



THIRTEENTH ANNUAL
PENN STATE
EASTERN REGIONAL
UNDERGRADUATE RESEARCH
SYMPOSIUM

April 20, 2024

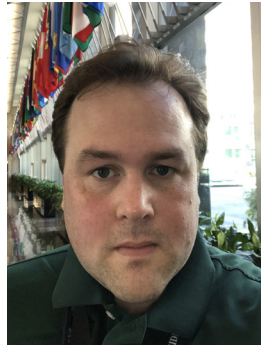


PennState
Lehigh Valley

KEYNOTE SPEAKER

Director Cole Donovan

Cole Donovan serves as Assistant Director for Research Security and Infrastructure in the White House Office of Science and Technology Policy (OSTP), detailed from the National Academies of Sciences, Engineering, and Medicine. Previously, he served as OSTP’s Assistant Director for International Science and Technology at the beginning of the Biden-Harris Administration. He previously served as Advanced Technology Coordinator in the Office of Science and Technology Cooperation at the State Department, in addition to serving as the Department’s representative to the National Science and Technology Council Research and Development Infrastructure Subcommittee and the Physical Sciences Subcommittee.



Cole’s career has focused on implementing research security policy, promoting U.S. leadership in major international facilities, and fostering collaboration with U.S. allies and partners. As a State Department Foreign Affairs Officer, Cole was awarded runner-up for the Keith J. Krach Award for Excellence in Economic Security for his efforts to ensure that future large research facilities investments take place in like-minded countries and the Rockwell Anthony Schnabel Award for Advancing U.S.-EU Relations.

He led U.S. negotiations toward science agreements with the United Kingdom and CERN, worked to make it easier for the U.S. academic community to engage with the EU’s framework programs for research and innovation, and served as the action officer for the U.S. relationship for large-scale international projects including the Long Baseline Neutrino Facility, CERN, and the ITER fusion facility.

SCHEDULE

Saturday, April 20, 2024

11:00 a.m.	Lunch
11:45 a.m.	Opening Remarks: Todd Retzlaff, Ph.D., Associate Professor Aníbal Torres, Ph.D., Chief Academic Officer and Professor
Noon	Keynote Presentation: “Mega Science, Mega Diplomacy” Cole Donovan Assistant Director for Research Security and Infrastructure, White House
1:00–3:00 p.m.	Judging
3:00 p.m.	Awards Ceremony

ACKNOWLEDGEMENTS

A special thank you to everyone who helped make this event possible.

ABSTRACTS: Arts and Humanities

AUTHOR: **Jacob Kepping**
MENTOR: **Eileen Morgan**
CAMPUS: **Hazleton**

Death Across Ancient Egypt and Greece

Death is something that cannot be escaped, this is a difficult fact to accept for humans; as a result, beliefs for a life beyond this current one have occurred in all cultures. Among these, some of the most famous for their concepts of what lies beyond death are Ancient Egypt and Ancient Greece. The Mediterranean Sea provided great opportunity for trade in these civilizations and still does [1]. This trade gave way to sharing cultural practices and beliefs among Mediterranean civilizations; this then caused similar ideas and practices to be held by many civilizations in this area [1]. An aspect both religions held was that one's actions in this life would affect if they could make it to the 'ideal' afterlife. This caused traditions surrounding death and preparing one for death to appear in both cultures as major traditions. Ancient Egyptians believed a proper burial was needed so people could use their body in the afterlife; additionally, people were often buried with items to help in the next life [2]. In contrast, Ancient Greek burials had few objects being buried and fewer preserval methods being used [3]. Both cultures had cleaning practices for the body [2,3], a central belief on one's right to a burial, and in later Ancient Greece (~500 BCE) stone coffins were commonly used as they were in Ancient Egypt [3]. Overall, both civilizations share common practices that have much overlap, especially with later years of trade causing more cultural sharing and overlap [1]. [1] Sağlam, Gülsün. (April 2013). The Mediterranean Sea: Cradle of civilization. U.N. Chronicle. Accessed March 20, 2024, from <https://www.un.org/en/chronicle/article/mediterranean-sea-cradle-civilization> [2] Preparation for death in Ancient Egypt. (N.D.). Australian Museum. Accessed March 21, 2024, from <https://australian.museum/learn/cultures/international-collection/ancient-egyptian/preparation-for-death-in-ancient-egypt/#main> [3] Department of Greek and Roman Art. (October 2003). Death, burial, and the afterlife in Ancient Greece. The Metropolitan Museum of Art. Accessed March 21, 2024, from https://www.metmuseum.org/toah/hd/dbag/hd_dbag.htm

AUTHOR: **Paris Presnell**
MENTOR: **Dr. Pamela Black**
CAMPUS: **Hazleton**

Drug Policy in Italy

This project is a research presentation on Drug Control Policy in Italy. My advisor for this project is Pamela Black. I completed this presentation in her CRIMJ415 class which is Drug Control Policy in a Comparative Perspective. This was the final project of the year. The presentation guidelines were to find any country other than the United States and analyze their drug issues from past to present. This will give an informative approach on Italy's drug policy approach and how their laws have shifted over the last 100 years. As the slideshow goes on, we can see that Italy is pretty lenient with their drug control approach. Their most used drug is clearly cannabis. Although they have other drug problems such as opioids; cannabis is the most prominently used drug.

