2026 TU Student Summer Research Conference

September 24, 2026

4:00-7:00 p.m.

Research@10 West

Conference Schedule

3:30 p.m.	Doors Open
4:00 p.m.	Opening Remarks Dr. Sidd Kaza, Vice President of Research, Towson University
4 - 4:50 p.m.	Poster Session 1
4:30 p.m.	Oral Presentations Begin (concurrent with poster sessions)
5 - 5:50 p.m.	Poster Session 2
6 - 6:50 p.m.	Poster Session 3

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Poster Session 1, Atrium, 4 - 4:50 p.m.

Poster #1: Extreme Heat and Hours Worked: Evidence on Labor Supply among Outdoor Workers in California and Texas
Student Researcher: *Zahira Argueta-Rivas*
Faculty Mentor: *Dr. James Manley* (Economics)

Abstract: *Extreme heat may affect workers' ability to supply labor by increasing physical strain, reducing productivity, and creating unsafe working conditions, particularly for workers in outdoor occupations. This study examines the relationship between extreme heat, outdoor employment, and weekly hours worked among employed individuals in California and Texas. Using Current Population Survey (CPS) data linked with county-level weather observations for 2022 and 2023, the analysis evaluates whether workers in counties experiencing average maximum temperatures of at least 90°F work fewer hours and whether the relationship differs for outdoor workers. The analysis controls for precipitation, age, sex, race and ethnicity, educational attainment, and county, month, and year fixed effects. Descriptive results show that workers average approximately 38.4 hours per week, with outdoor workers averaging fewer hours than indoor or other workers. Regression results indicate that extreme heat alone is not significantly associated with weekly hours worked. However, the interaction between extreme heat and outdoor employment is statistically significant, suggesting that the relationship between outdoor work and hours worked differs under extreme heat conditions. These findings indicate that the effects of extreme heat on labor supply are more complex than a simple reduction in weekly hours. The results contribute to understanding how changing weather conditions may affect workers and highlight the importance of considering occupational exposure when evaluating the labor-market effects of extreme heat.*

Poster #2: Comparing Staffing Levels and Behavioral Healthcare Needs by Facility Size in U.S Nursing Homes
Student Researcher: *Martha Agaba*
Faculty Mentor: *Dr. Bo Kyum Yang* (Health Sciences)

Abstract: *Background: There is an increasing concern across nursing homes regarding whether direct care providers are equipped to facilitate proper psychosocial care for elderly residents with dementia and other behavioral/cognitive disabilities. The size of the facility often determines key components that contribute to overall quality care, such as staffing levels, ownership, and availability of qualified behavioral and social service personnel (Baldwin et al., 2017). Objectives: To study the relationship between nursing home facility size, staffing levels, and behavioral healthcare needs in U.S. nursing homes. Data Sources and Study Design: The Centers for Medicare and Medicaid CASPER 2025 dataset is used for this study. Our sample consists of 10,206 nursing homes in the United States and compared across three different facility sizes. We used a statistical data analysis software*

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system, to compute these variables to determine the differences in staffing levels across and behavioral healthcare needs at each facility size. Results: Amongst the behavioral healthcare needs, results display several weak correlations across the different facility sizes. While many were still statistically significant, they were small in magnitude typically within the medium and larger facilities. However, results show a strong positive association between mental health staffing levels and the presence of contract, full-time, and part-time mental health services, also particularly among medium and large facilities. Conclusions: Evidence suggests that among large nursing homes, mental health staffing was weakly associated with most behavioral healthcare needs but demonstrated stronger positive associations with the availability of contract, full-time, and part-time mental health services.

Poster #3: Understanding the 2025-2026 Measles Resurgence
Student Researcher: *Harekrushna Das*
Faculty Mentor: *Dr. Farzin Ahmadi* (Health Sciences)

Abstract: *This research project examines the re-emergence of measles in the United States, with a particular focus on the 2025-2026 outbreak following the declared elimination of measles in the year 2000. The analysis explores patterns in measles incidence across twelve U.S. states with a brief focus on Texas (which was an epicenter of the outbreak in 2025) and compares these trends in relation to vaccination coverage, vaccine exemption policies, and social vulnerability. By examining differences between states with strict versus lenient vaccination policies, the study aims to identify key factors associated with increased outbreak risk(s). The findings highlight the role of low vaccination coverage within pocket populations, which includes coverage gaps, reporting exclusions, and policy variation in undermining overall herd immunity. This research aims to emphasize the importance of consistent public health policy and targeted county- and local-level interventions to prevent future outbreaks.*

Poster #4: Tone Affects Language Knowledge (TALK)
Student Researchers: *Jennifer Braunstein and Brianna Hinkleman*
Faculty Mentor: *Dr. Michelle Erskine* (Speech-Language Pathology & Audiology)

Abstract: *We explored how emotional prosody affects word learning in children and adult learners. We also explored how emotional prosody differentially impacts immediate and delayed recall, one hour later. Participants learned novel words taught in happy, angry, and neutral voices which were paired with unfamiliar images of gardening tools and pet toys. Then, to test recognition they saw the two images, one being the target and the other being a different object. They were told to choose which object matched the image they heard. Our findings were varied, where some children and adults recalled words very well, while others did not. Data collection is still ongoing.*

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Poster #5: Brain-Computer Interfaces in Neurodegenerative Disease Care: Anticipatory Ethical Analysis
Student Researcher: *Chloe Bourne*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *Advancements in neurotechnology are rapidly transforming approaches to neurological care, particularly through the development of brain-computer interfaces (BCIs), which enable direct communication between neural activity and external systems. As neurodegenerative diseases continue to increase in prevalence and remain largely incurable, BCIs offer emerging possibilities for improving diagnosis, restoring lost motor or cognitive function, and supporting patient independence. Technologies capable of accessing and interpreting neural activity introduce complex ethical questions, especially when applied to populations experiencing progressive cognitive and neurological decline. This research aims to explore the ethical implications of integrating Brain-Computer Interfaces into the care of neurodegenerative diseases, focusing specifically on Alzheimer's disease, Parkinson's disease, Amyotrophic Lateral Sclerosis, and Huntington's disease to capture variation in cognitive impairment, motor degeneration, disease progression, and target patient populations. Particular attention will be given to how progressive changes in cognition and agency may influence consent, treatment decisions, and ethical responsibility when neural data becomes integrated into AI-supported BCI medical systems, and the Ethical and Anticipated Ethical Issues with all of these developments.*

Poster #6: Algorithmic Amplification of Political Propaganda via Social Media
Student Researcher: *Owen Grove*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *When you scroll through TikTok or YouTube, an algorithm is deciding what you see next — and that algorithm rewards content that gets clicks, not content that's accurate or healthy for democracy. This project looks at how that system can be exploited to spread political propaganda, using the 2024 Tenet Media case as the main example. In that case, Russian state media secretly paid several popular American political commentators nearly $10 million to produce content for U.S. audiences, without disclosing to viewers — or even to the commentators themselves — where the funding actually came from. The resulting videos spread across YouTube, TikTok, and X the same way any other content does, amplified by algorithms with no way to flag foreign interference. This project argues that platforms can't treat their algorithms as neutral just because they didn't write the propaganda themselves: if a recommendation system is what makes propaganda effective at scale, the platform is part of the ethical picture too. Drawing on international relations and information-warfare research, this project treats algorithmic amplification as a real foreign policy tool rather than a purely technical problem, and asks what responsibility platforms, commentators, and lawmakers should bear when this kind of manipulation occurs.*

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Poster #7: Social-Emotional Learning in Philadelphia Schools: Comparing Experience to Literature as a Pre-Service Educator
Student Researcher: *Iris Smith*
Faculty Mentor: *Dr. Robert Blake* (Elementary Education)

Abstract: *My goal has always been to be the best educator possible for my future students. To do this, I know I must match my knowledge with my performance. As a future teacher, I have studied the textbooks, read the methodology, and practiced implementing targeted strategies like call and responses and sensory activities. However, I have noticed in my field experiences that these problems do not diminish much in classrooms where Social-Emotional Learning (SEL) is not continuously reinforced and upheld, despite the implementation of other behavior management strategies like proximity and point systems. To be prepared to bring SEL into my internship, I needed to experience it for myself and conduct more research about how it can truly shape a classroom. The purpose of this study is to become a better educator through learning from seasoned teachers. To do this, I wanted to focus on two essential questions to guide my findings; How can the implementation of social-emotional learning strategies positively affect the classroom culture? How do my observations at Spring Garden compare to the pre-existing literature and research on SEL? While there is no clear-cut "solution" or "best strategy" that works in every classroom, I observed a lot of valuable resources and ideas at Spring Garden School that I have compared to my research to gauge how SEL might be different in practice than it is in literature.*

Poster #8: Waking Up from the American Dream: Representing the Latino and Immigrant Experience Through the Visual Arts
Student Researcher: *Melany Cornejo*
Faculty Mentor: *Dr. Amanda Burnham* (Art + Design, Art History, Art Education)

Abstract: *Over the summer, funded by a Cardin grant, I began a body of work that consists of mixed media 2-D works (incorporating painting, drawing, and collage) and sculpture to bring attention to the Latino immigrant population in the United States, a group that is often invisible to the non-immigrant majority, and which only becomes visible when they are scapegoated by people in power. Through this work I am reflecting a positive self-image back to immigrants and Hispanics that are underrepresented in this nation, and making this diverse group visible to Americans that have never experienced immigration closely. I want to humanize those communities that are only seen as ALIENS by the non-immigrant majority, and to create empathy. Spurred by intensive studio time and wide ranging experimentation over the summer, this body of work is ongoing and will continue throughout this year, culminating, eventually, in an exhibition.*

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Poster #9: Characterization of Antibiotic Resistance Profiles of Gut Bacteria in *Onthophagus taurus*
Student Researcher: *Molly Rist*
Faculty Mentor: *Dr. Anne Estes* (Biological Sciences)

Abstract: *Use of antibiotics in the agricultural industry has been connected to the spread of antimicrobial resistance (AMR). Insects that consume livestock dung, such as the Onthophagus taurus dung beetle, are exposed to antibiotic residues, which may help transmit AMR genes to other bacteria. While bacteria may have natural resistance to antibiotics, they can also acquire resistance from the environment and interactions with other microbes. We characterized the antibiotic resistance profiles of twenty-eight bacteria isolated from the gut of the dung beetle, O. taurus. Five antibiotic compounds; tetracycline, ciprofloxacin, ampicillin, amoxicillin-clavulanate, and streptomycin, commonly administered to dairy cattle were used to test O. taurus gut bacterial isolates for antibiotic resistance. Minimum inhibitory concentration of the antibiotics was tested using the microtiter broth dilution method. These AMR assays allow us to determine the minimum concentration of each antibiotic necessary to inhibit bacterial growth. We found resistance to all five antibiotics tested. Each of the twenty-eight isolates has resistance to at least one tested antibiotic. Enterobacter cloacae, a species of clinical relevance, had resistance to tetracycline, ciprofloxacin, and ampicillin. These results suggest that there is evidence of widespread antibiotic resistance in dung beetle gut bacteria.*

Poster #10: Functional Impact of Varicose Projection Astrocytes on Neuronal Degeneration in Alzheimer's Disease
Student Researcher: *Alex Macias*
Faculty Mentor: *Dr. Carmen Falcone* (Biological Sciences)

Abstract: *Alzheimer's Disease (AD) is among the most prevalent neurodegenerative diseases in the US and presents cognitive impairment and neuroinflammation. Glial cells have recently been recognized for having important roles in AD pathogenesis and disease progression. Varicose projection (VP) astrocytes are a recently identified type of reactive astrocytes that, under certain pathological conditions, undergo morphological changes when exposed to pro-inflammatory cytokines such as IL-1β and TNF-a. However, functional changes remain unclear as to whether VP astrocytes support neuroprotective or neurotoxic roles. We plan to research whether VP astrocytes induce neuronal damage in AD through inflammatory and stress-related pathways or if they have a neuroprotective role. This will be done with the use of healthy and AD human induced pluripotent stem cell (hiPSC)-derived astrocytes and neurons in co-cultures. Then, we will analyze the impact of healthy versus AD-derived VP astrocytes on neurons through the use of immunofluorescence (IF) staining. The main aim is to assess the structural integrity of neurons in the presence of VP astrocytes derived from either AD patients or healthy controls. Anticipating that VP astrocytes cause neurotoxic damage or provide a neuroprotective effect. Knowing this is imperative to further classify neurotoxic*

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or neuroprotective mechanisms of VP astrocytes and whether it plays a role in neuronal degeneration in AD.

Poster #11: The Role of VP Astrocytes in Alzheimer's Derived Neuro-Inflammation
Student Researcher: *Eric Mitchell*
Faculty Mentor: *Dr. Carmen Falcone* (Biological Sciences)

Abstract: *Astrocytes are a type of glial cell in the central nervous system (CNS). Within the brain, astrocytes play pivotal roles, including maintaining neuronal homeostasis, support of the blood brain barrier, and regulate synapse formation and function. Astrocytes are also known to become reactive under pathological conditions, such as Alzheimer's Disease (AD). Neuroinflammation is a main driver to the progression to AD and, under such conditions, astrocytes go through morphological and functional alterations known as reactive astrogliosis. Located within cortical layer VI and white matter of the brain, a specific type of reactive astrocytes called varicose projection (VP) astrocytes has recently been detected. VP astrocytes show distinct morphological features compared to astrocytes, specifically displaying long processes with evenly distributed varicosities and a loss of astrocytic territorial domains. While their roles remain mostly unclear, it is known they are induced under pro-inflammatory conditions. In this research we aim to characterize a timeline of such morphological modification and to identify a molecular signature of VP Astrocytes in AD-specific neuroinflammation that can potentially help us use them as a biomarker and a target in AD. First, we confirmed the increase in density of VP astrocytes under seven days of exposure to pro-inflammatory cytokines (i.e., IL-1β and TNFa), using immunofluorescence staining and fluorescence microscopy. Then, over a seven-day period a fluorescent cell tracker will be used to track and detail a timeline of formation of these projections and the varicosities on astrocytes under pro-inflammatory conditions. Finally, we will perform single-cell RNA sequencing (scRNAseq) to find VP astrocyte-specific transcriptome versus other reactive astrocytes, in both AD- derived cells and controls, with and without pro-inflammatory cytokine exposure. These findings will allow for further characterizing the neuroprotective versus neurotoxic properties of VP astrocytes. Moreover, this study will give us an outline to research other conditions caused by neuroinflammation, as well as possibly use VP astrocytes as new therapeutic targets for these pathological conditions.*

Poster #12: Bla g 2 Allergen-Specific Immunotherapy: Assessing Shifts in Adaptive Immunity
Student Researcher: *Oluwajomi Akinwumi*
Faculty Mentor: *Dr. Erin Harberts* (Biological Sciences)

Abstract: *The incidence of allergies is estimated at 30 – 40% of people worldwide. Allergic symptoms result from an immune overreaction to usually harmless substances. Allergies begin with exposure to an antigen (a substance foreign to your body), which causes B cells to produce IgE and IgG1 antibodies (drivers of allergic reactions). Antibody isotypes like IgG2 are associated with reduced*

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allergic symptoms upon exposure. Allergen-specific immunotherapy (AIT) is an allergy treatment that gradually increases the allergen dose to help patients tolerate it. However, AIT efficacy varies widely among individuals. Our research seeks to enhance non-allergic adaptive immune responses to the German Cockroach antigen (Bla g 2) in a mouse model by adding immunoadjuvants BECC 438 and BECC 470 to AIT. We hypothesize that adding BECC 438 and BECC 470 to AIT will reduce allergic symptoms in mice after Bla g 2 challenge. Our experiment involves sensitization (making mice allergic to Bla g 2), followed by treatment with unadjuvanted AIT and AIT with different adjuvants. Finally, the mice are challenged to measure allergic reactions. We analyzed serum samples from post-sensitization, two days post-challenge, and intermediate time points to measure IgG1 levels using indirect ELISAs. Our results highlight that IgG1 production was consistent between all experimental groups at all 5 time points. These results confirm that IgG1 is not the primary driver of allergic responses in contrast to IgE. For future experiments, we plan to study IgE and IgG2c levels, observing a reduction in IgE and an increase in IgG2c.

