, and other considerations to appreciate the complex problems in public health. I will reflect on the importance that independent study and internships have had on my Wabash career.

**Presenter:** Marlon Lewis

**Sponsors:** Annie Strader (Art) & Damon Mohl (Art)

**Title:** aworldapart

The universe and The story of everything so far.

**Presenters:** Michael Reising & James Chedid

**Sponsor:** Eric Olofson (Psychology)

**Title:** Is Being a Good Father a New Privilege?

This paper focuses on providing an in-depth examination of how culture, role beliefs, and employment influence parental behavior. Specifically, it examines how these factors may influence a father's ability to be a good parent. We begin by providing details on what makes a "good" parent, through the scope of involvement, discipline, and praise. Next, we examine how culture, employment, and role beliefs influence the parental behavior of fathers in Austria, South Africa, and the US. Finally, we provide reasoning as to why we believe "good" fathering is a new privilege.

**Presenter:** Nathan Biggs

**Sponsor:** Shamira Gelbman (Political Science)

**Title:** Wabash College Men and Voting

In a country full of freedoms, the freedom to vote might be the most important one. Some would argue that electing the people who will represent you is a civic duty that one must complete every election. However, election after election the U.S. population fails to complete this civic duty, and voter turnout falls around 50%. Even worse, the "youth" age group sits at around 40% historically for voter turnout in any given election. One potential solution for this issue of low voter turnout is to adopt compulsory voting laws. These laws require citizens who are legal age to vote, vote. Australia has had success with these laws and their system could fit into our current system. I sat down with 16 Wabash Men to get their thoughts on the issue of low voter turnout and compulsory voting laws. I was also able to talk with them about potential fixes other than compulsory voting laws and see if these men were voting or not. In this presentation I plan to discuss what the responses were and with correlations I was able to find among the respondents.

**Presenter:** Nathan Young

**Sponsor:** Gilberto Gómez (Modern Languages & Literatures)

**Title:** *Cataluña y Pompeyo Gener: los orígenes del independentismo hasta el post-franquismo en España*

Using Pompeyo Gener's *Cosas de España: Herejías Nacionales y el Renacimiento de Cataluña* (more commonly known as *Herejías*) as the basis of the work, I analyzed the origins on the modern Catalanian independence movement since 1902 and its date of publication and its relevance as the cause of independence displays at events such as the 1992 Olympic Games in Barcelona and the 2017 referendum vote.

**Presenter:** Renzo Loyola

**Sponsor:** Agata Szczeszak-Brewer (English)

**Title:** No Space and Only Silence

Zoë Wicomb's novel, *David's Story*, is an unconventional story that follows David, a guerilla soldier in the latter years of South African Apartheid. As the novel illustrates a collage that alludes to larger themes of gender equality, race, and post-colonial anxiety, the audience maneuvers through flashbacks, memories, and mysterious accounts. This story is told through an unreliable narrator who assumes the role of amanuensis, but the stories told are obscured by David's apprehension to be honest and vulnerable about a female guerrilla soldier, Dulcie. The narrative weaves through an imagined past informed to the amanuensis by a reluctant subject. By the end of the novel the reader is left unsatisfied as David dies and Dulcie remains unrealized. Wicomb demands the reader to question the narrative in a metafictional sense and consider the characters' roles and identities. We must consider the some of the foundations of this fictional narrative: setting, character, and author's purpose.

As the narrative takes place in South Africa's transition into a post-colonial era, we follow David as he feels the need to rediscover an ancestral identity during this historical and societal change. Although the scope of this essay will mainly revolve around the subject of Dulcie, it is important to consider these themes of identity and holding on to the past. Toxic masculinity's persistence and plague on societal behavior must be considered by the reader in order to understand David's reluctance to show honesty and vulnerability in regard to Dulcie. Also, I claim that the narrator's role as the amanuensis is an attempt to detach her sympathy and moral consciousness from David's accounts of Dulcie. This disguise allows the narrator to imply the sexual and gender-based violence inflicted on Dulcie and the role of amanuensis seeks to avoid confronting the conflicting emotions she has as a fellow woman.

David and the narrator act under the societal pressures to keep silent about gender-based violence, and Wicomb uses them as center pieces to showcase an internal and unspoken realm of suppression. In its historical context, Wicomb emphasizes the ANC's shortcomings and society's continual struggle to create equal space for women. Ultimately, Wicomb attempts to comment on South Africa's fight for equality and it's continual struggle to overcome the imperfections of its past and present state.