AUTHOR: **Karandhir Singh Flora**
MENTOR: **Valerie Schrader**
CAMPUS: **Schuylkill**

Finding Meaning through Game Play: Narrative Theory and Burkean Identification in the Video Game "The Last of Us"

This paper applies Kenneth Burke's (1969) theory of identification and Jerome Bruner's (2002) narrative theory to the video game The Last of Us. The action-adventure video game was developed by Naughty Dog and released by Sony Computer Entertainment. The game takes place in a post-apocalyptic world in which a fungus has infected and transformed most people into violent creatures. The player controls Joel, a survivor entrusted with guiding Ellie, a teenager, across the nation to locate a group of rebels who may be able to assist them. Along the journey, the player must cross a range of perilous locales, battle diseased monsters and aggressive human survivors, and make moral decisions that influence the story's progression. Both narrative theory and Burkean identification have the potential to provide new perspectives on the game's story and its characters. Narrative theory can be used to analyze the game's structure, meaning, and effects, while Burkean identification can be used to analyze the player's emotional connection to the characters.

AUTHORS: **Lizzeth Lezama Luna**
MENTOR: **Jonathan Pineno**
CAMPUS: **Wilkes-Barre**

Globalization and the Influence of English on Korean Popular Music

With the rise of social media platforms, there has been an increase of cultural exchange which led to the globalization of Korean Popular Music thus enhancing diplomatic relations and economic growth due to the influence of English.

AUTHOR: **Amelia Anderson**
MENTOR: **Jonathan Pineno**
CAMPUS: **Wilkes-Barre**

History in Color: Examining the Composition of Paint and its Applications Over Time

For my research, I looked into the history of paint over time and how it played a role in not just the history of art but in humanity's culture over a span of thousands of years. I examined the composition of paint, how it was created, how it was applied, and what that meant for the creation of art. Paint has played a fundamental role in the preservation of ideas, stories, and material culture, and I wanted to delve deeper into a seemingly overlooked and underappreciated aspect of the creation of not only paintings but art as a whole.

AUTHOR: **River Moon**
MENTOR: **Dr. Kara Stone**
CAMPUS: **Scranton**

The Witch's Odyssey: Crone, Mother, Maiden

Beginning in the 1930s, the witch was portrayed, in literature, as a creepy old Crone, which forged the stereotypes of a witch to this day. With the progression of time, a transformational journey has occurred with the portrayal of the witch changing from the Crone, to the Mother, to the Maiden. The concept of the Maiden, Mother, and Crone is a Wiccan symbolization for their Triple Goddess and represents the common stages of a woman's life. These three stages are also seen as the Fates in modern fiction, like Neil Gaiman's *The Sandman*, as well as in the religious beliefs of ancient Greece. However, both ancient and modern depictions of witches have led to the modern-day, stereotypical image of the witch,

and the portrayal of witches in media has led to the reverse transformation of Crone, Mother, and Maiden. This image has changed in recent years and can be compared to stereotypical portrayals of real-life witchcraft.

ABSTRACTS: **Biological Sciences and Health**

AUTHOR **Michael Kern**
MENTOR: **Dr. Emily Blanke**
CAMPUS: **York**

Are Plant-Based Milk Options Healthier than Cow's Milk?

Plant-based food alternatives are increasing in popularity due to health purposes and trend diets. Specifically, plant-based milk alternatives have become popular, but are they healthier? "Healthy" is a subjective term and dependent on an individual's needs. For this study, we define healthy food as having a high protein and low fat and sugar content. We hypothesize that cow's milk will contain the highest amount of protein and least fat and sugar compared to oat and almond milk. This study utilized indicator tests to determine which milk was the "healthiest" by quantifying protein and glucose concentrations, relative fat, and starch concentrations in three popular milks purchased at a local supermarket: cow, almond, and oat. The Bradford assay and Benedict's solution in combination with spectrophotometry measured protein and glucose content, respectively. Starch and fat were evaluated with qualitative iodine and brown paper bag indicator tests. Almond milk (739.4 mg/mL) had the highest glucose concentration, followed by cow's milk (31.5 mg/mL), then oat milk (-289.0 mg/mL). All samples had a negative protein concentration and were inconclusive. The iodine indicator showed a distinct presence of starch in oat milk, slight presence in almond milk, and an absence in cow's milk. Brown paper bag tests showed almond with the least fat, then cow, and oat with the darkest ring presence. Overall, cow milk presented low glucose and fat with no starch presence, making it the healthiest milk option despite the lack of protein evidence.

