

2023 CELEBRATION  
OF STUDENT RESEARCH  
& CREATIVITY



BELLARMINE UNIVERSITY

# 2023 CELEBRATION OF STUDENT RESEARCH & CREATIVITY

**April 20**

Student Research Poster Session

5:00 – 6:15 p.m.

Frazier Hall

Reception

6:00 – 6:30 p.m.

Wyatt Center for the Arts foyer

Celebration of Student Achievement in

Arts and Humanities

6:30 – 7:30 p.m.

Black Box Theater

Senior Recital

7:30 p.m.

Cralle Theater

Capstone

7:45 p.m.

Black Box Theater

**April 23**

Honors Student Thesis Presentations

12:30 p.m.

Centro Atrium

## **ABOUT THE BECVAR ARTISTS IN RESIDENCE PROGRAM**

The Lansing School of Nursing and Health Sciences established the Artist-in-Residence program in the 2002-2003 academic year. This program examines the art and science of Nursing and Health Sciences through the eyes of an undergraduate student working in the fine and creative art mediums. Endowed by Mrs. Arthur N. BecVar in 2006 in honor of her husband, this program exemplifies the diverse and many creative and artistic talents of the BecVar family. Having earlier established an endowed nursing scholarship fund during Art's lifetime, with this endowment Jayne BecVar further connects her desire to support and provide to our community caring, ethical graduates. It is our mutual desire that the students' experiences in this program, as viewed through the arts, will give them new ways of thinking to inform their clinical practice, the health care profession, and patient contact and care.



### **BECVAR ARTIST IN RESIDENCE: MADELYN SHELDON**

Madelyn Sheldon is a design art technology and digital art double major. Her favorite color is pink, and it is reflected throughout her work. She especially loves bright and psychedelic aesthetics.

Artist Statement: My work explores the relationship between Neon pink as a focal point and other colors. My influences are as diverse as Andy Warhol, Takashi Murakami, and Pablo Picasso. I create my work with lots of mixed media and texture. The work displays dynamic elements and the focal point is the heart in the middle to represent movement in the body. This is representative of the systems we have in our bodies.

Cover by: Madelyn Sheldon

## BECVAR ARTIST IN RESIDENCE: ARIANA ALVARADO



Ariana Alvarado is a junior English major with minors in Creative Writing in Theology. In addition to being one of the BecVar Artists in Residence for the 2022-2023 year, she was the 2022 winner of the Flo Gault Student Poetry Prize from Sarabande Books, and a current recipient of the Katerina Stoykova Scholarship for the Poetry Gauntlet at the Carnegie Center in Lexington. In the future, she hopes to earn her MFA and one day work as an editor at a publishing house.

**Artist Statement:** The goal of this project was to tell the stories that too often go unheard. *Quiet Dark* began as a series of fictional letters and morphed into a theological, poetic investigation of sickness, care, the body, and grief. Although the project had many shifts in its thematic focus, I always sought to honor these stories, many of which are not my own, but to do so through my own theological and poetic lens. In times of struggle, particularly with health, many turn to their faith or personal belief for comfort. This project sought to take this and push it further to explore a new vision or understanding: what if sick bodies could be biblical gardens? What if caretakers could be both beautiful and flawed? What if suffering could be sacred? What do we do with grief that cannot be answered? In the end, I wanted to reimagine the harsh realities that many must struggle with burnout, sickness, health anxiety, and the hopelessness of seeing loved ones in pain. While poetry, and art, cannot stop someone's suffering, it can give them the voice and strength to come to terms with their experiences and ultimately move past them. I hope this collection speaks to the truth of these stories I am trying to represent and allows them to see their struggle in a new light.

### **Songbirds**

When I sit to write,  
all that comes to mind is  
death and death and  
death again, grief cutting  
underneath the skin.  
The bell never rung,  
black songbirds,  
lizards that scurry  
through the slats of  
the windows and  
The smell of island  
rain. Where are you?  
Where have you gone?

## BECVAR ARTIST IN RESIDENCE: SYDNEY HOWLEIT



Sydney Howleit is an emerging artist and a senior at Bellarmine University. She is earning her degree in Art: Painting and Design, Arts & Technology and plans to graduate in spring 2023.

Artist Statement: Howleit's work is inspired by the best medicine one could prescribe— humor. Although humor is different for everyone, nothing brings people together more than a good laugh. As we emerge from quarantine and begin to socialize and continue our studies, there have been countless tragedies and feelings of hopelessness. We need humor now more than ever, repairing the bonds we cherish and spreading hope to everyone around us. Howleit remembers the joy she felt reading the comic section in the Sunday newspaper. She wishes to bring that joy to readers with her comic book—MISSION: SURVIVE THE HEALTH SCIENCES (working title)— giving health science students various tips for success, along with a host of hilarious scenarios adapted from peers and imagination. MISSION: SURVIVE THE HEALTH SCIENCES is a collection of short form comics adapting anecdotes from fellow Bellarmine students and faculty that provide not only tips to survive the health science majors, but also humor to lighten your day.



# Celebration of Student Research & Creativity

## April 20, 2023

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### SPECIAL THANKS TO

- Dr. Susan Donovan, President
- Dr. Paul Gore, Vice President for Academic Affairs and Provost
- Dr. Mark Wiegand, Associate Provost
- Mrs. Connie Smith, Director of Office of Sponsored Projects
- Mr. Adam Elias, Director of Innovative Learning Systems
- Ms. Chris Ekstrom, Administrative Assistant College of Health Professions

# UNDERGRADUATE STUDENTS

## ACTUARIAL SCIENCE

### POSTER 1

#### **A Network Analysis of Transportation Costs of Oil Exports from the Andean Community to the United States**

Richard Osborn / [rosborn@bellarmine.edu](mailto:rosborn@bellarmine.edu) / Faculty Mentor: Bill Fenton

This research project investigates the application of network analysis in the study of international trade of crude oil. We aim to model the network of exporting countries and importing ports, with the nodes representing the entities and the edges representing the trade flows between them. By analyzing the topology of the network and the strengths of the nodes and edges, we hope to gain insight into the patterns and structure of the international trade of crude oil. To accomplish this, we gather data on the volumes of exports, transportation costs, and other relevant factors that affect the trade. We plan to use tools such as centrality measures, cluster coefficients, and visualization techniques to explore the network and interpret the results. Ultimately, we hope to provide new perspectives on the complex system of international crude oil trade and contribute to the development of quantitative methods for analyzing networks in international trade.

### POSTER 2

#### **Applications of Distributions in Insurance Claims**

Jacklyn Tellez / [jtellez2@bellarmine.edu](mailto:jtellez2@bellarmine.edu) / Faculty Mentor: Bill Fenton

Distributions are used to explain the statistics of a population or a sample of a population. What distribution is chosen for a population depends on the characteristics that represent the population. If the wrong distribution is chosen, the statistical results of the distribution can misrepresent the population. Insurance companies use different applications of distributions to model claims. Some distributions that are used include, but are not limited to, Exponential, Gamma, Weibull, Pareto, Lognormal, and Beta. It is important to not only know what distributions are used for applications, but also why that distribution is being adopted. The first step to understanding the applications is to know what each distribution is and what type of population it is used for. Next is observing what mixtures of these

distributions are commonly used. The second step is looking at the applications for each distribution and the mixed distributions. The last step, and the result of the research, is discerning the why behind the distribution of each application.

#### POSTER 3

### **National Residency Matching Program: Looking at the Data through Linear Regressions**

Jacklyn Tellez / jtellez2@bellarmine.edu / Faculty Mentor: Frank Raymond

After medical students graduate, the National Residency Matching Program (NRMP) oversees the process of students being matched to a residency program. The NRMP determines the hospital and residency program for medical students. After interviews, both hospitals and students rank each other, and the NRMP uses these lists to determine the matches. With the data about the applicants, hospitals, and other significant factors, three linear regressions were run to determine the importance of the different independent variables. In each data set, the dependent variable remains the percentage of applicants matched. The first regression looks at data from 1987 to 2022 with a dummy variable used to separate the switch in algorithms in 1997. The second data set looks at the data without the switch involved. Finally, the third data set breaks down applicants by the type of medical school they attended.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

#### POSTER 4

### **Option Pricing Models**

Haziq Zed / hzed@bellarmine.edu / Faculty Mentor: Bill Fenton

This project compares key option pricing models: the binomial, Black-Scholes, and Monte Carlo models. The research aims to thoroughly analyze each model's strengths and weaknesses and identify the circumstances under which each model is most appropriate. The binomial model is a discrete-time model often used to price European and American options, assuming that the underlying asset's price can go up or down and that the probability of each outcome is known. Conversely, the Black-Scholes method is a continuous-time model that can be used to price European options. This model assumes that



the price of the underlying asset follows a lognormal distribution and takes into consideration the expiration time, the risk-free interest rate, and the volatility of the asset. Finally, the Monte-Carlo model is a simulation-based approach that can be used to price different options. This simulation assumes that the underlying asset follows a unique risk-neutral distribution, a risk-free rate. (McDonald, 2006)

The project compares the performance of each model through mathematical complexity, accuracy, and flexibility. It also identifies the assumptions that underlie each model and the limitations of each approach. Ultimately, the results of the analysis imply that the different models have their advantages and disadvantages and that the choice of model depends on the unique characteristics of the option being priced.

#### POSTER 5

### **Portfolio Management**

Kaden Woo / [kwoo@bellarmine.edu](mailto:kwoo@bellarmine.edu) / Faculty Mentor: Bill Fenton

The goal of this research project is to not only assess what hedging is, but to also apply key concepts of interest theory to this form of risk management. In order to portray these key concepts this project is taking a look into a specific investment portfolio at a particular place in time and modeling out financial scenarios of high, moderate, and low risk. In order to portray these scenarios, I am applying the key concepts of portfolio management, duration, and immunization of the portfolio against small changes in interest rate variation. Modeling out these scenarios allows for the analysis of several positions and possible outcomes, from which I can use to infer the best course of action to reduce the portfolio's risk.

