

*the thirteenth annual*

# CAPSTONE

F E S T I V A L

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THE SHOWCASE OF UNDERGRADUATE RESEARCH,  
SCHOLARSHIP, AND CREATIVE ACTIVITY  
AT MARY BALDWIN UNIVERSITY

SENIOR PROJECTS • HONORS PROJECTS • SPECIAL PROJECTS

**MAY 10, 2018**

**MB** MARY BALDWIN  
UNIVERSITY

PARTICIPANTS IN THE CAPSTONE FESTIVAL HAVE BEEN NOMINATED  
BY THE FACULTY BASED ON THE HIGH QUALITY AND ORIGINALITY  
OF THEIR WORK AND HAVE ACCEPTED NOMINATION.

**#MBCapstone**

# CAPSTONE FESTIVAL

In the early days of Mary Baldwin Seminary, a Capstone Festival of sorts existed.

"All final examinations were held in public and members of the board of trustees and the townspeople attended to view students parse sentences, do intricate math problems, and recite soliloquies," wrote Professor Emerita of History Patricia H. Menk in her book *To Live in Time: The Sesquicentennial History of Mary Baldwin College 1842-1992*.

By the late 1800s, the practice of public recitations had disappeared. In 2006, Mary Baldwin College inaugurated a new Capstone Festival. The 2017 Festival marked the first as Mary Baldwin University.

At each year's festival, a select group of students, nominated by faculty, present their senior, honors, and special undergraduate research projects to the MBU community and the general public. The high quality and breadth of research, scholarship, and creative activities on display is a testament to the legacy of those earlier years and a celebration of our future.

The 2018 Capstone Festival is made possible through the support of the MBU Advisory Board of Visitors, the Office of Sponsored Programs and Undergraduate Research, and the the Global Honors Scholars Program.



Share your images of the day and be sure to tag them  
#MBUCapstone

## FESTIVAL PARTICIPANTS



### CARTER ANDERSON

**Project and Academic Advisor:** Beth Easterling

**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support

**Title:** The Application of Restorative Justice to Violent Juvenile Offenders

**Abstract:** Retributive methods (such as juvenile detention centers and the school-to-prison-pipeline) have failed in reducing juvenile violence, a growing problem in the United States. The purpose of this research is to explore an alternative method for reducing juvenile violence, known as restorative justice, which focuses on mending the relationships between the offender, victim, and community. Scientific studies indicate that the differences between juveniles and adults are substantial enough to warrant differing consequences, and case studies suggest that restorative justice may work well as an alternative method for juveniles, both in the context of the juvenile justice system and in schools. My research indicates that restorative justice has the potential to reduce the recidivism rate of violent juvenile offenders, as well as reduce violence in schools, thus reducing the number of juveniles in the criminal justice system overall.

**Biography:** Carter Anderson is a double major in criminal justice and history. She was born in Germany and currently lives in Dunkirk, Maryland. She is a member of Alpha Phi Sigma, Phi Alpha Theta, and Alpha Lambda Delta. In the fall, Carter will enter the Creative Writing MFA program at Kingston University.



### DIAMONIQUE ANDERSON

**Project and Academic Advisor:** Laura van Assendelft

**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support

**Title:** Why Did the Incumbency Advantage Not Predict the 2016 Presidential Election?

**Abstract:** Prior to the 2016 Presidential election, the Democratic Party possessed what political scientists identify as an "incumbency advantage." Americans have elected populist candidates in the past, but the 2016 election was unusual because Donald Trump was not predicted to beat the politically established Hillary Clinton. The unpredictability of the 2016 Presidential election raises questions about the effect of "mood of the country" in relation to the incumbency advantage. "Mood of the country" is an often-overlooked variable because it is difficult to measure, but failing to identify the mood in an election may cause unprecedented results. In this study, I analyzed National Election Studies data from the 2000-2016 presidential elections to determine if "mood" influenced the election and re-election of George W. Bush and Barack Obama.

**Biography:** Diamonique Anderson is a political science major from Chesterfield, Virginia. She is interested in pursuing a job in foreign affairs or public policy. She plans to pursue fellowship opportunities during her gap year to solidify her interests before graduate school.



### ALAYAH AUSTIN

**Project and Academic Advisor:** Amy Tillerson-Brown and Mary Hill Cole

**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support

**Title:** Land-Grant Schools in Virginia, VSU and VPI, 1860-1955: Questions of Equity

**Abstract:** Virginia's two land-grant schools, Virginia State University (VSU) and Virginia Polytechnic Institute and State University (VPI), emerged from the Morrill Act of 1862 but were later justified from the Morrill Act of 1890. The Morrill Act of 1890 established the legal separation of educational facilities throughout the nation based on race before the Plessy vs. Ferguson case in 1896. This bill stated that states with federally funded land-grant schools that discriminated on race were required to provide a school for each race and that funds allocated by the state to those schools must be equal in all respects. Despite the Morrill Act of 1890, however, Virginia's Black land-grant school never received the same funds as the White land-grant school.