**Presenter:** Samuel Phillips

**Sponsor:** Jeffrey Gower (Philosophy)

**Title:** The Natural Home: A Home Design for Community

This presentation will attempt to answer the question, how can a home meaningfully orient human dwelling in space and time? I will present a visual representation that embodies what I believe to be my "dream home," along with a theoretical rationale for the design decisions. This project is informed by the philosophy of architecture, along with the philosophy behind material things and how they are situated within space and time. Specifically, I researched famous architects such as Witold Rybczynski, Frank Lloyd Wright, Karsten Harries, Alan Waterhouse, and scientist Alexander von Humboldt, a pioneer in the development of the sciences of geography. I developed my own philosophy on how to orient my perfect home. I want to utilize expansive windows and large open spaces to connect people with each other through nature. I also want to remove basements and attics to try to minimize spaces where people can be alone because I believe people learn best from others. I also realize that people need to be alone at times, so I created spaces in my home that both support a community feel and transform into places of solitude, depending on the situation.

**Presenter:** Simon Hacker  
**Sponsor:** Jennifer Abbott (Rhetoric)  
**Title:** Academic Rhetorical Criticism of Tucker Carlson's "Why No One Ever Makes the Economic Case for Mass Immigration"

On December 13, 2018, Tucker Carlson ran a segment on his show called "Why No One Ever Makes the Economic Case for Mass Immigration". In this segment, Mr. Carlson makes several divisive, provocative, and often false claims about the migrant caravan that was on its way to the United States. This segment led me to wonder, "How did Tucker Carlson convince his audience that he was an unbiased reporter of facts while simultaneously spouting blatant falsehoods and misleading information, and that they should support the current administration?" After an in depth academic rhetorical criticism of the segment, I concluded that Tucker created a false discourse of power and hid behind the opinions of others to mask his racist ideology as traditional journalism and manipulate his audience into believing those things. To support this claim, I will first describe the context surrounding this artifact and its important themes, then explain the methods I used to conduct my critique, before finally completing the critique itself.

**Presenter:** Thach Huynh  
**Sponsor:** Neil Schmitzer-Torbert (Psychology)  
**Title:** Relationship between Obesity Dieting Success and Measures of Decision-Making

Obesity is associated with increased discounting of future monetary rewards, suggesting that altered decision-making may contribute to the risk for obesity. Here we examined the relationship between measures of decision-making, obesity and dieting success using an online sample (Amazon's Mechanical Turk service) and an undergraduate male sample. Participants completed monetary or food-based delay-discounting surveys, and a set of experiential foraging tasks (the Movie Row and Candy Row tasks). Rodent versions of the foraging tasks have also been used to demonstrate specific deficits in decision-making in drug-abstinent mice. In the foraging tasks (Movie Row and Candy Row), participants navigated through a 3D virtual environment on a square track. Rewards (4-sec video clips displayed on a virtual movie screens in the Movie Row task or candy/snacks delivered to magazine for the Candy Row task) were available from four zones on the track. Only a subset of undergraduates completed the Candy Row task. As participants arrived at a zone, the reward category and a random delay were presented. Participants could accept the offer or move on to the next reward site. Behavior on the Candy Row task (using physical rewards) was similar to that of the Movie Row tasks (using videos as rewards), suggesting that these two versions of the task were sensitive to individual differences in rewards. Performance on the monetary and food-based versions of the delay-discounting measure were also positively correlated, but delay discounting measures were not well related to measures from the foraging tasks.

Obesity (determined from self-reported weight and height) was not related to delay discounting measures ( $k$ ) for money or food, or to the number of rewards earned on the foraging tasks and delay thresholds (how long participants were willing to wait for a reward). Exploratory analyses found that obesity was associated with reduced regret on the Movie Row task. Self-reported change in body mass index (BMI) over the previous year was related to reported use of several dieting strategies (such as attempting to consume less food, avoiding carbohydrates), but not to measures of delay-discounting. However, several dieting strategies interacted with the discounting rate ( $k$ ). Among participants who reported that they had attempted to eat less food to manage their weight, only participants with low discounting rates showed a reduction in BMI, while for participants who did not report using this strategy, there was no relationship between  $k$  and changes in BMI. These results suggest that obesity and dieting success may be related to several different disruptions in decision-making systems.