## **BIOCHEMISTRY & MOLECULAR BIOLOGY**

#### POSTER 6

### **The Bellarmine Bee Bed: Organizing a Native Plant Garden Based on Feedback from the Local Community**

Kate Moran / [kmoran@bellarmine.edu](mailto:kmoran@bellarmine.edu) / Faculty Mentor: Kate Bulinski

Animal pollinators are the cornerstone of healthy ecosystems. Their survival is essential for the development of entire food chains: from the flowers they cross-pollinate directly, to the animals who depend on those plants for nutrition. Studies have shown that the establishment

of pollinator gardens- particularly ones that consist of native plants- are an effective way to enhance their quality of life. The main goal of this thesis is to construct a pollinator garden that maximizes the benefits for animal pollinators using feedback from Kentucky gardeners. A survey was used to gather information about the popularity and preferences of 40 flowering plants, and after analyzing the 101 responses, twelve species were chosen along with two native grasses. The garden was constructed on Bellarmine University's campus (October 2022) and is set to bloom as of spring 2023.

Presented at the Kentucky Honors Roundtable Conference, Morehead Kentucky, February 25, 2023

Recipient of Joe & Angela Schmidt Honors Award

Partially funded by Jefferson County Soil and Water Conservation District's Native Landscaping Cost-Share Program

#### POSTER 7

### **The Mental Health Epidemic in Veterinary Medicine**

Hannah Eckstein / [heckstein@bellarmine.edu](mailto:heckstein@bellarmine.edu) / Faculty Mentor: Courtney Keim

The Mayo Clinic describes burnout as a specific type of stress that involves a state of physical or emotional exhaustion. This exhaustion can lead to a lowered sense of accomplishment and negative personal identity. Despite burnout not being an actual diagnosis, many researchers believe there are several mental health components that contribute to burnout, such as depression and anxiety. Several factors are known to contribute to specifically work-related burnout, including lack of control, work-life imbalance, lack of social support, and extremes of the activity. All of the above factors relate to the veterinary field. In one study, 6.8% of male veterinarians and 10.9% of females were under severe psychological distress based on the Kessler-6 psychological distress scale. Compared to the rest of the population, veterinarians are under almost double the amount of severe psychological stress. Despite the staggering statistics, not much information is currently known about the post-pandemic burnout among veterinary professionals. During the pandemic, it has been estimated that 78% of pet owners acquired their pet. With this rapid increase in pet owners, there has been a dramatic increase in the need for veterinary care. It can be assumed that with more work, there will be higher burnout rates among veterinary clinics. The final sentiment is

best left in the words of one of the respondents: “Overworked, underpaid, underappreciated, undervalued.”

#### POSTER 8

### **The Mystery of the Unsolved Traveling Salesman Problem**

Paul Reynolds / preynolds@bellarmine.edu / Faculty Mentor: Bill Fenton

Given any collection of cities and the distance to travel between each pair of them, what is the shortest route to visit each city and return to the starting point? This is the travelling salesman problem, and despite its ostensible simplicity, it has stumped many people over the years and has yet to be fully solved. The traveling salesman problem has a rich history and has led to many unique discoveries. This paper delves into the history and challenges of this problem. Then, this paper analyzes the main methods that have been used to give an overview of the collective progress made towards solving the travelling salesman problem such as: trees, tours, the cutting-plane method, and branching.

## **BIOLOGY**

#### POSTER 9

### **Communicating Health: Misinformation and Mistrust in the Age of Coronavirus**

Chris Anstead / canstead@bellarmine.edu / Faculty Mentor: Emily Bingham

During the coronavirus pandemic, the U.S. was provided with ample biomedical therapies and public health interventions to effectively manage the disease. Yet, with over a million U.S. COVID-19 related deaths, many of which could have been prevented, other roadblocks to disease management must be investigated. This review looks at the effects of misinformation and social pressure on the dimensions of vaccination, mask use, and social distancing to give insight into possible failures of the U.S. medical system and how they effected the outcome of the coronavirus pandemic.

#### POSTER 10

### **Understanding the expression and role of pros-1 in the male gonad of *C. elegans***

Jack Bozik, Matthew Titus / jbozik@bellarmine.edu, mtitus@bellarmine.edu / Faculty

Mentor: Mary Kroetz

The gene pros-1 is a transcription factor highly expressed within neuronal sheath cells, glial cells, and excretory canal cells. pros-1 plays a role in proper cell determination of those cell types in the nematode *C. elegans*, which promotes organismal development. What makes pros-1 valuable to research is that it is a functional homologue to a gene found in humans called prox-1, a transcription factor that is vital in the proper neurogenesis of the central nervous system in the human body. Recent data has shown that pros-1 is highly expressed in the somatic gonads of male *C. elegans*. We want to understand whether the pros-1 genes plays a role in the development of the somatic gonad, however, this is complicated by the fact that pros-1 is expressed in the excretory canal cell and nervous system, and pros-1 expression in these non-gonadal cells are required for the survival of the animal. We accomplished this by selectively crossing nematode strains to develop progeny of *C. elegans* that contain a degron sequence as well as green fluorescent protein (GFP) tag on pros-1. Allowing us to observe the possible effects pros-1's removal has on the gonad's form and function.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

#### POSTER 11

### **The Purpose of a Museum: The Importance of Access and Data Preservation in Paleontology**

Eli Kreilein / skreilein@bellarmine.edu / Faculty Mentor: Kate Bulinski

Museum Studies, also called Museology, is the organization and management of museums. Paleontology is the study of ancient life and evolution through geological time (Bulinski K 2021). Combining these disciplines allows for educational outreach, and specifically at Bellarmine, gives students the opportunity to engage with a resource that was previously unknown and inaccessible to the student body outside of environmental science and biology courses. This project seeks to convey the importance of access to scientific data and the

importance of data preservation by discussing the purpose of a museum, and by constructing an exhibit in order to convey scientific information to the public, as museums do. The project included collection curation, exhibit creation, and a written thesis that provides reasoning for curation and creation choices, as well as recommendations for future curation and exhibit development at Bellarmine. The theme of the exhibit is modern applications of paleontological data, using specimens from strata surrounding Louisville. The written thesis covers the evolution of this project, background information on paleontology and museology, the history of Bellarmine's teaching collection, process of exhibit construction, and evaluation of the project as a whole.

Recipient of Joe & Angela Schmidt Honors Award

#### POSTER 12

### **Abrogating the Expression of *chk-1* and *fasn-1* in *C. elegans* During Somatic Gonad Development**

Sam Thompson / sthompson7@bellarmine.edu / Faculty Mentor: Mary Kroetz

Despite its widespread use in research, the model organism *C. elegans* has several biological processes like gonadal development with potentially unexplored genetic regulators. Previous transcriptome analysis has identified several genes that are upregulated in a specific tissue or sex during the development of the somatic gonad in *C. elegans* (Kroetz et al. 2015) that have not been previously connected to this process. Of these genes, this research is concerned with *chk-1* and *fasn-1*. Abrogating the expression of these genes in gonadal tissue during gonadogenesis could cause a change in phenotype for affected *C. elegans* that would aid in understanding these genes' regulatory role in this process. To accomplish this, we use CRISPR-Cas9 and homology-directed repair to modify the genome of *C. elegans* so that the proteins *chk-1* and *fasn-1* produce are tagged with GFP. These tagged proteins can be selectively degraded by the transgene GFP-nanobody-ZIF-1 degron system in somatic gonad tissues to achieve the desired abrogated expression of *chk-1* and *fasn-1* (Wang et al. 2017). To modify these genes with CRISPR, gRNA, and homology directed repair constructs were designed and created for each gene. With provided Cas9 endonuclease, the gRNA and homology directed repair construct would be injected into the germ cells of individual *C. elegans* to modify the genes-of-interest so that they produce GFP-tagged proteins. Future research would include cross-breeding the *C. elegans* animals containing GFP-tagged

proteins with those containing the degron system to generate an animal containing both the GFP-tagged genes and the degron system in their genome.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

#### POSTER 13

### **The Impact Instagram Has on Women: Mentally, Physically, and Academically**

Annie Gronotte / agronotte@bellarmine.edu / Faculty Mentor: Jean Lamont

Instagram promotes poor body image, which can ultimately decrease academic performance. Attending a same-sex high school, versus a co-ed high school, may buffer women against this since they are not affected by the male gaze and other distractors that comes with having the opposite gender in a work environment. This study will use a 10–15 minute anonymous online survey to examine college women's Instagram usage, body image, and academic performance, focusing on whether or not their high school environment shapes who they are today. I expect that women who attended a single-sex high school will have better body image and better grades in college, as they will have a stronger academic foundation going into college.