Poster #13: Functional Characterization of Rhomboid Proteases in Cyanobacteria: Generation of a *Synechococcus* sp. PCC 7942 g1835 Knockout Mutant and Analysis of its Role in High-light Acclimation and Photosynthesis

Student Researcher: *Ezinne Okafor*
Faculty Mentor: *Dr. Iskander Ibrahim* (Biological Sciences)

Abstract: *Rhomboid proteases are a group of intramembrane proteases (enzymes that break down proteins) and regulate a variety of important biological processes. These proteases are found across all domains of life, including both eukaryotic and prokaryotic organisms. Our lab previously discovered that Slr1461, the only rhomboid protease in the photosynthetic bacterium Synechocystis sp. PCC 6803, plays a crucial role in regulating CO2 uptake, especially under mixotrophic conditions. Deletion of the Slr1461 gene increased the cells' high-affinity CO2 import system. For my summer project, I further characterized the role of Slr1461 in high-light acclimation and generated a knockout mutant strain of g1835, the gene encoding the Slr1461 homolog in the cyanobacterium Synechococcus sp. PCC 7942. We found that the slr1461 mutant exhibited increased photosystem I activity when exposed to high-light conditions. We also demonstrated that the mutant phenotype could be rescued through genetic complementation, further supporting the role of Slr1461 in this response. In Fall 2026, I will further investigate the role of Synechococcus rhomboid protease g1835 in high-light acclimation to determine whether the function of this rhomboid protease is conserved across different cyanobacterial species.*

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Poster #14: Hardware Requirement Integration for the Comprehensive Avionics System for Balloons (CASBa) Async Hat
Student Researcher: *Keira Emshoff*
Faculty Mentor: *Dr. Jennifer Scott* (Physics, Astronomy & Geosciences)

Abstract: *NASA's Scientific Balloon Program Office (BPO) focuses on the creation and flight of NASA's scientific balloons, which are a low cost and fast response access to near space. These flights are useful for missions which do not require the space access NASA's Sounding Rocket Program provides, and could also benefit from longer flight duration. The Comprehensive Avionic System for Balloons (CASBa) is one of the three primary development efforts made by NASA through the BPO to modernize the existing balloon support systems. The CABSa is constructed using various "hats" that interface with a Raspberry Pi, which are interchangeable based on operational needs. The initial prototype design of the "Async Hat" was a modular port used to implement the RS232 UART interface which would allow the flight computer to communicate with other communication modules. The prototype was used to implement an RS232 UART interface to allow the computer to communicate with Over the Horizon and Line of Sight RF communication modules. The new design focuses on the genericity of the hat by introducing multiple signal routing options. Making the Async Hat as generic as possible would save the BPO time and money in creating new hats for different signal needs on future balloon flights.*

Poster #15: Assessment of Soil Geolocation by ATR FTIR and ICP-OES Spectroscopy
Student Researcher: *Melody Gokce*
Faculty Mentor: *Dr. Kelly Elkins* (Chemistry)

Abstract: *In this study, we assessed ICP-OES and ATR FTIR spectroscopy for analyzing soil for forensic geolocation predictions. Samples were collected from different soil types and locations in Maryland. Soil samples were prepared for the ICP-OES by digesting in nitric acid. Soil samples were placed directly on the ATR interface and 128 scans were collected on the FTIR with air as the background. Analysis was performed by searching several libraries within the FTIR's Omnic software, as well as the elemental composition from the ICP-OES using a multi-element standard within the prepared range. The library search on the FTIR instrument identified the materials as soil and soil components. The elemental composition from the ICP-OES revealed unique fingerprints for various samples. This was used to analyze samples from a historic site in Maryland.*

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Poster #16: Phenotyping Jamestown Canyon Virus 2000
Student Researcher: *Kathryn Walsh*
Faculty Mentor: *Dr. Kishana Taylor* (Biological Sciences)

Abstract: *Jamestown Canyon virus (JCV) is an emerging infectious disease in North America that remains understudied and under-surveilled. JCV infects humans through mosquito bites, leading to febrile illnesses, including meningitis and encephalitis that can lead death in severe cases. Establishing baseline phenotypic characteristics of JCV will provide a foundation for future studies investigating viral replication, adaptation, and pathogenesis. In this study, JCV strains 1999 and 2000 were initially characterized using plaque assays, growth kinetics, and quantitative PCR (qPCR) to examine viral growth over time. Of the two strains evaluated, JCV 2000 demonstrated the most substantial results and was selected for further characterization. It was found that at 60 hours incubation, the virus reached its peak concentration of 1.58x10^6 PFU (plaque forming units)/mL at a dilution of 10^-4. These results established foundational growth and replication characteristics for JCV 2000, providing a baseline for subsequent studies that will look at how the virus changes under repeat infection.*

Poster #17: Ligand-Directed Engineering of Two-Dimensional Silver Nanoparticles
Student Researcher: *Naomi Uiyoshioria*
Faculty Mentor: *Dr. Mary Sajini Devadas* (Chemistry)

Abstract: *We present a facile and rapid synthesis method to engineer silver anisotropic nanoparticles with dendritic projections which have applications in biomedicine, green chemistry, and agriculture. Existing methodologies to produce these particles require a time-consuming, and costly process. The use of the one-pot approach, which is an under studied technique to create variation in crystal growth, effectively addresses previous methods' limitations. Combining the ligand 4-bromo-triphenylamine (4-bTPA) with N,N-dimethylformamide (DMF) under moderate heating conditions (150 °C ambient pressure) alongside our metal precursor, AgNO3 generates a variety of structures such as cubes, stars, and dendrites. The nanoparticles are subsequently characterized using a variety of analytical methods, such as UV-vis spectroscopy, scanning electron microscopy (SEM), optical microscopy and surface-enhanced Raman spectroscopy (SERS) which are used to determine the presence of AgNPs, as well as their structural and plasmonic properties. This research project has the potential to provide novel usage of the ligand 4-bTPA act as a co-reductant allowing for the presence of Ag0. This can allow for growth that is favored on the {111} and {110} facets.*

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Poster #18: Competition Growth Experiment on *E. coli* with sORF Deletions
Student Researchers: *Doris Nwachukwu, Chloe Sullivan, Kaitlyn Finch, Samreen Khalid, Tobechukwu Amadike, and Toluwani Idowu*
Faculty Mentor: *Dr. Matthew Hemm* (Biological Sciences)

Abstract: *Small proteins are defined as peptides encoded by short open reading frames (sORFs) and containing fewer than 50 amino acids. Most small proteins are uncharacterized due to their extremely small size, making them difficult to even identify. To investigate the function of these small proteins in the bacterium E. coli, we performed a competition growth experiment to examine differences between the wild-type and a mutant strain lacking the ytjA, ynaE, ybaM, ynaL small protein genes. By observing changes in colony numbers in plated cultures over time, we assessed whether deleting the sORf affected bacterial growth. From our observations, we gain insights into on-going efforts to identify the functions and characteristics of these small proteins and improve our understanding of them.*

Poster #19: Ion Energy Distributions in Pulsed Laser Deposition Plasmas: Influence of Target-to-Substrate Distance Variation
Student Researcher: *Kayode Adegbo*
Faculty Mentor: *Dr. Rajeswari Kolagani* (Physics, Astronomy & Geosciences)

Abstract: *Ion energy distributions in pulsed laser deposition (PLD) plasmas can strongly influence the growth and properties of oxide thin films. In this study, ion energy spectroscopy (IES) was used to examine how target-to-substrate (T–S) distance affects plasma ion energies under different oxygen background pressures. Measurements were performed at a fixed laser pulse energy of 350" " mJfor T–S distances of 5, 7, and 10 cm under vacuum and oxygen pressures from 10 to 50 mTorr. The results show that the effect of T–S distance changes significantly with oxygen pressure. Under vacuum, the 5 cm condition shows a lower fraction of energetic ions than the 7 and 10 cm conditions, suggesting continued plume evolution when collisions are negligible. At 10 mTorr, the ion energy distributions begin to cross, and as pressure increases, this crossover shifts toward lower energy. By 30–50 mTorr, shorter T–S distances retain a larger fraction of energetic ions, consistent with stronger collisional energy loss during longer plume travel. SrTiO3 (STO) films grown on LaAlO3 under vacuum and 10 mTorr also show T–S-dependent changes in lattice parameters and resistivity. Overall, the results show that oxygen pressure strongly modifies how T–S distance controls plasma energetics and thin-film properties.*

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Poster #20: Seroprevalence of TcdB in Colorectal Cancer Patients and Indole-3-Acetic Acid protection from TcdB
Student Researcher: *Ezekiel Morris*
Faculty Mentor: *Dr. Cynthia Sears* (Johns Hopkins University)

Abstract: *CDI (Clostridioides difficile Infection) refers to the severe inflammation of the colon due to a bacterial pathogenic bacterium, C. diff. CDI has been correlated with the use of broad-spectrum antibiotics as during the course of treatment, this can allow for C. diff recolonization of the gut microbiome. C. diff ability to inflame and disrupt the gut microbiome hinges on its expression of tcdB, one of the exotoxins it secretes which contributes to its pathogenicity. TcdB disrupts the tight junctions in colon tissue as well as elicit pro-inflammatory cytokine responses, recruiting primarily innate lymphoid cells (ILCs), polymorphonuclear leukocytes (PMN), and Type III ILCs. Observed in murine models (GF ApcMin/+ and ApcMin/+;Il10-/- mice) which had to be gavage with slurries positive with tcdB- strains or tcdB+ strains, mice that received tcdB+ slurries significantly developed more colonic tumors than those that received tcdB- slurries. By surveying colorectal cancer patients for the presence of anti-TcdB antibodies, we can make further inferences as to how titers correlate to CRC (colorectal cancer) pathogenesis as well as if this correlates to specific stages of CDI.*

Poster #21: Tennis vs. Table Tennis: Investigating Multi-Skill Motor Learning
Student Researcher: *Katherine Do*
Faculty Mentor: *Dr. Steffen Wolff* (University of Maryland School of Medicine)

Abstract: *Motor skill learning requires individuals to refine movements through repeated practice and adapt to changing task demands. This project investigates motor learning at both the behavioral and neural levels using complementary human and rodent approaches. The primary focus is a human lever-tapping task in which eight participants practiced producing movements toward specific target intervals over multiple weeks. Participants were divided into groups with or without a contextual light cue, allowing us to examine how contextual information influences motor performance and adaptation. Performance was analyzed across training sessions to characterize changes in motor performance and consistency over time. Complementary rodent experiments use retrograde tracing and histological analysis to examine connections between the dorsolateral striatum (DLS) and globus pallidus externa (GPe), regions involved in motor control and learning. Together, these approaches connect observable changes in motor behavior with the neural circuitry that may support motor learning.*

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Poster #22: Digital Currency and the Threat of Hidden Weapons
Student Researcher: *Mofoluwaso Ilori*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *In this case study, we will examine how cryptocurrency fundamentally changes how modern wars are and how embargoed nations and terrorist groups use cryptocurrency to purchase weapons of mass destruction. On the surface digital currency offers genuine benefits for society such as fast, borderless transactions without traditional bank fees, but if exploited it allows people with bad intensions to easily collect terrorist donations and bypass international sanctions. The six central stakeholders in this situation are citizens around the world, embargoed governments, digital currency exchanges, terrorist organizations, lawmakers, world powers, and cybersecurity professionals. The primary technical problem is that the anonymous design of blockchain technology makes it incredibly difficult to trace exactly who is buying these dangerous weapons. Meanwhile, the ethical problem is balancing the need to protect the public from harm against the right to a new Advancing form of currency. To solve these issues, cybersecurity experts must develop tracing software, and international governments must establish unified financial regulations. We can analyze this case from three perspectives using three different ethical principles. First, digital currency exchanges should apply Utilitarianism, meaning they must actively monitor suspicious buyers to ensure the greatest safety and happiness for the global community. Second, lawmakers should be guided by Deontology, following a strict moral duty to protect human life above financial privacy by enforcing firm safety laws. Finally, cybersecurity professionals should rely on Virtue Ethics, so they can create space for people to gain traits like courage, honesty, and dedication as they work to stop illegal weapon sales.*

Poster Session 2, Atrium, 5 - 5:50 p.m.

Poster #1: Rainfall and Mosquito Net Use in Ghana
Student Researcher: *Grace Akumkperik*
Faculty Mentor: *Dr. Seth Gitter* (Economics)

Abstract: *Stagnant water, often resulting from rain, is a leading component in breeding mosquitoes. Insecticide-treated nets are a widely used prevention method mosquitoes bite and malaria prevention. In this study, I explore how rainfall and other factors affect the rates at which mosquito nets are used in Ghana. I predict that as factors such as education, media, and wealth increase alongside rainfall, households will be more likely to use mosquito nets. Using a series of OLS regression models, net use was measured against lagged and average rainfall. Differences in net usage by Ghanaians were observed over a variety of individual and household level demographic controls including education, rural or urban residency, wealth, age, television ownership, toilet*

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facilities, and religion. The models indicate that living in a rural area significantly increases the likelihood of using a bed net. Results also display a strong negative relationship between household wealth and bed net use.