**Presenter:** **Trey Barton**  
**Sponsor:** Shamira Gelbman (Political Science)  
**Title:** Vote Centers and Voter Turnout

In 2011, the Indiana General Assembly passed legislation that made it an option for any county to change from precinct voting to vote centers (Indiana Secretary of State 2019). When the data for this project was collected, September of 2019, 38 out of the 92 counties were using vote centers (Indiana Secretary of State 2019). The reason for adopting vote centers to this point has been primarily based on fiscal/resource efficiency. Precinct voting requires there to be a polling place in each precinct. Residents are then required to vote at the polling place in their precinct. Vote Centers do not require a polling place in each precinct, so there are fewer polling places needed in the county. However, with vote centers, residents are permitted to vote at any polling place within the county. A switch from precinct voting to vote centers potentially impacts the convenience of voting. The goal of this research then was to determine if vote centers impact voter turnout. The data revealed that vote centers might slightly increase voter turnout, but this assertion cannot be made with high statistical certainty. At the very least, vote centers do not have an impact on voter turnout. At the very most, they improve voter turnout to a small degree.

**Presenter:** **Wade Haesemeyer**  
**Sponsor:** Bronwen Wickkiser (Classics)  
**Title:** Rescue or Theft: A Podcast about the History of the Acropolis Museum and its Missing Marbles

The Parthenon captivated ancient Greeks at the time of its conception 2500 years ago—but also drew the attention of a 19th century diplomat, Lord Elgin, who took it into his own hands to rescue the crumbling Parthenon sculptures by bringing them with him to Britain. This presentation, in the form of an audio essay podcast, explores the Acropolis Museum: Greece's contemporary attempt to reobtain those sculptures taken in the early 1800's. The Acropolis Museum is a 21st century display of the invaluable sculptures from the sacred rock, providing modern amenities while retaining traditional Greek architectural excellence. The Elgin Marbles, which have been on display in the British Museum since their removal, leave jarring voids throughout the Acropolis Museum. My podcast, stitched together with music, my own narration, and an interview with Wabash's very own Classics major Sam Henthorn, aims to leave the listener asking themselves where these marbles truly belong.

## Poster Presentations (Listed by Poster Number)

### Poster 1

**Presenters:** Josh Garcia, Nolan Elsing, Harry Hallstrom, Devan Lucky, Cesar Martinez, Eddy Olvera, Grant Quackenbush, Tyler Rector, & Saul Villeda.

**Sponsor:** Damon Mohl (Art)

**Title:** Experimental Animation

To help promote and celebrate the Digital Arts on campus, ART 225-Experimental Animation would like to present a digital presentation of animation utilizing the program After Effects. Class members will be present during the Celebration event to talk about the animations and digital processes if any viewers have questions.

### Poster 2

**Presenters:** Alexander Goodnight & Robert Borland

**Sponsor:** Patrick Burton (Biology)

**Title:** The Role of Cell Proliferation During Tissue Regeneration in *Nematostella vecteggnsis*

*Nematostella vectensis*, or the Starlet sea anemone, is a species of anthozoan cnidarian that are capable of regenerating amputated or injured tissues. The regeneration process of these animals takes approximately four days to complete. Because of their ability to regenerate quickly, transparent tissues, and small size, Starlet sea anemones have been important in helping developmental biologists understand the intricacies of healing processes. Even though there is a fair amount of knowledge surrounding the topic of regeneration in general, there is not a lot known about the role actin, a protein correlated with muscle movement and cell division, plays in the process and whether f-actin would be a reliable marker for cell proliferation. In order to gain a better understanding of how actin is utilized by an organism to heal, we allowed the anemones to live in sea water treated with two chemicals. Alsterpaullone, one of the chemicals used during the experiments, was used because it increases cell proliferation. The second chemical, Ara-C, was used to inhibit cell proliferation. By challenging the process of cell proliferation in the anemones with Alsterpaullone and Ara-C, we hope to shed a light on the importance of actin in terms of development and regeneration.

### Poster 3

**Presenter:** Adam Berg

**Sponsors:** Walter Novak (Chemistry) & Erika Sorensen-Kamakian (Biology)

**Title:** Complex Control of Essential Genes in *C. elegans* using the cODC Degron LOCKR System

The 'Latching Orthogonal Cage-Key Proteins' (LOCKR) technology allows us to modulate gene expression, alter cell signaling pathways, control protein-protein interactions, or degrade proteins, all within living cells. Our particular interest is using the LOCKR system to regulate protein degradation using degronLOCKR. The degronLOCKR system requires 2 parts: 1) a gene fused to the 'degronSwitch' and 2) an inducer protein (the key). In the presence of key, the degronSwitch and the protein to which it is fused is degraded. This process has been shown to work in yeast and mammalian cell culture, but it currently remains unexplored within a multicellular organism. The use of degronLOCKR within a living animal is an exciting possibility because it allows for the spatial and temporal control of multiple genes. We propose to apply the degronLOCKR system in the animal *C.elegans*, a small nematode worm. These animals reproduce quickly, ~40% of genes are conserved between humans and worms, and various powerful gene expression tools exist in this system. Nematodes containing a mutation in the rol-6 gene will lay on their side and roll in a circle, while wild-type worms do not. We propose to fuse the degronLOCKR system to the rol-6 gene to visually assess the use of this technology in a well-characterized biological process.



