Lowrie Arnold

Cedar Grove UV System Improvements

Mentor: Jeffrey Giesey

Before 2018, many residents of Sneedville, Tennessee were drinking creek water that was unsafe to drink. In 2018 a Milligan senior design team installed a UV light water purification system for the residents of Sneedville, Tennessee. The 2018 system worked well, however, when power to the system was interrupted, the system would need to be shock treated with ozone to eliminate possible downstream contamination. Additionally, the filters in the system would become prematurely clogged when too much water was being drawn from the system at once. This year, our design team's goal was to solve these problems by designing improvements to the system. We began by gathering data such as, flowrate, pressure, and current, from the system. Using this data, we designed a solution. To prevent contamination of the system due to power loss, we installed two (three-way) motorized ball valves on both sides of the UV Filter that are automatically activated when the system senses a loss of power. Then, to prevent the premature clogging of the filters, we installed a flow control valve and installed a pressurized storage tank after the UV filter. Therefore, when people gather water from the system, they will receive up to 10 gallons of clean water at 7 gallons per minute and any more water gathered after that will be at 1 gallon per minute. These improvements to the system were installed and are currently being used to ensure safe drinking water to the residents of Cedar Grove.

Danielle Bryant

An Exploration of the Effects of Quorum Quenching Reagents Against *Pseudomonas aeruginosa* Biofilms

Mentor: Kristen Mudrack

This study explores the effects of two quorum quenching reagents, trans-cinnamaldehyde and carvacrol, against *P. aeruginosa* biofilms that have been allowed to develop for differing amounts of time. This is in an attempt to determine the mechanism by which quorum quenching reagents destroy biofilms: by disrupting established biofilms or by preventing their formation entirely. This research hopes to shed light on how quorum quenching reagents can be used in combination with novel dipeptide antibiotics, to better fight this chronic infection in Cystic Fibrosis patients.

Moses Coley

Premier League Performance After Midweek Games

Mentor: David Campbell

This study will examine the effect of midweek games played by teams in the English Premier League on their performance in regular club matches. There is a common understanding that Europa League games in the midweek cause teams to play worse in regular Premier League matches. This study's objective is to examine if there is a causal relationship that can be established between midweek games in UEFA, the Europa League, FA Cup, and EFL cup and worse performance in games in the Premier League itself. The performance of teams will be assessed using regression analysis that will dig into the relationships between all the different variables at play. Rest and recovery are critical to ensuring that players are able to maintain their health and play to the best of their ability.

Jake Crow

Hurt to Work: How Long are NFL Players Out for Injuries

Football is one of the most popular sports in America, but its athletes face a chance of injury with every game they play. In the NFL, the professional football league, every single team must deal with player injuries happening in games and in practice throughout the entire season. Despite injuries the majority of players will return to play later in the season. However, how many players are truly over their injuries and how many are just playing through them. This study will look at the injuries that are reported throughout the NFL season and when that player is taken off of the injury list in order to determine when a player is healthy. It will also take a look at a number of other factors to see if they play a part in helping players get back to playing on the field without being injured. Some of these factors are age, type of injury, team, position, and prior injuries. The overall goal of the study is to build a regression model that will help predict how soon an athlete will be able to return from injury.

Elizabeth Dotson

Student Perceptions on Online Nursing Education

Mentor: Beth Crouch

This study examines opinions of undergraduate nursing students regarding online education. The context for this focused research was the sudden switch from in-person to online education during the COVID-19 pandemic. As the COVID-19 pandemic took place in spring of 2020, more research is being conducted on the educational changes and the resulting effects on students. The study looked at general responses and opinions among college students related to online education, with an additional focus on effects of online education upon academic success and student confidence reports. Research for this study was gathered through a literature review and data collection conducted with junior and senior nursing students at Milligan University. Results were somewhat mixed. While some students reported greater academic learning and flexibility with online classes, decreased confidence related to clinical skills was also reported. Since nursing education depends heavily on successful acquisition of clinical skills, it is important to assess the effect of online education on nursing students.