Poster #2: Mosquitos, Malaria & Climate: How Rainfall Influences the Spread of Malaria in Tanzania
Student Researcher: *Sabra Homera*
Faculty Mentor: *Dr. Seth Gitter* (Economics)

Abstract: *My research explores how different economic projects funded or sponsored by foreign powers, including Western countries, the UAE, and most recently China, can serve as modern ways of maintaining influence over Africa and keeping African countries economically dependent. While these deals are often presented as opportunities for economic growth and development, they frequently come with strings attached, with the long-term impacts and consequences often falling on citizens and local communities to bear. The case studies in this research include port imperialism by the UAE across different African countries, including Egypt, Somaliland, and Tanzania. Another case study examines a Marriott tourism project in Kenya that was presented as an opportunity to diversify the country's tourism industry, but has raised concerns surrounding wildlife, land, and the displacement of Maasai communities from their ancestral lands. These examples demonstrate how foreign economic involvement can create short-term advantages that primarily benefit governments, political officials, and wealthy elites, while leaving ordinary citizens to deal with the long-term social, environmental, and economic consequences. Ultimately, this research examines whether these modern economic collaborations represent genuine development partnerships or whether they are continuing colonial patterns of dependency, extraction, and foreign influence in new forms.*

Poster #3: Importance of Stimulus Design in Hearing Testing
Student Researcher: *Salma Ghannoum*
Faculty Mentor: *Dr. Saradha Ananthakrishnan* (Speech-Language Pathology & Audiology)

Abstract: *Early and accurate hearing testing is central to development of auditory, speech, and language skills in infants. The auditory brainstem response (ABR) is an objective, non-invasive, and reliable method used to evaluate hearing in infants. The ABR is a measure of auditory nerve integrity and is generated by synchronous firing of auditory neurons which is picked up by scalp electrodes. The ABR is influenced by a number of stimulus-related parameters, one being stimulus type. For many years, the click stimulus, a brief broadband signal, has been commonly used in ABR testing with success. Although the click has several advantages, one of its drawbacks is that its acoustic make-up does not optimize synchronous firing of auditory nerve fibers. Chirp stimuli have been designed to address this drawback and have gained considerable attention in the last two decades. Yet, chirps are*

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not mainstream in clinical ABR workflows. Here, we explore possible contributing factors that may influence an audiologist's choice to employ the click vs. the chirp during ABR testing, with the goal of better understanding how click and chirp stimuli are being used by audiologists when conducting ABR testing. To this end, surveys are currently being developed for audiologists, audiology students, academic programs, and early hearing detection and intervention (EHDI) program managers. These surveys will explore familiarity with chirp stimuli, their use in academic training and clinical practices, and factors that influence the choice between click and chirp stimuli. Understanding how these stimuli are currently being used may help guide future research, education, and clinical practice in ABR testing.

Poster #4: Anticipatory Ethics of Artificial Intelligence Incorporated into Stem Cell Transplants
Student Researcher: *Anika Baratka*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *Artificial Intelligence (AI) has been incorporated into many aspects of healthcare, including stem cell transplants. This presentation explains what artificial intelligence and machine learning are, the ethical principles applied along with research about stem cell transplants. We will look into how artificial intelligence and machine learning have been used in the past for stem cell transplants, how they are being used now, and how they can be used in the future. We will discuss stakeholders and how the ethical principles apply to them. Artificial Intelligence has been used to help with analyzing large donor databases, identifying the best donor, predict which donor is most likely to reduce complications, predict transplant success, detecting complications earlier, improving cell processing, create personalized treatment plans, support research. Stakeholders we will discuss include doctors, patients, and those who create and implement the artificial intelligence technology being used.*

Poster #5: Thinking Outside the Classroom: Impact of Implementing Computational Thinking Elements Using Game-Based Learning in a Non-Traditional Outdoor Classroom Setting
Student Researcher: *Emily Yackley*
Faculty Mentor: *Dr. Lea Ann Christenson* (Early Childhood Education)

Abstract: *This research looked at the effects of teaching Computational Thinking in a nontraditional outdoor classroom setting with added applications on the importance of game-based learning (GBL), hands-on learning, and consistently implementing best teaching practices. The research was conducted at Rodney Scout Reservation, a Scouting America camp in Maryland, and followed four instructors as they taught a Nature lesson to scouts over the course of two weeks. The results showed the importance of Computational Thinking lessons along with a heavy support for GBL, outdoor classrooms, and implementing best teaching practices in and out of the traditional classroom. The scouts were able to get moving, play games, and connect what they were being taught to the natural*

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world around them, adding an extra layer of understanding to what they were learning. The implications of this study showed how these same lessons could be mirrored or tweaked slightly to apply to not only the traditional classroom but also have big implications in Early Childhood Education.

Poster #6: Artificial Intelligence and Advanced Radiologic Imaging in Cancer Detection
Student Researcher: *Sherylyn Quainoo*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *This case study examines the integration of artificial intelligence (AI) with advanced radiologic imaging for cancer detection, highlighting the diagnostic benefits and major challenges of clinical implementation. AI systems have shown faster detection and greater sensitivity, particularly in identifying subtle lesions across modalities such as computed tomography (CT), magnetic resonance imaging (MRI), and mammography. Nevertheless, current evidence indicates considerable clinical risks, including overdiagnosis of indolent findings, false positives and negatives that may influence clinician judgment, and cascade testing that elevates patient anxiety and healthcare expenditures. Technical limitations further constrain reliability: models frequently fail to generalize across different scanners and patient populations, image artifacts reduce accuracy, segmentation inconsistency impairs radiomic reproducibility, and minor pixel variations can destabilize outputs. Workflow analyses reveal that frequent AI flagging contributes to cognitive fatigue, while automation bias may cause clinicians, particularly trainees, to place undue trust in inaccurate predictions. Inadequate integration with existing Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) platforms also restrict real-time usability. Ethical concerns, such as opaque 'black-box' reasoning and disparate performance among underrepresented groups, underscore the necessity for enhanced governance. In summary, while AI improves radiologic sensitivity, safe adoption requires rigorous validation, transparent model development, and optimized workflow integration.*

Poster #7: Measuring the Concentrations of Na+ and Mg2+ Ions in Solution
Student Researcher: *Samir Vempalle*
Faculty Mentor: *Dr. Ana Maria Soto* (Chemistry)

Abstract: *Accurately determining the concentrations of Na+ and Mg2+ is a critical component for ensuring precision and reproducibility in chemical and biochemical settings. While divalent cations such as Mg2+ can be reliably measured via a titration with EDTA, monovalent ions such as Na+ cannot be measured with this method due to their low binding strength with EDTA. In this work, we explore the use of conductivity and spectroscopy methods to determine the concentration of Na+ ions in solution. The concentration of both Na+ and Mg2+ can be determined through conductivity measurements. The conductivity of these ions increases linearly with concentration and the resulting*

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Conductivity vs Concentration graphs yield straight lines that can be used to obtain the concentrations of the corresponding unknown solutions. However, these experiments require the use of conductivity probes, which are not always available. The identification of a molecule that specifically binds Na+ would facilitate the measurement of Na+ ions in solution. We are currently exploring whether common chromophores bind Na+ in a manner that can be quantified. Preliminary experiments show that Na+ alters the UV-Vis spectra of selected chromophores, and we are currently testing if these changes can be used to measure Na+ concentrations. We hope to develop a spectroscopic method to measure the concentration of Na+, to provide an accurate, alternative method to conductivity measurements.

Poster #8: Effect of Region Swapping on the Conformation of an RNA Riboswitch
Student Researcher: *Paige Headley*
Faculty Mentor: *Dr. Ana Maria Soto* (Chemistry)

Abstract: *Riboswitches bind to specific ligands and trigger a conformational change that affects gene expression. In this work we are comparing a riboswitch found in both Mycobacterium tuberculosis and Escherichia coli. Both riboswitches conform to the consensus, but differ in two key regions. Research from our lab shows that the M. tuberculosis riboswitch binds the cognate ligand with lower affinity than the E. coli riboswitch. To understand this difference, we swapped regions from one riboswitch into the other. Thermodynamic unfolding profiles show that the unfolding enthalpies remain relatively constant, but the Tms can vary between mutants and wild type, suggesting differences in the cooperative folding of the helices that form the riboswitch. Binding experiments show changes in the binding affinity of the resulting mutants, suggesting that the conformational change may affect the ligand binding site. Our results point to a region that may be critical in allowing the riboswitch to acquire the right conformation for binding. By continuing to examine these mutant riboswitches, we hope to better understand how specific regions facilitate the binding of the ligand.*

Poster #9: Effect of Small Molecules on DNA Conformation and Thermal Stability
Student Researcher: *Stevina Zargou*
Faculty Mentor: *Dr. Ana Maria Soto* (Chemistry)

Abstract: *Molecules such as DNA and RNA greatly depend on their conformation for proper function. Under normal physiological conditions, DNA predominantly adopts the B-form, whereas double-stranded RNA can only be in the A-form. However, it remains unclear why DNA does not readily adopt the A-form despite being capable of doing so under certain conditions. To better understand this conformational preference, we investigated DNA conformation using circular dichroism (CD) spectroscopy and its thermal stability using UV melting spectroscopy, in the presence of ethanol, spermidine, and neomycin. Analysis of the UV melting data revealed changes in DNA thermal*

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stability. The sample containing the combination of ethanol and spermidine exhibited a higher melting temperature and differences in unfolding enthalpy, compared to the control sample. These changes suggest that spermidine and ethanol promote a change in the conformation of the DNA. The sample containing neomycin also exhibited differences in melting temperature and unfolding enthalpy, suggesting that neomycin is also able to promote changes in conformation. We are currently investigating these conformational changes in more detail.

Poster #10: Effects of surface pretreatment on nano-oxidation characteristics of Strontium Titanate
Student Researcher: *Antonio Gomez*
Faculty Mentor: *Dr. David Schaefer* (Physics, Astronomy & Geosciences)

Abstract: *We sought to understand the effects of surface treatment on the nano-oxidation characteristics of SrTiO3 (strontium titanate) samples via an atomic force microscope (AFM). Topography metrics like sample roughness, oxide growth, and the dominance of two nano-oxidation parameters, i.e., tip velocity and tip voltage, have been determined. Nano-oxidation experiments were performed via AFM on oxygen vacancy doped strontium titanate (SrTiO3-δ or STO) substrates and thin films. The AFM utilizes a sharp probe to interact with surfaces on a nanometer length scale. It is most known for its ability to obtain three-dimensional topographical images with atomic scale resolution, but it is also capable of modifying surfaces and performing quantitative measurements of material properties, e.g., mechanical strength (elastic modulus), magnetic and electrical characteristics. Strontium titanate, colloquially known as STO, is a versatile member of the perovskite oxide family. Perovskite structures are an excellent candidate for nanodevice fabrication, with variations exhibiting differing degrees of ferroelectric, ferromagnetic, superconductive, and semiconductive properties1-4. Accordingly, STO's versatility has resulted in its incorporation into capacitors, sensors, memristors, solar cells, and much more. For thin films, surface characteristics have a disproportionately large effect on the properties of a material. Furthermore, there are many unique properties of STO that can be tweaked by doping the crystal structure with vacancies/substitutions, which can be understood by AFM.*

Poster #11: Evaluating the Impact of BECC-Adjuvanted Allergen Immunotherapy on Allergic Airway Inflammation, Immune Responses, and Lung Pathology Following Allergen Challenge in Mice
Student Researcher: *Hayley Bartholomew-Lowery*
Faculty Mentor: *Dr. Erin Harberts* (Biological Sciences)

Abstract: *Allergic diseases are driven by dysregulated type 2 (Th2) immune responses that stimulate allergen-specific IgE production. Although allergen-specific immunotherapy (AIT) can induce immune tolerance, effective adjuvants remain limited. Bacterial Enzymatic Combinatorial Chemistry*

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(BECC) adjuvants may improve AIT by promoting a more balanced immune response. This study evaluated whether BECC 438 and BECC 470 could enhance AIT efficacy. Mice were sensitized with allergen and treated with allergen alone, allergen plus BECC 438, allergen plus BECC 470, allergen plus alum, or PBS. Allergen-specific antibody responses were measured by indirect ELISA. BECC 438 treatment reduced allergen-specific IgE and increased IgG2a levels, indicating a shift away from an allergic phenotype. BECC 470 produced more moderate effects, while alum-treated mice showed stronger allergy-associated antibody responses. These results suggest that BECC adjuvants, particularly BECC 438, can modulate humoral immunity during AIT and may improve allergy therapies by reducing allergic sensitization and promoting protective immune responses.

Poster #12: Detection of LACV from Multiple *Aedes* spp. Mosquitos from Maryland and New Jersey in Vitro
Student Researcher: *Ulysses Matricciani*
Faculty Mentor: *Dr. Kishana Taylor* (Biological Sciences)

Abstract: *La Crosse Virus (LACV) is spread by infected mosquitoes, most prevalent in Midwestern and East coast regions of the U.S. Most infections present flu-like symptoms, however in severe cases the pathogen can be neuroinvasive. LACV traditionally infects children under the age of 15, and LACV is the leading cause of arboviral pediatric encephalitis in the United States. LACV is understudied and believed to be underdiagnosed. As mosquito transmitted viruses, it is essential to understand the prevalence of the virus in wild mosquito populations to better understand the risk of transmission to human and animal populations, as well as characterize the disease ecology of the virus. LACV has been isolated from mosquito pools processed by mosquito control departments in both MD and NJ despite little or no human cases of infection. We sought to gain additional information about viral prevalence for these two viruses. Using a combination of BG GAT2 gravid and BG Pro CDC light traps, mosquitoes were caught in Maryland and New Jersey in June, July and August of 2026. A total of 307 mosquitoes were collected and tested between the two states. Species collected included 31 Aedes albopictus, 250 Aedes cantator, 1 Aedes canadensis, 9 Aedes sollicitans, 20 Aedes triseriatus, and 5 Aedes vexans. Mosquitoes were pooled by species and date collected. 25 mosquito pools were tested for LACV using RT-PCR and S segment specific primers for each virus.*

Poster #13: Effects of Sonication versus UV Irradiation on Shape Directing Agent 4-Bromodiphenylamine and the Final Morphology of Silver Nanoparticles
Student Researcher: *Lloyce Frimpong*
Faculty Mentor: *Dr. Mary Sajini Devadas* (Chemistry)

Abstract: *Silver nanoparticles (AgNPs) are highly versatile nanomaterials with applications in biomedicine, electronics, and other fields due to their unique due to their unique interactions with light waves. Their shape and structure can be influenced by various synthesis conditions, with*

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reducing and shape-directing agents playing a critical role. This project investigates the effects of two polymerization methods, ultrasonication and UV irradiation, on 4-bromodiphenylamine (4-BrDPA) and the formation of its polymer, which is used as a shape-directing agent in the synthesis of AgNPs. The resulting nanoparticles were characterized using UV–Vis spectrophotometry, optical microscopy, and scanning electron microscopy (SEM). 4-BrDPA demonstrated the ability to produce cube-derived silver nanoparticle morphologies.

