IGNITE

ST. THOMAS AQUINAS COLLEGE

11th ANNUAL ART, DESIGN & SCHOLARSHIP EXHIBITION



Ignite your curiosity. Ignite your imagination.

Welcome to Ignite, St. Thomas Aquinas College's 11th Annual Art, Design, and Scholarship Exhibition. Ignite is a celebration of our undergraduate and graduate students, their original research, and their creativity from disciplines across campus. The scope of the presentations featured showcase the outstanding caliber of our students at St. Thomas Aquinas College. We hope that this exhibition will ignite the passion for discovery and ingenuity in all of our students for years to come.

The projects on display also demonstrate the ongoing commitment of our faculty to supporting undergraduate research. As is true of the faculty advisors who support them, these students and their work hold the potential to contribute positively to the world. Each of these students has benefited from mentoring provided by exceptional faculty. We thank the faculty for their efforts on behalf of these students.

We encourage you to share in this showcase as you visit the poster presentations and portfolios, and read the collection of abstracts included in this program and at *stac.edu/ignite*.

Organized and curated by

Members of the Ignite 2026 Committee

Special thank you to Annie Lombardi and the Office of Campus Communications

Superglue Fuming And The Chemistry Behind It
Presenter: Adam Levi
Faculty Advisor: Dr. Clara Tóth, Professor of Biology

During my internship at the Morris County Sheriff's Office CSI unit at the Morris County Public Safety Complex, NJ, a wide variety of tasks regarding different aspects of CSI work were performed, including photographing a crime scene, processing firearms, looking over cases, lifting fingerprints, and performing superglue fuming. Superglue fuming is used when looking for latent fingerprints or prints that are hard to make visible through lifting powder. The chemical reaction behind superglue fuming, its protocol, and how it works has been a staple in producing fingerprints suitable for analysis.

Utilizing Bicinchoninic Acid Assay Standards for Quantifying Proteins for Alzheimer's Disease Research
Presenter: Angela Durinda
Faculty Advisor: Dr. Clara Tóth, Professor of Biology

The Nathan Kline Institute (NKI), in Orangeburg, NY, is a laboratory that focuses on understanding the causes, diagnosis, and treatment of Alzheimer's Disease (AD). During my internship with them, I aided in making standards for bicinchoninic acid assays (BCA) using bovine serum albumin (BSA). These assays are crucial because they quantify the unknown concentration of proteins in substances. This method was applied by measuring the concentration of amyloid β plaques in the brains of mice which are associated with AD. The created standards helps to calculate the unknown concentration of amyloid β plaques using Beer's Law. Knowing how much of these amyloid plaques are present could help determine the stage of AD in the mouse. With further research it potentially could be compared to humans which could help find a diagnosis for AD.

A Synthetic Method For A Novel Serotonin Analog

Presenter: Brandon Mesias

Faculty Advisor: Dr. Steve Burns, Professor of Chemistry

The serotonin 2a receptor is the targeted receptor for numerous antipsychotic drugs which function as blockers of the receptor (antagonists). This site is also the target for many hallucinogenic drugs such as LSD which function as activators (agonists).

The compound being synthesized is N-(9H-fluoren-9-yl)-2-phenyltryptamine (NF2PT). This compound is intended to be a blocker of the 2a serotonin receptor. Receptor binding affinity was tested against 60 other compounds in a computational binding software. NF2PT was determined to have the highest affinity and the most feasible synthesis.

If successfully synthesized, this compound could be used as an antipsychotic, a tool to study the serotonin 2a receptor further, or as a narcan-style drug to combat the use of hallucinogens.

The Effects of Body-Worn Cameras on Police Behavior and Civilian Complaints

Presenter: Brianna Krinsky

Faculty Advisor: Prof. Ira Promisel, Instructor of Criminal Justice

I will be presenting my study of Body Worn Cameras and their affect on police behavior. Presenting the research and results I found on this study and explaining what my three key findings of police behavior, civilian complaints, and body worn cameras mean. I want the receivers to understand the history and upcoming plans of body cameras and what impact they have had on our society and law enforcement.