**Biography:** Alayah Austin is a history major, with a minor in mathematics and African-American studies, from Newport News, Virginia. She is a member of Phi Alpha Theta and Alpha Lambda Delta. In the fall, she plans to attend graduate school.



### VALERIE BAIRE

**Project and Academic Advisor:** Bruce Dorries

**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support

**Title:** Into the Fox's Den: An External Organizational Communications Audit of Fox News Using Systems Theory

**Abstract:** Fox News Channel is an American cable network and political commentary channel that was launched in 1996. Fox News has a standing history of media bias, with a policy of supporting conservative ideas. Through the aid of Rupert Murdoch and political consultant Roger Ailes, Fox News has been able to become the one of the most valuable brands in the world. In order to fully understand how Fox News has reached this point, it is important to understand how its external communications function. This study is an organizational communications audit of Fox News' external communications using systems theory, which includes recommendations for the organization.

**Biography:** Valerie Baires is currently a senior at Mary Baldwin University, majoring in marketing communications with a double minor in Latin American studies and religious leadership and ministry. Upon graduation, Valerie intends to travel to Costa Rica with the Peace Corps, working with developing communities to launch sustainable businesses.

**SUSAN BLACKBURN****Project and Academic Advisor:** Paul Deeble**Type of Project:** Senior Project**Presentation Category:** Poster**Title:** The Effects of CRISPR-Cas9 Mediated Knockout of NOX4 in GL-261 Cells

**Abstract:** Glioblastomas are a lethal, aggressive type of brain tumor and are difficult to treat. Currently, the median survival for this type of cancer is just over a year and there are no effective long-term treatments. NADPH oxidase 4 (NOX4) and the reactive oxygen species (ROS) it produces have been associated with cancer progression in certain cell types, including cervical cancer, non-small cell lung cancer, and some glioma cell lines. This study utilized CRISPR-Cas9, a relatively new genome editing system, to examine the role of NOX4 in GL-261 cells, a murine glioma cell line, by "knocking out" the NOX4 gene. This work, which is still in progress, initially demonstrated that NOX4 was expressed in GL-261 cells. GL-261 cells were found to be very difficult to transfect with the NOX4 CRISPR gRNA construct so troubleshooting was completed to confirm the optimal parameters for knockout of NOX4 gene expression. Following successful transfection of the NOX4 CRISPR gRNA constructs, assays measuring effects on proliferation and migration will be undertaken with the long-term goal of characterizing the role of NOX4 in the tumorigenic profile of GL-261 cells.

**Biography:** Susan Blackburn is a biology major and chemistry minor from Crozet, Virginia, who is in the process of applying to medical schools.

**CASSANDRA LIN BRAGDON****Project and Academic Advisor:** Abigail Wightman**Type of Project:** Senior Project**Presentation Category:** Presentation with multi-media support**Title:** Eclipsing the Sun: Conformity as Agency in Modern Japan

**Abstract:** This study focuses on the way that modern Japanese women conform to "traditional" gender roles as a vehicle of culturally-constrained agency. The first section explores the nationalization of gender ideology during the Meiji Period as a development tool of the state, as well as the socio-cultural effects of the 1990s recession. The second section discusses the results of a questionnaire on gender ideology and life choices sent to female Japanese college students in October 2017 and compares the results to previous studies and statistical data. Finally, the analysis focuses on anthropological theories of agency and how Japanese women actualize them today.

**Biography:** Cassandra Bragdon is an anthropology/sociology and international affairs major from Mont Vernon, New Hampshire. She was elected to Phi Beta Kappa this spring. In the fall, Cassie will attend the Graduate Institute of International and Development Studies in Geneva, Switzerland, pursuing an MA in the Anthropology and Sociology of Development.

**ABIGAIL CARINDER****Project Advisor:** John Ong**Academic Advisor:** Maria Craig**Type of Project:** Senior Project**Presentation Category:** Presentation with multi-media support**Title:** Auto-Correct: A Look at DNA Assembly Using the Levenshtein Distance

**Abstract:** Bioinformatics is a field of mathematical analysis of genomics that depends on the ability to assemble DNA for analysis. The assembly process is based on graph theory and utilizes circuits without any context to the DNA being analyzed when there is no reference genome. This project used classes of organisms with similar genes as a reference base and created a more accurate assembly with the Levenshtein distance. The Levenshtein distance is a string metric used in current auto-correct features. Auto-correct suggests possible alternatives based on misspellings or context clues in advanced algorithms, using distance between words. Auto-correct dictionaries are based on what we know and what we want it to know, like a new last name. By literally exchanging letters for nucleotides and words for genes, the same process of auto-correct that assists our day to day life was applied to DNA assembly. This project resulted in a working model for more accurate DNA assembly using *Mycoplasma genitalium* genes

**Project Advisor:** Peter Ruiz-Haas**Academic Advisor:** Maria Craig**Type of Project:** Senior Project**Title:** Removing Bisphenol-S with UV Light, Titanium Dioxide, and Hydrogen Peroxide