Poster #14: Engineering *E. coli* to Study Small Protein Function
Student Researchers: *Alexandria Hunt, Bridget Nyame, Holly Metzger, Madison Hedges-Bailey, and Samantha Adegbite*
Faculty Mentor: *Dr. Matthew Hemm* (Biological Sciences)

Abstract: *Escherichia coli is a widely used model organism because it reproduces rapidly and can be genetically mutated easily; thus, it has been used to make many important scientific discoveries. However, much of its biology, such as small proteins defined as those containing 50 or fewer amino acids, remain poorly understood. Since these small proteins are already known to be produced, we sought to characterize their function in the cell by creating strains that overexpress the small protein from the chromosome. To do this, our research group inserted an arabinose-inducible promoter (Para) from the pBAD24 plasmid into the E. coli genome upstream of select short genes containing an epitope tag. To make the inserted DNA, we performed a nested PCR, amplifying the Para to use as a forward primer for a second PCR, which we used to amplify the select genes containing the epitope tag. After transforming cells with the PCR product, we then performed a PCR screen to determine if the promoters were successfully inserted into the genome. Successful PCR products confirmed that the new strains of E. coli carried the intended recombinant DNA in the genome upstream of the short reading frames encoding the small proteins of interest. Creating these new strains will support future research into characterizing these proteins and identifying their functions.*

Poster #15: The Role of tirc in *Dictyostelium discoideum* Responses to Bacteria
Student Researcher: *Jade Gordon*
Faculty Mentor: *Dr. Michelle Snyder* (Biological Sciences)

Abstract: *Toll/interleukin-1 receptor (TIR) genes play an important role in innate immunity and programmed cell death across plants, animals, and microbes. The model organism for this project, Dictyostelium discoideum, is a soil-dwelling amoeba possessing both unicellular and multicellular qualities. TIR genes are found in the genome of D. discoideum, but their function in this organism is unknown. Past research suggests evidence that there are various phenotypes associated with TirC, a TIR protein, however further investigation needs to be done. Investigation of the function of proteins encoded by TIR genes in D. discoideum can help researchers gain a deeper understanding of how they function in bacterial and mammalian cells. In addition to that, it has been found that the expression*

of TirC changes in response to bacteria. Therefore, we hypothesize that TirC would play a role in either detection or response to the bacteria. Using CRISPR-Cas we have created a D. discoideum cell line deficient for tirc. Our preliminary results with this mutant, suggest that TirC acts to promote phagocytosis. We are currently investigating the changes in transcriptional responses in our bacteria in tirc deficient cells. These studies should give insight into TirC interactions and give clues to how that is applicable to eukaryotic cells and other molecules.

Poster #16: Effects of Spin Coating Flourination on the Superconducting Properties of YBCO Thin Films
Student Researcher: *Cristofer Varela Duarte*
Faculty Mentor: *Dr. Rajeswari Kolagani* (Physics, Astronomy & Geosciences)

Abstract: *YBCO thin films are nanoscale layers of Yttrium Barium Copper Oxide deposited onto a supporting base called a substrate, Lanthanum Aluminum Oxide in our case. Physical properties of thin films are altered, such as the superconducting transition temperature, electric conductivity, and critical current density by varying the ambient oxygen pressure during the fabrication process. Changing the thin film's chemical structure and accessing new characteristics in it. A set of experiments were designed and executed to vary the ambient oxygen during the cool-down portion of thin film fabrication. The structure of the film's atoms was further altered using a method known as spin-coating fluorination. Vacancies within the film lattice are filled with fluorine atoms; that would otherwise be filled by oxygen atoms. A solution is placed on top of the film, spun, and then heated to allow the fluorine atoms to diffuse into the film structure. This method has proven to optimize the previous characteristics in other thin films. Utilizing characterization tools like an X-ray diffraction machine and physical properties measurement system indicated that the fabricated samples lost their superconducting capabilities after fluorination. Further investigation revealed that our process for heating our samples caused their diminished quality. Our results indicated a new heating procedure done at 800 C had improved the electrical properties of our films back to their initial state. Future work will focus on attempting fluorination via vapor transport.*

Poster #17: Presence of Haemogregarina in Northern Map Turtles (*Graptemys geographica*)
Student Researcher: *Joshua Sliwka*
Faculty Mentor: *Dr. Steven Kimble* (Biological Sciences)

Abstract: *Leeches are a parasitic or predatory segmented worm. With many species being parasitic, there are some pathogens and blood parasites that use leeches as a vector, infect other slow-moving fish, amphibians, and reptiles. On turtle species such as Maryland's endangered Northern Map Turtle (Graptemys geographica) a few species of leeches in the Placobdella genus are common. In the Susquehanna River species such as Placobdella parisitica, Placobdella ornata and Placobdella ali are known to be the final invertebrate host for Haemogregarina spp. Haemogregarina can lead to severe*

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anemia, shell necrosis, and hemorrhages in higher stress environments. We hypothesize that Haemogregarina spp are present and detectable in some of the leeches and the host turtles. The leeches were obtained during the turtle nesting season from May-June where the turtles come on land to nest in areas above and below a hydroelectric dam on the Susquehanna River in Maryland. After catching the turtles, their shells and limbs are inspected and that is when the leeches are found. The leeches are removed using sterile tweezers, grabbing where the mouth is attached and stored in 70% ethanol or imminently put in a tube on ice to be later frozen at -80°C. A dichotomous key was used to determine the possible species from the physical characteristics. Turtle blood smears were used to identify the presence of Haemogregarina spp. Parasites. To confirm this, the midsection of the leech known as the crop was cut out and used for DNA extraction which will then be used in a polymerase chain reaction (PCR). The PCR will run with primers detecting Haemogregarina spp, which will allow us to run a gel electrophoresis on the leech and corresponding turtle DNA to detect the presence of Haemogregarina spp. We expect not all but some of the turtles and leeches to have the presence of Haemogregarina spp because only leeches that feed only on an infected turtle will allow the Haemogregarina spp to complete their life cycle in the leeches' body. Thus, only certain leeches that have fed on an infected turtle should have Haemogregarina present. This study will help us add to the limited knowledge of the Northern Map turtle and if the area they live in is a determining factor in parasite spread. This will allow for further conservation measures to be taken to improve the environment that Maryland's endangered Northern Map Turtle resides.

Poster #18: Understanding and Establishing Effective Operating Conditions for AM–FM Atomic Force Microscopy
Student Researcher: *Mary Bartlett*
Faculty Mentor: *Dr. David Schaefer* (Physics, Astronomy & Geosciences)

Abstract: *Amplitude Modulation–Frequency Modulation Atomic Force Microscopy (AM–FM AFM) allows for parallel investigation of surface topography and nanoscale mechanical properties of a given sample, but effective operation requires an understanding of both cantilever dynamics and tip–sample interactions. This summer's research combined theoretical analysis with experimental investigation to develop effective AM–FM operating procedures using an Asylum Research Cypher AFM. The first half of our work focused on deriving the equations connecting cantilever motion, tip–sample forces, virial, and resonance-frequency shifts to contact stiffness, indentation depth, and effective modulus. These derivations provided a physical basis for interpreting the measured signals and understanding the assumptions underlying mechanical-property calculations. The second half of our work focused on applying the theoretical understanding to an experimental context by investigating attractive and repulsive tapping regimes and adjusting operating conditions to maintain suitable tip–sample interactions. Utilizing a known repulsive phase regime, which maintains the first mode phase below 90°, was used as an indicator of predominantly repulsive operation. This repulsive regime was tied to better and consistent, physically reasonable indentation and modulus results. This work emphasizes the importance of combining theoretical understanding*

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with careful control of the tip-sample interaction regime when establishing reliable AM–FM measurements and data.

Poster #19: Albert S. Cook Library Through the Lens of Black Students
Student Researcher: *Temi Oyedokun*
Faculty Mentor: *Dr. Jasmine Thomas* (Research & Instruction, Cook Library)

Abstract: *The uprisings against police brutality and the systemic oppression of Black people in the United States in 2020 prompted library workers at Albert S. Cook Library to reflect on how the history of racism and adherence to white cultural norms in academic libraries have prevented the library from fully serving the Towson University community. The 2022 Anti-Racism Action Plan and this research study resulted from those conversations. Using the photovoice method, this research aimed to answer the following questions: How do Black students use Cook Library?; Do Black students consider Cook Library an inclusive and welcoming space?; What changes can Cook Library make to ensure that Black students feel included and supported at the library?*

Poster #20: Improving Population Health: Modeling Health Outcomes and their Determinants with Multiple Linear Regression
Student Researcher: *Huong Giang Ho*
Faculty Mentor: *Dr. Xiaoyin Wang* (Mathematics)

Abstract: *The 2025 County Health Rankings & Roadmaps dataset, consisting of 3,000 counties and 15 variables to be accounted for, is used in evaluating county-level performance in relation to the selected health outcomes: physical and mental health. Tasked with answering questions imperative to understanding how health insurance coverage differs across counties, and how those variances are correlated with physical and mental health outcomes, we employed the use of Python as a mechanism to facilitate our multiple linear regression analysis. The findings assess the effect of health insurance coverage and social determinants, such as food environment index, education, and income on physical and mental health outcomes, identifying target areas of concern, informing strategic prioritization and practical, managerial methodologies that aid in alleviating the potential challenges incurred by affected populations within counties. In conducting our multiple linear regression analysis, we've discerned the significant predicting power of social determinants in correspondence to physical and mental health outcomes across counties. Social determinants collectively explain greater physical health outcomes in proportion to mental health outcomes, suggesting that mental health is influenced by a broader and more complex set of factors beyond those captured by socioeconomic indicators alone. All four predictors were statistically significant ($p < 0.001$) across both models.*

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Poster Session 3, Atrium, 6 - 6:50 p.m.

Poster #1: Sampling vs. Teasing: How Pre-Release Disclosures Drive Anticipation and Album Sales
Student Researcher: *Changhyuk Byun*
Faculty Mentor: *Dr. Hua Chang* (Marketing)

Abstract: *The entertainment industry is characterized by high pre-purchase uncertainty, meaning consumers cannot easily evaluate the quality of a product before experiencing it. To address this, firms heavily rely on building pre-release consumer buzz (PRCB) through promotional materials like teasers and trailers. While most existing research focuses on narrative media such as movies and books, we expand this focus to the music industry. Specifically, we examine how partial disclosures (e.g., teasers) differ from full product samples (e.g., pre-release singles). In Study 1, using daily YouTube search data, we find that while audio and visual teasers promoting a pre-release single build positive next-day search momentum, the pre-release single itself causes an immediate spike on release day followed by a sharp drop in search interest the following day. Since this initial surge quickly fades, Study 2 explores whether dropping a pre-release single actually benefits the focal album sales. We find that while pre-release singles have no effect on first-week physical album sales, they successfully build pre-release buzz in the week leading up to the release, which subsequently marginally benefits downstream album sales, suggesting an indirect, mediated pathway. Moving forward, we plan to expand our empirical datasets and run follow-up experiments to further investigate the mechanisms behind these findings.*

Poster #2: Strengthening Election Integrity: Developing and Evaluating a Poll Worker Training Application to Mitigate Cyber, Physical, and Insider Threats
Student Researcher: *Keerthana Sujesh*
Faculty Mentor: *Dr. Natalie Scala* (Business Analytics & Technology Management)

Abstract: *Poll workers are the first line of defense in our elections. The purpose of this research project was to create a stronger foundation for poll worker training via app delivery, developed for use by Maryland poll workers ahead of the 2026 Midterm Elections. We designed five poll worker training modules, ensuring they addressed mitigations to potential vulnerabilities identified through previous lab research. The learning content was also informed by analysis conducted on the Security Behavior Intentions Scale, which measures existing cybersecurity behavior. After launching the app, we completed statistical analysis on survey results from participants who tried out the app. During our analysis of participant interaction data, a literature review revealed a notable gap in app effectiveness across age groups. Because older poll workers represent a core segment of our target population, we wanted to focus on issues our older participants experienced. As a result of this*

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research, changes were implemented in the app, and it was given to poll workers once more to see how effective the changes were. Our approach offers a model for strengthening poll worker training and increasing the integrity of our elections, that in the future, could be used nation wide.

Poster #3: Biafra and the Fracture of Culture: Colonial Design, War Trauma, and Western Erosion in Igbo Identity
Student Researcher: *Dez Akano*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *Nigeria as we know it is a colonial construction, its major ethnic groups (Hausa-Fulani, Yoruba, and Igbo) administered through a system of indirect rule that hardened ethnic hierarchy for the convenience of British control. The 1967-1970 Biafran War is the clearest rupture produced by that design: a conflict that killed an estimated one to three million people, disproportionately through disease and starvation. The war severed cultural transmission on three fronts at once: women and children died in the majority under blockade and famine conditions; men and young boys were pulled from their homes and communities to fight; and many of the children left behind were absorbed into Christian missionary institutions, raised inside Western religious and cultural frameworks rather than within their own. Those who survived carry a trauma that has gone largely unexamined in relation to their reluctance to question the same colonial and Western institutions, particularly the Christian humanitarian organizations that offered relief during the conflict, while leaving the underlying structures of dependency intact. Biafra functions as both symptom and accelerant: a fracture engineered by colonial rule, deepened by the war's toll, and now sustained by Western cultural influence filling the vacuum the war created. That vacuum shows up concretely: "mana" replaced by "but," kola nut replaced by soft drinks, ákwà replaced by boxers. It also shows up structurally, in the gendered authority that now defines much of modern Igbo social life, itself substantially a missionary import layered over precolonial systems that distributed power differently. This erosion runs through homeland and diaspora Igbo populations alike, though not without exception.*

Poster #4: Ethical and Technical Analysis of Gene Editing in Agriculture Biotechnology
Student Researcher: *Evyn Romero Infante*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *Improvements in biotechnology are transforming agricultural practices, particularly through gene editing tools like CRISPR-Cas9. As global agriculture faces rising challenges from climate change and food security, gene editing oU'ers several developing possibilities for enhancing crop resilience and food sustainability. However, altering plant genomes introduces technical and ethical questions regarding environmental impact and food safety. Following structured bioethical case study guidelines, this research explores the ethical implications of integrating gene editing into*

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agriculture. It examines technical challenges across primary stakeholder perspectives, including agricultural producers, government regulators, and consumers. Central ethical problems will be analyzed by applying foundational philosophical frameworks, such as Consequentialism, Deontology, and Theories of Justice to evaluate societal benefits, grower choice, and equitable access. Ultimately this study integrates technical standards and ethical frameworks to recommend practical policy guidelines for regulating gene-edited crops.