AUTHOR: **Darla Lattimer**
MENTOR: **Dr. Khalid Almasloukh**
CAMPUS: **Scranton**

The Effects of Breastfeeding on Postpartum Depression

Abstract Postpartum depression (PPD) is one of the most frequent birth complications, affecting 10-20% of all births. However, there is little research on treatment for PPD. This study aims to explore the effects of breastfeeding on PPD. A literature review was conducted in CINAHL and PubMed to gather relevant information regarding breastfeeding and its effects on PPD. Overall, the studies showed that breastfeeding decreased symptoms of PPD, while the inability to successfully breastfeed increased the potential for signs and symptoms of PPD. It was concluded that breastfeeding could be used to reduce the risk of PPD. As a result of this finding, nurses working in mother and baby settings can educate on the benefits of breastfeeding to improve outcomes on postpartum depression. Further research could investigate if additional non-pharmacological treatments could improve PPD symptoms.

Keywords: postpartum depression, postnatal depression, breastfeeding, PPD

AUTHOR: **Jacob Campbell**
MENTOR: **Dr. Laura Guertin**
CAMPUS: **Brandywine**

Endangered Species: Captured through Art and Data

The goal of my study was to create four individual acrylic paintings, each one featuring an animal listed on the Endangered Species Act with supporting scientific data showcasing that species population over time. One of the takeaways from my work is the overall impact of the Endangered Species Act, to inform people that there are species that have been saved and that there are species still in need of protection.

AUTHORS: **Cortez Catalano, Samantha Surks**
MENTORS: **Kathy Van Alstyne, Morgan Eisenlord**
CAMPUS: **Brandywine**

Evidence of *Labyrinthula zosterae*'s Ability to Infect Two Species of Ulvoid Seaweeds

Labyrinthula zosterae (Lz) is a marine protist responsible for eelgrass wasting disease in the seagrass species *Zostera marina*. Due to *Zostera*'s ecological importance, significant effort has been directed towards understanding the relationship between Lz and eelgrass wasting disease. However, these studies have been conducted under the assumption that Lz is primarily an obligate pathogen to *Zostera*. In this study we challenge this idea by showing evidence that Lz is able to infect two species of Ulvoid seaweed, *Ulva fenestrata* and *Ulvaria obscura*. We found that seaweeds exposed to Lz and left to grow for 5 days exhibited counts of Lz DNA similar to those found in exposed *Zostera*. Those same exposed seaweeds showed a statistically significant change in growth when compared to unexposed seaweeds. Additionally, we visually confirmed the presence of Lz cells on the surface of exposed *Ulva* and *Ulvaria* samples through the use of scanning electron microscopy. These findings have large implications in understanding the ecological role of Lz and should be considered in future studies of Lz. For instance, while not examined in this study, it is possible that Ulvoid seaweeds are able to spread Lz to *Zostera*, which if true would have potential conservation implications.

AUTHOR: Morgana Costanzo
MENTORS: Dr. Margret Hatch, Dr. Robert Smith
CAMPUS: Scranton

Exploring Differences in Tick Prevalence and Intensity Among Migratory Songbird Species in Northeastern Pennsylvania

Studying how different species affect tick infestation is crucial for managing tick-borne diseases and ecosystem health because understanding these interactions can help identify key species that contribute to the abundance of tick populations. Our analysis centered on the examination of tick presence, or lack thereof, on the heads and mandibles of songbirds captured at Lackawanna State Park in Lackawanna, PA. We were interested in whether there was a relationship between species and number of ticks present. Of the 12 species examined, there was a significant relationship between tick number and species, with American Robins (*Turdus migratorius*), Common Yellow Throats (*Geothlypis trichas*), Eastern Towhees (*Pipilo erythrophthalmus*), and Wood Thrushes (*Hylocichla mustelina*) differing significantly than the other species examined (Kaufman 2000). There were also four species on which no ticks were observed. Our study contributes to others that found differences in tick prevalence among various species of songbirds and may contribute to the further understanding of tick-borne diseases in birds.

AUTHORS: Sakshi Sandhir, Priya Mathiy
MENTOR: Dr. Eric P. Ingersoll
CAMPUS: Abington

Exploring the Efficiency of Differentially Substituted 4-thiazolidinones on Gastrointestinal Stromal Tumor (GIST) Cell Survival

4-thiazolidinones have garnered medical interest as potential anticarcinoma agents by exhibiting antiproliferative properties when exposed to cancer cell lines. Studies have shown that differentiated substitutions of these compounds can not only inhibit cancer cell growth but also assist in cell death. This project examines the effects of differentially substituted 4-thiazolidinone compounds on Gastrointestinal Stromal Tumor cells (GIST) compounds. The compounds vary in substituent (Br, CF₃, Cl, F, and CH₃), position (meta and para), and dosage (300 and 400 μ M). Cell growth and health was measured by microscopic observation. Our study not only highlights the potential of 4-thiazolidinones in inhibiting GIST cell growth, but also suggests avenues for further research in cancer treatment.