**Poster 4****Presenter:** George Azar**Sponsor:** Erika Sorensen-Kamakian (Biology)**Title:** Depletion of *lin-9* and *mcm-6* Cell Cycle Genes Causes Notch Signaling Loss of Function Phenotypes

Notch signaling regulates stem cells and differentiation during normal animal development and when dysregulated can lead to cancer. In the genetic model organism *C. elegans*, a small worm, Notch signaling functions broadly in fertility to impact: vulval development, egg ovulation, and maintains a population of germline stem cells (GSCs) in an undifferentiated, self-renewable, and totipotent (capable of giving rise to all cell types) state. In fact, Notch signaling is the only pathway in *C. elegans* that functions to maintain GSCs which is required to create a continuous supply of gametes (eggs and sperm). Therefore, without functional Notch signaling, animals lack fitness (the ability to produce offspring). Molecularly, Notch signaling promotes target gene expression to maintain fertility; however, despite this pathway's cellular importance, Notch target genes remain elusive. To study Notch-dependent fertility in *C. elegans*, we depleted putative target genes *mcm-6* and *lin-9* using an RNAi approach. Following RNAi, we observed that *mcm-6* and *lin-9* depleted animals had: vulval defects, a reduced GSC number, polyploid (too much DNA) eggs, and reduced ovulation rates. Given that disruptions in mammalian Notch signaling result in reduced fertility, we propose that *C. elegans* provides a simplified model to uncover the molecular mechanisms of human infertility.

**Poster 5****Presenter:** Alexander Pittsford**Sponsor:** Paul Schmitt (Chemistry)**Title:** Measurement of Trace Crystallinity Using Second-Harmonic Generation Microscopy

As an increasing number of new active pharmaceutical ingredients (APIs) are in danger of being abandoned due to low aqueous solubility, new methods of crystallinity identification have been introduced to study the effects of crystallinity on solubility. Second-harmonic generation (SHG) microscopy, with a low (<.001% w/w) crystalline limit of detection, is a promising new technique for identification of trace crystallinity. By pairing SHG microscopy with dissolution testing for APIs, a comprehensive study of trace (~1% w/w) crystallinity's consequences on solubility was completed. To obtain varying levels of crystallinity, polymeric amorphous solid dispersions (ASDs) consisting of API (griseofulvin) and a polymeric excipient (HPMCAS) were cast. Over time, these ASDs crystallize and were imaged for SHG activity and subjected to dissolution to measure solubility. The correlation between the API's trace crystallinity and subsequent solubility was assessed and showed no decrease in solubility across the relative crystallinities generated despite a lack of solubility in a fully crystalline control. These results may illustrate the importance of particle size and surface area to volume ratio in dissolution kinetics.

**Poster 6****Presenter:** Christian Gosser**Sponsor:** Erika Sorensen-Kamakian (Biology)**Title:** Development of a GFP Reverse Genetics Experiment in *C. elegans*

In the Bio-311 laboratory, students investigate gene function using a reverse genetics approach in the model worm *C. elegans*. In reverse genetics, the researcher examines which characteristic(s) results from manipulating a specific gene or genetic pathway. Examples include: behavior, shape, size, and molecular readouts of gene expression (i.e. protein and mRNA levels). Reverse genetics is helpful when using a model organism like *C. elegans* because this can yield insight into human gene function since ~38% of genes are conserved between worms and humans. One reverse genetics' tool is RNA interference (RNAi). In RNAi, double-stranded RNA destroys target mRNAs to reduce gene expression. RNAi causes the target mRNA and protein to be "functionally absent" in the cell without changing the DNA sequence. Our goal was to develop an RNAi experiment targeting Green Fluorescent Protein (GFP) expression in *C. elegans*. To do this, we genetically engineered two versions of bacteria that produce RNAi against GFP. We then assayed these animals using molecular readouts of gene expression including: 1) protein visualization, 2) protein abundance, and 3) mRNA levels. Our results reveal significant reduction in GFP following RNAi in all assays; however, the magnitude of change varied depending upon the bacterial version used.