Exo-Planet HAP-P Observations

Presenter: Genevieve Estinfort

Faculty Advisor: Alfredo Viegas, Astronomer and Observatory Coordinator

This research focuses on observing the Exo-Planet HAT-P-12b through ground-based photometry using the HOPS software. By analyzing its light curve during transit, we were able to model the system and estimate important values like the planet-to-star radius ratio (Rp/Rs) and the timing of the transit event. Our measured Rp/Rs value was 0.1416 ± 0.0041, compared to the expected value 0.1406 ± 0.0013. While the values slightly differ, the result is still within uncertainty when accounting for error. The signal-to-noise ratio









Charlotte Boshoff
Visual Communications in Graphic Design

(SNR) was relatively strong at 17.33, and both the autocorrelation (0.403) and Shapiro statistic (0.046) suggest the data had minimal noise and few outliers, which was expected. The observed-minus-calculated (O–C) timing deviation was 0.0 ± 2.3 minutes, showing that the transit occurred right where it was predicted. To check how reliable the data was, we looked at several diagnostic metrics. The small deviation in Rp/Rs (0.23σ) also supports consistency with published values. Overall, this analysis confirms a successful detection of HAT-P-12b's transit and shows how light curve modeling can be used to study and understand distant planetary systems. detection and highlight the effectiveness of light curve modeling in characterizing exoplanetary systems.

Ethanol Adaptation in Yeast Under Ethanol-Containing Growth Conditions

Presenters: Chelsy Louisthelmy
Faculty Advisor: Dr. Stephanie Lauer. Assistant Professor of Biology

The objective of this experiment was to determine whether yeast can develop a tolerance to ethanol when grown in an ethanol-containing solution. Two batches of yeast were cultured: one grown in a YPD solution containing ethanol and the other grown in YPD alone. Performing evolution experiments is important because they allow for genetic and evolutionary changes to be analyzed over short periods. During the initial plating, a single serial dilution was performed and no significant differences in colony growth were observed between plates. However, during the second and final plating, evidence of ethanol adaptation was observed. While ethanol tolerance appeared to develop in the yeast exposed to ethanol, temperature stress did not produce as strong of an effect on growth as initially hypothesized..

Sample-Efficient Reinforcement Learning on Physical Systems

Presenters: Colin Bottrill, Gavin Kopf, Jojo Jose, Christina Manjappallil
Faculty Advisor: Prof. Brett Karopczyc, Lecturer of Professional Practice of Computer Science

Our project is built on research performed by Thomas Bi and Raffaello D'Andrea in their paper Sample-Efficient Learning to Solve a Real-World Labyrinth Game Using Data-Augmented Model-Based Reinforcement Learning. Labyrinth is a game where players navigate a marble through a physical maze by tilting the playing surface along two axes. Our research involves building a simple robot that can learn to play this game proficiently, without explicit instruction, using model-based reinforcement learning (RL) via the Dreamer V3 algorithm. Our work combats a common issue in RL - it typically requires an excessive amount of training data to achieve good performance. Our research focuses on improving sample efficiency by optimizing multiple aspects of the learning process. By changing the sampling of the replay buffer to prioritize episodes

with higher rewards, our system focuses its learning on new parts of the maze that have yet to be mastered. By removing a portion of the decoder neural network in the world model to selectively reconstruct the model's inputs, our system can use the latent space more efficiently to learn the dynamics of the physical system. These updates alone have already resulted in a 23% increase in the total rewards the system can achieve on a fixed budget of 250,000 training steps of experience.

Students' Emotional Responses to Disease and Death in Anatomy & Physiology Courses

Presenter: Dahiana Garcia Atuesta
Faculty Advisor: Dr. K. Emma Emanuel. Associate Professor of Biology

Anatomy and Physiology (A&P) courses play a critical role in undergraduate education, particularly for students pursuing healthcare-related careers. These courses introduce students to complex topics such as disease, organ failure, and death, which may represent one of their first academic exposures to human mortality. While A&P is primarily taught as a scientific discipline, the emotional impact of this content on students is often overlooked.

Previous research suggests that exposure to anatomy-related content can produce a range of emotional responses, including anxiety, discomfort, curiosity, and reflection. However, much of this research focuses on medical or cadaver-based education, leaving a gap in understanding how undergraduate students experience these topics in lecture-based A&P courses.

This study aims to examine the emotional responses of students at St. Thomas Aquinas College when learning about disease and death in A&P courses. A quantitative research approach was used, consisting of an anonymous online survey distributed to A&P students. The survey included scale questions, multiple-choice items, and some open-ended responses to evaluate emotional experiences, perceived preparedness, and attitudes toward the inclusion of emotional or grief-related discussions in A&P education.