Aubin Dulin

Study of how predictable the end of season Formula 1 championship is using data from the first three races

Mentor: David Campbell

Formula 1 is often criticized in the world of motorsport for being a category without suspense where the winner is already known in advance. But is this really the case? To verify this hypothesis and find out if the start of the season in Formula 1 is representative of the general classification at the end of the season, a linear regression will be used in this study. The factors will therefore be composed for each driver of the qualifying time (subtracted from the pole position time), the percentage of the number of laps completed during the race, as well as the final classification of the race. The data will be collected from the racing-statistics.com website on the first three Grand Prix over the last five years, between 2017 and 2021, this to avoid any variances concerning the introduction of new circuits, constructors, drivers or even the design and engine of the car. The hope is to see a relationship between a driver's performance in the first three Grand Prix and his final standing at the end of the season.

Molly Dycus

Influence of Divine Imagery on Patriarchal Leadership in the Church

Mentor: Jeff Miller

Patriarchal hierarchies hold a long history dating back to the earliest of biblical texts as the authors and biblical figures were influenced by the cultures around them. The foundations of Judaism and Christianity built on these oppressive ideals granted men the favor of power and control. Therefore, when describing the Deity who possesses omnipresent capabilities and reigns over all of creation, the images used typically were masculine ones. Furthermore, as the leadership for structures and institutions of Christianinty have been developed, they continue to mirror the male God described. A broad view of leadership from Judaic rabbis to Catholic popes to Evangelical pastors reveals that a large majority of those in positions of authority are male. My research focused on the central idea as articulated by Mary Daly that "if God is male, then male is God." To expand on this idea, I reflected on questions about the origin of patriarchy in Christianity, and whether there are facets of the images unexplained due to language barriers as well as questions about how this has manifested into the religion of modern Western Christianity. Through the use of several pieces of literature researching similar questions, I discovered that without deconstructing colonized, Western Christianity, white men will continue to be the face of Christianity and will further pursue uplifting masculine divine images as a means of propagating that men are ordained to be leaders. The circulation of patriarchal theology continues to keep women out of leadership, which does not allow them to have a voice to seek change. Though modifications need to be made on the individual level about attitudes regarding women in leadership, the issue contains systemic roots. Keywords: patriarchy, divine imagery, Western Christianity, leadership.

Blake Fauver

Food Fight: The True Cost of Agriculture in the Amazon Rainforest

Mentor: Heather Hoover

Amazon Rainforest deforestation has been a volatile topic over the past half-century, but it has truly come to light in the last five years. Past governmental administrations in Brazil had numerous laws/regulations in place to prevent detrimental use of the forest edge. This is the most vulnerable are of forest because it is easy for humans to access. As the Bolsonaro administration has risen in Brazil, environmental regulations have fallen by the wayside. Since 2016, political ideology has become increasingly economy-based, and this has threatened the sustainability of the rainforest. Resource-intensive agriculture is supported because it yields the highest profits, which is what is best for Brazil's economy. To combat this recent spike in deforestation, I will investigate new ways to potentially increase the effectiveness of agricultural processes so that less farmland has to be use and less rainforest is destroyed. I will also research the relationship between building a stable economy and sustainable agriculture. This natural ecosystem struggle stems from the balance of providing for a growing population, sustaining one of the largest biomes on Earth, and satisfying human greed. By understanding the impact of economy on agriculture and vice versa, Brazil can begin to make stable change that benefits both economic and environmental ecosystems.

Nicholas Florio

State governments' efficiency on forcing residents to move

Mentor: Dr. David Campbell

Many people change their residency for numerus reasons. As of late, it seams like people have been migrating to other states at a higher rate. There are many different factors that would cause people to change their residency. The aim of this research is to find how much of migration is due to governmental factors like taxes and regulations. In this project I will be looking at how differences in state taxes and the cost of living in different states incentives people to migrate to a different state. It is important to control for other factors that would cause people to move regardless of state tax and regulations. Holding other factors constant, what are the forces of the free market, or invisible hand, on state migration?