AUTHOR: Madeline Marous
MENTOR: Tricia Clark
CAMPUS: Berks

Graphical User Interface (GUI) Implementation for Agent-Based Microbial Radiobiology Model

Sending human life to explore the Moon and Mars will be challenging. The Earth's magnetic field naturally protects life from deep-space particle radiation that will pose health risks to humans in deep space. Current research is insufficient as it can only report cell damage in the form of bulk growth curves. AMMPER (Agent-based Model for Microbial Populations Exposed to Radiation) is an open-source, agent-based, computational model designed to simulate the effects of deep-space radiation on individual yeast cells (*Saccharomyces cerevisiae*) to facilitate interpretation of biological radiation experiments. Version 1.0 of the code ran in a console, limiting the program's accessibility. Here we present a graphical user interface (GUI) for AMMPER, developed internally by converting input points and UI files, designing an application and logo, and expanding program packages. Additionally, optical assistance corresponding with simulation parameters has been integrated. Future work will include creating a bit installer and runtime environment for AMMPER to increase ease of download and use. Ultimately, the creation of the GUI has two main goals: to facilitate the integration of computational models into the work of researchers in microbial radiobiology, and to act as an interactive and visual resource for space biology education.

AUTHORS: Isabela Caruso, Kaely Walshaw
MENTOR: Dr. Lucas Redmond
CAMPUS: Schuylkill

Influence of Weather on Body Condition of Songbirds During Fall Migration on the Penn State Schuylkill Campus

Birds and mammals are unique among animals because they are endotherms. Endothermy represents both an advantage and a disadvantage compared to ectothermy. On one hand, endotherms are able to maintain body temperatures that are often much higher than ambient temperatures. This is a benefit because endotherms, unlike ectotherms, can remain active even at very low temperatures. On the other hand, this ability to maintain a constant body temperature comes at the cost of increased energy expenditure. The energy required to maintain body temperature in vertebrates is expected to increase when ambient temperatures are both above and below the thermal neutral zone of an organism. We studied the effect of weather on body condition of songbirds on the Penn State Schuylkill campus during the fall migratory period. Mist nets were used to capture birds on a weekly basis from early-October through early-November. Once captured, we measured morphology and determined age and sex (when possible) and scored both furcular and abdominal fat stores. Temperature and precipitation values were obtained from the Penn State Schuylkill weather station and were used to explore variation in body condition among the birds that were captured during this study.

AUTHOR: Alexander Kociuba
MENTOR: Dr. Jacqueline McLaughlin
CAMPUS: Lehigh Valley

Investigating the Filtration Efficiency and Water Quality in the Danube Delta Biosphere Reserve Area

The Danube Delta is the second largest and best preserved of Europe's deltas. Thus, it is an essential ecosystem for biodiversity and a natural filtering system for water that flows into it from nineteen nations before it enters the Black Sea. The increase of human activity since the mid 19th century, however, has led to areas of pollution and eutrophication in the delta - all endangering its biodiversity and ecosystem services. This study assessed the water quality of select sampling locations within the Danube Delta by analyzing organic carbon concentration and its relevant measurements. These measurements were then used to further assess filtration efficiency by a spatial-temporal comparison of the biodegradability of dissolved organic compounds along the Lower Danube Basin. This study concluded that the overall water quality in the areas tested within the Delta itself ranged from good to moderate and that filtration efficiency within the Danube Delta is still functioning effectively. To sustain the water quality and filtration capability of the Danube delta, it is suggested that reduction of anthropogenic stresses, especially lack of adequate sewage treatment, excessive fertilizer use, antiquated animal husbandry methods, and excessive unrestrained tourism, be more heavily monitored and regulated.

AUTHORS: Kyla Valerie Guillermo, Karandhir Singh Flora
MENTOR: Mary Ann Smith
CAMPUS: Schuylkill

Jar Wars: The Rise of Sourdough

This research project examines our journey through the development of sourdough starters using different flours in the same environments. The research team examined unbleached all-purpose flour, protein flour, and barley flour. The results discuss the challenges and successes experienced throughout the process as these living biomes finally come to rise.

AUTHORS: Isabella Mystkowski, Matthew Greenfield, Issa Rodriguez
MENTOR: Dr. Megan Schall
CAMPUS: Hazleton

Preliminary Testing of Brook Trout Microsatellite Markers for Population Analysis

Brook Trout *Salvelinus fontinalis* are a cold-water fish species native to Pennsylvania whose populations are threatened by habitat degradation including acid mine drainage (AMD). Acid mine drainage results in uninhabitable stream conditions that can create a barrier between upstream and downstream populations and lead to stream reaches that are devoid of fish life. In the Cooks Run Watershed, Clinton County, Pennsylvania remediation efforts have improved stream quality and allow the possibility to reunify fragmented Brook Trout populations. We tested a set of established brook trout microsatellite markers for feasibility in population genetics analysis on sixteen fish samples. Results revealed amplification of alleles for all loci, although four had weak amplification and need to be adjusted. All alleles were scorable and loci were polymorphic, however, most alleles were shifted by two to four bases when compared to a subset of calibration samples. It appears that these markers will work for brook trout population genetic analysis and with modifications to the current methods, can be used for the larger sample set collected from Cooks Run. This work will then be used to better understand brook trout connectivity and population genetic structure in the Cooks Run Watershed after remediation.