**Abstract:** Bisphenol-S (BPS) is a common replacement for bisphenol-A (BPA). Both compounds have been determined to be endocrine disrupting compounds (EDCs). The increased use of use of BPS makes it necessary to understand its fate in wastewater treatment. In this study, the destruction of BPS with advanced oxidation (AOP) processes that employ a combination of UV irradiation and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) or titanium dioxide (TiO<sub>2</sub>), was examined. Both UV/H<sub>2</sub>O<sub>2</sub> and UV/ TiO<sub>2</sub> AOP can destroy organic contaminants through generation of radical species. In this research, UV/H<sub>2</sub>O<sub>2</sub> AOP at 7% w/w H<sub>2</sub>O<sub>2</sub>, with UV light breaks down over 80% of BPS in a 5 mg/L solution in under 2 hours. Exposure to TiO<sub>2</sub> in powdered form instantly reduces the amount of BPS present in a 5 mg/L solution by half, though continued UV exposure does not increase the degradation.

**Biography:** Abigail Carinder is a double major in chemistry and math from Durham, North Carolina. Following graduation, she hopes to pursue work in analytics or big data before returning to education for a higher degree.

**ANNAPURNA CHITNAVIS****Project and Academic Advisor:** Maria Craig**Type of Project:** Senior Project**Presentation Category:** Poster**Title:** The Effects of Varying Vitamin D3 Concentration on LL-37 Production in THP-1 Cells

**Abstract:** One way in which the innate immune system, an immediately active first line of defense, protects against infection is by producing antimicrobial peptides (AMPs). Cathelicidins are an important family of AMPs that establish an antimicrobial barrier at epithelial interfaces, such as the skin. LL-37 is the only cathelicidin-derived AMP found in humans. In autoimmune skin disorders, LL-37 production is often altered, and vitamin D3, the metabolically active form of vitamin D, has been shown to induce the production of LL-37. In order to determine the relationship between vitamin D3 levels and amount of LL-37 produced, human monocytic THP-1 cells were cultured in varying concentrations of vitamin D3. The cell culture supernatant and lysate were collected and analyzed via total protein assays and LL-37-specific immunoblotting. Based on the six immunoblots (dot blots) performed, the amount of LL-37 produced in THP-1 cells in both the absence and presence of vitamin D3 was less than 100 pg/μL. Further experimentation is necessary in order to establish the relationship between concentration of vitamin D3 used in cell treatment and amount of LL-37 produced.

**Biography:** Annapurna Chitnavis is a biochemistry major with minors in mathematics and piano performance. Her hometown is Phoenix, Arizona. Annapurna has been elected to Phi Beta Kappa and is the recipient of the Outstanding Chemistry Student Award for 2018. She has a strong passion for helping children and plans to pursue a career in medicine.

**ASHLEY CURRIE****Project and Academic Advisor:** Bruce Dorries**Type of Project:** Senior Project**Presentation Category:** Presentation with multi-media support**Title:** External Communication in the Modern Age: An Analysis of the Trump

Administration's External Communication

**Abstract:** The 45th president's use of Twitter is unprecedented; nearly every day in the United States, there is at least one news story covering something the president tweeted. However, this form of communication has led to some disconnect with other White House communication systems. To ensure the overall success of an administration, communication must be effective and comprehensive, and lack of effective communication can result in a loss of allies, resources, and constituent support. This project analyzed the White House's external communications, focusing on the relationship between traditional and modern communication in the 21st century. The press secretary plays the role of controlling the message portrayed by the media and updating the public on the administration's platform. However, this administration has encountered issues with presenting a unified message. There have been numerous instances in which the president tweeted something that contradicted statements made by

a press secretary, risking the appearance of a disorganized, unprofessional administration. Moving forward, the President and his press secretary must work together to unify their communications and consult one another about how and when to speak to the general public. Without this, there will continue to be a significant and damning disconnect in communications, leading to further disapproval from constituents and lack of partisan support.

**Biography:** Ashley Currie is a marketing and communication major and philosophy minor from Mechanicsville, Virginia. She plans on attending graduate school for philosophy to pursue a career as a professor.

**KAELYN DICKINSON****Project and Academic Advisor:** Donovan Branche**Type of Project:** Senior Project**Presentation Category:** Presentation with multi-media support**Title:** Modern Medicine: The Impact of Telemedicine in Texas Corrections**Abstract:** In the late 20th century, the

emergence of technology contributed to innovative health care reforms, including telemedicine – the use of telecommunication and information technology to provide health care from a distance. As telemedicine and its technologies have expanded, so has the demographic that it serves. Telemedicine is not limited to the civilian health care system; its current reach includes inmate populations. By definition, "correctional telemedicine" can be defined as the application of technology to assess, diagnose, or treat a patient's medical condition in any correctional setting. Considering the variables of cost and access, the researcher investigated the effectiveness of telemedicine in Texas correctional facilities prior to and post-1994. The year 1994 marks the introduction of telemedicine in Texas corrections. Texas was one of the first states to institute telemedicine in corrections and has one of the highest incarceration rates in the United States. The purpose of this research was to explore how the emergence of telemedicine made a progressive difference in correctional healthcare for Texas inmates.