Poster #5: Ethical Ramifications of Endometriosis Testing in the United States
Student Researcher: *Hannah Rovner*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *Endometriosis affects 2-10% of people with uteruses. It is defined as the presence of endometrial tissue outside the uterus. Symptoms include nonspecific pelvic pain, leading to difficulty in diagnosing endometriosis. It is difficult to treat, and most conventional treatments have a high failure rate. A diagnosis is difficult, expensive, and time consuming to obtain. Current endometriosis testing in the US involves laparoscopic surgery, where the surgeon inserts tools and cameras into small abdominal incisions to visually identify endometriosis tissues. The patient undergoes general anesthesia and has a six-week recovery period. Stakeholders in these cases include the patient, the doctor, and in the US, the insurance company. New studies are looking into microRNA (miRNA) markers for endometriosis, making endometriosis significantly easier and cheaper to diagnose. MiRNA markers can be detected in the patient's saliva. These new tests, available in many countries other than the United States of America, are significantly less invasive and more affordable for the patient. An ethical perspective needs to balance the patient and doctor's time, resources, and energy to find an optimal outcome for all stakeholders. This project will focus on using the analysis lenses of consequentialism, deontology, and care ethics.*

Poster #6: Strings Attached: How Economic Partnerships Between African Countries and Foreign Powers Reproduce Colonial Patterns of Dependency
Student Researcher: *Sabra Homera*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *My research explores how different economic projects funded or sponsored by foreign powers, including Western countries, the UAE, and most recently China, can serve as modern ways of maintaining influence over Africa and keeping African countries economically dependent. While these deals are often presented as opportunities for economic growth and development, they frequently come with strings attached, with the long-term impacts and consequences often falling on citizens and local communities to bear. The case studies in this research include port imperialism by the UAE across different African countries, including Egypt, Somaliland, and Tanzania. Another case study examines a Marriott tourism project in Kenya that was presented as an opportunity to diversify*

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the country's tourism industry, but has raised concerns surrounding wildlife, land, and the displacement of Maasai communities from their ancestral lands. These examples demonstrate how foreign economic involvement can create short-term advantages that primarily benefit governments, political officials, and wealthy elites, while leaving ordinary citizens to deal with the long-term social, environmental, and economic consequences. Ultimately, this research examines whether these modern economic collaborations represent genuine development partnerships or whether they are continuing colonial patterns of dependency, extraction, and foreign influence in new forms.

Poster #7: Stuck in The Middle: Black and Latino Gay/Bisexual Men's Connection to Racial and Queer Communities in The South
Student Researcher: *Nova McLeod*
Faculty Mentor: *Dr. Troy Kearse* (Psychology)

Abstract: *While research on intersectional stigma on sexual minority men of color has grown in recent years, little research has looked into experiences of strength and alienation between the intersectional racial and LGBTQ communities among Black and Latino gay and bisexual men in the Deep South. This presentation draws data from a larger NIH-funded project that developed and piloted an intersectional, culturally responsive therapy intervention for Southern queer Black and Latino men. Using 22 in-depth interviews with gay/bisexual Black and Latino men in the middle Tennessee area, we conducted a qualitative thematic analysis to explore their community related experiences. We highlight 4 themes from our qualitative analysis. First, considering the resiliencies and strengths of queer communities of color, we discuss two themes: (1) Resilience through Adversity and (2) Breaking the Social Standard. Then, in terms of their sense of alienation from the mainstream LGBTQ community, we discuss two more themes: (3) Lack of Relatability and (4) Lack of Community Support and Solidarity. Overall, these findings provide insight on the unique experiences of community connectedness among Black and Latino gay/bisexual men. Our findings can be used to help develop a scale to examine community connectedness among queer men of color. Finally, this work can inform therapists who work with queer men of color in the South about their experiences with community on their mental health.*

Poster #8: Characterizing the SAM IV Riboswitch from *Mycobacterium tuberculosis*
Student Researcher: *Daniel Golabi*
Faculty Mentor: *Dr. Ana Maria Soto* (Chemistry)

Abstract: *Mycobacterium tuberculosis is a bacterium that has been killing humans for thousands of years. It is notoriously difficult to treat and develops resistance to typical antibiotics. Riboswitches are nucleic acid sequences that regulate gene expression within bacteria. Since they are found within bacteria and not within human cells, they are a potential target for atypical antibiotic treatment. The riboswitch we are studying is the SAM IV riboswitch which is present in M. tuberculosis as well as*

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other bacteria. This riboswitch binds S-Adenosylmethionine and it typically regulates genes related to sulfur metabolism. We were successfully able to express and purify the SAM IV riboswitch from M. tuberculosis. We tested the unfolding capabilities of the riboswitch, and this confirmed that it is folded in accordance with what we know of this riboswitch. When testing its binding affinity to S-Adenosylmethionine, the results suggest that some binding did occur, but further experiments are needed to confirm this binding We hypothesize that a potential cause of this weak binding is the length of the riboswitch itself. Due to its large size, this riboswitch may have a tendency to misfold and aggregate onto itself, blocking the ligand from binding properly. We expressed 2 additional riboswitches to better understand this riboswitch, one from Streptomyces coelicolor and a shortened version of M. tuberculosis. The S. coelicolor riboswitch has been structurally characterized and serves as a control for the study of the SAM IV riboswitch from M. tuberculosis. The shorter M. tuberculosis is similar to the full length, but some regions are removed to make it more similar to S. coelicolor and avoid potential misfolding/aggregation. We have successfully expressed these riboswitches and are in the process of purifying them for further experimentation.

Poster #9: Measuring G With a Gravitational Torsion Balance
Student Researcher: *William Crombie*
Faculty Mentor: *Dr. James Overduin* (Physics, Astronomy & Geosciences)

Abstract: *In the Newtonian theory, the force of gravity is given by f g= GMm / r 2 where G is a universal constant of gravitation. This same constant appears in Einstein's gravity, and to this day it is the least precisely measured of all the universal constants. This presentation will detail the author's use of a gravitational torsion balance to measure the force of gravity and find an approximate value for G using two experimental methods. In addition to our findings this presentation will cover the difficulties in getting a precise measurement of gravity, as well as a brief history of torsion balance experiments and a section on cutting edge gravitational experiments.*

Poster #10: Constructing a Template Baryonic Tully Fisher Relation
Student Researchers: *Michael Vaudreuil and Nicole Gorberg*
Faculty Mentor: *Dr. Jennifer Scott* (Physics, Astronomy & Geosciences)

Abstract: *Here we present work done to refine the determination of a template Baryonic Tully-Fisher Relation (BTFR) using HI spectra of 196 supernova host galaxies using the L-Band receiver on the Green Bank Telescope and an archival sample of 21-cm spectra for a total sample of 320 galaxies with accurate, redshift-independent distance estimates. We are presenting updated best estimates of galaxy distances from supernovae and other methods, inclinations from the NASA/IPAC Extragalactic Database (NED) Local Volume Sample, and stellar masses from unWISE photometry. We use these newly compiled and calculated values to generate a preliminary template BTFR.*

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Poster #11: Quantum vs. Classical Hamiltonian Evolution
Student Researcher: *Makenzie Earle*
Faculty Mentor: *Dr. Jia-An Yan* (Physics, Astronomy & Geosciences)

Abstract: *Hamiltonian evolution is fundamental to modeling the behavior of quantum systems, but accurately simulating this evolution can become computationally challenging as system size increases. This project investigates whether quantum Hamiltonian evolution can provide improved accuracy and efficiency compared with classical numerical methods. The classical approach uses the Crank–Nicolson finite-difference method to solve the time-independent Schrödinger equation, while the quantum approach uses a Qiskit quantum circuit to implement the same finite-difference Hamiltonian. The Hamiltonian is converted into a Qiskit operator and Trotterization is used to approximate the time-evolution operator through quantum gates. The resulting amplitudes and probability distributions from both simulations are compared with an exact solution using probability and probability-density errors. Initial results show that the classical finite-difference solution has greater error in the tested case, while the quantum simulation is affected by Trotter and commutator errors caused by the approximation of the Hamiltonian evolution. To improve the quantum simulation, a fourth-order Suzuki–Trotter expansion with multiple repetitions is implemented to reduce these errors. By examining accuracy, efficiency, and convergence toward the exact solution, this project evaluates whether improvements to quantum Hamiltonian evolution can allow it to outperform the classical method for increasingly complex quantum systems.*

Poster #12: Data-Driven Nudging for Turbulent Flow Reconstruction Using Neural Networks
Student Researcher: *Christopher Toomer*
Faculty Mentor: *Dr. Jing Tian* (Mathematics)

Abstract: *This project applies deep neural networks to reconstruct turbulent flows governed by the Clark–α model via a data assimilation algorithm. With only partial and incomplete initial data, the framework integrates the Clark–α equations while incorporating a nudging feedback term that steers the numerical solution toward a high-resolution reference simulation. We emphasize investigating how data representation and variable structuring impact neural network performance and output accuracy. Ultimately, this approach aims to advance stable, computationally efficient turbulence simulations with broad applications in weather forecasting, climate modeling, and engineering design.*

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Poster #13: Measuring Locomotive Performance in Freshwater Turtle Hatchlings
Student Researcher: *Sam Norris*
Faculty Mentor: *Dr. Krista Kraskura* (Biological Sciences)

Abstract: *Over half of all freshwater turtle species are endangered, making them a central conservation concern. They are especially vulnerable as hatchlings, when up to 99% are eaten by predators. Locomotive performances, such as swimming and the ability to self-right, are important to hatchlings' ability to evade predation. However, few studies have focused on measuring specifically freshwater turtle locomotion. The objectives of our study were to: 1) develop methods to collect locomotive performance data from freshwater hatchlings, and 2) collect and analyze preliminary locomotive data in preparation for applied use (e.g., evaluation of stamina, dispersal capacity). We successfully established an experimental setup and developed protocols to measure hatchlings' swim force production using force transducers, as well as tested self-righting performance both in water and on land. Preliminary results of swimming (n = 3) and self-righting (n = 11) performances suggest that some hatchlings can maintain steady swimming for 20 minutes while others refuse to swim, and only 36% of hatchlings righted themselves within 10 seconds on land. Locomotive performance and motivation vary highly across individuals, so more sampling effort will further explore and solidify these preliminary data trends. Using these methods, we will test next summer's Northern Map Turtle (Graptemys geographica) hatchlings. These data will tie into a larger, interdisciplinary study using machine learning to relate Northern Map Turtle hatchling locomotive performance to parental microbiome and blood toxicant content, allowing us to assess the impacts of multiple potential stressors on the fitness of a threatened species.*

Poster #14: Affinity Purification and Detection of Small Proteins in *Escherchia coli*
Student Researcher: *Alani Alleyne, Elani Joseph, and Sasha Vinarev*
Faculty Mentor: *Dr. Matthew Hemm* (Biological Sciences)

Abstract: *Throughout the E. coli genome there are sequences known as short open reading frames (sORFs), that may or may not be genes. These sORFs are arbitrarily defined, difficult to express due to their size, but potentially encode unknown small proteins. Due to the difficulties posed by their size, little is known about small protein functions in the cell. In previous experiments, methods were used to determine if a given list of sORFs encode detectable small proteins. However, due to unwanted background signal the results from those experiments were difficult to interpret. The purpose of our experiment was to determine whether affinity purification using calmodulin-binding protein (CBP) beads could enrich SPA-tagged small proteins and reduce background signals, making the proteins easier to detect. Results from experiments show that the purification was successful in increasing the concentration of small proteins, but that background signal remained the same. Altogether, however, these results suggest that affinity purification does help the determination of whether these sORFs are expressed. Additionally, these findings could contribute to molecular biology research by*

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providing a more reliable approach for analyzing small proteins and improving the quality of experiments involving protein expression, purification, and characterization.

Poster #16: Optimizing Engineered Prototypes to Improve Habitat for Captive Aquatic Turtles
Student Researcher: *Dante Meucci*
Faculty Mentor: *Dr. Pamela Lottero-Perdue* (Physics, Astronomy & Geosciences)

Abstract: *The goal of this project was to develop one or more prototypes created during EPHY 155 Engineering Design for Society classes during the fall 2025 and spring 2026 semesters into usable designed solutions. These prototypes, including basking platforms and enrichment devices, aimed to improve the physical and mental wellness of two captive turtles that live in the Towson University Living Lab. Over the summer, I designed a basking platform, which captive semi-aquatic turtles need to receive the proper amount of ultraviolet light and heat. I worked with the Living Lab staff, the university's Machinist, my mentor, and others, to take the work done in prior semesters and fabricate a testable prototype. This process involved examining the previous blueprints and prototypes, researching and selecting appropriate materials, and designing a new dock, and fabricating it. This prototype dock was then tested and improved repeatedly, culminating in a two-day long test, in which it held the larger turtle for over two hours. The design, while functional, ended up being slightly too conservative. It offered significantly more floorspace for the turtles than the previous dock while maintaining the same footprint, but according to a lab staff member, it was not a big enough increase to make it worthwhile. If more time was available to me, I would make the next iterations using similar design decisions, just larger.*

Poster #17: Origins of the Juvenile Microbiome of the Northern Map Turtle (*Graptemys geographica*)
Student Researcher: *Litzzy Romero*
Faculty Mentor: *Dr. Steven Kimble* (Biological Sciences)

Abstract: *A microbiome, the collective community of microorganisms in or on a host organism, reflects and impacts its health. Therefore, microbes can provide insight and reference for wildlife conservation. Northern Map Turtles (NMTs) are endangered in Maryland, yet their microbiomes remain poorly understood. Previous research has demonstrated microbial vertical transmission (i.e., transfer of microbes from mother to offspring) in sea turtles and lizards, suggesting this concept is also applicable to NMTs. If vertical transmission occurs in NMTs, then the microbiomes between juvenile and adult NMTs would be similar in composition. DNA of skin, eggshells, dirt, cloacal, oral, and water samples have been extracted. Faith's Phylogenetic Diversity indicated eggshell alpha diversity differed significantly from water ($p = 0.000421$) and dirt ($p = 0.000811$), while Pielou's Evenness showed significant differences between eggshell and oral ($p = 0.020897$) and dirt ($p = 0.000002$). Faith's Phylogenetic Diversity and Pielou's Evenness revealed eggshells and cloacal*

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samples did not significantly differ (p = 0.375786 and p = 0.758341, respectively). These findings suggest the eggshell microbiome resembles the cloacal more than the environment, supporting the possibility of vertical transmission and limited environmental influence. This contributes to the understanding of NMTs' microbiome development, and the data establishes a microbial baseline. Since microbes are influential on and indicative of health, these findings provide a reference for wildlife conservation efforts and can guide health assessments for endangered species such as NMTs.