AUTHORS: Anna Ferraris, Cassie Dierolf
MENTOR: Melisa Littleton
CAMPUS: Wilkes Barre

Unmasking Wakefield: Dissecting the Autism-Vaccine Connection

Andrew Wakefield's impact on autism research was profound, as his now-debunked 1998 study falsely linked the MMR vaccine to autism spectrum disorders, sparking widespread fear and vaccine hesitancy. Despite subsequent rigorous scientific refutation of Wakefield's claims, the legacy of his discredited study continues to influence public perception and vaccine-related policies.

ABSTRACTS: **Physical Sciences, Information Sciences, and Engineering**

AUTHORS: Natasha Agape, Ndella Jagne
MENTOR: Dr. Anna Sigmon
CAMPUS: Brandywine

Bromination of Flavonoid Derivatives

The goal of this research is to run a bromination reaction on 7-OH derivatives and successfully add a Br group to the carbon adjacent to the carbonyl carbon. The problem we are facing for this research is that 7-OH contains a phenol group (benzene ring with OH) in its structure. The OH group on the ring makes it a strong activator that directs the Br to the aromatic groups instead of the carbon adjacent to the carbonyl carbon. To redirect the Br, we need to reduce the nucleophilicity of the OH group, which is why creating a derivative is essential. By converting the OH group into an ester, the ring will not be nucleophilic, and the carbonyl carbon could instead react with the Br.

AUTHORS: Joseph Flanagan, Ryland Wulff, Cheryl Binoy,
Jessica Penrose, Steven Zukley
MENTOR: Dr. Masataka Okutsu
CAMPUS: Abington

Chemical Composition of Martian Regolith Simulant and Mechanical Properties of Martian Concrete

Sulfur concrete is considered as in-situ construction material for human exploration of Mars. To assess the feasibility of the concept, we fabricate concrete specimens by mixing molten sulfur and Martian regolith simulants. Mechanical properties are measured via compressive load tests. An X-ray fluorescence is used to analyze the chemical composition of the Martian regolith simulants.

AUTHORS: Kristofer Boswell, James Labelle, Ethan Marti, Eric Rine

MENTOR: Dr. Mizanoor Rahman

CAMPUS: Scranton

Design and Development of a Wheel and Tire Alignment Robot

Individuals, particularly those with physical injuries or accumulated wear and tear from years of work, face challenges when changing tires on vehicles. The objective was to develop a functional proof-of-concept prototype that effectively demonstrates the use of the innovative tool or robot designed for assisting people when changing tires on vehicles. To achieve the objective of developing a tire-changing robot, several key mechanisms and components were researched and developed for integration into the design. This includes a lead screw activated scissor lift mechanism to enable vertical movement. This scissor lift allows the robot to adjust its height, ensuring that it can reach and align with various vehicle types and tire sizes. A belt and pulley system, coupled with a motor, is employed to facilitate the rotation of rollers and the tire itself. A joystick interface is integrated into the system, allowing users to intuitively control the rotation of the tire. The core of the robot's control system is based on Arduino microcontrollers. Detailed Solidworks schematics were created to illustrate the design and structure of the robot and its individual components, and a proof-of-concept model was constructed to show the product's functionality. The group developed a dynamic model for the robot and analyzed the dynamic characteristics of the robot design and evaluated the performance of the physical prototype. The results showed satisfactory dynamic characteristics and performance of the prototype. Keywords: Automobiles, tire replacement, tire alignment robot, electromechanical design, dynamic system, performance evaluation

AUTHORS: Obaid Mohsin, Alina Vladimirskaia

MENTOR: Dr. Anna Sigmon

CAMPUS: Brandywine

Developing Synthetic Strategies for Brominating the alpha-Carbonyl Site on Flavonoid Structures: Yielding Products with Potential Anti-oxidative and Anti-carcinogenic Properties

In this project, we investigated the flavonoids naringenin and 7-hydroxyflavanone, which are compounds that occur naturally in fruits, vegetables and plants. These compounds are most notably found in citrus fruits like oranges, tomatoes, lemons, and grapefruit. Naringenin and

7-hydroxyflavanone are flavonoids that belong to a subclass of flavanones that have been studied for their pharmacological effects, such as anti-oxidative, anti-inflammatory, and anti-carcinogenic properties. These properties of flavanones hold great promise, as other areas of medical and pharmaceutical research can incorporate relevant findings into drug design and management of common diseases.

AUTHORS: Daniela Carolina Fernandez, Dany Dabboura

MENTOR: Dr. Maryam Kiani

CAMPUS: Lehigh Valley

Explore Cognitive Maps as Higher-Order Learning Activity to Assess Learning Calculus

Cognitive maps are regarded as “internally represented schemas or mental models for particular problem-solving domains that are learned and encoded as a result of an individual’s interaction with their environment” (Swan, 1997, p. 188). Cognitive maps can be viewed as an externalization of a schema encoded in a learner’s long-term memory. They are often used as media for constructive learning activities and as communication aids in lectures, study materials, and collaborative learning (Cañas et al., 2003). This learning tool has become popular in various educational settings. However, the existing research has not fully explored the effectiveness of cognitive mapping as a learning tool nor analyzed its utility as an assessment tool in mathematics-particularly calculus. This study will report on the implementation and evaluation of a novel assessment, cognitive mapping, in a university calculus course (N = 40). We will investigate relationships between cognitive mapping performance and two major outcome variables: academic achievement and assessment self-efficacy.