By analyzing student responses, this study seeks to gain insight into how A&P coursework impacts students beyond academic understanding, emphasizing the importance of emotional awareness in science education.

Resilience & Stress-Engagement Training (RESET) for Mental Health Crisis Response

Presenter: Gabriela Mills
Faculty Advisors: Prof. Ira Promisel, Instructor of Criminal Justice; Dr. Clara Tóth, Professor of Biology

Millions of adults in the United States of America experience severe mental illnesses, including schizophrenia, severe bipolar disorder, and major depression with psychotic features. When these individuals suffer a mental health crisis, police officers are often sent to respond. With insufficient specialized training in deescalation and in a society with a strong stigma against mental illness, police are ill-equipped to respond to a person in crisis (PIC). While incidents involving death or injury are rare, they disproportionately impact people with mental illnesses. People with mental illnesses are four times more likely to be arrested and 16 times more likely to be killed during a police incident than other civilians.

Resilience & Stress-Engagement Training (RESET) integrates heart rate variability biofeedback into the current Crisis Intervention Training (CIT) programs widely implemented in the United States. Through RESET, officers will gain a deeper understanding of their physiological stress responses during critical events and be able to manage stress in real-time, mitigating its negative effects on cognitive performance and deescalation abilities.

Mental Heath In Policing

Presenter: Grace Quattrocchi
Faculty Advisor: Prof. Ira Promisel, Instructor of Criminal Justice

Police officers are proven with many forms of evidence to be at a significantly higher risk for developing mental health disorders such as PTSD and PISD, depression, anxiety, and suicidal thoughts compared to us citizens. This topic shows the relationship between repeated exposure to traumatic incidents and the psychological well-being of law enforcement officers. Based on this approach, it is expected that my research findings will find a strong correlation between occupational stressors in policing and increased rates of mental health challenges. Specifically, studies are anticipated to show that frequent exposure to violence, traumatic incidents, long work hours, and organizational stress contribute to higher levels of psychological distress. Furthermore, it is expected that barriers such as stigma surrounding mental health treatment and limited access to support services may intensify these risks. Overall, the evidence is likely to support the theory that the traumatic exposures and experiences, as well as the nature of police work, significantly impact officers' mental health outcomes.

Studying the Transit of HAT-P-42b with Ground-Based Photometry
Presenter: Heather Ghussin
Faculty Advisor: Alfredo Viegas, Astronomer and Observatory Coordinator

We analyzed the transit of the hot Jupiter HAT-P-42b using ground-based photometric observations. By fitting a transit model with quadratic detrending to the light curve, we estimated key parameters such as the planet-to-star radius ratio (Rp/Rs) and the mid-transit time. Our results give Rp/Rs = 0.086, which agrees well with published values for this system. The mid-transit time was found to be BJD 2459192.53042, consistent with predicted timings within uncertainty. The observed minus calculated (O–C) timing does not show any significant deviation, suggesting the orbital period is stable. The light curve shows a clear transit signal, and the residuals are relatively small with low autocorrelation, indicating that the fit is reasonably reliable and not strongly affected by systematic noise. Overall, our results confirm the transit of HAT-P-42b and show that ground-based observations can still produce solid measurements when combined with proper light curve modeling.

Same Image, Different Feeling: The Role of Color in Emotion
Presenters: Isabella Myers
Faculty Advisors: Nina Bellisio, Professor of Graphic Design; Dr. Benjamin Wagner, Associate Professor of Psychology

Colors are often associated with specific emotions, such as red being linked to excitement and blue to calmness, but these relationships are often oversimplified and treated as universal. In reality, emotional responses to color can vary depending on context, individual perception, and prior experience. This study examines how altering the color of a single image influences emotional response and perception, focusing on whether color alone can shift how a visual is experienced. By isolating color as the primary variable while keeping all other visual elements constant, the research aims to better understand its direct psychological impact and challenge simplified assumptions about color-emotion relationships..

Dimensional Analysis of Impact Craters
Presenter: Jake Halloran
Faculty Advisor: Dr. Heather Rave, Professor of Physics; Dr. Don Johnson, Professor of Physics

Impact crater formation is influenced by the transfer of energy and momentum during projectile collisions, as well as the physical properties of the target material. This study applies dimensional analysis to examine how projectile mass and diameter affect crater size, while holding impact conditions constant.