Presented at the Kentucky Honors Roundtable Conference, Morehead Kentucky, February 25, 2023

Recipient of Joe & Angela Schmidt Honors Award

#### POSTER 14

### **The Role of GPER in Cadmium-induced Phosphorylation of ERK1/2 in Ovarian Adenocarcinoma**

Laura Sackie, Haley Todd / lsackie@bellarmine.edu, htodd@bellarmine.edu / Faculty Mentor: Mary Huff

Cadmium, a carcinogenic heavy metal, is an environmental contaminant found in air, water, and soil. It also exhibits endocrine disruptive properties by mimicking the proliferative effects of the hormone estrogen and is classified as a metalloestrogen. At low concentration

levels in some cancer cells, cadmium induces cell proliferation and phosphorylation of ERK 1/ 2, a key protein in the estrogen signaling pathway. While the signaling pathways for cadmium-induced phosphorylation of ERK 1/2 have been discovered in breast and lung cancer cells, it has not yet been fully determined in ovarian cancer cells. The recent discovery of a transmembrane receptor found in estrogen responsive tissues, G protein-coupled estrogen receptor (GPER), presents a possible pathway for studying cadmium's effects in ovarian cancer cells. To determine the role of GPER in cadmium-induced phosphorylation of ERK 1/ 2, two human ovarian adenocarcinoma cell lines, OVCAR3 and SKOV3, were treated for 30 minutes with 10  $\mu$ M G15, a GPER Inhibitor, followed by treatment with 100 nM CdCl<sub>2</sub> for 10 minutes. Immunoblot analysis was performed to measure cadmium-induced phosphorylation of ERK 1/ 2. The results indicate that in both cell lines, G-15 decreased cadmium-induced phosphorylation of ERK 1/ 2 suggesting that GPER may play an important role in cadmium's proliferative effect in ovarian adenocarcinomas.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

Partially funded by Bellarmine University Biology and Biochemistry Department

#### POSTER 15

### **E. californicum: A Potential Source of PTP1B Inhibitors**

Chase Yost / cyost@bellarmine.edu / Faculty Mentor: Savita Chaurasia

Protein tyrosine phosphatase 1B (PTP1B) is a distinct therapeutic target for diabetes, obesity, a multitude of cancers, neurodegenerative, and cardiovascular diseases. Yet, due to high conservation among protein tyrosine phosphatases, the majority of PTP1B inhibitors lack specificity and therefore, clinical efficacy. Thus, there is a need to develop novel strategies to target this enzyme. In the search for new drug candidates from nature, this study is focused on the combinatorial effects of phytochemicals present in an ethanolic extract of *E. californicum* (ECE) as a source for PTP1B inhibition. *Eriodictyon californicum* is an edible herb, that traditionally was used by Native Americans to heal a multitude of ailments. In the preliminary study, we reported the radical scavenging and antioxidant potential of ECE. Additionally, more recent studies have also uncovered its anti-inflammatory and neuroprotective activities. The present study aims to investigate the

PTP1B inhibitory activity and mechanism of ECE. Inhibition assays and inhibition kinetics of ECE were conducted in vitro and docking analysis was conducted. The results demonstrated that ECE significantly inhibited PTP1B and displayed dose-dependent characteristics (IC50 of 4.25  $\mu\text{g/ml}$ ). A kinetics analysis using the Lineweaver-Burk plot revealed that ECE decreased  $V_{\text{max}}$  and increased  $K_m$  of PTP1B, indicating a mixed type of inhibition against PTP1B. Molecular docking demonstrates the binding of known bioactive compounds present in ECE to the catalytic site of PTP1B with docking poses like other known catalytic site inhibitors. This is the first study demonstrating the PTP1B inhibitory potential, inhibition kinetics, and inhibition mechanism of ECE. This study presents *E. californicum* as a promising source of PTP1B inhibitors.

Presented at the American Society for Biochemistry and Molecular Biology (ASBMB) Discover BMB 2023 Annual Conference, Seattle WA, March 25-28, 2023  
Presented at the American Chemical Society (ACS) Crossroads of Chemistry Annual Conference, Online, March 26-30

Recipient of Student Government Association Research Grant Award  
Partially funded by the Bellarmine University College of Arts and Sciences Biochemistry and Molecular Biology Program in the Department of Chemistry

#### POSTER 16

### **Maladaptive Peripheral Sensory Plasticity Contributes to Neuropathic Pain Following Spinal Cord Injury**

Emily Ernst / [ernst@bellarmine.edu](mailto:ernst@bellarmine.edu) / Faculty Mentor: Sonja Bareiss

Chronic neuropathic pain is a very common outcome following spinal cord injury (SCI). Most treatments are largely ineffective because they do not remedy damage done to the nervous tissue, as well as the mechanisms of neuropathic pain not being fully understood. As a result, patients are left with debilitating at and below-level disruptions in sensory and motor function. After spinal injury, a cascade of events happens within the nervous system. One important aspect of this cascade for investigation is the anatomical changes that occur post-SCI. There is evidence of aberrant sprouting in primary nociceptive fibers after injury in humans and in rat models. This growth is a proposed mechanism for the development of pain as it has been associated with thermal hyperalgesia and mechanical allodynia in rat models. Sprouting of primary afferents in the cord, mediated by the dorsal root ganglia



(DRG) may contribute to the sensory issues that patients experience after injury. The signaling cascade containing the protein GSK-3 $\beta$  may be important in this maladaptive growth. GSK-3 $\beta$  is highly and constitutively expressed in the nervous system and serves to regulate neurite growth by regulating cytoskeletal molecules that aid in neurite outgrowth. However, after injury, GSK-3 $\beta$  becomes inactivated by the upstream inhibitor of phosphatidylinositol 3-kinase (PI3K) that is released due to the injury cascade, and thus sprouting can occur. The goal of this study is to compare the changes in GSK-3 $\beta$  expression with the presence and severity of pain in a rat model to see if they correlate. At and below level self-grooming are indicative of pain and the severity of these post-SCI will be compared with the microscopic study of the spinal cord and DRG tissue.

Presented at the American Physical Therapy Association Combined Sections Meeting, San Diego, CA, February 23-25, 2023

Recipient of Joe & Angela Schmidt Honors Award

#### POSTER 17

### **Promoting Engagement Through Socioscientific Inquiry at the Middle School Level**

Kaitlyn Kalehuawehe / [kkalehuawehe@bellarmine.edu](mailto:kkalehuawehe@bellarmine.edu) / Faculty Mentor: Kristin Cook

Learning science is not just about facts. It is an area that has the potential to expand beyond the classroom. There is a concern for students having negative associations with science, and not seeing the relevance it plays within their lives. The curriculum should reflect the value of science within society and the influence it has on complex issues. Learning science in the context of socioscientific issues (SSI) can promote an understanding that connects science to society and everyday life. The main objective of this thesis is to see how the use of SSI in the middle school classroom can promote student engagement and how they apply their scientific learning within the social context. Through the research of the literature surrounding SSI and support of Amgen Biotech Experience to present an SSI lesson to a middle school science class, student engagement with this approach can be seen. It is hypothesized that a classroom that uses SSI within its curriculum will have students that gain a deeper understanding of science with the appropriate knowledge and skills needed to deal with complex issues. Following an analysis of the data collection and a connection to the literature, this thesis will address the desired outcomes of improving the perception and

how the use of socioscientific issues can be a resource to helping middle school students become more engaged and improve their perception of learning science.

Presented at the AMGEN Biotechnology Experience Conference, Virtual, April 26, 2023

#### POSTER 18

### **Using CRISPR to Genetically Engineer Four Genes Involved in Gonadogenesis in the Model Organism *C. elegans***

Peyton Young, Sam Thompson / pyoung@bellarmine.edu, sthompson7@bellarmine.edu /  
Faculty Mentor: Mary Kroetz

*C. elegans* is a nematode model organism commonly used in research because of its small size and similarity to humans. Of the known protein sequences of *C. elegans*, 40%-80% have human homologous genes, making *C. elegans* an ideal organism for study of human proteins (Lai et al. 2000). Additionally, there are two sexes of *C. elegans*, male and hermaphrodite. Of the two sexes, this research focuses on the males, especially the development of the gonad and the genes involved in this process. Four genes were chosen for study, C10E2.6 and pig-1 being the two that I specifically worked with, based on essentiality and mRNA expression during gonadogenesis. An essential gene is defined as a gene that is necessary for the organism to survive. The mRNA expression of the genes was observed to be higher in both the male and hermaphrodite gonads during development when compared to the mRNA expression in the rest of the organism. DNA constructs, including gRNA (guide RNA) and a homologous repair construct, were designed to study the genes. In this research, CRISPR will be used to genetically alter the worms so that the gene products of the aforementioned genes are no longer present in the gonad. Future research will allow for the study of the genes' specific role in gonadal development through the study of the effects of the absence of the gene products in the worm. Even further, it is possible that some parts of gonad formation may be a conserved process between species, perhaps shedding light on this process in mammals.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

## **BUSINESS ADMINISTRATION**

### **POSTER 19**

#### **Exploring and Marketing Partnerships between Communities and Student Athletes to Foster Mutually Beneficial Relationships**

Jensen Kitrel / [jkitrel@bellarmine.edu](mailto:jkitrel@bellarmine.edu) / Faculty Mentor: Carla Childers

Student athletes are expected to fill multiple roles and must balance their athletic and academic responsibilities while facing other stressors. In some cases, student athletes are further tasked with engaging with their communities as university representatives. It is hypothesized that the motivation to participate in these initiatives is low due to burnout. Past research has acknowledged burnout among college athletes. However, few studies have taken an applied approach to addressing this important challenge. Utilizing consumer behavior theory and a value proposition approach, the current research develops a marketing program to increase motivation for community engagement among Division I collegiate athletes.