AUTHORS: Brian Tylutke, Dario Lobo
MENTOR: Dr. Joseph Ranalli
CAMPUS: Hazleton

The HIP Nature Park Project: Providing Net-Zero Power for a Local Community Park

The Hazleton Integration Project (HIP), a local, nonprofit community organization, aims to enhance a downtown Hazleton nature park with trail lighting and a water feature while preserving the park's biodiversity. Our senior design team at Penn State Hazleton's engineering program surveyed the site, calculated lighting requirements based on footpath length & horizontal lux measurements, performed a photometric analysis, and explored solar power options due to the lack of onsite power. After analyzing solar data and the total seasonal power required for the park features and selected equipment options, our team optimized a lighting and solar array design, meeting over 90% of the park's generation needs, allowing HIP to take advantage of net metering, and contribute to decarbonizing the local electrical grid while empowering the community.

AUTHORS: Josh Maclunny, Aiden Newell, Lucas West, Samuel Oster, Ben Hollister
MENTOR: Dr. Violet Major
CAMPUS: Wilkes-Barre

Kinematics of Shot-Put

Our group decided to calculate the optimal angle to throw a shot-put ball and calculate the different forces between a variety of participants and how they stack up against one another.

AUTHORS: Alexander Malandra-Martin, Adam Pohl
MENTOR: Dr. Andrei Blinkowski
CAMPUS: Abington

Mysterious Meteorite NWA 13188: Could it Have Been Launched from Earth During a Volcanic Eruption

The chemical composition of meteorite NWA 13188 shows similarities to that of volcanic rocks on Earth. In this project, we use a simple aerodynamic model to investigate the possibility that the meteorite NWA 13188 could have been launched from Earth during a volcanic eruption.

AUTHORS: Elizabeth Pao
MENTOR: Dr. Nasibeh Zohrabi
CAMPUS: Brandywine

Smart Traffic Light Management: From Design to Implementation

In this research, the goal is to design and implement a working traffic light system using Raspberry Pi, Python programming, and the finite state machine technique to generate optimal traffic-flow patterns. Specifically, the finite state machine technique will be used to model an algorithm that can autonomously handle the flow of traffic. To achieve this goal, the CrowPi (Compact Raspberry Pi Kit) is used in this project, which provides an electrical and digital interface, as well as electronic components to enable hands-on activity in the control and programming of the traffic light system.

AUTHOR: Evelyn Louca
MENTOR: Dr. Lee Silverberg
CAMPUS: Schuylkill

Synthesis of the Product of Furfural

This research focuses on the synthesis of heterocycles from furfural. The heterocycle was reacted with an amine and one of two acids: thionicotinic acid or 3-mercaptopropionic, using T3P as a coupling agent. This process was changed in many ways, one variable at a time until a product was successfully made through the process of synthesis. With the newly found reaction method, it is hypothesized that current failed reactions could be successful under these conditions. It can be further hypothesized that current successful reactions could be recreated with higher yields using this method. These compounds have many biological uses such as having antifungal and antiparasitic properties as well as being resistant to cytotoxicity. Synthesizing new compounds is necessary for this area of research to combat these organisms becoming resistant to the medication resulting in tragic side effects.

AUTHORS: Trevor Ruggiero, Isabella Colyer
MENTOR: Dr. Dinesh Patel
CAMPUS: Hazleton

Toward Photochromic Diarylethenes for Use in Organo-Metallic Frameworks

Working in collaboration with researchers at the University of Buffalo, we have been synthesizing and characterizing photochromic diarylethenes (DAEs) for use in metal-organic frameworks. These photochromic DAEs have other uses such as in organic electronics, photonic materials, and drug delivery vehicles. Here we present the synthesis of cyano and pyridyl derivatives of a quinone containing DAE. Both contain nitrogen lone pairs, which will be utilized for metal binding. The cyano derivative has been obtained in pure form and characterized by UV-Vis spectroscopy. A crystal structure has also been obtained. The pyridyl derivative has been characterized by mass spectrometry.