**Biography:** Kaelyn Dickinson is a native of New Castle, Delaware and currently resides in Richmond, Virginia. She is a health care administration major with an emphasis in public health. Kaelyn has interned with Augusta Health Hospital in Staunton, Virginia, and Pfizer in Richmond, Virginia. She is a member of Upsilon Phi Delta, the National Honor Society for Healthcare Administration and the 2018 recipient of the Mary Baldwin University Health Care Administration award. In the future, Kaelyn aspires to work for the Centers for Disease Control and Prevention or the World Health Organization.



**JEREMIAH DUBICK**

**Project Advisor:** Calvin Chung  
**Academic Advisor:** Virginia Trovato  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** A Tax to Save America  
**Abstract:** The costs of gun violence

in America are absurdly high. Hospitalizations, death and productivity loss are just a few of the impacts on our health and economy. So far, it seems as though legislation to curb firearm violence has been scarce and very partisan. This study incorporates research on the costs and benefits of the gun industry and proposes a tax to begin the process of reducing gun violence in the United States. Comparisons from similar industries show that taxes would be effective in reducing the negative impacts of firearms on our citizens and our economy.  
**Biography:** Jeremiah Dubick is a business administration major with an emphasis in accounting as well as a minor in economics. He is originally from Calgary, Alberta, Canada, and is applying for citizenship in the United States. He has volunteered for the Valley VITA program for 4 years and has helped many community members with their taxes. He has a goal to get his CPA as well as his CFE (Certified Fraud Examiner).

**Y. REBECCA DUBOIS**

**Project and Academic Advisor:** Lise Keiter  
**Type of Project:** Senior Project  
**Presentation Category:** Performance or reading  
**Title:** The Impact of Global Music  
**Abstract:** As Victor Hugo once stated, "Music expresses that which cannot be

said, and on which it is impossible to be silent." This program consists of pieces from different parts of the world. It showcases different cultures and also demonstrates how emotion can be conveyed, even in a language that is unfamiliar to the listener. Six Creole folksongs by Maud Cuney-Hare incorporate Creole music from Louisiana and the Caribbean. An ancient Japanese lullaby arranged by Scarlett Antaloczy shows that music can withstand time as well as evoke the emotion of love. Marj Desius set her own words to Adele's "Hello" to invoke change for the country of Haiti. And "Too Beautiful for Words," from The Color Purple, encourages self-worth despite what society may cause one to believe. These pieces, all written by female composers, allow music to describe emotions of love, hope, and self-worth.  
**Biography:** Y. Rebecca Dubois is a music major with an emphasis in vocal performance from Naples, Florida. At Mary Baldwin she studies voice with Dr. Anne Wick. She hopes to further her education in the fall at the University of Akron or Morgan State University.

**KIMBERLY N. FENNELL**

**Project and Academic Advisor:** Jennifer Hancock  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** Hormone Replacement Therapy and Depression: A Review of Treatment

During Postpartum and Postmenopausal Periods  
**Abstract:** Postpartum depression and postmenopausal depression are two disorders that are common in women. Although psychosocial factors can contribute to their onset, physiological factors can also contribute to the development and severity of both disorders. Hormone replacement therapy is one potential treatment for these conditions. For this therapy, women are prescribed either estrogen, progesterone or both to supplement the decreased levels of the hormones following pregnancy or perimenopause. This study reviewed the literature to determine which hormone replacement therapy is the most effective in treating these conditions. The scientific consensus of research to date indicates that estrogen replacement therapy is the most effective treatment.  
**Biography:** Kimberly Fennell is a health science major with a passion for women's health. She hails from Richmond, Virginia. In the fall, Kimberly will be entering a Master of Health Administration program at Virginia Commonwealth University.

**BRIANNA GUOKAS-COOPER**

**Project and Academic Advisors:** Amy Tillerson-Brown and Mary Hill Cole  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** The Millworker's Dilemma: Equity in the 1929 Textile Strikes of

Tennessee and North Carolina  
**Abstract:** In the turbulent climate of the southern textile industry during the late 1920s and 1930s, factory workers endured inequitable conditions. Through strict manipulation of mill towns, large corporations exploited their workers and violated labor regulations in order to maintain their lucrative businesses in places such as Elizabethton, Tennessee, and Gastonia, North Carolina. Instead of remaining submissive, the thousands of mill workers that took to the picket lines in 1929 found themselves at the forefront of a national stage in which they defied stereotypes and voiced their grievances about the problematic nature of the textile industry.  
**Biography:** Brianna Guokas-Cooper is a history major from Luray, Virginia. After graduation she plans to pursue a degree in museum studies.