**Poster 7****Presenters:** Austin Chivington, Andrew Jamison, & Chukwunalu Chukwuma**Sponsor:** Laura Wysocki (Chemistry)**Title:** An Inquiry into the Formation of Bis-Spiropyran and their Properties

Working in conjunction with Taylor Neal '14 and Jovica Badjic at The Ohio State University, bis-spiropyran, a class of molecule that was thought to show promise as a new dye featuring a reversible color change, were investigated in terms of their chemical behavior, synthetic efficiency, and the scope of the synthesis of derivatives. Investigating the substrates of the synthesis of bis-spiropyran offered insights for the mechanism for their formation and possible uses. Further, examining and practicing the synthesis of bis-spiropyran will be used in the development of an undergraduate teaching lab because of the simplicity of its 'one-step' formation.

**Poster 8****Presenter:** Connor Michael**Sponsor:** Erika Sorensen-Kamakian (Biology)**Title:** Comparing Efficiency of Two RNAi Vectors in the Knock-Down of lin-9 and mcm-6 Gene Expression in *C. elegans*

One method for characterizing gene function is reverse genetics. This involves picking a gene of interest, disrupting its function, and examining organisms for abnormal traits (phenotypes) caused by this disruption. We used RNA interference (RNAi) to disrupt genes via reverse genetics. In RNAi, the presence of double-stranded RNA (dsRNA) causes messenger RNAs (mRNAs) of a target gene to be destroyed. Because mRNA presence and maintenance are crucial for gene expression and function, RNAi knocks-down (reduces) gene expression. In the *C. elegans* worm, these animals feed on bacteria and can be engineered to express dsRNA for a chosen gene to confer a specific interference effect. The original expression vector for feeding RNAi was generated in 1998; however, in 2018, this vector underwent modification. The new vector reports increased RNAi efficiency which could produce a more pronounced reduction in gene expression and more dramatic trait change(s) in the animal. This past summer, we cloned two candidate genes (mcm-6 and lin-9) into the new vector (T777T) and observed animal phenotypes (trait changes) relative to controls and to the original RNAi vector (L4440). We report gene specific changes in RNAi efficiency between the two RNAi vectors.

**Poster 9****Presenter:** Joseph Kaefer**Sponsor:** Walter Novak (Chemistry)**Title:** Design of a Novel Small-Molecule Initiated Caged Peptide System

The goal of this research was to design a small molecule that could be used to manipulate the function of a protein. We used programs such as Rosseta Commons and Chimera to visualize a theoretical representation of how the synthesized helix would interact with the open and closed states of the protein. We then manipulated the helix by changing its length and the sequence within the chain to bind optimally to the site in which we wanted it to on the open state. As a result, the designed helix theoretically was able to interact with a specific area on the open state of the protein, while in the closed state the area was erased. Moving forward, we will be looking to test our results from the computer in a laboratory setting to observe if it is physically possible.

**Poster 10****Presenter:** Alexandru Mircea Rotaru**Sponsor:** Eric Wetzel (Global Health Initiative)**Title:** Monitoring Public Health in Montgomery County using GIS

Wabash College is an integral part of Montgomery County. Yet, like many communities across America, the county is facing many public health issues such as substance use, prosperity disparities, and prejudice towards those affected. Over the summer, my research focused on using the Montgomery County Health Department's Geographical Information System (GIS) to identify the areas of the county most affected by these issues, while also combating myths about public health struggles through evidence conveniently plotted on a map. This poster summarizes the findings in three key areas: public health interventions and subsidized housing; substance use and methamphetamine production; and prosperity metrics. There are some counter-intuitive results in this research, such as the low incidence of subsidized homes being deemed unfit for human habitation. In essence, this poster stands to showcase this summer's results of the Health Department's public health surveillance of the county.

**Poster 11****Presenters:** Zachary Myers & Christopher Wilson**Sponsor:** Walter Novak (Chemistry)**Title:** N-Terminal Variation in Iron Dependent Regulators

Iron plays an integral role in a variety of physiological processes, and many pathogenic bacteria rely on iron-dependent regulators (IDeRs) to sense cellular iron levels and regulate the transcription of iron storage and scavenging genes. The N-terminal alpha-helices of IDeRs are thought to play a significant role in dimerization and DNA-binding. Accordingly, the length of the N-termini in IDeR proteins varies little across a wide variety of species. Intriguingly, *Actinomyces coleocanis* possesses two IDeR open reading frames; one is the canonical length (“short”), while the second encodes an additional 39 amino acids at the N-terminus (“long”). Here we present the expression, purification, and initial DNA-binding studies of the short and long IDeR forms from the gram-positive bacteria *Actinomyces coleocanis*.