A Sustainable Solar Cooker for Developing Countries

Erin Forgety, Elliott Baldy, Iris Fregoso, and Abenezer Gidafe
Dr. Daniel Cutshall and Dr. Choonsang Park

The World Health Organization estimates that roughly 3 billion people across the world cook using biomass, kerosene, or coal. An estimated 4 million people die prematurely each year due to the harmful fumes that are produced by using these fuel sources. We have developed a safe, sustainable, and affordable cooker which will serve as a solution to this problem. The solar cooker is powered by two 100 W solar panels and utilizes a heating element consisting of 42 diodes chained together, allowing for consistent power output over a wide range of solar conditions. The diodes are inserted into channels in the lower part of an aluminum structure that redirects the heat produced in the diodes towards a flat upper surface where the cooking pot is placed. The design, along with the thermal properties of aluminum, serve to compose a heating element that both protects the lifetime of the electrical components and transfers heat efficiently. The proposed solar cooker has been found to provide a heating element surface temperature up to 118℃ during testing at average solar conditions for East Tennessee. In these solar conditions, our solar cooker replicates the function of a standard slow cooker on its high setting, cooking food in four hours. With a total cost of approximately $300, this cooker is a cheap, safe, and sustainable solution that can be implemented in various parts of the world.

Caroline Gamble

Emotional Implications of Adopting a Drug Exposed Child

Mentor: John Paul Abner

Adopting children who were prenatally drug exposed may lead to stresses and concerns for adoptive parents. This qualitative research study examined the emotional implications of adopting a drug exposed child. This is a vastly under studied area. This study sought to create awareness of the emotional challenges of parenting drug exposed children. The qualitative study was conducted through structured interview of three adoptive mothers. Analysis of the data revealed four overarching themes: developmental concerns for the child, change in home life and family relationships, need for more resources, and the emotional impact. Findings may aid in the creation of appropriate training and interventions to promote emotionally healthy adoptive families of children who were prenatally drug exposed.

Elise Greene

Lay Down your Stones: A Look Into Why Christians Support The Death Penalty and The Justifications For Being Against It.

Mentor: Jeff Miller

This project explored the issue of the Death Penalty in America. Particularly, this study focused on why Christians are some of the largest proponents for the Death Penalty despite the foundations of our beliefs resting on the execution of our savior under the government. In this study, I looked at passages in the Bible that deal specifically with issues of capital punishment, such as the gospel texts about the woman in John 8, Pontius Pilate and Barabbas, and the crucifixion of Jesus. I looked at these passages through the lens of commentaries specifically from Christian church/Church of Christ publishing houses, to see what the Church, and specifically the movement that is my own heritage, has to say about capital punishment. In addition to this research, I also studied how the early church in Acts and the leaders of the Stone-Campbell movement approached the issue of state executions in contention with their faith. The foundational beliefs that Christians hold is that we have been saved through grace from death, though being guilty of sin and undeserving of life. However, that belief does not seem to stand true when it comes to extending the same grace and forgiveness towards others who sinned just like us. All throughout the Bible is a story of grace and forgiveness, a story that we as Christians should extend and share with others, even those who seem the most unlikely.