**KELSEY JAMERSON**

**Project and Academic Advisor:** Lise Keiter  
**Type of Project:** Senior Project  
**Presentation Category:** Performance or reading  
**Title:** Exploring 20th-Century Styles through the Piano Music of Robert Starer and Florence B. Price

**Abstract:** At the start of the 20th-century, composers strayed away from traditional rules and techniques and began experimenting with new ideas. This program of piano music explores some of those new styles through works of American composers Robert Starer and Florence B. Price. Starer's "Sketches in Color," a set of seven pieces, illustrates a different 20th-century technique for each piece, or "color." For example, the first piece, "Purple," is very dissonant and mysterious because of its chromaticism. "Shades of Blue" shows the influence of jazz, with syncopation in the melody. "Black and White" is bi-tonal because the melody and accompaniment have two different key signatures. And "Grey" is an example of serialism, or 12-tone writing. In "Ticklin' Toes," Florence B. Price shows her individual style by incorporating her African-American heritage into the music. "Ticklin' Toes" is a cakewalk, which is an African-American dance with a distinctive rhythm.  
**Biography:** Kelsey Jamerson is a music major with emphasis in piano performance from Chesapeake, Virginia. She studies piano with Dr. Lise Keiter. Last year, Kelsey was chosen to perform in a master class with Simone Dinnerstein. After graduation, she plans to attend a graduate program in piano performance or music therapy.

**NICOLE KEEN**

**Project and Academic Advisor:** Mary Hill Cole and Amy Tillerson-Brown  
**Type of Project:** Senior Project  
**Presentation Category:** Delivered paper  
**Title:** Death of the Matriarchy: Women's Rights and Religion in Medieval Iceland

**Abstract:** During the Old Norse era in Iceland (874-1000), Icelandic women enjoyed considerable freedoms written into the law and into societal norms. Married women determined the line of inheritance, legally owned property, had the unique power of calling blood feuds to defend their family's honor, and were regarded with respect by their communities. After the Norwegian king converted the Icelanders to Christianity, more restrictive Christian practices introduced during the eleventh and twelfth centuries reduced the power of women within the family and society and slowly eradicated the legal, social, and economic powers of women in Icelandic society, placing them at a lower social standing than before. In her thesis, Nicole analyzed the earliest Icelandic sagas, early church canons, and the Icelandic law codes *Gragas* to examine the systematic destruction of the social matriarchy in Iceland.  
**Biography:** Nicole Keen is a history major and psychology minor from Richlands, Virginia, and was elected to Phi Beta Kappa this spring. Nicole hopes to pursue a master's degree in history in the coming years and one day become a professor of European history.

**SHELBY MA**

**Project and Academic Advisor:** Maria Craig  
**Type of Project:** Senior Project  
**Presentation Category:** Poster  
**Title:** Concentration Dependence of LL-37 Induction with Vitamin D

**Abstract:** LL-37 is a crucial antimicrobial peptide whose main function is to assist the immune system in fighting off bacterial infections. In addition, LL-37 plays a role in some cancers, such as breast cancer, and in certain autoimmune diseases, including psoriasis, lupus, and rheumatoid arthritis. Vitamin D, a regulator of the immune system, has been shown to induce the production of LL-37 in some immune cell types. In order to investigate LL-37 induction by vitamin D, varying concentrations of vitamin D were added to monocytic (THP-1) cells from 0 nM to 160 nM and the amount of LL-37 that was produced was analyzed. Several techniques were used to detect LL-37, including western blot, dot blot, and ELISA. The results demonstrated that LL-37 was present in THP-1 cells, but further research is required to conclusively determine if increasing the concentration of vitamin D has an effect on the production of LL-37.  
**Biography:** Shelby Ma is a biochemistry major from Virginia Beach, Virginia. She is planning to pursue her master's degree in biomedical sciences research and eventually obtain her Ph.D.

**TALULA MAYS**

**Project and Academic Advisor:** Jim Sconyers  
**Type of Project:** Senior Project  
**Presentation Category:** Visual or audio-visual creation  
**Title:** Asomatous  
**Abstract:** As buildings are left vacant,

forgotten behind years of overgrowth, nature exhibits its tendency to reclaim its former property, creeping in through the walls whenever given the chance. These places exist in a world separate from that of our everyday lives, hidden from common awareness and accessible only by those who choose to notice. Through this series of photographs, Talula intends to explore nature's inevitable reclamation of all man-made structures and the beauty that can be found in the layered textures of decomposing materials, as well as to convey the experience of exploring this eerie world existing parallel to our own.  
**Biography:** Talula Mays is a studio art major with a minor in film from Staunton, Virginia. She works in a variety of mediums, including photography, painting, film, and sculpture. Her film, *Delicacy*, has been selected for the 2018 Richmond International Film Festival. Talula is a rising senior who plans to enter an MFA program after graduation.