Presented at the American Marketing Association International Collegiate Conference, New Orleans, LA, March 30-April 1

## **COMMUNICATION**

### **POSTER 20**

#### **How much does the Consumption of Social Media apps (Instagram) affect College Students' Mental Health and Body Image?**

Madyson Lira / [mlira@bellarmine.edu](mailto:mlira@bellarmine.edu) / Faculty Mentor: Maggie Rossman

Mental Health and Body Image issues have become an epidemic, especially among teenagers and young adults. Obsession with social media is also growing among younger audiences. With the increase of users using social media, research has shown that there is a growth in body image issues which has been directly influenced by social media. Despite the research done, there hasn't been a lot of traction surrounding this topic. College students are thrown into constant exposure to the 'ideal' college life through social media sharing apps. Between classes, extracurriculars, and meetings, college students are on their phones a lot. Most

college students now grew up in an age where being on all social media apps is the norm and because of this, we see students who are already struggling emotionally and mentally with class load, financials, and other factors being influenced by what people around them or people that show up on their ‘for-you-page’ are posting. Although social media is not necessarily a new topic, there hasn’t been copious amounts of research done on how it impacts specifically college students (both male and female) and how this can influence their mental health and body image. I think we can learn a lot from performing this study and continue to draw awareness to how important researching this is. We can learn the impact upon quality-of-life social media has on younger generations, especially those who are already going through life stages.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

Recipient of Joe & Angela Schmidt Honors Award

## COMPUTER SCIENCE

### POSTER 21

### **TradeMind: Streamlining your Investment Strategy with Automated Trading**

Bobby Gabriel / bgabriel@bellarmine.edu / Faculty Mentor: Nathan Johnson

TradeMind is a web-based stock trading service that allows users to implement their own trading strategies and then executes trades on their behalf. A common problem when investing or trading stocks is emotional decision making. With manual trading, emotions such as greed, anxiety, and fear could lead to irrational decision making and ultimately affect one’s investment returns. With TradeMind, the user will have a fully automated trading experience and not have to worry about emotional decision making. Unlike popular platforms such as TDAmeritrade and Etrade, which require some degree of manual input from the user, TradeMind follows a set of predefined rules and will trade without the need for constant monitoring. TradeMind is designed with user-friendliness in mind, with a simple and intuitive interface that allows users to easily input and adjust their trading rules, view their open positions, account balance, save/load a model, and see how their strategy is

performing in real-time. The platform supports a wide range of trading strategies, including technical indicators and fundamental analysis. For this project, the web-based user interface is built using HTML, CSS, JavaScript, and Bootstrap. The back end is built using Node.js – a popular server-side JavaScript framework. To connect the front-end and back-end, a RESTful API named express.js was used, which allows the front-end to make requests to the back end and receive responses. To receive live market data, another API is used to quickly locate the current bar and price for any given stock symbol. Finally, Firebase (a NoSQL database) is used to store a trading strategy and load it back when needed.

#### POSTER 22

### **CoachConnect – A Private Coaching Session Scheduler**

Omar Sanyang / osanyang@bellarmine.edu / Faculty Mentor: Nathan Johnson

CoachConnect is a web-based system for scheduling private coaching sessions. The goal of CoachConnect is to provide a web-based system for scheduling private coaching sessions makes it easier for both coaches and clients to set up private coaching sessions. Coaches and clients can use the system to book and cancel sessions and view available time slots. The application is built with Python programming language, and all-important information, such as coaches, clients, sessions, and time slots, is stored in a MySQL database hosted on a cloud server. The Flask web framework was used to build the web server. Flask and the Jinja2 templating engine were used to build the user interface. The main feature of CoachConnect is the scheduling interface, which uses the FullCalendar JavaScript library to show a calendar that lets users book and cancel sessions and see open time slots. Full Calendar has features like drag-and-drop, event creation, and time slot selection, which make it easy for users to see when sessions are available and book them whenever they want.

#### POSTER 23

### **Music Connect**

Isaiah Parker / iparker@bellarmine.edu / Faculty Mentor: Nathan Johnson

MusicConnect is a Next.js-based web application designed to connect users through their music preferences. This project aims to create a cloud-based system that allows users to join communities, create profiles, make posts, and interact with others based on their music tastes. MusicConnect is intended to foster a sense of community among music enthusiasts,

providing a platform where users can interact with others who share their musical interests. Additionally, musicians can use the app to connect with their fans and reach out to new audiences. This project demonstrates how technology can be used to facilitate meaningful connections between people, even in the context of online communities. MusicConnect was developed using the Next.js framework, which allowed for cross-platform compatibility and efficient development. The app's cloud-based system was built using Firebase, a platform that provides scalable and secure backend services. The user interface was designed to be intuitive and easy to navigate, with a focus on providing a seamless user experience. The MusicConnect app is designed to be user-friendly and accessible to a wide range of users, including those who may not have advanced technical skills. The app's interface is intuitive and easy to navigate, with a clean and modern design. The user's homepage displays a personalized feed of posts from their communities and a discover page that recommends new communities based on their music tastes. One of the key features of MusicConnect is the ability to create and join communities based on specific music genres or themes. Users can create their profile, search for communities based on keywords or scroll through a list of popular genres to find one that suits their interests. Once a user joins a community, they can make posts, like other users' posts, and comment on them. The MusicConnect app's cloud-based system allows for real-time messaging and push notifications, which creates a seamless user experience. With MusicConnect, users can discover new music, make new friends, and connect with others in a way that was never before possible.

#### POSTER 24

### **MusicMe**

Grant Pennington / [gpennington2@bellarmine.edu](mailto:gpennington2@bellarmine.edu) / Faculty Mentor: Nathan Johnson

Music is something that is universally loved and a huge part of people's daily lives. However, finding new music that you enjoy can be tough. The goal of this project is to use various correlations between music track audio features to generate new playlists based on a given source playlist. MusicMe utilizes two machine learning algorithms along with the Spotify application programming interface (API) to find correlations between a user-submitted playlist and other audio tracks. MusicMe then suggests new playlists the user might enjoy as well as allowing users to explore other functionality of the Spotify API. AI models used to find correlations between various audio tracks include a random forest classifier for feature analysis and decision trees for predicting recommended tracks. The

system employs the modern JavaScript frontend framework, React, as well as a node express backend to create a user-friendly interface for utilizing the tool.

#### POSTER 25

### **Simulating Displacement of U.S. Residents After Severe Weather Crises**

Kaitlyn Reed / [kreed3@bellarmine.edu](mailto:kreed3@bellarmine.edu) / Faculty Mentor: Nathan Johnson

With severe weather crises becoming a “when” rather than an “if,” the United States can benefit from predictive modeling of such events and the inevitable displacement of affected people. Displacement of residents across the U.S. creates strain in communities via loss of life and property among other things. Understanding the proportion of people who will be displaced and where they settle will allow organizations such as non-profits, government, and humanitarian aid agencies to prepare for these inevitable situations. The Severe Weather People Displacement Predictor (PDP) program displays data movement in the form of maps, showing the projected number of people moving to each state following a crisis. The PDP mines U.S. Census data from years with large-scale weather events creating a probability matrix and a predictive model to apply to future populations, which is then displayed as a U.S. map in the output window. The system uses Markov chains to model the number of people being displaced. A probability transition matrix is developed using a Python program that pulls U.S. Census data from Excel sheets. The matrix contains probabilities for movement across all 50 U.S. states (not including Costa Rica or Puerto Rico).

#### POSTER 26

### **Once Upon a Time - An Interactive Picture Book Generator**

Spencer Childers / [schilders@bellarmine.edu](mailto:schilders@bellarmine.edu) / Faculty Mentor: Nathan Johnson

The time of iPad kids is upon us. Everywhere you look, children are "borrowing" their parents' devices for entertainment; children may interfere with their parents work or even access inappropriate materials or media. Once Upon a Time is an interactive picture book generator for Windows devices. Children fill in blanks to create a simple outline which is used to construct a unique picture book. Once Upon a Time uses the Python programming language to connect with ChatGPT, a highly advanced AI chatbot that can deliver believable responses on the fly, and DALL-E, an artificial intelligence art generator that can create

vibrant images from simple-language requests. To create a story, the user's outline is converted into a request that is delivered to ChatGPT, which returns the text of a story. The text is parsed into individual pages and further into formatted requests that are shipped to DALL-E to create a linked photo for each page. Lastly, with the help of Node.js, the images are connected to their respective pages and presented in a friendly web app.

## DATA SCIENCE

### POSTER 27

#### **Forecasting NBA Game Attendance using Historical Data Analysis**

Elijah Sartin / [esartin@bellarmine.edu](mailto:esartin@bellarmine.edu) / Faculty Mentor: Robert Kelley

This project aims to develop a predictive model that accurately forecasts attendance at NBA games based on pre-determined factors, such as start time, home and away teams, and day of the week. To achieve this, data will be collected from various online sources and analyzed using Python and MySQL. The results will be displayed using Tableau. The project's end goal is to create an adaptable model that can be extended beyond the NBA to predict attendance for other sports. Through the use of advanced data analysis techniques, this project will provide valuable insights for sports organizations to improve attendance and increase revenue.

### POSTER 28

#### **Predicting Tech Industry Layoffs: A Regression Model**

Kerry Effinger / [keffinger2@bellarmine.edu](mailto:keffinger2@bellarmine.edu) / Faculty Mentor: Robert Kelley

With news of companies laying off employees in technology positions constantly appearing in headlines, it seems as if there is a never-ending trend of tech layoffs. To investigate the characteristics of companies engaging in these layoffs and the frequency with which they occur, data was collected on layoff events as well as information about the company that made the decision to let these people go. The attributes of these companies were studied to find patterns and to create a model that can predict whether a company in the technology industry will conduct a mass layoff and how large it will be. Finally, the results and findings are summarized visually in a dynamic dashboard which shows many different metrics from the project.



#### POSTER 29

### **Daily Trips: How Often do Americans Leave Home?**

Trevor McCormick / tmccormick2@bellarmine.edu / Faculty Mentor: Robert Kelley

Most people in America leave their houses on a regular basis, but some do so at a much higher or lower rate than others. The Department of Transportation has recorded data on how often people leave their homes daily in each state. The goal of this project was to see if machine learning can be used to predict how often people will leave their homes in the future on a given date. In this project, I will be using various applications such as Python (with packages), SQLite, and Power BI to do my analysis, visualization, and testing.

#### POSTER 30

### **Box Office Breakdown: Analyzing the Factors that Drive Movie Revenue**

Zane Brown / zbrown2@bellarmine.edu / Faculty Mentor: Robert Kelley

This data science project is focused on analyzing movie data that includes a popularity score and vote average score provided by The Movie Database, as well as budget, revenue, runtime, and genre, to try to gain insight into what drives a movie's success. A predictive regression model will also be created to try to accurately predict movie revenue. The tools used to accomplish this include Python, SQLite3, and Power BI. Further analysis will be conducted to determine if there are any trends that hold true across a larger sample size and to identify other factors that contribute to a movie's success.