Sarah Greer

From Pulp to the Web: The Evolution of Sequential Art & Visual Storytelling

Mentor: Art Brown

The medium of comic books as we know it got its start in the late 1930s with the debut of Superman kicking off what is referred to as the "Golden Age of Comics". As the stories comics tell have changed, allowing for more nuance and a wider variety of genres print technology has vastly improved alongside it, giving birth to the graphic novel, and now has made its way on the internet in the form of the webcomic. As these aspects have changed, so too has the comic's structure. The typical comic page is made up of three things: the panels, the art within those panels, and the text accompanying the art. The way these three aspects are laid out on the page and interact with each other has a major effect on how the reader's eye moves through the page. The earliest "golden age" comics had panels that were usually simple squares, and each panel was stuffed with text, over-explaining what could clearly be seen in the artwork. This simplicity was due in part both to how new comics were, and the limitations of print technology of the time. As comics moved into modern print and the graphic novel format, new technology and a better understanding of the balance between text and image allowed for paneling that broke away from the simple square, and utilized the art itself to assist with the flow of the page. With the advent of digital webcomics, page structure has moved away from the format found in printed books, with panels now spaced out vertically to build anticipation and make a comfortable reading flow on mobile devices. During this academic year, I have studied "golden age" and modern print reading formats, as well as those of digital webcomics to ascertain how the visual storytelling techniques have evolved. Using this research, I have created five works of sequential art, telling an original story, to demonstrate these techniques.

Henry Holben

Milligan Robotics Remote Operated Vehicle Development

Mentor: Ian Lundholm

We are Milligan Robotics, Milligan's student-run, student-led, robotics team. Our mission is to seek to honor God as a team of servant leaders by addressing environmental and humanitarian challenges through the exploration and development of robotics applications. We have structured ourselves in the fashion of a technology company with sixteen students serving in any of three branches: electrical, mechanical, and software with the advisement of two faculty coaches and two alumni. Each year since the team's conception in 2020, Milligan Robotics has worked to develop an ROV (remote operated vehicle) to compete in the Marine Advanced Technology Education (MATE) ROV competition. The MATE ROV competition challenges students to study STEM and entrepreneurship-related disciplines by designing, fabricating, wiring, programing and piloting an ROV capable of performing tasks related to professional and humanitarian disciplines such as off-shore aquaculture, deep sea exploration, renewable energy, and environmental sustainability. At present, Milligan Robotics is answering MATE's challenge to produce a submersible ROV and compete in the explorer class of MATE's 2022 competition. MATE presents its competition as a call for proposals and encourages each participating team ("company") to consider "the global community", as a client. In addition to demonstrating the operation of an ROV, each company must give a presentation, explaining their work, in front of a panel of judges. This competition requires the ROV to be controllable via an above-water station, capable of traveling under the surface of a swimming pool without human assistance, and grasping submerged items with a mechanical claw (the manipulator). Additionally, the system must produce photographs while underwater, and to use image-recognition software to identify target objects. Teams are further encouraged to implement certain fully autonomous functions for tasks such as entering a docking station or creating photomosaics of regions of interest. Milligan Robotics' strategy is to develop off of work done in preparation for the 2022 MATE competition while implementing more sensors. The team also desires to produce a more "modular system", to provide easier means for an end user to repair, or modify the machine's configuration. The competition's rules require the finished ROV to be the physical and

intellectual product of students with faculty mentors and community volunteers serving chiefly as advisors. As such, participating students are required to research and develop the ROV's systems. Through participation, team members gain experience with machine design via the design and fabrication of the machine's structural components and mechanisms; computer programming, via the writing, debugging, and execution of software; and electrical design via the wiring of the ROV's control system. To best showcase and explain our machine's design and capabilities. We would like the option to perform a live demonstration of our prototype. For this purpose, we request that our presentation for the 2022 Milligan RISE above conference take place at the fieldhouse pool.