Poster #18: Reflectometry on GeCu Multilayers
Student Researcher: *Nolan Cote*
Faculty Mentor: *Dr. Vera Smolyaninova* (Physics, Astronomy & Geosciences)

Abstract: *Superconductivity is a property of a material in which it loses its electrical resistance below a critical temperature, known as the superconducting critical temperature. This phenomenon has many promising applications. However, not all metals become superconducting. Our group has shown that metamaterial engineering can enhance superconducting properties by creating artificial structures, such as hyperbolic metamaterials, in which the layers of metal alternate with layers of superconductor. In this project, we use copper and germanium layers to investigate whether cupper can acquire superconductivity in a hyperbolic configuration. We used polarization reflectometry to characterize the hyperbolic dielectric properties of our previously fabricated germanium-copper multilayer samples. The structure of these samples can result in anisotropic dielectric properties, with the material behaving like a metal along one direction and like an insulator along the perpendicular direction. This anisotropy produces unique optical properties that are not found in either of the constituent materials alone. Two dielectric response components, ε1 and ε2, describe in-plane and out-of-plane directions. Hyperbolic behavior occurs when these two components have opposite signs. To determine whether a sample exhibits this desired hyperbolic behavior, we used an optical bench setup to reflect polarized laser light from the samples at different angles of incidence and measure the reflected intensity with a photodetector. We then plotted the amplitude of reflected light normalized to light reflected from a mirror for both s- and p-polarizations. By fitting these reflectance measurements to an appropriate anisotropic optical model, we defined the real parts of ε1 and ε2 for each sample. Using these methods we found several germanium-copper compositions with ε1 and ε2 of opposite sign, confirming their hyperbolic behavior.*

Poster #19: Germanium Copper: Using a Metamaterial Engineering Approach to Induce Superconductivity in Copper
Student Researcher: *Tyler Hannesson*
Faculty Mentor: *Dr. Vera Smolyaninova* (Physics, Astronomy & Geosciences)

Abstract: *Superconductors are materials that conduct electricity without resistance, leading to advanced technological applications in medicine, quantum computing, and magnetic field generation*

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through low-loss electrical transmission. Our group has previously demonstrated that metamaterial engineering can be used to create superconducting materials with enhanced critical temperatures due to Epsilon Near Zero (ENZ) conditions enhancing the electron-electron interaction. In this work, a selection of compositions containing varying copper to germanium ratios were fabricated to investigate whether copper acquires superconductivity while undergoing a Metal Insulator Transition (MIT) where the ENZ condition lies in close proximity. Using magnetron co-sputtering, a series of germanium-copper thin films were deposited with thicknesses around 100 nm. Compositions were identified through Energy Dispersive X-Ray Spectroscopy using a Scanning Electron Microscope. X-Ray diffractometry was performed to examine the crystal structure of the samples. Through electronic transport measurements, MIT was observed in compositions around 27% Cu, 73% Ge. Polarization reflectometry showed that ENZ occurs in samples with a 24% Cu content for 488 nm wavelengths, a composition that is also associated with the MIT region. Low temperature resistivity measurements are planned to be done at the Naval Research Laboratory for the samples around MIT to test for superconductivity at T < 1.7 K.

Poster #20: BIPOC Student Experiences at Albert S. Cook Library
Student Researcher: *Jaylen Beaner-Walker*
Faculty Mentor: *Dr. Jasmine Thomas* (Research & Instruction, Cook Library)

Abstract: *While the library plays an important role in student success, academic libraries, like other academic institutions, center whiteness and leave BIPOC students underserved due to structural racism embedded in the public services, physical spaces, and staff. This research study aims to understand how Albert S. Cook Library can better support BIPOC students by investigating student perceptions of the library and how they interact with library as a whole to inform meaningful changes to Cook's spaces, services, collections, library workers, and events.*

Poster #21: The Role of Students in Towson University's Women's Studies Program
Student Researcher: *Allison Witt*
Faculty Mentor: *Dr. Christian Koot* (History)

Abstract: *In 1971, female faculty and students approached President James Fisher to advocate for the Women's Studies Program, the Childcare Center, and the Women's Center. From the start of the feminist movement at Towson, students advocated alongside staff, challenging their teachers and disciplines to do better, supporting campus improvements, providing their perspectives, and working in the background to enable the success of the movement. The nature of feminism enabled students to find their voices by encouraging them to challenge the structure of society and to question authority. Because of this collaboration between students and faculty, Towson University transformed its curriculum, partnered with local community colleges to change their curriculum, hosted the National Women's Studies Association 1989 Conference, published On Our Minds, the Women's Studies*

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newsletter, and established the Institute for Teaching and Research on Women. This research showcases the underrepresented role students played in advancing the feminist cause, and the way feminism enabled students to take a more active role in their education.

Poster #22: Dynamics of Splenic Immune Cell Populations During an Adaptive Immune Response in the Amphibian *Xenopus*
Student Researcher: *Allison Coyne*
Faculty Mentor: *Dr. Martin Flajnik* (University of Maryland School of Medicine)

Abstract: *The African clawed frog Xenopus contains unique dendritic cells (DC) known as XL cells, which have functions of both classical and follicular DC. Past unpublished studies identified two distinct DC subtypes, XL1 and XL2, with XL2s binding higher levels of surface immunoglobulin and complement fragments. Changes in abundance, phenotype, migration, and potential interrelationships of both DC subsets post-immunization have not been examined. I evaluated known and novel reagents to identify a unique marker for XL1 cells and red pulp macrophages to track their movement within the spleen and characterize the overall adaptive immune response. Splenic cells from a clonal Xenopus line were analyzed longitudinally at multiple time points (D0-D9) following immunization with Incomplete Freund's Adjuvant. Cell-surface markers were identified using flow cytometry, while cell localization in the spleen was tracked by immunohistochemistry (IHC). Our results indicate that three novel reagents- Isolectin, Peanut Agglutinin, and a monoclonal antibody specific for a Xenopus lectin- were not XL1-specific. However, the data revealed new insights into the Xenopus adaptive response, including shifting phenotypes across XL1s and XL2s and the presence of early class-switched B cells. Furthermore, reagents with unknown specificities identified populations not previously observed in this model. Ongoing analysis will investigate the cells stained with the new reagents and further classify XL1/XL2 localization to better understand the development and migration of these cells. These findings advance our understanding of amphibian adaptive immunity and its evolution, in addition to providing a foundation for future studies with our new reagents and identified cell populations.*

Poster #23: Are Accommodations Truly Accommodating?
Student Researcher: *Holly Staggers*
Faculty Mentor: *Dr. Erjona Gashi* (Communication Studies)

Abstract: *This study, titled, "Are Accommodations Truly Accommodating?" explores how Towson University students navigate the accommodation process and the ways in which it impacts their experience of college as well as academic success. In the last several years there has been a fair amount of research done on the topic of accommodations especially in higher education like college and even graduate school (De Los Santos, et al, 2019). Scholars are looking for how accommodations impact student success and students' GPAs (Iqbal et al, 2020). Scholars also looked at how students*

disclosed disabilities to a professor seeking help and support. They used the Accommodation Communication theory to explain the student-professor relationship (Traxler & Isaacson, 2025). Unfortunately, the accommodation process can be very tedious for students and cause more problems than help. The process can cause students to fall behind and even push graduation back because students can't continue or pass classes based on their disability (Mamboleo, et al, 2020). My study will continue this conversation by focusing on student experiences with accommodations, success, and relationships with professors. The method I use for this study is semi-structured interviews. Participants are all Towson University students who have at least one accommodation for the Accessibility and Disability Services (ADS) office. I use thematic analysis (Braun & Clarke, 2006) to analyze data from the interviews. The research project is still ongoing, and I aim to analyze the data in Spring of 2027. I believe this project will help TU specifically be more intentional about their accommodation process and make it more accessible to students. I hope the findings will be useful for other universities to understand students' experiences with the accommodation process and the ways in which it affects their academic success.

Oral Presentations: Parallel Sessions Beginning at 4:30 p.m.

Room 160, Research@10 West

4:30 p.m. Making Archaeology Accessible in K-12 Education
Student Researcher: *D'Angelo Pracht-Scott*
Faculty Mentor: *Dr. Katherine Ahlrichs* (Sociology, Anthropology & Criminal Justice)

Abstract: *This project explores how archaeology can be made more accessible and meaningful within K–12 education. Archaeology is often misunderstood as simply digging for artifacts or studying distant civilizations, but it is an interdisciplinary field that uses material evidence to investigate the human past. This project develops an educator's guide that translates archaeological methods into accessible classroom activities while emphasizing ethical research, preservation, and community perspectives. The guide is grounded in archaeological fieldwork and laboratory practices conducted through the Baltimore Community Archaeology Lab at Towson University. It demonstrates how methods such as excavation, mapping, artifact analysis, classification, and recording context can be adapted into age-appropriate classroom activities. The project also emphasizes the importance of teaching students to distinguish observation from inference, evaluate evidence, develop competing interpretations, and become familiar with uncertainty. A major goal is to connect archaeology with subjects including science, history, mathematics, geography, literacy, and civics. The guide also*

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encourages place-based learning, preservation, and responsible engagement with Indigenous and local communities.

4:45 p.m. The Truth Covered in Ivy
Student Researcher: *Brianna Weishaar*
Faculty Mentor: *Dr. Katherine Ahlrichs* (Sociology, Anthropology & Criminal Justice)

Abstract: *My presentation is about an archaeological dig that was conducted this past summer with Dr. Ahlrichs and a crew of Towson students. This project happened just 10 minutes away from Towson University, in the backyard of Mr. McWilliams, the owner of Maxalea Landscaping Company. In this presentation, I will discuss what we found, projectile points, stone tool debris, non-native rocks, a possible feature, and what a feature is. I will also discuss what our findings could mean as well as what the future looks like for this site and others like it. This site conflicts with the historical narrative that the land was uninhabited by Indigenous Peoples. I will show that this site was not only inhabited but had been so for over 1000 years. This site and others like it are extremely important in correcting historical wrongs and rebuilding trust between two communities that have been at odds for hundreds of years.*

5:00 p.m. Students are Using Learning Objectives to Study, but Are They Using Them Effectively?
Student Researcher: *Chloe Romm*
Faculty Mentor: *Dr. Crystal Uminski* (Biological Sciences)

Abstract: *Learning Objectives (LOs) are the foundation of Backward Design curriculum and inform the development of assessments and instructional activities. When LOs are aligned with assessments, the LOs can be powerful tools that convey course expectations and help students prepare for exams, yet there are few studies to provide evidence of how undergraduate students perceive and use LOs when studying and there remains a need to evaluate how Backward Designed courses affect student outcomes. To better understand how students are using LOs in a Backward Designed introductory non-majors biology course, we designed a mixed methods study rooted in Expectancy-Value Theory. Students in the non-majors course (n = 185 across two semesters) were provided LOs for each class session and they took exams in which every question was aligned to an LO. After each of four exams in the course, we asked students to reflect upon if and how they used LOs to prepare for the exam (i.e., assessing their Utility Value of LOs) and if they thought their study strategy was effective (i.e., assessing their Expectancy for success on the exam). We found that students who used LOs were more likely to report that they felt their studying was effective ($p < .05$). We also found that LO use increased as the course progressed. By the last exam, 81% of students reported that they used LOs and felt that their studying was effective, compared to only 65% of students for the first exam. We did not see any statistically significant relationship between reported use of LOs and exam score though. Our qualitative analysis may explain this trend. Students described a wide range of ways that they*

were using LOs that included study strategies we would consider effective (e.g., using LOs as a self-assessment tool) and ineffective (e.g., memorizing the list of LOs). Our results suggest that many students see value in using LOs when preparing for exams but that students may need addition instruction on the most effective way to use LOs to study. This work echoes Hennessey & Freeman's call for deeper investigation into how Backward Designed courses affect student outcomes.

5:15 p.m. Navigating the Aftermath: Understanding Barriers to Care After Sexual Violence for Nigerian Women
Student Researcher: *Chinenye Ofor*
Faculty Mentor: *Dr. Tosin Adebayo* (Communication Studies)

Abstract: *Globally, one in three women has experienced some form of gender-based violence, ranging from domestic violence to sexual abuse, rape, sexual assault, among others. In Nigeria, the problem is more prevalent, as one in three females, oftentimes in childhood, has experienced or will experience sexual violence in their lifetime. More concerning, instances of sexual violence are grossly underreported in Nigeria due to several factors, making data surrounding sexual violence challenging to access. Survivors face lasting mental health, physical, reproductive, and social consequences, often compounded by limited medical care, a lack of knowledge surrounding sexual violence, and weak family and community support networks. These factors impede the quality and level of care providers can give, and that survivors can receive. In this project, through qualitative interviews with healthcare providers who have provided care to sexual violence survivors in Nigeria, I examined the structural and cultural factors that impede survivors' ability to eek care and follow through on providers' recommendation; I also examined factors impeding providers ability to provide adequate care. Four themes emerge from the data which include: Cultural barriers impacting disclosure and treatment; Lack of consistent and comprehensive medical training on survivor care; Informal care approaches developed by providers; Lack of Sexual health education/risk risks education In the end, recommendations for post violence medical support are made, including standardized training and procedures for all medical personal, institutional funding, coordinated care between medical institutions, and community outreach in the form of sexual risk education.*

5:30 p.m. Unearthing TU: The Women's Aid Society
Student Researcher: *Leah Reyes*
Faculty Mentor: *Dr. Christian Koot* (History)

Abstract: *This summer, I worked as a research assistant at the Towson University Archives. My cohort's mission under the Unearthing TU project was to highlight Towson's notable female alumni. In the spirit of female achievement, I set my sights on the evolution of birth control counseling at Towson. I focused my work on the Women's Aid Society, an entirely student-led organization that*

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operated from 1970 to 1973. The group offered counseling sessions, transportation to medical facilities, and emotional support to their fellow students. Their collective efforts contributed to the implementation of a birth control clinic at Towson State College, now Towson University. I traced the history of the Women's Aid Society through archival research, examining student publications and other records that documented the organization's activities and members. Because the archival record left gaps in the group's history, I conducted oral-history interviews with former members to uncover experiences and perspectives that the Towerlight did not capture. These interviews provided greater insight into the motivations behind the organization and the students who worked to expand access to reproductive-health resources on campus. By combining archival research with oral histories, my research examines how a small, student-led organization contributed to broader changes in reproductive health access at Towson.