By expressing the system in terms of dimensionless parameters, scaling relationships are developed to predict crater diameter and depth. Controlled experiments are conducted in which projectiles of varying mass and size are dropped from a fixed height into a uniform medium, ensuring consistent impact conditions without directly investigating velocity. The results reveal clear power-law relationships between projectile characteristics and crater dimensions, emphasizing the role of mass and geometric scaling in impact processes. These findings provide insight into crater formation mechanisms and demonstrate the usefulness of dimensional analysis as a predictive tool in physics and geophysical studies.

Filing Legality: Bureaucracy, Surveillance, and The Immigrant Body

Presenters: Jasmine Giselle, Castillo Solares
Faculty Advisors: Dr. Carolyn Fraker, Assistant Professor of Sociology

This project examines how immigration bureaucracy functions not only as a legal process, but as a form of social control that shapes the everyday lives of immigrants. Drawing on independent ethnographic research conducted through my work at an immigration law firm, I analyze the process of filing work permit petitions ("perms") as a site where legality is constructed through paperwork, documentation and procedural order.

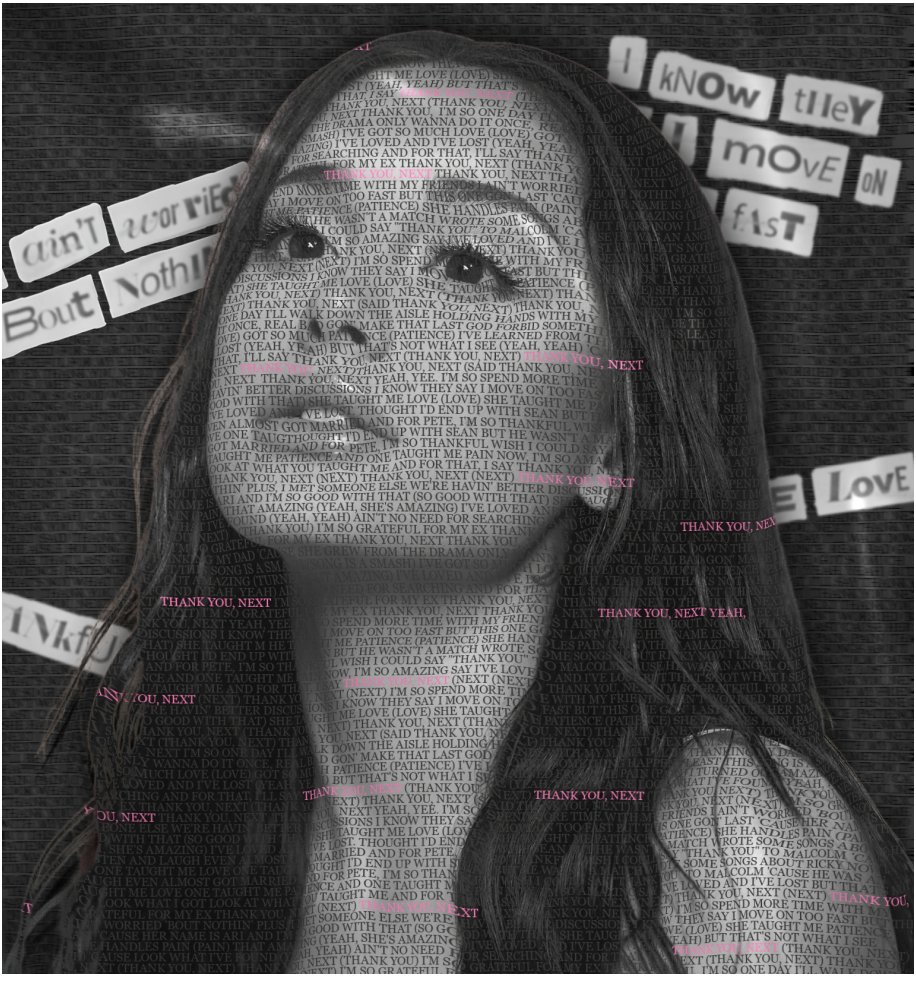
Using Max Weber's theory of bureaucracy, I explore how rationalized systems of exhibits, classifications, and formal requirements produce legitimacy and authority. At the same time, I engage Michel Foucault's concept of surveillance and the invasion of the private sphere to examine how immigration law extends into intimate domains such as employment, identity, mobility and fear.