Works Cited

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Samuel Kelly

Survivalist Chemistry: Producing Organic Solvents to Harness Herbology

Mentor: Matthew McDonald

Fermentation has been used for centuries as a means of ethanol production. While there is a tremendous amount of research and technology surrounding the subject, the roots of fermentation are undeniably humble. This project examined the practicality of producing ethanol using a simplified fermentation scheme, in hopes of finding a way to produce ethanol, a versatile organic solvent, in wilderness environments. Four separate tests were conducted to test the viability of various techniques and sugar sources. The primary measure of success was percent alcohol content in samples taken from each of the four fermentation solutions using a standard alcoholometer (refractive index was used in the first test). The first test was the most primitive. A blackberry solution was mixed in a five-gallon bucket and allowed to ferment without being boiled. No ethanol was detected in this run. In the second test blackberries were mixed and then diluted and placed in an Erlenmeyer flask with a gas trap. The solution was then allowed to ferment without boiling the solution. The third test differed from the second only in that the solution was boiled before being placed in the Erlenmeyer flask. The fourth test consisted of boiled apple extract being allowed to ferment in a jug with a gas trap. Tests 2-4 all displayed evidence of potential fermentation. This research indicates that it may be possible to produce ethanol using primitive techniques.

Samuel Kelly

Inhibition of Tyrosinase Through a Phenol-Aniline Azo-Stilbene Inhibitor and its Novel Derivatives

Mentor: Kristen Mudrack

This study seeks to add to the growing literature on a variety of inhibitors for the enzyme Tyrosinase An attempt was made to synthesize the following Azo-stilbene compounds and test their inhibitory effects compared to several known inhibitors: Phenol + Aniline, Resorcinol + Aniline, Phenol + N-ethylaniline, Resorcinol + N-ethylaniline, Phenol + N-methylaniline, DI Menthol + Aniline, Phenol + Dimethylaniline, and 4-acetamidophenol + Aniline. Of all the synthesized inhibitors, only Phenol + Aniline produced quality results. Sodium Azide (a known inhibitor of tyrosinase) was found to have a V_{max} of 0.09215 mmol/min at 50% target inhibition and 0.01295 mmol/min at 90% target inhibition. Cinnamic Acid (a known inhibitor) had V_{max} of 0.01723 mmol/min (50%) and 0.01154 mmol/min (90%). Phenol + Aniline was found to have a V_{max} of 0.027 mmol/min (trial one) and a V_{max} of 0.067 mmol/min (trial two). Sodium Azide was found to have K_m of 2.1473 mM (50%) and 0.5771 mM (90%). Cinnamic Acid was found to have a K_m of 0.1073 mM (50%) and 0.06355 mM (90%). Phenol + Aniline was found to have a K_m of 2.792 mM (trial one) and 6.834 mM (trial two). Sodium Azide was the weakest known inhibitor (IC 50 = 3.647 mM at 50%) followed by Cinnamic Acid (IC 50 = 1.607 mM at 50%) and then the Phenol + Aniline Azo-stilbene (IC 50 = 0.347 mM in trial 1; 0.0543 mM in trial 2). Overall, this experiment not only explored novel inhibitors for Tyrosinase, but also adds additional data to the already extensive literature on Tyrosinase inhibition.

Anna Konstantopoulos

Origen: Platonism and the Preexistence of Souls in the Gospel of John

Mentor: Lee Blackburn

Philosophy and religion have been at odds nearly as long as both have existed. There is a never ending tension between philosophy and religion, reason and faith. Many believe these categories are completely separated, with no need to use one with the other. Others believe reason is essential to faith, otherwise it is impossible to know what one really believes. Origen of Alexandria was one of these people. An early church father who was considered the father of biblical scholasticism, he is the perfect example of what it means to integrate philosophy with theology. But Origen was not a true Platonist, as many believe. He simply used Platonism as a means to interpret scripture more accurately, which can be seen in his *Commentary on the Gospel according to John.* This paper looks at both the historical and literary contexts and Origen's *Commentary on the Gospel of John* to show that he was first and foremost a Christian who used his philosophical knowledge to find scriptural truths. It specifically focuses on the doctrine of the preexistence of souls and how his language surrounding it is misused as evidence of Platonism.