**Poster 12****Presenters:** William Borland & Spandan Joshi**Sponsors:** Jill Rogers & Eric Wetzel (Global Health Initiative)**Title:** SWAT: Vector Control at The Montgomery County Health Department

A part the summer internship at the Montgomery County Health Department (MCHD) involved the continuation of the S.W.A.T. Team. S.W.A.T. stands for the Surveillance of Water and Air-borne Transmitters. Our internship dealt more specifically with the monitoring of mosquitos. Mosquitos are a vector because they transmit a variety of bacteria, viruses, and protists that cause disease from one organism to another. Our goals were to track hotspots of mosquito populations, work with state labs to monitor and test for active disease carriers and provide early-prevention tools to help decrease population sizes during the summer months.

**Poster 13****Presenters:** Spencer Shank & William Lillis**Sponsor:** James Brown (Physics)**Title:** Automation and Machine Learning can Help you do More Physics Sooner

Detector calibration is a task that is critical, mundane, and time consuming. As detector arrays have grown in scale, the tasks required have grown as well. For experiments with the MoNA/LISA neutron detectors it is critical to calibrate the arrays' 576 timing and energy response in order to extract accurate physics data. We will report on methods leveraging automation and machine intelligence to determine calibration parameters, and identify detector elements that require additional attention and/or adjustment from experimenters. We will report on methods using a large number of cosmic-ray tracks to determine relative time offsets of the 288 detector bars, based on a truncated travelling salesman-like approach. Additionally, two methods of determining positions will be explored, one based on the ratio of light reaching the two ends of a detector bar, and one using the time difference between the ends. These two methods will be compared, showing that light difference can be used as backup to time difference in some cases, and that specific types of two-neutron events can be distinguished using these parameters and machine learning. These methods can reduce the time taken to calibrate and help one move from calibrations to physics sooner.

**Poster 14****Presenter:** Michael Tanchevski**Sponsor:** Eric Wetzel (Global Health Initiative)**Title:** Zoonotic Diseases Pose Public Health Risks

Pets are a great source of companionship that can provide many benefits to humans. However, they also have the propensity to carry harmful diseases that can be transmitted to humans and cause illness, if left untreated. These are known as zoonotic diseases. To determine if zoonotic disease poses a risk in Crawfordsville, IN, we tested canine fecal samples from the local animal shelter for soil-transmitted helminths. Positive tests for parasite eggs were observed, with some individual samples testing positive for multiple types. This identified risk factor shifted our attention to public and private parks in search of potential transmission sites. The prevalence of worms of distinct morphologies throughout sites suggests a possibility of exposure risk if they correspond to the zoonotic disease nematodes. The plethora of free living soil-nematodes and similarity to parasitic helminths makes it difficult to differentiate.

**Poster 15****Presenter:** Theodore Lupinski**Sponsors:** Nathan Tompkins & James Brown (Physics)**Title:** An Arduino Based Constant Pressure Fluid Pump

Constant pressure pumps are a valuable resource for many situations in microfluidics. One such situation is to maintain an equilibrium pressure amid changing flow rate or viscosity. A pump which provides a continuous flow rate may create changing fluid pressure due to chemical reactions or physical deformations within the flow channel. The constant pressure pump presented here is designed on the premise of creating and maintaining a pressure differential between the laboratory and a reservoir which forces the output fluid at a specified gauge pressure. This inexpensive design can be built for under \$100 using an Arduino microcontroller, Adafruit electronic components, air pump, Nalgene water bottle, small fluid vial, and tubing components. This pump assembly is vastly more affordable than comparable commercial pumps which can retail for in excess of \$4,000. The constant pressure fluid pump presented here is able to hold a constant pressure of up to 14 psig with a fluid flow for water at roughly 65L/s

**Poster 16****Presenters:** Devin Vanyo & Clarke Criddell**Sponsor:** Colin McKinney (Mathematics & Computer Science)**Title:** Archimedes' Proposition 10 (In Color!)

Ancient Greek mathematics is almost purely geometric, and its proof and deductive reasoning very nearly parallel the manner of modern-day mathematics. As an illustration of this, we present two results from the Ancient Greek mathematician Archimedes in his work *On Spirals*. He creatively uses a result about the sums of squares to find, definitively, the area enclosed by a spiral. The proof is an accessible window into the questioning yet rigorous thought processes of a mathematician, ancient or modern. Anyone who once took high school geometry and who still now understands the notions of "bigger" or "smaller" has all the concepts they need to walk through the proof. The hardest part is following the logic! Luckily, we have colorful pictures to help.