Through field notes and reflective analysis, I ask: How does filing for legal status discipline the immigrant body? How does the state enter private life through bureaucratic form? I argue that the process of "filing legality" reveals how immigrants must continuously perform compliance within systems that both promise protection and produce precarity.

Why do motor vehicle theft crimes rarely get solved?

Presenter: Jason Mejia
Faculty Advisor: Prof. Ira Promisel, Instructor of Criminal Justice

Despite many developments in different types of technology, investigation techniques, research methods, and many more developments, motor vehicle theft crimes are the crimes that get solved the least. This study is going to be based on why the clearance rate for motor vehicle theft crimes are so low. In



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the FBI's Uniform Crime Reporting (UCR) Program, motor vehicle theft is defined as the theft or attempted theft of a motor vehicle. A motor vehicle is defined in the UCR Program as a self-propelled vehicle that runs on land surfaces and not on rails. Examples of motor vehicles include sport utility vehicles, automobiles, trucks, buses, motorcycles, motor scooters, all-terrain vehicles, and snowmobiles. Motor vehicle theft does not include farm equipment, bulldozers, airplanes, construction equipment, or watercraft such as motorboats, sailboats, houseboats, or jet skis. This study will use research and data collected by New York State, to identify possible causes and opportunities for solutions.

The Role of Parent and Teacher Math Self-Efficacy and Beliefs in Early Childhood Learning

Presenter: Jessica Partridge
Faculty Advisor: Dr. Nydia Prishker, Assistant Professor of Childhood Education & TESOL

Amid ongoing concerns about children's mathematical development, specifically at the early childhood level, it is essential to examine the factors that constitute children's exposure and experiences with mathematics. This is an integral part of children's school readiness; therefore, it is important to investigate the self-efficacy of the adults who support children's learning. In light of significant setbacks in mathematical progress among early childhood students, it is important to examine whether there is a correlation between this progress margin and the self-efficacy of parents and teachers in mathematics. When parents and teachers lack confidence in their subject-matter competence, it can affect their children's or students' progress with the material. This study investigates parents' and teachers' self-efficacy with mathematics and their beliefs about when mathematical learning begins in children's development. Using a qualitative descriptive approach, this study collects data through anonymous online surveys given to a convenience sample of parents and teachers. Preliminary findings suggest that the self-efficacy of parents and teachers may be lower than expected, which may impact their ability to support children and students in their educational progress. By examining teachers' and parents' self-efficacy in mathematics, and their beliefs about when mathematical learning begins in early childhood development, this study aims to understand how these factors may affect children's and students' educational progress.

Exoplanet research
Presenters: Jude Petersen
Faculty Advisor: Alfredo Viegas, Astronomer and Observatory Coordinator

This presentation explores the field of exoplanet research and why it is important in modern astronomy. Exoplanets are planets that orbit stars outside of our solar system. We are using the transit method which measures small dips in a star's brightness. By using this technique we are able to determine a planet's size, mass, and distance from its star.

Exoplanets in our Galaxy - Analysation of stars to find them
Presenter: Justus Behne
Faculty Advisor: Alfredo Viegas, Astronomer and Observatory Coordinator

We use the Telescope at STAC to find different stars that have an exoplanet orbiting them. We first find stars with an exoplanet from exospies.clock. We put that information into our telescope and get multiple pictures of the starry sky. After that we use HOBS to analyze the data and find information about the planet.

Impact of Sedentary Behavior on Postural Health in College Students
Presenters: Kailey Tvedt
Faculty Advisor: Dr. Gabriel Martinez, Assistant Professor of Exercise Science

Modern collegiate lifestyles often involve sustained sitting during academic, transport, and leisure activities. These behavioral patterns in the university setting increase the risk for poor postural health in students. This survey investigates the relationship between these sedentary behaviors, postural habits, and the correlation between perceived back pain and physical disability. The Sedentary Behavior Questionnaire and Oswestry Disability Index in this study identifies the prevalence of sitting and poor ergonomic awareness, correlating with increased reports of pain among students at St. Thomas Aquinas College. This data is calculated through a tailored point system where lower scores indicate sedentary behavior and higher scores reflect increased physical activity. The study's goal is to determine the extent to which sedentary duration and postural habits influence back pain intensity. These findings aim to increase ergonomic awareness in students, which can serve as a practical application in future wellness interventions. Through the assessment of specific sedentary behavioral patterns, students can better understand how to reduce the physical risks built-in the modern collegiate environment.