Room 162, Research@10 West

4:30 p.m. Language Mixing in Bilingual Spanish-Catalan Speakers After Right-Hemisphere Stroke: An Exploratory Case Study
Student Researcher: *Kylie Houston*
Faculty Mentor: *Dr. Alexandra Durfee* (Speech-Language Pathology & Audiology)

Abstract: *This project serves as an exploratory case study of language mixing in three bilingual Spanish-Catalan speakers after right-hemisphere stroke. Language mixing refers to switching between more than one language within a sentence or phrase, which healthy multilingual speakers utilize in daily life, often to aid in word-finding or to emphasize a point. Though a typical language use, a dearth of research exists on language mixing behaviors in multilingual speakers after left-hemisphere stroke, and almost no literature exists following right-hemisphere stroke. Linguistic data was extracted from three speech transcripts depicting several language tasks (i.e., picture description, discourse, and storytelling) and analyzed using various micro- and macrolingustic factors, such as examining correct information units (CIUs) by considering correct semantic meaning over target language accuracy, deemed translanguaging. Preliminary results found a combination of intra- vs intersentential switching (that is, within or between utterances) and emerging trends surrounding part of speech. Thus far, language mixing appears to aid in word-finding difficulties or to emphasize story recall, patterns that are consistent with typical language mixing use in healthy multilingual speakers. These similarities are significant to note as right-hemisphere stroke often impacts a speaker's pragmatic awareness, and better understanding language mixing behaviors is crucial in maximizing communication recovery for multilingual populations.*

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4:45 p.m. AI and Machine Learning on Medicinal Plants with Ethics
Student Researcher: *Anthony Puleo*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *Although genetic modification of the Madagascar Periwinkle (Catharanthus roseus), a key source of vincristine and vinblastine, has substantial medical benefits including cancer treatment, it also presents considerable ethical and technical challenges. Recent advances in artificial intelligence and machine learning have become central to improving the efficiency and safety of plant genome engineering. Machine learning models trained on large biochemical datasets enhance enzyme to substrate prediction and forecast how specific edits will influence downstream metabolite flux. Deep learning architectures further support CRISPR guide RNA design by reducing off target probabilities and optimizing edit precision. Together, these computational tools increase the plant's ability to withstand environmental stress, stabilize alkaloid output, and address long standing issues with the scalability and dependability of therapeutic plants. However, there are hazards associated with genome editing therapeutic plants, including metabolic disturbance, regulatory complexity, and off target mutations that persist despite algorithmic screening. Ethical concerns also emerge, including potential monopolization, ecological loss, and the exploitation of Indigenous Malagasy people who have historically used the plant. Using ethical frameworks including distributive justice, autonomy, positive rights, non maleficence, and Kantian ethics, this study investigates these issues from the stakeholder perspectives of cancer patients, Indigenous communities, and pharmaceutical businesses. As a proactive strategy for controlling long term safety, equity, and sociotechnical consequences, anticipatory ethics is also introduced to evaluate emerging AI driven biotechnologies before widespread implementation. All things considered, there is a lot of promise for treating cancer with genetically modified C. roseus. However, this research concludes that responsible growth requires open governance, equitable sharing of benefits, and strict ethical oversight under the direction of a thorough ethical analysis based on accepted ethical standards.*

5:00 p.m. ATryn and the Future of Biotech: Ai, Transgenic Animals, and Ethical Responsibility
Student Researcher: *Olanis Sanchez*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *The development of ATryn, the first FDA-approved drug produced from the milk of transgenic goats, represents a major advancement in biotechnology while raising important ethical questions about the moral boundaries of science and perceptions of humanity's responsibilities toward non-human life. This paper focuses on the scientific and ethical dimensions of ATryn's development, using it as a case study to examine how transgenic animals are engineered and brought into clinical use. Central to this process is the increasing role of artificial intelligence (AI) and machine learning (ML), which are transforming gene-editing technologies by improving precision, efficiency, and predictive modeling in the creation of transgenic organisms. AI-driven tools can analyze large genomic datasets, identify optimal gene insertion sites, predict gene expression*

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outcomes, and reduce unintended off-target effects during genetic modification. By accelerating the design and evaluation of transgenic organisms, these technologies have the potential to increase the speed and reliability of pharmaceutical development while reducing costly trial-and-error experimentation. Using anticipatory ethics as a guiding framework, this research explores how ethical responsibility is distributed among key stakeholders involved in ATryn's development, including patients, biotechnology companies, regulatory agencies, and the animals themselves. The ethical analysis is grounded in consequentialism, Kantian ethics, care ethics, and established bioethical principles to compare how each group interprets the moral implications of producing pharmaceuticals through genetically modified animals. Patients may justify ATryn based on its life-saving outcomes, while biotechnology companies emphasize safety, innovation, and regulatory responsibility. In contrast, the use of animals raises concerns centered on welfare, justice, and the moral limits of scientific intervention. The growing integration of AI and machine learning into biotechnology further intensifies these ethical challenges by expanding the scale and capability of genetic engineering while potentially obscuring accountability in decision-making processes. As algorithmic systems become increasingly involved in guiding scientific research and development, questions emerge regarding transparency, oversight, and the distribution of responsibility when unintended consequences occur. This paper argues that anticipatory ethics is essential in guiding the continued development of technologies like ATryn, ensuring that future scientific progress balances biotechnological innovation with transparency, moral responsibility, and respect for both human and non-human life.

5:15 p.m. Ethics of Artificial Intelligence in the Treatment of Autism Spectrum Disorder
Student Researcher: *Aidan O'Maille*
Faculty Mentor: *Richard Wilson* (Philosophy & Religious Studies)

Abstract: *Autism spectrum disorder (ASD) is a complex and heterogeneous order in which phenotypes and severity of symptoms can range dramatically between individuals (Saeliw et al., 2026). This creates challenges for both diagnosis and treatment of the disorder (Kao et al., 2025). Clinically, there are no common molecular diagnostic tools for ASD, and treatments such as Applied Behavior Analysis (ABA), Speech Therapy, and medications target only the behavioral symptoms of this disorder. Current treatments are generally homogenous and not sufficient to personalize treatment on an individual basis. Artificial intelligence (AI) and machine learning (ML) have advanced rapidly over recent years, with particular interest in how these technologies can be used to diagnose and treat complex disorders, such as ASD. On the diagnosis side, AI is already being researched extensively through application in areas such as eye-tracking technologies, MRI neuroimaging, and biomarker identification (Solek et al., 2025; El-Ashram et al., 2024). Therapeutic research includes CRISPR-Cas9 mediated gene editing, methylation-targeted epigenetic therapy, and brain-computer interfaces (Shokoohi et al., 2026, Kao et al., 2025; Dias et al., 2025). Ethical barriers and challenges abound regarding AI for medical use in general, and the ASD population presents unique considerations. Ensuring autonomy and navigating intricacies of informed consent practices*

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are among those most prescient in this discussion (Livanis et al., 2024; Yeo-Teh & Tang, 2022). Additionally, the need for AI and ML models to be trained on enormous amounts of data raises questions regarding the ethical collection and use of this data. A future wherein AI is able to meet the promises it holds for ASD treatment and diagnosis without detracting from these benefits through unethical pitfalls, is possible only if these issues are examined thoughtfully, and through a collaboration of multi-disciplinary teams.

5:30 p.m. Blood Pressure and Hemodynamic Parameters in Facioscapulohumeral Muscular Dystrophy
Student Researcher: *Mya Toolaabee*
Faculty Mentor: *Dr. Davi Mázala* (Kinesiology)

Abstract: *Facioscapulohumeral muscular dystrophy (FSHD) is a neuromuscular disease that causes the progressive weakness of muscles across the body. Current research on cardiovascular and hemodynamic involvement in FSHD includes multiple conduction and structural abnormalities but is scarce and inconclusive. Research indicates that despite exercise intolerance, exercise is safe and effective for those with FSHD. PURPOSE: 1) evaluate whether blood pressure parameters, which can be predictive of cardiovascular disease, are altered due to FSHD; 2) determine the acute effects of exercise on blood pressure parameters in individuals with FSHD compared to healthy controls. METHODS: Participants with FSHD (n=12) and age-, sex-, and physical activity-matched controls (n=7) completed tests for physical function. Participants then performed three sets of 10 repetition maximum exercises targeting the biceps brachii and quadriceps muscles. Vascular assessments and blood samples were collected pre- vs. post exercise. Vascular parameters include heart rate, brachial and aortic blood pressure, aortic pulse pressure, aortic augmented pressure, augmentation index (%), mean arterial pressure, pulse forward height, reflected pulse height, reflection magnitude (%), and sub-endocardial viability ratio (%). Blood samples will be used to analyze biomarkers of muscular damage and inflammation. RESULTS: Statistical analysis is currently incomplete. Preliminary results indicate that FSHD and controls exhibit similar baseline hemodynamic parameters and similar hemodynamic responses to acute exercise. CONCLUSION: This is the first study examining acute responses to a resistance exercise challenge to analyze vascular and hemodynamic responses in FSHD. Similar responses indicate that despite potential cardiovascular differences, exercise is safe and likely to pose similar cardiovascular health benefits in FSHD as in general populations.*

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Room 165, Research@10West

4:30 p.m. The Role of Lipid Signaling in Axolotl Limb Regeneration
Student Researcher: *Daniel Sackey*
Faculty Mentor: *Dr. Prayag Murawala (Mount Desert Island Biological Laboratory)*

Abstract: *Axolotls (Ambystoma mexicanum) are renowned for their ability to regenerate lost limbs, yet the role of specialized lipids (fat molecules that regulate inflammation) in this process remains poorly understood. To investigate this, previous collaborators mapped the lipid profile of regenerating axolotl limb buds and examined the effects of disrupting this molecular balance. Promoting inflammation by administering the pro-inflammatory lipid LTB4 or blocking natural anti-inflammatory pathways caused severe deformities, leading to stunted, spike-like limbs. In contrast, treating the limbs with pro-resolving lipids, such as maresin 1 and resolvin E1, which actively reduce inflammation, permitted normal, scarless regeneration. These findings indicate that axolotls require a chemical microenvironment rich in inflammation-resolving lipids to rebuild lost tissue effectively. An imbalance that favors sustained inflammation halts functional regrowth, providing valuable insights into how managing lipid-driven inflammation could potentially enhance tissue repair and wound healing in humans.*

4:45 p.m. Effects of Inflammatory Conditions on Brain Cell Energy Proteins
Student Researcher: *Kyle Hastings*
Faculty Mentor: *Dr. Carmen Falcone* (Biological Sciences)

Abstract: *This project investigates the effects of inflammatory stimuli on astrocytes, in a model similar to the effects of Alzheimer's disease. Astrocytes are supportive brain cells that are highly responsive to damage of the central nervous system. This project also identified a mitochondrial protein, the mitochondrial pyruvate carrier (MPC), not yet documented in human astrocytes. The inhibition of this protein in animal models of Parkinson's Disease promoted neuronal survival, and reduced the tangles and plaques present in animal models of Alzheimer's Disease. By exposing human IPSC-Derived astrocytes in a culture, to the pro-inflammatory cytokines, TNF-α and IL-1β, over a series of 4 days, 96 hours, I replicated the conditions of a neurotoxic Alzheimer's Disease brain. Control astrocyte cultures were concurrently receiving non-inflammatory medium to use for comparison. One pair of cell cultures were exposed for two days, the other pair for four days. At the end of each period, the astrocytes were stained with several biomarkers. These biomarkers included an antibody for the mitochondrial pyruvate carrier, MPC1, an antibody for glial filament acidic protein (GFAP), typically upregulated after damage, and a nuclear stain, DAPI. Cells were imaged using an immunofluorescent microscope and allowed for analysis of the expression of each biomarker.*

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5:00 p.m. Measuring IgG1 Antibody Isotype Responses Following Bacterial Enzymatic Combinatorial Chemistry-Adjuvanted Allergen Immunotherapy in Mice to German Cockroach Antigen
Student Researcher: *Asia Trogdon*
Faculty Mentor: *Dr. Erin Harberts* (Biological Sciences)

Abstract: *Allergic asthma is characterized by an overactive type 2 immune response that contributes to airway inflammation and mucus production. German cockroach (Blattella germanica) allergen is an important environmental trigger of allergic asthma, particularly in urban communities. Allergen immunotherapy aims to modify the immune response to allergens rather than simply treating symptoms. Bacterial Enzymatic Combinatorial Chemistry (BECC) adjuvants are being investigated for their ability to modify allergic immune responses. Previous research using ovalbumin showed that BECC-adjuvanted treatment altered antibody responses. Building on this work, this study examines immune responses following BECC-adjuvanted immunotherapy using German cockroach allergen, with a focus on IgG1 antibody responses. IgG1 is associated with type 2-skewed immune responses in mice and can provide insight into how the immune system responds to allergen exposure. We hypothesize that BECC treatment will alter allergen-specific IgG1 responses and may contribute to redirecting the allergic immune response. Mice were sensitized and challenged with German cockroach extract and treated with BECC, alum, or control formulations. Serum samples were collected, and allergen-specific IgG1 was measured using indirect enzyme-linked immunosorbent assays (ELISAs). IgG1 responses were characterized following treatment. This work may provide insight into how BECC influences allergic immune responses and support further investigation of BECC adjuvants as a potential approach for allergen immunotherapy.*

5:15 p.m. Functional Tagging of Glomeruli
Student Researcher: *Jake Shaheen*
Faculty Mentor: *Dr. Dinu Florin Albeanu* (Cold Spring Harbor Laboratory)

Abstract: *Glomeruli in the mouse olfactory bulb exhibit distinct odor response profiles that may serve as functional "fingerprints" for identifying corresponding glomeruli across hemispheres. Using in vivo calcium imaging across 321 odors, I developed Python-based methods to match 116 left and 120 right glomeruli using cosine similarity and confidence-based filtering. I then developed a single-pixel correlation tool to visually validate computationally derived matches. Comparing high- and low-concentration odor responses showed that highly confident bilateral matches could be recovered across stimulus intensities, supporting odor-response fingerprints as a promising approach for functionally tagging glomeruli. The results also highlight the importance of accounting for biological noise when identifying functional matches.*

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5:30 p.m. Not Just Pregnancy: A GDF-15 Variant with Female-Specific Health Effects
Student Researcher: *La-Shawna Stegall*
Faculty Mentor: *Dr. Kathryn McDougal* (Biological Sciences)

Abstract: *The rare GDF15-C211G variant (rs372120002) impairs normal protein function and is a genetic risk factor for a severe nausea and vomiting disorder during pregnancy. As hyperemesis gravidarum (HG) diagnoses are inconsistently captured in electronic health records (EHR) and C211G is a rare variant, standard genome-wide association studies (which scans the genome for variants linked to a condition) failed to reach significance for HG using the All of Us Research Program. To better leverage the statistical power of the rare variant, we conducted a phenome-wide association study (PheWAS) using the All of Us Research Program, to test C211G against approximately 1800 health conditions recorded in EHR data, independent of pregnancy status. This approach identified three phenotypes that reached PheWAS significance in a combined male-female cohort, including two female reproductive conditions: cyst or abscess of the Bartholin's gland (OR = 8.91, p = 1.56 x 10-6) and excessive or frequent menstruation (OR = 2.71, p = 1.93 x 10 -6). Helicobacter pylori infection also reached the significance level (OR = 4.53, p = 8.89 x 10-6). Sex-stratified follow-up studies showed that two associations strengthened in the female-only PheWAS (H.Pylori OR = 6.91; Bartholin's gland OR = 8.97), while in male carriers, the reproductive conditions were not applicable, and the H. pylori association was absent. These results suggest that effects of C211G may extend beyond pregnancy and differ by sex. Future studies will explore GDF15 functional molecular pathways to identify protein-interaction partners that may provide insight into these health outcomes.*

5:45 p.m. Can We Stop Viruses From Causing Cancer?
Student Researcher: *Erick Del Cid Chavez*
Faculty Mentor: *Dr. Elana Ehrlich* (Biological Sciences)

Abstract: *Kaposi's Sarcoma Herpesvirus (KSHV) is a type of oncovirus that contributes to the development of cancers such as Kaposi's sarcoma and primary effusion lymphoma, among other inflammatory diseases. The purpose of our research was to investigate what happens to KSHV replication if we inhibit one of the human host-factors that KSHV hijacks for its own replication. This host-factor is a protein known as ATR that naturally responds to DNA damage during DNA replication. For our methods, we used iJSC1 cells from a clinical patient that already contained inactive KSHV. We then separated those cells into untreated and enhanced-induction treatment groups and added different concentrations of ETP-46464, an ATR inhibitor, to the experimental group. We incubated the cells for about seven days, harvested the DNA from each treatment, and lastly measured the quantity of viral DNA copies using qPCR. Our results showed that higher ETP-46464 concentrations lowered KSHV replication but were also toxic to human cells. Meanwhile, a lower concentration was not toxic to human cells but did not have a significant impact on reducing KSHV replication. However, a concentration of 0.41 μM significantly reduced KSHV replication while*

also causing less toxicity to the cells. Therefore, we conclude that inhibiting ATR does help with the reduction of KSHV replication and may provide opportunities to identify new cancer treatments, as well as other host-factors that KSHV needs for its own replication.