#### POSTER 31

### **Man-made or AI? Creating a system that can determine whether a piece of art was made by a human or by AI.**

Gracie Bayer / gbayer@bellarmine.edu / Faculty Mentor: Robert Kelley

Over the past few years, art created by Artificial Intelligence has been on the rise, and there have been very mixed opinions on it. Looking at various works of art with the naked eye, it's very difficult to distinguish whether a piece is AI-created or man-made. In this project, I intend to create a system that can determine whether an inputted image was created by AI, or a real-life artist by training the system to distinguish between various characteristics such as geometry, shadows, reflections, and more. I will be doing this through deep neural

networks (DNN). DNN is a class of machine learning algorithms that are similar to the artificial neural network and aims to imitate the information processing of the brain – just as AI art aims to imitate human artists’ art. Deep learning is a neural network consisting of three or more layers, which allows a system to learn from large amounts of data. The deep learning library I will be using is TensorFlow, which will help me build this system that is able to recognize various features in an image. TensorFlow combines Machine Learning and Deep Learning models and algorithms and provides image recognition. TensorFlow allows you to create a graph of computations to perform, where each node in the graph represents a mathematical operation, and each connection represents data. The goal of my project is to make the computer do the work for me – by creating a system that will easily determine whether a piece of art is synthetic or not.

#### POSTER 32

### **Classroom Climate: Predicting live classroom occupancy through ambient temperature changes from body heat**

Brett Tully / btully@bellarmine.edu / Faculty Mentor: Robert Kelley

Monitoring classroom occupancy is an important aspect of managing educational facilities. However, current methods for detecting occupancy are often cumbersome, expensive, and may not be accurate. In this study, we propose a low-cost and non-invasive method of detecting classroom occupancy by monitoring ambient temperature and humidity changes using Raspberry Pi and DHT22 temperature sensors. The Raspberry Pi is a small, affordable computer that can be used for a variety of projects. We used the Raspberry Pi to collect temperature and humidity data from DHT22 sensors placed inside classrooms. The sensors were set to record temperature data every 5 minutes, and the data is then pushed to an SQL server for later analysis. Machine learning algorithms are employed to analyze the temperature and humidity data and identify patterns of occupancy based on changes in temperature. The study seeks to explore the potential of temperature changes as an indicator of occupancy in classrooms. This research has important implications for educational institutions looking for a low-cost, non-invasive, yet innovative method of monitoring classroom occupancy. By using Raspberry Pi and DHT22 temperature sensors, schools can save money on expensive occupancy sensors and ensure that their facilities are being used efficiently.

# ECONOMICS

POSTER 33

## **The Relationship Between Nonprofit Financial Health and Donations in the Nonprofit Sector**

Emily Dalton / edalton@bellarmine.edu / Faculty Mentors: Dan Bauer and Bradley Stevenson

As the nonprofit sector has grown in size and importance over the years, so has competition for donations and attention to the financial performance of organizations. Donors and information intermediaries have long expected nonprofits to remain financially lean - there is an expectation for organizations to direct all revenues directly to program areas, and any other spending is a misappropriation of funds. Nonprofit organizations attempt to satisfy this widely held donor expectation at the expense of organizational infrastructure and growth potential. I will look at IRS statistics of income, Economic Research Institute Form 990 data, and NCCS CORE data from 2013 to 2014 to measure how donors respond to overhead, solvency, profitability, and margin measures through their donative behaviors. I will also look at the same sample during 2018 and 2019 to determine if donor expectations have shifted with increased research and discourse on the negative implications of NPO financial leanness over the past five years. This study looks at the root of the discussion about misguided donor expectations, the need for greater impact disclosure, and the necessity of more discussion with donors about the importance of organizational growth and capacity building in order to further program impact. I will do this by empirically examining the impact on contribution revenues of nonprofits' financial behaviors. Over the period analyzed, overhead aversion and emphasis on financial leanness have seen a slight increase. This is demonstrated through stronger negative relationships between capacity and infrastructure-building financial measures and contribution revenues in 2018 and 2019 than in 2013 and 2014. This reaffirms the need for more discussion about the importance of overhead spending and capacity building in the nonprofit sector, as well as for more transparent and uniform means of reporting organizational impact.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

#### POSTER 34

### **How Greenhouse Gas Restrictions Can Affect Developing Countries**

Hayden Petter / hpetter@bellarmine.edu / Faculty Mentor: Hongwei Song

Over the past few years, many countries have had sustained growth with greenhouse gases. The economies of countries like China, India, Nepal, and more have seen major growth with the use of greenhouse gases. With more carbon emission policies being put in place to stop global warming, developing countries will not have the same resources to grow as many other countries have before them. This study examines developing countries from 1995-2020, where we look at countries' reliance on different greenhouse gases for GDP growth. This study hypothesizes that developing countries relied heavily on greenhouse gases to energize growth in the country, and with the increase in policies/agreements, countries' growth has either lowered or reliance on greenhouse gases has been lowered. After looking at the results, I offer hope for the future of developing countries with policy or technological changes that can change developing countries to stop relying more on greenhouse gases.

## **EDUCATION**

#### POSTER 35

### **“You taught us how to change the world”: A Critical Autoethnography Reimagining the Future of Education**

Isabella Howard / ihoward@bellarmine.edu / Faculty Mentors: Caitlin Murphy, Amy Lein

As schools become more culturally and linguistically diverse, we need trained, well-prepared educators that value students for who they are, build on their backgrounds, and maintain their unique identities in the classroom. An asset-based, culturally sustaining approach to teaching incorporates theoretical grounding, a consideration of global identities, and a sociopolitical edge that allows students to thrive and think analytically. Through this approach, we can give students more confidence in their abilities as learners by activating their prior knowledge and experience to break down the content and build understanding of it, and we can connect the students to their learning, providing them with a space to recognize themselves and their identities as valued and as crucial in the classroom. The first critical step in challenging current practices and attitudes in the education system and offering solutions to reconstruct education today to be asset-based and culturally sustaining,

is teachers' self-reflection. Toward that end, my autoethnography provides a model of teacher self-reflection. In my autoethnography, I portray my lived experience as a student teacher by analyzing my lesson plans, reflective journals, and evaluation feedback to uncover the assumptions, challenges, and motivations for teachers in the 21st century education system. I hope to inspire future teachers to critically analyze their experiences and to recognize that change starts in our own classrooms with us and our students.

Accepted for presentation at the Kentucky Excellence in Educator Preparation, Virtual, April 21, 2023

## **ENVIROMENTAL SCIENCE**

### **POSTER 36**

### **Relationship Between Habitat Quality and Biodiversity in an Urban Floodplain Ecosystem**

Hanah Carter / [hcarter@bellarmine.edu](mailto:hcarter@bellarmine.edu) / Faculty Mentor: Martha Carlson Mazur

Biodiversity is becoming an increasingly important variable in the survival of our planet's ecosystems. In an effort to better understand how urban environments can influence biodiversity in a given area, this study aims to analyze the relationship between biodiversity and habitat quality in order to assess ways in which urban ecosystems can meet the needs of the biodiverse species that support those ecosystems. The study was performed across two urban floodplain ecosystems within a mile of each other located in the heart of Louisville, KY USA—The Passionist Earth and Spirit Center, an 11-hectare natural area, and Joe Creason Park, a nearby 25-hectare city park connected by the riparian zone of South Fork Beargrass Creek. Macroinvertebrate sampling was used to assess diversity on a lower trophic level within the food web. Bird observation and audio and habitat structure were analyzed using ocular estimation to evaluate diversity at a higher trophic level. Birds and macroinvertebrates were chosen due to their capacity to be indicator species of changes within an ecosystem. The findings demonstrated a connection between greater habitat diversity and quality and greater abundance and diversity in both macroinvertebrates and bird populations. This pilot study lays a foundation for further work to be done to evaluate the connection between habitat diversity and biodiversity in an urban environment to assess how urban environments can be shaped to support greater biodiversity.

Presented at the Kentucky Academy of Science, Fall 2022 Poster Presentations

Presented at the Association for Environmental Studies and Sciences, Spring 2023 Conference

Submitted for presentation at the Wilson Ornithological Society, June 2023 Conference

Recipient of Student Government Association Research Grant Award

#### POSTER 37

### **How does habitat influence macroinvertebrates populations in forested wetlands in urban settings?**

Jaylyn Ferrell / [jferrell2@bellarmine.edu](mailto:jferrell2@bellarmine.edu) / Faculty Mentor: Martha Carlson Mazur

Macroinvertebrate biodiversity in wetlands is very important. Without biodiversity, ecosystems can dwindle, and the loss of species can affect the food web, causing extension (Hughes 2010). More plant covered, flooded wetlands have shown a higher and more diverse macroinvertebrate population than those who do not (De Szalay and Resh 2008). Studies have shown that more detritus or natural debris in wetland has a positive impact on the macroinvertebrate population (Wissinger et al 2008). Other factors such as urbanization take away from these beneficial processes or habitat, but the effects are varied. Therefore, my research question was: How does habitat influence macroinvertebrate populations in forested wetlands in an urban setting? Two wetlands studied in Louisville, Kentucky at Passionist Earth and Spirit Center. Temperature, pH, and dissolved oxygen were collected at each site, along with samples of macroinvertebrates using D-frame nets. Percent cover of habitat types (emergent vegetation, large woody debris, and coarse particulate matter) was recorded at each sample location. A total of three sample sites 5 meters apart were used at each wetland. Macroinvertebrate and habitat relationship metrics such as abundance, family-level richness, and Shannon Diversity Index were calculated and analyzed graphically using bivariate plots. A positive correlation was observed in Wetland 1 between abundance and percentage of emergent vegetation, but this trend was not observed in Wetland 2, likely due to cooler temperatures and lower percentage of emergent vegetation in Wetland 2. A positive relationship between higher temperatures and abundance of species was observed in Wetland 1. Wetland 2 is deeper and colder compared to Wetland 1, which is shallower and receives more sunlight, producing more emergent vegetation overall. The results confirm relationships identified in previous studies between habitat characteristics and biodiversity of

aquatic macroinvertebrates but advance our understanding of habitat supporting macroinvertebrates for wetlands in urban settings.