Mallory Leichty

Climate Change and its Impacts on Mental Health

Mentor: Hongyou Lu

It is common knowledge that climate change impacts the environment in drastic ways. But it is less discussed how climate change may influence and individual's mental health. We analyzed a collection of recent peer-reviewed research on mental health impacts from climate change. Based on several surveys and interviews, researchers found the impact on individual's mental health is increasing and sizable. It not only could indicate a loss of autonomy and control, but also a loss of personal and occupational identity. Our research highlights further effects of climate change in relation to mental health, as well as suggestions of how to combat these impacts effectively.

Cody Leonard

Water Sustainability for Sambalat

Mentor: Gregory Harnell

The people of Sambalat, Kenya currently do not have access to clean drinking water. With an estimated 3,000 citizens in the village and another estimated 1,000 students at Sambalat Primary School, the current water system is operating through an insufficiently maintained government infrastructure and is severely lacking in any form of purification for safe drinking. This has created a serious issue for the Sambalat people, who are unable to sustain a viable standard of living through their lack of safe water-supply. Through the work of Milligan University, our team has designed a water treatment system to be built at the Sambalat Primary School. This location will serve as a central distribution hub to fulfill the needs of the village and the school. The projected water system will operate to filter out any potentially harmful particles and will treat the water with an ultraviolet light to ensure that the water is potable. We have designed to power the new infrastructure through a series of solar panels and batteries to develop a sustainable power source that does not rely on an inconsistent power grid. When designing the system, we have considered a variety of factors in terms of economic affordability and overall efficiency to ensure that the projected system is both suitable and manageable for the needs of the Sambalat community.

Catherine Manifold

Save the Earth or Yourself?

Mentor: David Campbell

As electric vehicles are on the rise many questions tend to be asked; “Are they safe?”, “Is it cheaper?”, etc. A question that doesn’t seem to be asked as often is, “Is driving an electric vehicle safer than driving a gas vehicle in terms of safety?” Using regression analysis, the purpose of this study is to analyze the tradeoffs between driving a gas or an electric vehicle in terms of safety crash testing. This study will look at the results of testing done on different makes of vehicles such as Nissan, Toyota, Chevy, Jeep, and more. This study will also show comparisons across one vehicle throughout different years to determine if their protocols have improved. The results of this study will determine whether driving an eco-friendly vehicle that is beneficial to the Earth will be beneficial to one's safety compared to a gas vehicle that is not beneficial to the Earth but could be beneficial to one.

Cameron McConnell

Novel Antibiotic Compounds For Killing Of Pseudomonas aeruginosa Biofilms

Mentor: Kristen Mudrack

Novel antibiotics are necessary to combat antibiotic resistant infections, including those found in the lungs of cystic fibrosis patients. *Pseudomonas aeruginosa* is a common bacterium that is not harmful to unaffected individuals, but patients with cystic fibrosis experience chronic infections that require constant use of antibiotics. In order to combat the antibiotic resistance that arises, researchers are working to create novel antibiotic compounds to test *in vitro*. Six different antibiotics were created in triplicate to determine the percent killed of *Pseudomonas aeruginosa*. Solid phase peptide synthesis was used to create the different antibiotics. A biofilm assay with *Pseudomonas aeruginosa* was used to determine the percent killed by each antibiotic. All antibiotics used purified prior to the biofilm assay. Out of the six antibiotics produced, D-Tyrosine with 2-chlorobenzyl bromide performed the best, killing on average 37.27 ± 3.9% (% ± SEM, n=3 analyzed in triplicate). D-Valine with 2-fluorobenzyl bromide and L-Tyrosine with 2-fluorobenzyl bromide performed relatively similarly; killing 29.05 ± 5.4%, and 33.78 ± 5.1% (% ± SEM, n=2 analyzed in triplicate for each) respectively. Overall, the compounds made with the alkylation agent 2-fluorobenzyle bromide indicated higher percent killed averages. The data presented here aligns with previous student research and expounds upon the depth and breadth of compounds in the Milligan database.