**NIRANJANA MENON**

**Project and Academic Advisor:** Amy Diduch  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** Determinants of Monetary Demand and Velocity after Demonetization in India

**Abstract:** On November 8th, 2016, the Indian government decided to devalue 84% of the currency to tackle the problem of unaccounted currency and counterfeit money. This project analyzes the impact the demonetization initiative in India had on macroeconomic indicators such as velocity, money demand, and spending. Monetary velocity examines the rate at which currency is exchanged in the economy and has implications



on national spending and saving rates. Monetary velocity in India spiked post-demonetization due to a rise in electronic transactions, and predictors of monetary demand are strong indicators that show that velocity was impacted by factors other than monetary supply. The results provide insight on the usage of massive cash removal as a tactic to increase digitization and monetary accountability.

**Biography:** Niranjana Menon is an economics major and math minor from Thrissur, India. She is a student in the PEG program and was elected to Phi Beta Kappa this spring. She conducted a research project on microfinance in China in 2017. She will be attending Duke University for a Master's in Analytical Political Economy in the fall.



**ZORINA MORTON**

**Project and Academic Advisor:**

Donovan Branche

**Type of Project:** Senior Project

**Presentation Category:** Presentation with multi-media support

**Title:** Journey to Wellness: African-American Mistrust of the Health Care System

**Abstract:** This project reviews the history of African-Americans and how key historical events have altered the way that they view health care, especially in comparison to individuals of other races. Blacks have a higher-than-average rate of health issues and complications and also express significant mistrust of the health care system. This research paper traces where these attitudes may have stemmed from and the lasting effects still lingering today, showing that past experiences have an impact on the future. Although past events are not the only reasons for medical distrust, they clearly warrant careful study. I urge that ignoring past events and experiences will further the trust gap in medical services provided by persons who are not African-American.

**Biography:** Zorina Morton is a health care administration major with an emphasis in public health. She is from Philadelphia, Pennsylvania. In the fall she will be entering a master's program in disaster medicine and management at Thomas Jefferson University.



**MARIANNA MOYNIHAN**

**Project and Academic Advisor:**

Heather Macalister

**Type of Project:** Senior Project

**Presentation Category:** Presentation with multi-media support

**Title:** A Theater Intervention for Troubled Teens

**Abstract:** Drama therapy is beginning to take flight in the field of psychology, but research is mostly qualitative. This study aimed to provide quantitative evidence in support of the positive effects of theater interventions on self-esteem in troubled teenagers. Participants were two girls (aged 16 and 17; one white, one Latina) who have experienced multiple forms of abuse and are enrolled in an alternative schooling institution due to this fact. Self-esteem was tested before and after participation in an eight-week theater intervention. Self-esteem was measured with the Culture-Free Self-Esteem Inventory, Third Edition. I designed this intervention to promote

dramatic projection and dramatic embodiment, two drama therapy core processes proven to promote client change. The exercises within the theater intervention are based on Augusto Boal's *Theater of the Oppressed* and Anne Bogart's *Viewpoints*. Results show a significant decrease in defensiveness in one participant and a significant increase in self-esteem in the other participant. This study suggests that troubled teens might benefit from participating in exercises that include drama therapy core processes.

**Biography:** Marianna Moynihan is from Croix-des-Bouquets, Haiti. She is graduating with a BA in theater and a BS in psychology and was elected to Phi Beta Kappa. Marianna plans to pursue a PhD in creative counseling and eventually establish her own drama therapy practice. She'd like to express gratitude to the psychology department and her parents.



**GISELLE OLIVERA**

**Project and Academic Advisor:** Jim Sconyers

**Type of Project:** Senior Project

**Presentation Category:** Visual or audio-visual creation

**Title:** The Complexity of Human Form

**Abstract:** The earliest artistic

endeavors of our species unveil a fascination with the intricacies of the human form. In a matter of seconds, a visual language derived from posture, facial expression, complexion, and innumerable other aspects is absorbed through the power of the glance. In artworks, representations of the human body are often intended to convey a certain message. The intention of my senior painting thesis, *The Complexity of Human Form*, is to probe into the viewer's perception by examining the body within different contexts. Figure painting is poised in balance between change and stability, posing perhaps one of the greatest challenges of all: capturing the essence of a person, something that often seems to transcend visual expression, within a precise likeness. It is a search for the intangible force within each human that marks us as individuals, in order to perpetuate it for ages to come.

**Biography:** Giselle Olivera will graduate Phi Beta Kappa, magna cum laude, achieving a BA in Studio Arts with an Art History minor at MBU and the Fundamental Diploma in Florence, Italy. Her honors thesis, *The Scientific Art of Portraiture*, won the Russell Award at MBU. She received the Ulysse Desportes Award for Outstanding Achievement in Studio Art, and her work, including her portrait of Stephen Hawking at the University of Cambridge, is in a museum, two monasteries and two universities. Currently working with bioengineers on a systematic taxonomy of plant species and their uses in three different countries, her botanical illustrations identify medicinal species for book projects sponsored by the World Wildlife Fund.