**POSTER 38**

**The Effects of Habitat Change and Pollution from Surface Top Mining and Current Reclamation Practices on Biodiversity in Eastern Kentucky**

Sydney Pardieu / spardieu2@bellarmine.edu / Faculty Mentor: Martha Carlson Mazur

Biodiversity is a key component in maintaining the valuable ecosystem services that are vital to the way humans interact with and rely on the environment. The Appalachian Region in Eastern North America is one of the most biodiverse temperate broadleaf forests in the world and is home to hundreds of endangered or endemic species. Despite the high biodiversity, the region is also heavily mined, particularly by mountain top removal, causing habitat change and pollution. Current reclamation practices for mined lands are lacking in effective reclamation criterion, and there is little or no attention to the preservation of biodiversity in state statutes. Therefore, this study investigated the effect of surface top mining on biodiversity in the Central Appalachian region of Eastern Kentucky using publicly available biodiversity indices and geospatial data analysis at the watershed scale while also examining reclamation effectiveness through interviews with government officials and a meta-analysis of current reclamation research. Fish biodiversity was significantly impacted in areas with high percentages of surface mines. A positive correlation was observed between surface mining and herbaceous, shrub, and barren land cover, showing the utilization of the grassland reclamation approach as a primary method of reclamation. Analysis suggested insufficiency in reclamation to support biodiversity in Eastern Kentucky despite policies being effectively written, suggesting a root cause in lack of enforcement or funding. More stringent land use approval processes and stricter enforcement are needed, along with increased funding for divisions responsible for reclamation to utilize ecologically beneficial reclamation methods that support biodiversity.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

**POSTER 39**

**Water Retention in Urban Agriculture**

Kaylie Malloy / [kmalloy@bellarmine.edu](mailto:kmalloy@bellarmine.edu) / Faculty Mentor: Michele Abee

Understanding topography and soil properties is essential for increasing water retention in urban agricultural environments. In environments where flooding is prevalent, lack of water retention can lead to soil erosion that can remove the soil horizon and its nutrients. This study investigated the relationship between topography and soil properties of urban agriculture in Louisville, Kentucky. To investigate this relationship, infiltration rate and water flow were collected at the Bellarmine University Farm during the months of March and April. The data was collected through field surveys as well as drone aerial image. The field survey used the index for soil erosion as well as soil and water conservation technologies as criteria for collecting data in the field. Additionally, infiltration rates were recorded at eleven different elevation points at the farm. The aerial images that were collected consist of topography and hillslope profiles. This information was synthesized through ArcGIS to create a complete assessment of areas within the urban agriculture environment that soil erosivity was the highest based on soil properties and hill slope. This information provides the framework for implementation of regenerative agriculture practices that increase water retention on property. If implemented the findings could mitigate the effects of flooding, such as soil erosivity that are so prevalent in Louisville.

Recipient of Student Government Association Research Grant Award

**POSTER 40**

**Water Quality and Sustainability in Urban Wetlands**

Colin Duncan / [cduncan4@bellarmine.edu](mailto:cduncan4@bellarmine.edu) / Faculty Mentor: Martha Carlson Mazur

Water and soil pollution have been and remain a concern for residents of Louisville and beyond. Consistent testing and monitoring of watersheds help ensure clean water for homes and businesses, but various types of pollution are constantly being added to the landscape. These pollutants then get into aquatic ecosystems, such as urban wetlands. The aim of this research is to utilize various water and soil sampling methods to analyze the quality of two restored wetlands at the Passionist Earth and Spirit Center (PESC) and using this data to identify possible sources of pollution to guide solutions for improving sustainability and water quality. Water-quality data—including temperature, pH, specific conductance,



dissolved oxygen, turbidity, and alkalinity—will be sampled biweekly in February through April to characterize changes in water chemistry. A water sample and a soil sample will be taken at each of the two wetlands at PESC to do a more in-depth analysis of the water for anions and cations and of the soil for pesticides. Samples will be sent to Microbac Laboratory for testing, and the results will be analyzed and compared with land-cover data in the watershed using Geographic Information Systems to identify water-quality concerns and to formulate possible solutions to improve wetland sustainability for the PESC. Results will be presented at the Bellarmine Celebration of Student Achievement poster symposium on April 20.

Recipient of Student Government Association Research Grant Award

#### POSTER 41

### **Symbiotic Relationships of Midwestern Wildlife**

Haley Thayer / [hthayer@bellarmine.edu](mailto:hthayer@bellarmine.edu) / Faculty Advisor: Michele Abee

This study will investigate the various ways native wildlife interact with the campus farm and the urban environment around it to better understand how wildlife live within these environments. This will explore what types of wildlife are in the area, how they interact with an urban garden and environment, and gain knowledge of how to best protect them from roadways, vehicles, toxins, etc. Collecting data from wildlife cameras on the Bellarmine University Farm, throughout the Spring 2023 semester, to capture these organisms at all times of the day/night and monitor their symbiotic behavior with their environment through the spring season here in the Midwest. The Midwest during the spring season is extremely abundant in wildlife populations due to the reproduction cycle of most species at this time of the year. Ultimately, this will provide understanding and education of various symbiotic relationships among the various species within the Louisville Metro Area. Over time tracking their patterns and survival instincts in urban areas will show relevant results to this research study and conclude the data findings as beneficial in preservation, restoration, and education to provide Louisville communities with better wildlife knowledge for the future.

Recipient of Student Government Association Research Grant Award

# EXERCISE SCIENCE

POSTER 42

## Examining the Accuracy of Two Commercially Available Global Positioning System Enabled Watches in Two Trail Conditions

Ally Tripure / atripure@bellarmine.edu / Faculty Mentor: Sara Mahoney

According to the American College of Sports Medicine Worldwide Survey of Fitness Trends for 2022, wearable technology is the number one fitness trend. Wearable technology, specifically with GPS capabilities, has become a common tool among a range of athletes and sport-types. However, the accuracy of these devices in different trail environment has not been fully determined. **PURPOSE:** The purpose of this investigation is to determine the accuracy of the GNSS (global navigation satellite system) in the Coros® Vertex 2 and Garmin® Fenix 6 (GPS watch) during two trail running conditions in a group of recreational trail runners. **METHODS:** Six participants (women n=4, men n=2) completed four self-paced, one-mile trail runs. Accuracy of the two watches were compared across two trail conditions, heavy and light tree coverage. Both watches were worn simultaneously and then switched to the opposite wrists for the next trial. Distance measured by the watches was reported every quarter mile. Conditions were compared using paired t-tests ( $\alpha < 0.05$ ). Mean and standard deviation was calculated for each condition. **RESULTS:** On average, the Garmin reported  $0.93 \pm 0.03$  miles and the Coros reported  $0.94 \pm 0.02$  miles for the one-mile trail. But overall, no difference was detected between the two watches ( $p = 0.43$ ). The distance measured by the watches was significantly greater during the light tree coverage condition than in the heavy tree coverage condition ( $p < 0.01$ ). Additionally, the distance was significantly greater while the watches were worn on the left wrist than when worn on the right wrist ( $p = 0.04$ ). **CONCLUSION:** While there was no difference in accuracy between the two watches, this technology is inaccurate in trail conditions. Both watches were, on average, cutting off 6-7% of the distance; and, in some trials, the watches were cutting off more than 10% of the distance covered. This discrepancy could cause much greater ramifications when greater distances are covered.

Accepted for Presentation at the National American College of Sports Medicine Annual Meeting, Denver, CO, June 2023

Accepted for Presentation at the Midwest American College of Sports Medicine Annual Meeting, Indianapolis, IN, October 2023

Funded by Hope College, Holland, Michigan

#### POSTER 43

### **Freestyle: A Guide to Making Swimming Nutrition Simple**

Megan Wills / mwills@bellarmine.edu / Faculty Mentor: Erin Wiedmar

Nutrition plays a critical role in the performance of an athlete. Although academic research surrounding the topic has increased, there is a disproportionate increase in materials created for the athletes themselves. Regarding competitive swimming, the scope of athlete-friendly instructional materials is even more limited. Therefore, there is an inherent disconnect between the academic research on the topic of competitive swimming nutrition and the athletes who need the information. The purpose of this project is to bridge the gap between the research and the content accessible for athletes themselves. Using an interpretive and simplistic approach, the available academic research was used to assemble a user-friendly guide to nutrition for swimmers. The suggested nutritional guidelines also provided the groundwork to develop recipes that the target audience can utilize. Graphic design elements and artwork are used throughout the book to appeal to the audience and create a space where readers can learn about ideal nutrition during the competitive season.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

## **MATHEMATICS**

#### POSTER 44

### **Exploring 2- and 3-Manifolds**

Kathleen Zopff / kzopff@bellarmine.edu / Faculty Mentor: Gregory Kelsey

This project explores the concept of topological manifolds in 2 and 3 dimensions. It covers the historical context as well as the various types of manifolds. The methods of classifying manifolds are defined and explained. Many examples of various notable manifolds are given. Finally, the applications of manifolds are discussed, both in mathematical research as well as in real-world settings.