Room 264, Research@10West

4:30 p.m. Syncretization of Simplex Matrices
Student Researcher: *Raphael Zeldin*
Faculty Mentor: *Dr. Tatyana Sorokina* (Mathematics)

Abstract: *Piecewise polynomial functions in several variables, or multivariate splines, are widely used in numerical analysis, computer-aided design, approximation theory, finite element methods, machine learning, and data science. They represent complicated functions by simple local polynomial pieces. As finite-dimensional vector spaces, spline spaces require stable local bases to ensure numerical stability. The Bernstein–Bézier form is an effective framework for the mathematical analysis of multivariate spline spaces, with a numerically stable basis that possesses some shape-preserving properties under floating-point arithmetic. Each polynomial piece is represented with respect to a local basis in barycentric coordinates relative to its supporting simplex. Polynomial pieces are assembled into a globally smooth spline function by enforcing smoothness conditions. Because the local coefficients of polynomial pieces and the smoothness conditions between ad- jacent pieces are indexed over partial simplex lattices rather than rectangular grids, direct im-plementation is challenging. Practitioners typically map each arbitrary simplex onto a standard reference simplex via an affine transformation. The associated polynomial pieces are then defined and evaluated using local Cartesian coordinates over this reference domain. We introduce a new class of matrices together with a set of algebraic operations that allow the direct implementation of algorithms based on the Bernstein–Bézier form. These operations trans- form the de Casteljau algorithm—central to Bernstein–Bézier analysis—from an iterative procedure into an explicit formula. This provides a foundation for simplifying computational methods for mul- tivariate splines. We demonstrate how these operations are utilized in the de Casteljau algorithm for point evaluation and directional derivative computations.*

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4:45 p.m. Interventions Increasing Students Reaching Entry-Level Mathematics at Towson University, Maryland
Student Researcher: *Amanda Wisoky*
Faculty Mentor: *Dr. Diana Cheng* (Mathematics)

Abstract: *At our institution, in Fall 2025, over 700 students (representing approximately 25% of the incoming first-time students) were enrolled in Intermediate Algebra. Developmental Mathematics and Intermediate Algebra are pre-requisite courses for a university core mathematics course College Algebra needed for students pursuing majors in the Colleges of Science and Mathematics, Business and Economics, and Health Professions. In post-pandemic semesters, the pass rate for Intermediate Algebra ranged from 60% to 75%. Also, data showed that students who did not pass Intermediate Algebra on their first try were significantly more likely to change majors. We report the results of two separate interventions conducted in Fall 2025: a peer support class accompanying Intermediate Algebra taught by pre-service teachers, and a 7-week half-semester format enabling students placed below intermediate algebra to complete the two-semester sequence of Developmental Mathematics and Intermediate Algebra within the same semester. Students enrolled in the 7-week format had a significantly higher pass rate in Intermediate Algebra than students enrolled in the full-semester course. Additional ideas for improving the success rate related to pedagogical improvements for future semesters will be discussed.*

5:00 p.m. Analytical Solutions for the Ekman Model with General Power-Law Eddy Viscosity and their Deflection Angles
Student Researcher: *Efosa Owie*
Faculty Mentor: *Dr. Vincent Martinez* (Hunter College, CUNY)

Abstract: *The Navier-Stokes equations are a system of partial differential equations (PDEs) used to model fluid flow. We study a special case developed for the geophysical fluids called the Ekman model, which describes the effect of Earth's rotation of atmospheric and oceanic flows. We reduce the PDEs to ordinary differential equations (ODEs) and investigate the power-law family $K(z) = \frac{f}{k}z^\alpha$. Previous research has given explicit solutions for specific values of α, we extend on that by deriving a general solution for arbitrary $\alpha \neq 2$ and separately analyze the critical case $(\alpha=2)$. We identify and correct errors in several existing treatments of the model, including incorrect velocity formulas and calculations of the Ekman deflection angle.*

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5:15 p.m. Improved Model for Dust in the Intergalactic Medium and its Implications on Olbers' Paradox
Student Researcher: *Mauro Sgromo*
Faculty Mentor: *Dr. James Overduin* (Physics, Astronomy & Geosciences)

Abstract: *There has been tremendous progress in our understanding of dust in the intergalactic medium over the past few years, thanks especially to analysis of deep fields with JWST. We use this data to develop a model of IGM dust opacity as a function of redshift and test this against various observational constraints. We combine this model with standard extinction theory and LambdaCDM cosmology to derive rigorous upper and lower limits on optical depth as a function of redshift and observed wavelength. In future work, we will be able to combine this with new data on star formation rate to put what may be the first quantitative lower limits on the importance of absorption in resolving Olbers' paradox (or why the sky is dark at night).*

5:30 p.m. Developing Almost Shallow Permutation Classification Through Pattern Counts
Student Researcher: *Isabel Cole*
Faculty Mentor: *Dr. Nathan McNew* (Mathematics)

Abstract: *Permutations are a mathematical object that consists of a string of numbers in various orders that can be used to simplify complex structures, like knots. Smaller strings of permutations, called patterns, can be found within permutations and mathematicians use these patterns to learn more about the underlying structures and make comparisons between permutations. One special type of permutation is the "shallow permutations," a class of minorly scrambled permutations that were introduced in a seminal paper by Diaconis and Graham in 1977. These shallow permutations were recently characterized using a set of mathematical tools called "pattern avoidance" by Berman and Tenner. We are investigating the next simplest class of permutations, which we have named "almost shallow permutations," to similarly classify which patterns are avoided by almost shallow permutations. Using a combination of generalized pattern analysis techniques from Berman and Tenner and computer experimentation on permutation objects, we are developing a set of patterns that are avoided by almost shallow permutations.*

5:45 p.m. Single-Particle Fluorescence Reveals Molecular-Weight-Dependent Network Dynamics During PEGDA Polymerization
Student Researcher: *Daniel Eisenstein*
Faculty Mentor: *Dr. Khanh-Hoa Tran-Ba* (Chemistry)

Abstract: *The UV-induced photopolymerization of three poly(ethylene glycol) diacrylate (PEGDA) formulations (Mn = 250, 575, and 700 g mol^{-1}) was systematically investigated using single-particle fluorescence (SPF). This study provides new insights into PEGDA photopolymerization and post-*

polymerization behavior by elucidating the influence of molecular weight (MW) on these processes, as evidenced by distinct diffusion, drifting, and thermal profiles across the three formulations. In contrast to previously reported ensemble measurements, such as rheology, which was also employed in this study, SPF enabled highly sensitive detection of differences in early-stage PEGDA network formation (<5% yield), as reflected by the entrapment and immobilization of fluorescent nanoparticles (d ≈ 200nm) within the developing cross-linked network. Analysis of the magnitude and direction of rapid x-y drift immediately prior to particle immobilization and drifting perpendicular to the imaging plane (z-drift) following particle entrapment further revealed distinct MW-dependent spatial dynamics during network formation. The z-drift profiles revealed MW-dependent expansion and contraction behavior due to heat released from the reaction and mechanical properties of the formed gels. The observed trends across molecular weights indicate a strong correlation between molecular weight, reaction kinetics, and gel properties. Based on these observations, a new model for PEGDA gel formation is proposed. Overall, this work demonstrates the utility of SPF for probing polymer network formation and dynamics with high spatial and temporal sensitivity.

Room 266, Research@10West

4:30 p.m. Policy, Heat, and Violent Crime in Baltimore
Student Researcher: *Liam Walker*
Faculty Mentor: *Dr. James Manley* (Economics)

Abstract: *This study examines the relationship between temperature and violent crime in Baltimore City and evaluates whether the Group Violence Reduction Strategy (GVRS) changed patterns of violent crime following its implementation. The analysis uses crime incident data from January 2022 through May 2026, which were geocoded and aggregated into a complete census-tract-by-day panel. Daily maximum temperature and precipitation data were merged by date, while demographic controls were obtained from the American Community Survey and merged at the census-tract level. Poisson regression models were used because the dependent variable measures the daily number of violent crimes within each tract. The models estimate the relationship between maximum temperature and violent crime while controlling for precipitation, neighborhood socioeconomic characteristics, weekends, seasonal patterns, year effects, and geographic differences. A separate event-study design examines changes in violent crime before and after the district-level implementation of GVRS. The results indicate that higher temperatures are associated with modest increases in violent crime. However, the GVRS estimates are less conclusive and do not provide consistent evidence of a statistically significant reduction in violent crime across treated districts. These findings demonstrate the importance of environmental conditions when examining crime*

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patterns while also illustrating the difficulty of isolating the effects of place-based violence-reduction policies.

4:45 p.m. How Has Global Warming Impacted Anxiety for Americans in the 1980s and the 2020s?
Student Researcher: *Willow Brenig*
Faculty Mentor: *Dr. James Manley* (Economics)

Abstract: *I observed extreme heat in 1988 and 2020 through 2024 to see the effect that heat has on anxiety, in order to predict how heat will affect our mental health in the future. The independent variables examined were: age, sex, race, education, family income, family size, employment status, anxiety level in children & adults, health care coverage, and region. After running multiple regressions, I found hardly any significant results that these factors influence anxiety in either 1988 or the 2020s. I ran additional regressions testing the extreme cold as a dependent variable, and testing certain mental health aspects as dependent variables such as; therapy, general health, and school days missed. The R squared and low coefficients for all regressions conclude that the results of this regression do not actively reflect mental health.*

5:00 p.m. The New-Age Dust Bowl: Impacts of Rising Temperatures in Oklahoma and Kansas on Electricity Costs
Student Researcher: *Alexa Maisel*
Faculty Mentor: *Dr. James Manley* (Economics)

Abstract: *Climate change throughout the 21st century has led to an increase in extreme weather events, including rising and falling temperatures, and households are having to pay more for air conditioning and energy. Low-income households are being affected disproportionately, forcing some households to choose between healthcare and electricity bills. Previous research shows multiple other factors which influence a rise in energy consumption bills; including race and neighborhood. Doremus et al. classifies those affected disproportionately as a household who pays greater than 10% of their income on electricity. Population density is another major influence in expenditures – living in a more urban area relates to a lower bill with higher temperatures. In this paper, we examine the impact of temperature on household electricity expenditures, and other factors which may affect the price. Understanding how extreme weather impacts household energy expenditures can provide insight into the economic burden of climate change on residents.*

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5:15 p.m. Analyzing Post-Disaster Income Inequality Following Hurricane Harvey
Student Researcher: *Samuel Ackerman*
Faculty Mentor: *Dr. James Manley* (Economics)

Abstract: *This study analyzes the impact of Hurricane Harvey on personal income in Houston and select geographic study areas using a regression-based analysis of demographic and meteorological precipitation data. It assesses post-storm shifts in income inequality within Harris County and other study areas across Texas. We find that precipitation largely did not affect annual income by 2018, but that the storm increased the economic inequality faced by African Americans and Hispanics in Houston. Concurrently, we also see evidence that non-U.S. citizens in Houston decreased their pay gap with U.S. citizens, while the gender pay gap in Harris County stayed about the same. We also find that the average minority individual living in Harris County in 2018 has a significantly lower income than the average White individual living in the other study areas in 2016. The results of this study can assist interest groups and policymakers in determining if the response to Hurricane Harvey was effective and equitable while providing a strong basis for additional research on how natural disasters impact economic inequality between different socioeconomic groups.*

5:30 p.m. Clearing the Air: The Impact of London's Ultra Low Emission Zone Expansion on Rescue Inhaler Prescriptions
Student Researcher: *Simon Johnson*
Faculty Mentor: *Dr. James Manley* (Economics)

Abstract: *In the past 50 years concerns over air pollution have been on the rise. Continuous studies link poor health conditions to air pollution. This study aims to evaluate the causal impact of London's rollout of Ultra Low Emission Zones (ULEZ) across all 32 boroughs on respiratory health, measured through Short-Acting Beta-Agonist (SABA) inhaler prescription rates. Ultra Low Emission zones are a recent addition to UK's clean air initiative. Central London was first to become an ULEZ in 2019 and continued to grow until covering all Greater London in 2023. Similar research has been conducted in cities such as Berlin pointing to the connection between Low Emission Zones (LEZ) and pediatric respiratory health. However, little research has been conducted on the full scale of ULEZ due to its recency.*

5:45 p.m. Privacy Preservation in Online Processing
Student Researcher: *Saifu Lamin*
Faculty Mentor: *Dr. Akshita Maradapu Vera Venkata Sai* (Computer & Information Sciences)

Abstract: *Generative Artificial Intelligence (AI) is increasingly being used in areas such as customer service, healthcare, and finance because of their ability to process information and assist with tasks usually performed by humans. However, these models are limited by the information available in*

their training data and may not have access to current or context-specific information. Retrieval-Augmented Generation (RAG) addresses this limitation by allowing AI models to retrieve relevant information from external sources before generating a response. While RAG can improve the accuracy and relevance of AI- generated responses, it also introduces potential privacy concerns, particularly when sensitive information is processed during retrieval and generation. This presentation will focus on privacy preservation during the online processing stage of the RAG pipeline. Online processing occurs in real time when a user submits a query, which is converted into a vector embedding, then used to retrieve relevant document information, and provided to a generative AI model as context. Though Personally Identifiable Information (PII) may potentially be exposed at multiple points during this process. This presentation will examine the RAG pipeline to identify where PII may be exposed and investigate existing privacy-preserving approaches. Following this analysis, techniques such as PII detection, anonymization, and tokenization will be considered for implementation at selected stages of the online pipeline. Future evaluation will examine how effectively these techniques reduce PII exposure while maintaining retrieval performance and response quality. The overall goal is to determine how well privacy protection can be incorporated into RAG systems without disrupting their functionality.