**DESTINY RODRIGUEZ**

**Project and Academic Advisor:**

Louise Freeman

**Type of Project:** Senior Project

**Presentation Category:** Poster

**Title:** The Effect of Caffeine on Anxiety in Pre- and Post-Pubescent Mice

**Abstract:** Caffeine increases anxiety

both in humans and in animal models. In recent years, caffeine

use has increased, especially among children and adolescents. Presently, much remains unknown about the long-term effects of pre-pubescent caffeine and its effects on caffeine consumption and sensitivity in adulthood. This study examined the relationship between caffeine and anxiety with regard to age and sex in mice. Pre-pubertal mice weaned at 21 days and raised in Mary Baldwin University's vivarium were given caffeine via drinking water (0.3 mg/ml) for seven days, then were tested for anxiety in an elevated plus maze. This dose of caffeine is equivalent to drinking three to four cups of coffee per day. As predicted, caffeine-treated mice spent less time [M = 11.68 s. SD = 15.75 s] in the open arms of the maze than controls [M=26.47 s., SD = 29.99 s.; F(1,62) = 5.171, p = 0.026], indicating higher anxiety. There was no significant effect of sex on anxiety and no interaction between sex and drug treatment. The second phase of this study tested the hypothesis that mice exposed to caffeine as juveniles are less sensitive to caffeine as adults (older than six weeks). Mice who received caffeine as juveniles and control mice were re-tested for anxiety after two weeks of adult caffeine treatment and compared to mice that were not given caffeine as juveniles or adults. Time in the open arms decreased in adulthood compared to the juvenile period (p=0.045). Caffeine decreased time in open arms at both ages (p=0.008). There was also an interaction between sex and age (p=0.013), with a sex difference in the juvenile, but not adult period, and a trend of treatment group by age (p=0.096). Overall, caffeine increased anxiety at both ages, but there was no evidence that pre-pubescent exposure to caffeine altered later effects.

**Biography:** Destiny Rodriguez is a psychology major from Culpeper, Virginia, and is a member of Psi Chi, the psychology honor society. She has worked for a state psychiatric facility for over a year as a behavioral health care worker and plans to be a counselor to troubled youth. Destiny is the first one in her family to graduate from college.



**SHERRIE SCHMON**

**Project and Academic Advisor:**

Jennifer Hancock

**Type of Project:** Senior Project

**Presentation Category:** Poster

**Title:** A Comparison of the Prevalence of *S. aureus* and MRSA between Health Care Professionals and Other Professions

**Abstract:** According to the Centers for Disease Control and Prevention (2016), 1 in 3 people are carriers for *Staphylococcus aureus* and 2 in 100 people are carriers for methicillin-resistant *Staphylococcus aureus* (MRSA). Carriers can spread these bacteria even if they do not have symptoms of an infection. MRSA is a strain of antibiotic resistant *Staphylococcus aureus* that most commonly causes skin infections, but can be fatal. In this experiment, members of the Mary Baldwin University community were tested for both *S. aureus* and MRSA. They were also asked a series of questions to determine if they currently or previously worked in a health care setting. The hypothesis was that prevalence of both *S. aureus* and MRSA would be higher in individuals who have worked in a health care setting. The results proved to be the opposite. A higher prevalence of both *S. aureus* and MRSA was found among those who had never worked in health care.

**Biography:** Sherrie Schmon is a health sciences major. She is a local who currently resides in Waynesboro, Virginia. After graduation, Sherrie is applying to the physician assistant program at Murphy Deming College of Health Sciences.



**HALEY SHOWS**

**Project and Academic Advisor:**

Katherine Turner

**Type of Project:** Senior Project

**Presentation Category:** Delivered paper

**Title:** Uncanny Houses of Patriarchy in Shirley Jackson's *The Haunting of Hill*

*House* and *We Have Always Lived in the Castle*

**Abstract:** Shirley Jackson, a twentieth-century American writer, is best known for her work within the horror genre, with short stories such as "The Lottery" and novels such as *The Haunting of Hill House*. The horror she crafts is remarkable for its focus on the domestic lives of its female protagonists and especially on the houses in which they live. This focus on domesticity serves not to distract from the horror but rather to enhance it, as well as illuminate certain terrifying aspects of female existence within a patriarchal society. Drawing on feminist critiques of architecture and the uncanny, this thesis examines two of Jackson's novels: *The Haunting of Hill House* (1959) and *We Have Always Lived in the Castle* (1962). In doing so, this thesis explores ways in which portrayals of horror in domestic settings allow for subtle yet powerful critiques of patriarchal ideology and its effects on women's lives.

**Biography:** Haley Shows is an English major with a minor in sexuality and gender studies. She is originally from Richmond, Virginia, and now lives in Staunton.