#### POSTER 45

### **The Sharp Bounds of a Quasi-Isometry of P-adic Numbers in a Subset of the Real Plane**

Kathleen Zopff / kzopff@bellarmine.edu / Faculty Mentor: Gregory Kelsey

P-adic numbers are numbers valued by their divisibility by high powers of some prime,  $p$ . These numbers have applications in cryptography and are also an important concept in number theory that are used in major ideas such as the Reimann Hypothesis and Andrew Wiles' proof of Fermat's last theorem. This project carefully defines p-adic numbers and explores various ways to visualize them. In particular, the project looks at a mapping of p-adic numbers into the real plane which constructs a fractal polygon with  $p$  sides. The properties of this map are discussed and formulas for the sharp bounds of its distance distortion are given.

Presented at the Kentucky Section of the Mathematical Association of America 2023, March 31-April 1

#### POSTER 46

### **Regression Analysis: Bellarmine Basketball's Offensive Efficiency**

Sheldan Christmas / schristmas@bellarmine.edu / Faculty Mentor: Michael Ackerman

Regression analysis helps basketball teams formulate strategies by providing information for certain aspects of the game such as expected points per possession. This study uses multilinear regression to highlight variables that are used to maximize a team's points per possession. This multilinear regression considers three quantitative variables that are used to determine the points per possession for the Bellarmine men's basketball team. This regression is followed in four simple steps. The first collects data on the independent variables from watching film of twenty conference games. The second step finds the regression coefficients for each variable, which is done through Excel. The third step puts all the information into the respective formulas to come up with an expected points per possession value. The final step analyzes the results and determines what this means in basketball terminology. This final step is the main goal of the project. This study attempts to show when the Bellarmine offense is most effective and what variables are most important to maximize points per possession. These results are used to formulate strategies on the court that lead to team wins.

#### POSTER 47

### **Determinant of Run Differential in the MLB During the Statcast Era**

Nate Clark / nclark3@bellarmine.edu / Faculty Mentor: William Fenton

Run differential has been established as the determining factor when predicting win percentage. In fact, Bill James, a renowned statistician, created a formula that uses runs allowed and runs scored to predict winning percentage. This project investigates which stats and variables are significant in determining run differential in the MLB during the Statcast era (2015-present). This will be done using regression to see how certain stats and variables affect run differential. Because most offensive stats are correlated and most defensive stats are correlated, using many different variables to predict run differential creates bias through multicollinearity. It is crucial to narrow the number of independent variables while also ensuring that significant variables are not omitted. The final specification of the model includes OPS (on base plus slugging), ERA (earned run average), and opening day payroll as the significant independent variables in determining run differential.

#### POSTER 48

### **Fractals and their Dimension**

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Fractals are shapes that are self-similar at various scales. One definition of fractal is a shape whose fractal dimension exceeds its topological dimension. Fractal dimension is an intriguing topic as some fractals can have dimensions with non-integer values. In this paper, we discuss fractals and their dimension, as well as the process of computing fractal dimension through various methods. Fractal dimension can be computed using the box-counting and Hausdorff dimensions, among others. We compare these methods and discuss our results.

POSTER 49

## **Quadric Functions: A More Focused Approach**

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The traditional approach to quadric functions is a simple one, using x and y variables to graph in a three-dimensional space with a z output. However, we believe that quadric functions can be viewed in a similar way to conic sections, their two-dimensional relative. In this project we will explore what it's like to look at quadric functions from the perspective of a focus and directrix. Additionally, we will also explore how this information can be used to graph quadric functions in spherical or cylindrical coordinates. These coordinate systems are the three-dimensional counterpart to polar coordinates.

## **MEDICAL LABORATORY SCIENCE**

POSTER 50

## **Atypical AML Presentation with t(8;21)(q22;q22) RUNX1-RUN1T1 Gene Mutation**

Rachel Gay / [rgay@bellarmine.edu](mailto:rgay@bellarmine.edu) / Faculty Mentor: Karen Golemboski

Acute myeloid leukemia (AML) is a type of cancer that starts in the bone marrow, then enters the bloodstream. There are multiple types of AML, all with different genetic mutations and prognoses. A 39 y/o female began having abdominal pain, and her primary care physician referred her to have a CT scan. The CT scan found a 16cm pelvic mass appearing to be of ovarian origin. Her peripheral blood contained immature white blood cells and was sent for further evaluation. The mass and the immature cells in the blood were suggestive of lymphoma. Patient samples were then sent to molecular for genetic mutations, karyotyping with fluorescence "in situ" hybridization (FISH), and flow cytometry to differentiate the immature cells in the blood. Molecular testing found the patient had the t(8;21)(q22;q22) RUNX1-RUN1T1 gene mutation, which is diagnostic for AML and has a better prognosis. This is an unusual presentation of AML considering the mutation occurs in a small population of AML cases (2.5-9.1%). A smaller fraction of AML cases includes an extramedullary tumor site, suggestive of myeloid sarcoma. Since the patient received her results, she started chemotherapy and had fewer immature cells in her blood. Initial chemotherapy did not achieve remission.

# NURSING

POSTER 51

## Effects of Guided Reflection Journaling on Nursing Clinical Judgement During an Externship

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Background: New graduate nurses face a multitude of challenges when entering the workforce and nursing clinical judgement (CJ), also known as critical thinking or clinical decision-making, accounts for more than 46% of daily tasks nurses perform in their first year (Hensel, 2019, p. 128). There is longstanding discussion concerning the competency of novice nurses who passed the National Council Licensure Exam (NCLEX) and their ability to practice safely. Guided reflective journaling is one active learning strategy that encourages students to reflect on what they have learned, anticipate future needs, and enhance clinical judgement skills (Meijer, 2021, p. 9, 11). This qualitative pilot study follows one nursing student throughout a student nurse extern program (SNEP) utilizing guided reflection questions based on the Tanner Model, Situated Clinical Decision-Making Framework (SCDMF), and a previous qualitative study to determine the effectiveness and feasibility of guided writing to develop clinical judgement. Results: The four themes across all reflection responses were: 1) organization of basic nursing care; 2) prioritization attempts; 3) recognition of common protocols; 4) increased confidence. The most significant finding was the change in reflection writing from haphazardly utilizing the steps of the SCDMF and Tanner Model to systematically following each process, also accounting for the dynamic properties of the CJ models. Conclusion: Following this study could benefit new nurses as the National Council of State Board of Nursing Clinical Judgement Model has similar reasoning phases as the Tanner Model and SCDMF, of which the reflection questions are based upon. By answering guided reflection questions, a form of active learning, based on the Tanner Model and SCDMF during a SNEP experience, it can be concluded that guided reflection writing is one form of active learning that promotes clinical judgement development.

# PHYSICS

## POSTER 52

### **Performance Studies of 30-Node Raspberry Pi4 Beowulf Cluster**

Samia Mahmood / smahmood@bellarmine.edu / Faculty Mentor: Akhtar Mahmood

Raspberry Pi is revolutionizing the field of computing technology in the cluster computing environment. One of our goals is to test and explore the capabilities of Raspberry Pis to determine how well the Raspberry Pis perform in a cluster computing environment for parallel processing tasks. At Bellarmine University, we have built a portable table-top Raspberry Pi4 Beowulf cluster, nicknamed Orchard. The Orchard Raspberry Pi4 cluster uses a gigabit managed switch along with PoE (Power over Ethernet) to deliver power to each Raspberry Pi node. The 30-node Orchard Raspberry Pi4 cluster consists of 120 cores; each node has a quad-core Cortex-A72 (ARM v8) 64-bit SoC clocked at 1.5GHz with 4GB LPDDR4-3200 SDRAM connected to a 48-port gigabit ethernet switch and is running the 32bit Raspbian-11 operating system which is based on the Linux Debian operating system optimized for the Raspberry Pi hardware. Using the Orchard Raspberry Pi4 cluster. We have tested the performance of an ARM (Advanced RISC Machine) CPU compared to a conventional Intel CPU in high throughput computing environment. We have compared the performance of the 30-node Orchard Raspberry Pi4 cluster with a previously built 33-node Raspberry-Pi (RPi) cluster with 33 cores, nicknamed Vine which has a first generation Raspberry Pi1 Model B+ CPU (700MHz processor with 512MB of RAM) running the Raspbian-7 operating system. Both Raspberry Pi clusters use OpenMPI for the parallelization across the nodes. We have used custom made benchmarks created in C++ using the OpenMPI library. We will present the results of our benchmark tests and show the performance across the nodes.



# PSYCHOLOGY

## POSTER 53

### **Associations Between Parental Attachment, Resilience, and Homesickness in College Students**

Shelby Chatterton / schatterton@bellarmine.edu / Faculty Mentor: Christy Wolfe

Transitioning to college can be a very difficult task. It requires resilience which can be defined as “a person’s capacity to successfully adapt in the face of adversity” (Bakar et al., 2010; Masten, 2014; as cited by Tanner, 2018). Previous research has shown an association between early interactions with caregivers and the development of resilience and one’s adjustment to college (Tanner, 2018). One form of adversity that a college student faces that may impact adjustment to college is feelings of homesickness, “the distress or impairment caused by an actual or anticipated separation from home” (Thurber & Walton, 2012). The purpose of the current project was to explore the associations between parental attachment status, traits of resilience, and feelings of homesickness. Thus, the current project extends the existing literature by considering specifically the feelings of homesickness while also exploring the potential mediation of parental attachment status and homesickness by self-perceptions of resilience. This project was built upon the hypothesis that those students with secure attachment histories with their primary caregivers also have increased resilience in responding to feelings of homesickness. Our college student participants were recruited through convenience sampling. They were invited to complete an online survey consisting of questions based on existing scales which measured parental attachment, resilience, homesickness, and adjustment to college. The findings from this research could be useful to colleges and universities by improving their ability to identify possible causes of maladjustment; thereby improving interventions and programs to support their students who are not adjusting as well.