AUTHORS: Sadid Hassan, CJ Dunham
MENTOR: Dr. Asif ud-Doula, Dr. Gillian Pearce
CAMPUS: Scranton

Violations of Kepler's Third Law Among Planetary Types

Currently, exoplanets are classified into four different categories based on their size: terrestrial, super-earth, Neptunian, and Gas Giants. According to Kepler's Third Law of planetary motion, the squares of the orbital periods of these planets are directly proportional to the cubes of the semi-major axes of their orbits. The purpose of this research is to investigate whether this law always applies to each category of exoplanets. If not, the research aims to understand the factors that could cause a divergence from the relationship, and whether those differences are a trend in that particular exoplanet type. It is expected that exoplanetary systems will follow Kepler's Third Law if: 1. the exoplanets are much less massive than the parent star, 2. gravitational influence between the planets is not significant, 3. the stellar system is clear of dust and debris, and 4. the system does not contain multiple stars. Our preliminary results show that there are several systems of exoplanets that deviate from such Kepler's Third Law with majority being among the terrestrial type. Further, this research aims to explore the factors that could cause this shift, whether it be experimental errors or the existence of a hidden celestial body in the planetary system influencing the orbit of a particular planet.

ABSTRACTS: Social Sciences and Business

AUTHOR: Emily Hallman
MENTOR: Dr. Raymond Petren
CAMPUS: Scranton

The Association Between Parenting Stress and Child and Adolescent Mental Health

Children who perceive stress from their parents tend to face more problem behaviors and mental health issues. The following review examines the associations between parenting stress and child and adolescent mental health with a special focus on conditions and processes that moderate and mediate these associations.

AUTHOR: Lauryn Helt
MENTOR: Mary-Ann Smith
CAMPUS: Schuylkill Haven

Big Lick in Tennessee Walking Horses: Glitz & Glam?

The Tennessee Walking horse is a gaited breed known for its natural running-walk; solid, muscular build; and calm disposition. The breed was officially recognized in 1935 and popularized for its smooth, comfortable gaits. Today, they compete under a variety of disciplines, most notably performance pleasure, a saddleseat-like variant requiring Big Lick. Recently, the practice of Big Lick has fallen under scrutiny for a variety of reasons. This presentation will delve into the Tennessee Walking Horse industry to examine the methods used to obtain the Big Lick movement and why it persists. Additionally, the legality of the related practices and the ethical principles behind them will be discussed.

AUTHOR: Mahika Chatterjee
MENTOR: Dr. Sadan Kulturel-Konak
CAMPUS: Berks

Building an Innovative Mindset in Business & STEM Programs

Fostering innovation and creative thinking is crucial in higher education. It allows students to develop new solutions to modern-day problems across different fields of study. This paper explores entrepreneurial approaches and activities that educators in science, technology, engineering and mathematics (STEM), business, and beyond can implement in higher education to foster innovation in their teaching. In today's evolving economy and workforce, it is crucial to have an entrepreneurial mindset, however, many students lack opportunities and experiences in building such mindsets. After compiling an extensive review of literature, case studies, and practical experiences, this paper identifies several tools and strategies to foster innovation and cultivate an entrepreneurial mindset in higher education. Note: Entrepreneurial/innovative/creative (mindset) are used interchangeably throughout this paper. Keywords: Entrepreneurial mindset, (higher) education, classroom, business, STEM, pedagogical interventions, challenge-based learning.

AUTHORS: Amar Jannatul-Ferdous Chowdhury, Khaleelah Hamm
MENTOR: Dr. Signorella
CAMPUS: Brandywine

Campus Climate for Students of Color

Even before recent world events, with universities struggling to maintain cultural safety for their students, DEIB efforts by universities have been questioned, attacked, and, in some cases, eliminated. In the present study, students from several regional campuses of a public university were surveyed on their diversity-related experiences at their campus, inside and outside the classroom (N = 57). The university has continued DEIB efforts, although funding for some programs was reduced. Building on work by Torres-Harding et al. (2012) on racial microaggressions and research on reducing prejudice through classroom and campus events, the survey included three sections: participation in and reactions to diversity-related classes and events, classroom diversity climate, and microaggression experiences related to student identities. A preregistered hypothesis that BIPOC students would experience more microaggressive experiences than would White students was supported ($p < .05$; $d = .49$). These results point to both a continuing problem and the possibility of improving climate through inclusive classroom environments.

AUTHORS: Anna Ferraris, Cassie Dierolf
MENTOR: Melisa Littleton
CAMPUS: Wilkes Barre

Cultural Competency: Ethnic Minorities in Human Services Settings

Cultural competency remains a critical topic in the field of human services. Ethnic minorities face a multitude of difficulties surrounding human services due to a lack of awareness for cultural norms amongst service providers. This poster will explain the common problems faced by ethnic minorities in human services settings as well as providing a better understanding of their cultural norms.

AUTHOR: Mabriel Martinez
MENTOR: Dr. Jennifer Parker
CAMPUS: Lehigh Valley

Exploratory Studies on Associations Between Cognitive and Mental Health Disorders, Parenting Styles, and Self-Esteem

The purpose of the study is to investigate the associations between cognitive and mental disorders, parenting style, and self-esteem. College students 18 years or older attending a university in the northeast of the United States were surveyed and used as participants in the study. The survey included the Rosenberg Self-Esteem scale, the Parental Authority Questionnaire, questions regarding the status of mental and cognitive disorders, and whether any medication taken affects the mood of parent and student participants. A statistical analysis utilizing a t-test for each parenting style (authoritative, authoritarian, and permissive) and self-esteem concluded that the permissive parenting style had a statistically significant association with cognitive disorders in student participants and no associations were found with authoritative and authoritarian parenting. Self-esteem was only associated with mental health disorders in both parents and student participants. Students were found to have lower self-esteem when their parents had a mental health disorder. Future studies can focus on perceptions of student participants' upbringing through qualitative interviews to understand parent-child relationships better.