**Poster 17****Presenter:** Tyler Richmond**Sponsor:** Nathan Tompkins (Physics)**Title:** 3D Microfluidics in PDMS

This research presentation will explain the procedure to rapidly design and fabricate 3D microfluidic systems in the elastomer polydimethylsiloxane (PDMS), without the use of photolithography which can be very expensive. Microfluidic systems are used to observe chemical reactions on a small and controlled scale. In my research, I helped create a microfluidic system of channels designed in a CAD program with the final fluid path being fully three-dimensional. Then using a 3D printer to manufacture these molds out of plastic. PDMS is cast in the 3D printed mold in multiple pieces which are then cured. By using a layer of uncured PDMS as a "glue" to fuse together the separate parts creating the final 3D device. A sample device of interlocking ring voids will be presented along with the poster presentation to demonstrate the fabrication of a complex geometry which would be nearly impossible to manufacture via traditional soft lithography methods utilizing photolithography.

**Poster 18****Presenter:** Mason Simmons**Sponsor:** Peter Mikek (Economics)**Title:** Crisis, Education, and Income Inequality in Latin America and Asia: A panel approach

The goal of our research was to analyze how educational attainment affects income inequality. This analysis was done through Panel data regressions, with income Gini acting as the dependent variable. Educational attainment was measured by mean years of schooling, and the data sample contained a range from 2000 to 2017. The countries included are from the regions of Asia and Latin America. Coefficient estimates show that mean years of schooling decreases income inequality in the region of Latin America as well as all countries included. The crisis variable was not significant in individual regions, but raises inequality in all countries. Differing from the findings of existing literature, inflation in this dataset decreases income inequality in Asia, Latin America, and all countries together. Foreign direct investment and exports increase income inequality when its estimate is significant.

**Poster 19**

**Presenter:** Zachary Ostrowski  
**Sponsor:** Nathan Tompkins (Physics)  
**Title:** Linear Chemobrionic Membrane Formation

The research that I have been conducting with Dr. Tompkins over the last two years or so has been based on the chemical reactions that occur in chemical gardens. Chemical gardens are organic like structures formed from metal salts reacting with sodium silicate. This reaction creates a semipermeable membrane that allows for these structures to build. These chemical reactions have led to the development of Chemobrionics, the study of these artificial membranes. These membranes are challenging to study, as these membranes form unevenly and in strange structures. My work over this past summer was to help create linear membranes that will allow for better study of Chemobrionics. I continued this work over the semester by helping develop voltage trials during membrane formation.

**Poster 20**

**Presenter:** Benjamin Kiesel  
**Sponsor:** Matthew Carlson (Philosophy)  
**Title:** The Artificial Crisis: Analyzing the 2007–2008 Financial Crisis using David Hume’s Moral Philosophy

In “Responsibility in the Financial Crisis”, Tom Sorell argues that some individual responsibility for the devastating 2007–2008 financial crisis lies with those who systematically took advantage of vulnerable groups to make a tremendous amount of money leading up to 2007, executives in large investment banks. In this paper, I break down Sorell’s analysis of responsibility in the crisis in conjunction with David Hume’s account of justice. Within his analysis of moral philosophy, Hume defines justice as an “artificial virtue”. He argues that there is no natural inclination towards something like justice, instead, justice is established by social convention. Additionally, Hume mentions what is now called the problem of the sensible knave, one who for the most part follows this convention of justice. However, in cases where not adhering to this rule of justice is beneficial and will not disrupt one’s role in society, the sensible knave will breach the rule of justice for a significant gain. Hume offers two solutions to this issue: that the knave knows they may get caught and that they may feel a negative feeling which will deter them from the action.

I posit that more than any other actor in the financial crisis, leaders in large investment banks personified this “knave”. In this case, neither solution seemed to deter these executives from making high-risk investments. The result of risky investing by these bank executives significantly harmed society, with minimal punishment or responsibility actually falling on the executives themselves. My intention here is not to argue that blame entirely rests upon these executives, instead I argue this case works to show that as it plays out in modern society, Hume’s sensible knave problem is an issue that can have far-reaching consequences.

**Poster 21**

**Presenter:** Michael Reising  
**Sponsors:** James Brown & Nathan Tompkins (Physics)  
**Title:** Building an Economical Autonomous Underwater Vehicle

The goal of this project was to design, build, and test a working AUV prototype. The majority of the semester was designated for the design process and assembly of the different components. The later half of the semester was designated for working with the internal components, sensors, and functionality.