## POSTER 54

### **The Effects of Social Media on Self-Perception**

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Social media is now a prominent feature and even a daily activity in most people's lives, especially those entering adolescence and early adulthood. When someone scrolls through their feed, they are bound to take in countless streams of information. This information can reflect true, moments of reality, or it can show unrealistic and staged moments, altered through filters and face-tune applications (Chen et al., 2022). The type of social media content a person views on any given day can make users feel a variety of different feelings ranging from neutral, to happiness, to jealousy, to sadness, and so on, these positive or negative feelings can tend to make the user uncomfortable (Jeong et al., 2019). For example, constantly seeing posts reflecting unrealistic body standards, lavish lifestyles, and enviable life accomplishments can trigger negative emotions. Experiencing these negative emotions can affect a person's mental health impacting their daily functioning and potentially resulting in harmful behaviors and even suicidality threatening their daily functioning (Swedo et al., 2021). For example, a post reflecting unrealistic standards may include pictures with happy and beautiful friends, exotic travels, expensive cars, and pictures of idealized physiques. Viewing these images could be negatively related to a person's self-image or self-perception and negative self-perception including negative self-worth is associated with disordered eating, anxiety, the fear of missing out, and depression (Oh, 2020). Negative self-perception could be the "steppingstone" psychological experience between social media and maladjustment. With that in mind, in this study, we grouped together different photos to create various social media posts in two different categories, one displaying a neutral life and one portraying an idealistic life. In the current study, we grouped a series of photos from an "idealized" life or unrealistic standard elements into a social media feed and contrasted them with a second social media feed and contrasted them with a second social media feed including "normal" everyday life events (e.g., grocery shopping, cooking, pets, a gas station, etc.)- an idealistic life versus a neutral life. College students were randomly assigned to view either the idealistic or the neutral feed. We hypothesized that the pictures and posts of the idealistic life may trigger negative emotions, and specifically decreased self-esteem, compared to the pictures/posts reflecting a neutral life. Results from this study could inform parents of adolescents and upcoming college students to be weary of social media and the effects it can have on mental health and could be utilized in clinical work.

Presented at the Kentucky Psychological Association 2023 Conference, March 25, 2023

POSTER 55

## **Cultural Concepts of Distress and Clinical Intake Processes in Chinese and Chinese American Populations in the United States**

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Research shows that Chinese Americans underutilize mental health services more than any other ethnic group in the U.S. This project aims to explore the mental health experiences of Chinese American and immigrant communities, with a specific focus on clinical intake processes, including interviews and screening assessments. Cultural concepts of distress refer to ways that cultural groups experience and communicate mental distress, and an exploration of these illness experiences within Chinese populations can inform how to adapt or develop screening and interview tools to fully capture personal narrations of illness during intake processes in preparation for treatment. Challenges that may arise in the intake assessments of Chinese populations include stigma, different conceptualizations of illness and languages of distress (including somatization), illness experiences that overlap with DSM disorders (such as MDD, GAD), and intracultural variations in illness related to other identity factors (gender, generational status, level of acculturation, etc.). Some clinical interview and screening tools have been developed to incorporate local concepts and idioms to create more culturally reflective assessments, including the Cultural Formulation Interview, Chinese American Depression Scale, and Neurasthenia symptom screeners. Data for this project was collected by interviews with mental health providers who work with Chinese and Asian populations in clinical practice and analyzed using a qualitative thematic approach. Synthesis to existing literature and implications is discussed. Further exploration of cultural manifestations of mental distress in Chinese Americans and immigrants may help provide more culturally informed intake processes, assessments, diagnosis, and treatment, which can contribute to higher utilization and effectiveness of mental health services.

Presented at the Southern Regional Honors Council, Charlotte, NC, March 30 – April 1, 2023

## POSTER 56

### **Eritrean Refugees on Coping Mechanism for Stress and Overwhelm**

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This research examines the relationship between refugees and mental health coping strategies among the Eritrean population in the United States. The primary goal is to see how refugees cope with mental health issues and identify resources that might help ease their psychological struggles. This paper reviews the obstacles refugees face pre-migration, during, and post-migration and how that accumulates to impact their mental status as they settle in America. Seventeen refugees and immigrants were interviewed to analyze their coping mechanisms with stress and challenges as new settlers. The interview highlights the distress and post-traumatic stress disorder these individuals experience but are yet to attain adequate and appropriate aid such as counseling and financial and community support. It addresses the role of gender and culture and how that impacts the way individuals process and copes with stress. It also presents the difference in struggle and coping mechanism with those who had a family while settling versus those who did not have anyone here. The interview also highlighted the role of religion in coping with stress and will see how that helped the Eritrean population.

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## POSTER 57

### **Phones and Physiology**

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Cell phones have become an integral part of our everyday life worldwide given their widespread use in communicating, listening to music, playing games, browsing the internet, and shopping. Despite the benefits of cell phones in our daily life, they represent a serious environmental health hazard because they are a major generator of continuous-pulse microwave and radiofrequency electromagnetic radiation. The effect of cell phone radiation on cardiac health, such as, blood oxygen, blood pressure, heart rate, and heart rate variability (HRV) and function remain an important issue (Alassiri et al.,2020). Yet, with

social media and news right at your fingertips to consume, and immediate information at your disposal, can all the gaming, media, and streaming you consume affect your physiology as well, and have an impact on your cardiac health such as, blood pressure, heart rate, blood oxygen, and heart rate variability. In this current study, participants were conveniently sampled and tested for blood pressure, blood oxygen, heart rate and heart rate variability (HRV) in accordance with phone usage. We conducted three trials of phone use, the first being streaming, then gaming, and lastly social media. We tested all participants for their initial baseline, and then tested everyone at five minutes of phone use and at fifteen minutes of phone use, within each trial. We hypothesized that being on your phone will raise your heart rate, heart rate variability (HRV), Blood oxygen levels, and blood pressure. The hierarchy for effect in what participants does goes Games, social media, Streaming. We theorize that Gaming will have the largest change in variability, blood pressure, and oxygen levels, followed by social media, and then streaming. We will know our hypothesis to be supported if our measurements indicate that the heart rate, heart rate variability (HRV), blood oxygen and blood pressure went up compared to previously taken measurements.

## **SOCIOLOGY**

### **POSTER 58**

#### **Family Over Everything: The Implications of Gender Roles on Appalachian Family Dynamics**

Taryn Rollins / [trollins@bellarmine.edu](mailto:trollins@bellarmine.edu) / Faculty Mentor: Frank Hutchins

When we hear the word “Appalachian,” many will look at the countless examples of negative stereotypes displayed in the media. From Hillbilly Elegy to hyperbolized stories of blue people in the mountains, Appalachians have been perpetuated as backward, dirty, incestual, and stupid. Through incessant dehumanization by the media, Appalachian communities have been ignored and even blamed for their disparities. However, historical and social factors have led to Appalachian poverty and, in turn, shaped the culture and values of the region. In addition, due to geographic isolation, family has become a central value and the most significant avenue for socialization within Appalachia. This project explores how familial socialization, gender expectations, and gendered labor impact the experience of family in Appalachia. Informed by enculturated lens theory and utilizing focus groups and ethnographic methods, this project examines the familial experiences of a

specific family in Eastern Kentucky. Appalachian narratives have a history of being manipulated and shared through an outsider's lens. Ethnographic methods amplify and give agency back to those stripped of such. The main objective of this project is to advocate for social change within Appalachia by sharing Appalachian experiences. This thesis is for and about Appalachia.

Presented at the North Central Sociological Association, Indianapolis, IN, April 1st, 2022

Recipient of Student Government Association Research Grant Award

## SPANISH

### POSTER 59

#### **A Constant Presence of Absence: The Construction of Invisibility and Immigrant Death in the Borderlands**

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The same nation that once championed itself as a cultural “melting pot” is the very same that allows thousands of migrant bodies to rot in the heat of the United States-Mexico Borderlands. It is through the sociopolitical debasement of immigrants to “bare life bodies” that thousands are made invisible and erased through their deaths, with little recognition or accountability taken on behalf of government institutions. Hiding behind the conveniently harsh desert terrain to mask any need for culpability, the United States government enacts a sort of invisible hand over immigrant lives that is reinforced through harmful policy, Border Patrol surveillance, and even armed civilian militias at the border. This ethnographic study of invisibility and erasure as it pertains to immigrant populations exposes how power and politics intersect to make certain groups invisible. In a political moment in the United States where immigrants are being shipped from Texas in droves like cattle, visibility is wielded by politicians as a double-edged sword in which the implications of illegal status forces immigrants to live in the shadows, threatened by deportation. In response, immigrant rights activists and organizations expose the “necroviolence”, neglect, and death of undocumented border crossers by employing search and rescue teams and constructing sites that serve as visible representations of this egregious loss of life. Memorials of immigrant populations

constructed by the living therefore serve as an act of political protest to restore visibility to populations that are left by sovereign nations to die, decay, and disappear.

Recipient of Joe & Angela Schmidt Honors Award

## GRADUATE STUDENTS

### MEDICAL LABORATORY SCIENCE

#### POSTER 60

#### **A Centralized Benchmarking Database in Clinical Laboratory Research: A Project to Improve Patient Safety**

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Benchmarking is a technique utilized to compare similar data points within or between organizations. Typically, benchmarking occurs in healthcare to optimize efficiency and patient safety. Current healthcare benchmarking literature can be found for most specialties throughout healthcare, but benchmarking research in the context of the medical laboratory is sparse. Thus, the Patient Safety Committee of the American Society for Clinical Laboratory Science (ASCLS) has set out to establish a centralized benchmarking database. This project aims to employ benchmarking techniques to help monitor patient safety indicators within clinical laboratories across the United States. The goal of this beta-test is to test the efficacy of the database, timeliness of reports, and effectiveness of features currently in place prior to the release of the database. The results of this project, when available, will have several implications for further research. A functional central benchmarking database will allow organizations the opportunity to improve upon their statistics and continuously increase patient safety. This project brings awareness to some of the goals of clinical laboratories. It is a small beginning for what could become a larger benchmarking project.