Emily Messner

Silence in the Face of Racism: Exploring the Inaction of White Christian Churches/Churches of Christ During the Civil Rights Movement

Mentor: Tim Dillon

The 1960's were crucial years for the Civil Rights Movement in the United States, as Black demonstrators fought for equal rights under United States law. It impacted every aspect and institution of American society, including churches of all different denominations and movements. The three branches of the Stone-Campbell Movement (Churches of Christ, Christian Churches/Churches of Christ, and the Disciples of Christ) each reacted uniquely. Disciples of Christ joined other mainstream Protestant denominations to openly advocate for the Civil Rights Movement, while the Churches of Christ began the process of publicly confronting racism and segregation in their own congregations due in large part to the work of Black members. [1] However, during this pivotal decade, white members of Christian Churches and Churches of Christ (who made up the vast majority of the movement) took almost no action to support the Civil Rights Movement, despite several prominent adherents advocating for an end to racial prejudice. Through a study of articles in the *Christian Standard* and records from the North American Christian Conventions that took place during this decade, three prominent causes of this silence emerged. The movement's historical background enabled white Christian Churches/Churches of Christ members to see Black Americans and members as outsiders, the racism of some white members caused them to oppose those who wanted to seek change, and even those who called for an end to racism utilized individualist theology to oppose systemic change through legislation.

[1] D. Newell Williams, Douglas A. Foster, Paul M. Blowers, eds. *The Stone-Campbell Movement: A Global History* (St. Louis: Chalice Press, 2013), 204-208.

Ethan Pfister

Predicting the Stanley Cup Playoff Tree

Mentor: David Campbell

The National Hockey League is the largest and most competitive league in the world for the sport of ice hockey. As with all of the major leagues, the coveted prize is winning the playoffs at the end of the year. Reaching the playoffs is quite simple in theory: earn top eight in your respective conference. However, data shows that winning down the stretch in hockey becomes much more complex than simply scoring goals. In essence, what generally makes hockey teams "good" does not always equate to wins down the stretch in this league. Highlighting several key metrics, this study will attempt to calculate the win expectancy for every remaining team in the NHL. The variables chosen account for historical evidence when assessing regular season wins, and include the most significant statistics for winning hockey games so far this year. The goal of this study is to build a series of regression models that will accurately predict which sixteen teams will remain at the end of the season.

William Rucker

"If I were in heaven, Nelly, I should be extremely miserable": Experiencing Existence and the work of Emily Brontë

Mentor: Kayla Walker Edin

Emily Brontë lived at the height of the Romantic Period, and though her life was short, she produced prose and poetry that cements her place in the canon of English literature. She wrote of life, death, class structures in society, identity, revenge, and redemption in methods that have inspired writers in the years following her death. Though Brontë's brief life was mainly confined to her father's parsonage, she walked the moors and the heath that surrounded the home, studied French and German, and became a proficient piano player as well. Her life would make her seem as the quintessential "angel of the house", but Brontë lived in this fashion because she wanted to; she savored her independence, never marrying or bearing children. She lives a mainly solitary life, writing for the sake of writing, and managing the home of her family, as fame and fortune were distinctions that she preferred to avoid. For Brontë, life entails more than the level of celebrity one achieves, or the amount of capital that they accrue. My paper considers Emily Brontë's way of living, her only novel, Wuthering Heights and living after death, and the sublime as shown in her poem, "Riches I hold in light esteem". I argue that Brontë's life and experiences can be seen in her work, from the perspective of Catherine Earnshaw and an unnamed speaker in her poetry, that suggests existence after death is possible, and that feat can be accomplished if one has the courage. The writers of the Romantic period glorified the individual, a return to nature, and examining the sublime; Emily Brontë does this in own existence, in the death of Catherine Earnshaw of Wuthering Heights, and in her poem "Riches I hold in light esteem".

Skylan Stephens

Why Old Testament Wisdom?