**Poster 22**

**Presenter:** James Andry  
**Sponsors:** Bronwen Wickkiser (Classics) & Lon Porter (Chemistry)  
**Title:** 3D Printing Models of Ancient Greek Art

Museums around the world, including the Smithsonian and the British Museum, are enhancing the preservation and analysis of Greek and Roman art by creating digital 3D models of their artifacts that can be viewed or downloaded online for free, and these digital 3D models can be used in conjunction with a 3D printer to create physical models that allow for personal inspection. These digital 3D models are useful for showing an extra dimension of detail in the original object that is unavailable via photography, and this greatly improves the amount of information that can be shared in online resources. In this project, digital 3D models of a bust of Demosthenes and a statue of Asclepius were loaded onto a 3D printer to create physical models of those pieces. The resulting physical models show the potential for the application of 3D modeling in classrooms or private use; at the same time, they also display some of the challenges associated with 3D printing.

**Poster 23****Presenter:** Thach Huynh**Sponsor:** Neil Schmitzer-Torbert (Psychology)**Title:** Demeaning Homeless People's Needs

Maslow's Hierarchy of Needs (1943) suggests that human motivations form a hierarchy, in which lower-level needs are physical (e.g., food, shelter,) while abstract psychological needs, such as self-actualization, make up higher-level categories. Because physical needs are considered more "basic" or "animalistic" than psychological needs, we propose that demeaning (i.e., diminishing the importance of others' psychological needs) is a form of dehumanization. In this study, we tested whether people tended to demean the needs of homeless people (a typically dehumanized group). Students and homeless people were asked to evaluate the importance of three levels of need categories for themselves and the other population. Then, they were asked to make funding decisions for a counseling versus food program for the homeless population. Results indicated that students rated homeless people's psychological needs as less important than their physical needs, while homeless people considered these needs equally important. Such an erroneous judgment spilled over to their funding decision-making process. Overall, our study indicates that demeaning may not be just a bias, but also an error.

**Poster 24****Presenter:** Tyler Rector**Sponsors:** Bronwen Wickkiser (Classics) & Damon Mohl (Art)**Title:** Eleusis Amphora Creation

The Eleusis amphora is a large vase, towering over four feet tall, of the sort typically used to mark a tomb in ancient Greece. This amphora, in particular, also contained the cremated remains of a 10-12-year-old boy and is decorated with scenes from mythology. Through the use of green screen and Adobe After Effects, I created an experimental animation depicting: how the body and neck of the vase would have been formed, painting of characters that appear on the neck and body, and detailed work done to characters to give them definition. I also attempted to capture how the artist might have wanted us to see movement throughout the characters, as well as showing the final process of heating the pot so that it can solidify and be used. At the neck, you will see "The blinding of Polyphemus" by Odysseus and his men, in the middle a fight between a boar and a wild dog, and finally at the bottom dancing gorgons. This was a project done for Professor Wickkiser's CLA-103 Greek Art & Archaeology class.

**Poster 25****Presenters:** Chukwunalu Chukwuma, Andrew Jamison, & Austin Chivington**Sponsor:** Laura Wysocki (Chemistry)**Title:** Synthesis and Testing of a Fluorogenic Acid Phosphatase Sensor

Fluorescein dyes are known to have a wide variety of applications in biological and chemical experiments, including biochemical labels, cellular stains, and pH indicators. They could be used in image-guided-surgery and to visualize biochemical and biological processes, like enzyme activity. Para-nitrophenylphosphate (pNPP) is an acid phosphatase sensor currently used. It reacts well with the enzyme and produces a color change when base is added, allowing for an absorbance measurement at a single timepoint. However, pNPP does not allow for continuous reads for acid phosphatase. One structure that has been proposed for continuous fluorescence reading is phosphatase sensor 2',7'-difluorofluorescein diphosphate, but the instability of the phosphate ester groups causes them to fall off easily in aqueous solution even in the absence of enzyme, leading to high background fluorescence and low contrast in assays. This research project is focused on synthesizing a hydrolytically stable fluorescein-based acid phosphatase sensor that can be used to monitor the activity of acid phosphatase through continuous reads. To achieve this, phosphatoxymethyl ether groups were used to mask the phenol groups on 2',7'-difluorofluorescein, leading to a profluorophore that is soluble and stable in water and that interacts well with acid phosphatase under assay conditions. The results from a preliminary test show that the addition of the phosphatoxymethyl ether groups to the 2',7'-difluorofluorescein yields a suitable acid phosphatase substrate. Further purification and testing of the phosphatase sensor are needed to be done to obtain more reliable data.