Virtual vs Real Autopsies
Presenters: Kaitlin Yonta
Faculty Advisor: Dr. Clara Tóth, Professor of Biology

If you or a loved one under the circumstance died, would you choose a virtual autopsy or a real autopsy? This study investigates the public's preference between traditional and virtual autopsies. Traditional autopsies involve surgical incisions to determine cause of death, while virtual autopsies use imaging technologies such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) to examine the body noninvasively. Survey responses were collected and analyzed to determine which method people would choose and whether advancing technology influences their decision.

The Role and Versatility of FARO Technology in Homicide Investigations
Presenters: Kayla Martini
Faculty Advisor: Dr. Clara Tóth, Professor of Biology

During my 80-hour internship with the Passaic County Sheriff's Office Crime Scene Investigation Division, NJ, I observed how FARO 3D laser scanning technology is used in real homicide investigations. FARO scanners record millions of precise spatial measurements to create detailed digital reconstructions of crime scenes, allowing investigators to preserve evidence locations, analyze spatial relationships, and revisit the scene after it has been cleared. Witnessing the use of this technology during an active investigation demonstrated how it strengthens documentation, supports forensic analysis, and improves courtroom visualization. Combined with national forensic research, this experience shows that FARO technology is becoming an essential and increasingly adopted tool in modern homicide investigations.

A Consumer Flower Pollen Database for Forensics
Presenters: Kayla Martini
Faculty Advisor: Dr. Clara Tóth, Professor of Biology

Forensic palynology is an important trace evidence technique, although most pollen databases are centered on naturally occurring species rather than flowers that are commercially available. The purpose of this project is to create a consumer-oriented pollen database that includes flowers that are commonly purchased at grocery stores, flower shops, and retail outlets. Since commercially available flowers are widely available and can be found in homes, cars, and public areas, they represent an under-exploited source of forensic trace evidence. While pollen is not conclusive evidence, it could be an important associative link between people, objects, or places and particular floral sources in urban and suburban settings.

Impacts of Riparian Vegetation on Chemical Composition, Erosion, and faunal biodiversity at Sparkill Creek in NY

Presenter: KellyAnn Baumann
Faculty Advisor: Dr. Bianca Wentzell, Associate Professor of Biology

This study focuses on the effects of ecological restoration on riparian vegetation located alongside the Sparkill Creek. Riparian vegetation sites act as important ecological hot spots that help protect against climate change and support flourishing ecosystems in and around water bodies. Human interference and subsequent destruction of local environments have led to changes in the Sparkill Creek and other local bodies of water in Rockland County and beyond. Previous studies have worked alongside local conservation efforts, such as New York State's DEC *Trees for Tribs* program, which has planted 500 trees and shrubs alongside the Sparkill Creek in an act of restoration for these important environments. This study is a continuation of the prior year, with the addition of the summer period, running from June 2025 to May 2026. Data collection included pH, dissolved oxygen, conductivity, and temperature, alongside recordings of amphibian populations and avian species, and photographs of sites along the stream. Avian and amphibian population surveys provided a visual indicator of changes within the creek, in addition to water chemistry readings to provide insight into stream health. Data collection provides significant findings in small-scale restoration efforts in bodies of water like the Sparkill Creek. This study provides insight into the importance of healthy riparian vegetation and its effects on biodiversity and environmental health.

Rape Kit Collection and Analysis
Presenter: Layla Cesar
Faculty Advisor: Dr. Clara Tóth, Professor of Biology

During my internship at the Westchester County Laboratories and Research, in Valhalla, NY, I observed the forensic biology section's analysis of biological evidence including that of sexual assault kits. These kits are utilized to collect evidence in cases of assault and rape. Collection for the kits are handled by medical personnel. Kit contents are handled by forensic technicians and analysts. Specific protocols are used for both collection and analysis.

Environmental Influence on the Survival and Dominance of Escherichia coli and Saccharomyces cerevisiae in Co-Culture.
Presenters: Abigail Vernaud
Faculty Advisor: Dr. Stephanie Lauer, Assistant Professor of Biology

Microbiomes consist of multiple species competing or cooperating under changing environments within the body, including bacteria, fungi, algae, and

viruses. In this study, Escherichia coli and Saccharomyces cerevisiae were co-cultured to investigate how each organism reacts in different environmental settings. By exposing both individual and mixed cultures to variations in nutrient availability and other environmental factors, the study aims to observe their competitive behavior as well as population shifts over time. The results provide insight on how bacteria-yeast interactions influence community and how environmental changes shape survival and dominance. This helps us better understand microbial competition and adaptations in mixed-species ecosystems such as the human gastrointestinal tract.