Mentor: John Jackson

Old Testament (OT) wisdom literature is a unique collection of books, in both style and content, that provide valuable perspectives for its interpreters. This paper explores the ancient Israelite wisdom tradition as an important resource for Christ-followers' spiritual growth as people of righteousness. First, OT wisdom is explored and defined. Next, the Old Testament wisdom books (Proverbs, Ecclesiastes, and Job) are compared with their geographical neighbor's (Egypt, Mesopotamia, etc.) wisdom traditions. Third, the relationship between creation and wisdom is explored. Fourth, the fear of YHWH is studied which also leads into discussion on the wisdom books' relationship with the Torah. Finally, wisdom and righteousness are connected which demonstrates why Old Testament wisdom literature is both practical and necessary for believers today.

Korynne Taylor

Plastic Lifecycle: Recycling Via Shredding

Mentor: Landon Holbrook

Milligan Engineering partnered with the Emmanuel Seminary recycling club to reduce plastic waste on campus. Polypropylene is commonly used to manufacture disposable containers, but this type 5 plastic is not recycled by Johnson City and ends up in landfills. To address this, a machine was designed and built to shred type 5 plastic. The shredder blades had the potential to cause serious injury, so electronic and physical safety features were implemented to protect the operator. An electronic sensor was integrated to detect shredder jams and begin an unjamming sequence without operator intervention. The shape and size of the loading door was selected to prevent a person from reaching into the machine to the shredder blades. A third independent safety feature was implemented to prevent shredder operation during plastic loading. The shredder was designed for use in the full recycling process developed, which included collection, sorting, pre-cleaning, shredding, cleaning, and storage. The implementation of this process will allow Milligan to reduce the types and amount of materials it sends away as waste and exercise good stewardship of God's creation.

Dakota Topp

Survivalist Water Filtration

Mentor: Matthew McDonald

Water filtration is an essential component for survival, it is necessary to have easy access to large volumes of safe drinking water in order to survive. This research was conducted in order to evaluate forms of water filtration to determine which one is the most effective in terms of timeliness and ability to filtrate large volumes of water, remove elemental contaminants specifically lead, which is used as an analogue for other heavy metals, as well as looking at the removal of potential pathogens such as bacteria by using yeast as an analogue. The forms of filtration methods used were activated charcoal, water filtration tabs, moss and soil gravity filtration, and rocks and soil gravity filtration.

Christina Triplett

The correlation between ACE scores, self-esteem, and relationships in college

Mentor: Christine Browning

Adverse childhood experiences (ACEs) have been shown to affect both a person's mental and physical health as they get older. These negative experiences have been correlated with cognitive impairment, disease, risky behavior, and even early death. This research examines the emotional toll ACEs could have on college students who are trying to manage relationships with peers, professors, and themselves. It was hypothesized that college students with a higher number of adverse childhood experiences, typically 4 or more, will have lower perceived rates of self-esteem and poorer perceived rates of relationships with peers and professors. Through the process of an online survey and one-on-one interview, participants (N= 124) were asked about demographics, adverse childhood experiences, perceived self-esteem, and relationships.

Isaac Wood

Wendell Berry's Vision of Enacted Community in the Story of Hannah Coulter

Mentor: Phil Kenneson

To a culture focused on individualism, Wendell Berry's writing proclaims the importance of meaningful community. His fiction tells the stories of a small, farming town in Appalachian Kentucky called Port William. In *Hannah Coulter,* the titular character narrates her life and the community enacted throughout it. This paper explores how community is enacted by members of Port William throughout Berry's novel.

Herver Yang

The factories to effect MLB positions players' salary

Mentor: David Campbell

The Purpose of this research is to find out what are the important factories to impact MLB positions players' salaries. My research objects only include the position players whose salaries are higher than 10 million in 2022 season. The main approach I use for researching this project is regression model. I collect the data from the website is called baseball-reference.com, it has all the players' data. The data I collected incudes players' homerun, RBI, hit, batting average, on base percentage, average salary, and so on. Most importantly, this research is to find out what dependent variables are correlated to the players' salaries.