AUTHOR: **Danny Eldabbas**

MENTOR: **Laura Evans**

CAMPUS: **Brandywine**

The Impact of Mindfulness on the Well-being of College Students: Exploring Pedagogical and Virtual Reality Practices

Stress is quickly increasing among college students. Prior research has indicated that mindfulness based interventions (MBIs) like meditation, self-reflection, and self-compassion can lead to significant reductions in mental health symptoms (Hirshberg et al., 2022). Research has also demonstrated that a rising MBI called Virtual Reality-Based Mindfulness can reduce stress, anxiety, and depression (Brelet & Gaffary, 2022). A total of 33 undergraduate students enrolled in a course on human flourishing rated their ability to manage life qualities like stress, coping behaviors, and resilience at week 2 and again at week 15 of an academic semester. 16 of the total participants engaged in mindfulness-based virtual reality and reflected on how this may support the cultivation of flourishing. Quantitative analyses did not find that the course positively influenced student wellbeing given that the only significant finding between pretest and posttest was on participant relaxation scores. Qualitative analyses, however, indicated some shifts in how participants managed stress and setbacks. Virtual reality facilitated access to awe, focus, and flourishing for some, but not all participants. Based on these findings, student wellbeing might be best supported by differentiated individual strategies. Further research with a larger sample size and less sample attrition may point to clearer findings.

AUTHOR: **Kelee Phan**

MENTOR: **Dr. Jennifer Parker**

CAMPUS: **Lehigh Valley**

Parenting Style and Academic Achievement: Objective vs. Subjective Outcomes

Parenting style is something that affects everyone, whether this means the parent is involved or absent in the child's life. While there is research done on the effects of parenting style on GPA, less attention has been given to the relationship of parenting style on self-satisfaction with GPA. This research examined the associations between three types of parenting style (permissive, authoritarian, and authoritative) from the Parental Authority Questionnaire and academic performance (measured by GPA)

and self-perceptions about their academic performance. Participants included college students at a small four-year campus in the Northeast of the United States (N=144) who were asked to take a survey. The only parental style that was found to have a significant effect on academic performance was permissive parenting style. Permissive parenting was associated with lower levels of academic performance. Authoritative parenting, on the other hand, showed higher levels of self-satisfaction with academic performance. Implications are discussed.

AUTHOR: **Poetic Session**

MENTOR: **Dr. Valerie Schrader**

CAMPUS: **Schuylkill**

The Rights of the “Uncivilized”: Applying Social Constructionism and Agenda-Setting to Dehumanization Rhetoric in the Current Israeli-Palestinian Conflict

Using rhetorical analysis as a research method, I apply Berger & Luckman's (1967) theory of social constructionism and McCombs & Shaw's (1972) theoretical construct of agenda-setting to statements from Yitzhak Herzog, Benjamin Netanyahu, Yoav Gallant, Ghassan Aljan, and Erza Yachin about the current Israeli-Palestinian conflict. In this project, I illustrate how Palestinians have been dehumanized and are equated to Hamas by some members of the Israeli government and military. I note how, through these statements, Palestinians are compared to animals and beasts, and they are portrayed as compliant to Hamas's actions against Israeli citizens. I also discuss how similar rhetoric has been used to dehumanize other marginalized groups of people in an excuse to justify various countries' governments' actions that indiscriminately oppress groups of people. This dehumanization is meant to make citizens and onlookers compliant to the attacks and human rights violations against those who may be of different races, ethnicities, or religions. I reflect on why it is important to recognize these agenda-setting tactics that have led to discrimination in the past and may currently lead to human rights violations in the present.

AUTHOR: Elizabeth Pao

MENTOR: Dr. Nasibeh Zohrabi

CAMPUS: Brandywine

Smart Traffic Light Management: From Design to Implementation

In this research, the goal is to design and implement a working traffic light system using Raspberry Pi, Python programming, and the finite state machine technique to generate optimal traffic-flow patterns. Specifically, the finite state machine technique will be used to model an algorithm that can autonomously handle the flow of traffic. To achieve this goal, the CrowPi (Compact Raspberry Pi Kit) is used in this project, which provides an electrical and digital interface, as well as electronic components to enable hands-on activity in the control and programming of the traffic light system.

AUTHOR: Anastasiya Datsenko

MENTOR: Dr. Kurt Fowler

CAMPUS: Abington

The Thousand Year Lie: Russian Propaganda and The War in Ukraine

This research included the analysis of speeches and statements released by President Putin from February 2022 - February 2024. The intended outcome of this research was to analyze the sample of the media to find patterns and themes and better understand the social process of how misinformation impacts the perceptions of the on-going war in Ukraine.

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