Assessment of Surface Bacterial Contamination on Fruits

Presenter: Marlene Lewin
Faculty Advisor: Dr. Clara Tóth, Professor of Biology

Fresh fruits can carry microorganisms on their surfaces due to environmental exposure during growth, harvesting, handling, and transportation. The purpose of this experiment was to investigate the presence of possible fecal indicator bacteria on the unwashed surfaces of grapes, blueberries, and strawberries. Fruit surfaces were sampled using sterile swabs and streaked onto agar plates using a consistent zig-zag pattern. Plates were incubated for 24–48 hours and bacterial growth was measured by counting colony-forming units (CFUs). Results showed that grapes had the highest number of bacterial colonies, while blueberries and strawberries showed significantly lower levels of contamination. These findings suggest that surface characteristics and fruit structure may influence microbial accumulation on fresh produce. The results highlight the importance of proper washing and handling of fruits before consumption to reduce potential microbial contamination.

AIsland Signals: An AI-Based Traffic Management Solution for Hylan Boulevard

Presenters: Michael Maher
Faculty Advisor: Prof. Ira Promisel, Instructor of Criminal Justice; Dr. Tracy Tully, Associate Professor of Criminal Justice

Traffic congestion is a persistent challenge in urban transportation systems, particularly along major corridors that experience high vehicle volumes and outdated traffic management infrastructure. This study proposes the AIsland Signals program, an artificial intelligence enhanced traffic management system designed to reduce congestion and improve roadway safety along Hylan Boulevard in Staten Island, New York. The program integrates closed-circuit television (CCTV) cameras with adaptive signal control technology and machine learning algorithms to monitor real-time traffic conditions. This will dynamically adjust signal timing at intersections. Unlike traditional fixed-time traffic signal

systems, the proposed approach continuously analyzes traffic flow data to optimize signal coordination, reduce intersection wait times, and improve overall traffic movement. The paper reviews relevant literature on traffic congestion, artificial intelligence, machine learning, and signal optimization to establish the theoretical and technological foundations of the program. Traffic Flow Theory and Three-Phase Traffic Theory are used to explain how increasing traffic density and localized disturbances contribute to recurring congestion patterns. Case studies such as the Adaptive Signal Control System (ACS-Lite) in Albany and private sector systems like NoTraffic demonstrate that adaptive signal technologies can significantly reduce delays and travel times when implemented effectively. The proposed program addresses congestion along Hylan Boulevard, a 14-mile roadway known for heavy traffic volume, long travel times, and frequent accidents. By deploying AI-enhanced signal control at key intersections, the AIsland Signals program aims to reduce travel times by 10–15 percent while maintaining roadway safety and minimizing accident risks. Overall, the project demonstrates how integrating artificial intelligence with modern traffic management infrastructure can provide a scalable solution for improving urban mobility and reducing congestion in densely populated cities.

Two Journeys, Two Nations, One Fight for Freedom and Justice

Presenter: Monique Muller
Faculty Advisor: Dr. Francesca Ciotoli, Associate Professor of Education

History is the process of reconstructing and interpreting the past since we have not personally witnessed historical events. It's not a single narrative, but rather, multiple diverse perspectives that together create a more complete understanding of the past. Elementary social studies educators should include diverse narratives of historical events, especially those involving individuals who faced similar struggles in different contexts. As a South African preparing to become an American elementary social studies educator and who has learned the historical injustices of apartheid and slavery for people of color, I developed a list of inquiry questions that social studies educators can use to help bridge diverse texts of multiple perspectives in a unit on freedom, justice, and human rights. The focus is on one fourth-grade key idea addressed in the South African and American Social Studies curriculum (throughout history, people of color have struggled for freedom and equal rights), and the comparison of two children's literature texts: Long Walk to Freedom, abridged by Chris van Wyk and Henry's Freedom Box: A True Story from the Underground Railroad, by Ellen Levine. This project's purpose is to demonstrate how beneficial international texts addressing similar struggles in different historical contexts, can be for American students' understanding of history. Students can

become classroom historians by exploring inquiry questions, analyzing diverse texts for evidence, and creating projects that reflect understanding of multiple perspectives, different paths to freedom and justice, and the impacts that social, political, and cultural forces have on the lives of people of color.