**ABINAYA SUBRAMANIAN**

**Project Advisor:** Bruce Dorries

**Academic Advisor:** Claire Kent

**Type of Project:** Senior Project

**Presentation Category:** Presentation with multi-media support

**Title:** Friendly Skies with a Few Turbulences: An Analysis of United Airlines Using Systems Theory

**Abstract:** In April 2017, social media went berserk when a video of an innocent passenger being beaten up and dragged off a United Airlines flight was released on the forum. The incident was one of the worst cases of customer service ever seen, and the public relations that followed were a nightmare for the airline. Following this event and several other issues to hit United, Abinaya conducted an external communication audit of the organization using systems theory to evaluate the effectiveness of their communication on social media, website and their overall media relations. After a thorough analysis of United Airlines communication, it was evident that while the skies are friendly, they have a few turbulences to overcome.

**Biography:** Abinaya Subramanian is a marketing and communications major with a double minor in mathematics and human resource management. In the fall, she will be entering a Master's Program in Public Relations and Corporate Communications either at NYU or Georgetown University.



### ZINDZI THOMPSON

**Project and Academic Advisor:**

Maria Craig

**Type of Project:** Senior Project

**Presentation Category:** Poster

**Title:** The Time Dependence of LL-37 Upregulation by Vitamin D

**Abstract:** Autoimmune diseases result

from the body's inability to distinguish itself from pathogens and are, essentially, the body's immune system attacking itself. In the United States, the autoimmune disease psoriasis affects 7.5 million Americans and, in 2013, the total direct cost of psoriasis-associated treatment was around \$50 billion (American Academy of Dermatology). LL-37, an antimicrobial peptide active in the immune system, is overexpressed in many autoimmune diseases, including psoriasis. Some studies show that vitamin D, which has been shown to have both positive and negative effects on immunity, upregulates the production of LL-37. To observe the relationship between vitamin D treatment and LL-37 production in immune cells, model macrophages (THP-1 cells) were incubated for various lengths of time in the presence and absence of vitamin D, and their contents, supernatants and lysates, were analyzed using methods including the dot blot antibody test and western blotting. Our data suggested that vitamin D upregulated the production of LL-37 in model macrophages after a 48 hour incubation, leading to increased amounts detected in cell supernatant.

**Biography:** Zindzi Thompson is a biochemistry major from Columbia, South Carolina. During her time at Mary Baldwin University, she has conducted research on LL-37 under the mentorship of Dr. Maria Craig. After graduation, Zindzi will matriculate at Meharry Medical College.



### CORINNE WEEKS

**Project Advisor:** Peter Ruiz-Haas

**Academic Advisor:** John Ong

**Type of Project:** Special Project

**Presentation Category:** Poster

**Title:** O<sub>3</sub> and H<sub>2</sub>O<sub>2</sub> Advanced Oxidation Process of Bisphenol-S in Water

**Abstract:** Bisphenol-S (BPS) is an endocrine-disrupting compound, now commonly used as a replacement for bisphenol-A (BPA) as a plasticizer and in thermal paper. In this project, we examined the removal of BPS from water by ozone (O<sub>3</sub>) and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) advanced oxidation processes (AOPs). AOP techniques combine strong oxidants to destroy organic contaminants by radical attack.

We conducted degradation experiments in buffered aqueous solutions containing 5 mg/L BPS. At concentrations of O<sub>3</sub> from 0.1 to 3.4 mg/L and 0.5 mg/L H<sub>2</sub>O<sub>2</sub>, we observed BPS degradation (measured by high performance liquid chromatography (HPLC)): 35% BPS remained at O<sub>3</sub> levels of 3.4 mg/L and a 10-minute reaction time. Substantially smaller degradation rates (>80% of BPS remaining) were observed at lower O<sub>3</sub> concentrations. Second order kinetics were observed that suggest a multi-step reaction mechanism, which were simplified to pseudo-first order kinetics.

**Biography:** Corinne Weeks is an applied mathematics major with minors in chemistry and physics. She is originally from Cincinnati, Ohio. In the fall, Corinne will be entering a Ph.D. program in chemical engineering at Stanford University.



### MARY RUTH WOSSUM-FISHER

**Project and Academic Advisor:**

Abigail Wightman

**Type of Project:** Senior Project

**Presentation Category:** Presentation with multi-media support

**Title:** Contextualizing the Murderous

Ethnic Cleansing of the Rohingya: Rhetoric and Discourse

**Abstract:** This project addresses the merged ethnic and political identities within Myanmar that led to the murderous ethnic cleansing of the Rohingya. The first section explores symbolic rhetoric that upholds existing oppressive power structures and is used to justify the violence. Elaborating on the origin of the Rohingya and the Rakhine ethnicities, the second section applies theories of ethnicity and identity to contextualize the rhetoric with Myanmar's history. The concluding section explores how these ethnicities merged with governmental ideals to produce an environment conducive for murderous ethnic cleansing. With these analyses, potential situations of ethnic cleansing will more easily be identified.

**Biography:** Mary Ruth Wossum-Fisher is an anthropology/sociology and international affairs major with a minor in Francophone studies and was elected to Phi Beta Kappa this spring. She is from Pulaski, Tennessee, and will attend the University of Tennessee, Knoxville, next fall to pursue a master's degree in cultural anthropology with a certificate in displacement, disaster, and human rights.

## CONGRATULATIONS

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