Engineering Biochemical Solutions for Protein Energy Undernutrition

Presenters: Nachly Noel, Jennifer Sumba Ruiz
Faculty Advisor: Dr. Stephanie Lauer, Assistant Professor of Biology

Global food insecurity has reached unprecedented levels, with 349 million people across 79 countries experiencing acute hunger. Since the COVID-19 pandemic began, an additional 200 million individuals have been affected by malnutrition. One major consequence is protein energy undernutrition (PEU), a condition characterized by inadequate protein and/or caloric intake that can lead to stunted growth and wasting, particularly in children. To explore potential nutritional interventions, we focused on Nepal, where extreme weather events have damaged agricultural infrastructure, leading to crop and livestock losses. Flooding has also increased the prevalence of waterborne diseases, further limiting nutrient absorption. These environmental and public health challenges are further compounded by social stressors, including increased rates of domestic partner violence, which can limit food access and worsen nutritional outcomes for vulnerable households. To identify feasible alternative protein sources for this population, we evaluated combinations of candidate proteins under real-world constraints including availability, cost, transportation, packaging, storage stability, and nutritional composition. Protein concentrations were initially quantified using the Bradford assay, allowing us to compare candidate formulations and further refine our design to accommodate additional constraints. Our findings highlight several promising protein combinations that could improve nutritional accessibility. Here, we present our design framework and recommendations as potential strategies for addressing PEU in vulnerable populations.

Relationship between Hand Held Dynamometry Strength Measures and Fatigue, Injury Risk, and Performance in NCAA Division II Collegiate Baseball Players: A Pilot Study

Presenter: Ricardo Gonzalez
Faculty Advisor: Dr. Gabe Martinez, Assistant Professor of Exercise Science

Overhead throwing athletes, particularly collegiate baseball pitchers, are exposed to repetitive high loads that place stress on the upper and lower extremity kinetic chains, contributing to a high rate of injury. These injuries can lead to decreased performance, lingering musculoskeletal issues, and missed

playing time. Identifying simple and reliable methods to detect fatigue and predict injury risk is essential for this population.

The purpose of this study is to determine whether hand held dynamometry and the Y Balance Test can be used to detect fatigue and assess injury risk in collegiate baseball pitchers. Four NCAA Division II pitchers will participate in this study. Weekly assessments will include lower body dynamic balance using the Y Balance Test for the Lower Quarter, upper extremity strength using a hand held dynamometer, and body fat measurements to monitor musculoskeletal changes. Daily rate of perceived exertion scores will be collected to track subjective fatigue, and performance measures such as strike percentage will also be recorded. It is expected that decreases in strength and balance will be associated with increased fatigue levels and potential declines in performance. These findings may support the use of simple, field based assessments to monitor fatigue and help reduce injury risk in collegiate pitchers.

Socioeconomic status can affect access to legal representation

Presenter: Shaniamina Petit-Homme
Faculty Advisor: Prof. Ira Promisel, Instructor of Criminal Justice

This research examines how socioeconomic status plays a major role in determining a person's access to legal representation and the outcomes of legal cases in the criminal Justice system. The research will examine how income influences a person's ability to obtain quality legal defense. Individuals with higher income status often have the resources to hire private attorneys, who may have more time and resources to defend them. While individuals with lower socioeconomic status typically rely on public defenders, who often have large case loads and limited resources.

The purpose of this research is to explore whether these differences in legal representation contribute to unequal outcomes in the criminal Justice system. It will examine the existing data, legal statistics and sociological studies to understand how economic status may shape legal access resources .The research will look at the differences in individuals with private attorneys who may receive more favorable plea deals, reduced sentences or even case dismissals compared to those who are represented by public defenders. By using criminal justice data, this research will analyze how inequality shapes access to justice. It would highlight how certain inequality may affect justice and legal access. It is important because it raises questions about fairness and equality within the legal system. Based on findings of this research and data it may discuss and provide information about legal reform and the need to ensure equal access to justice regardless of socioeconomic background.

Strategies to Support Students with Disabilities in Accessing Curricula with Same-Age Peers

Presenter: Sophia Veteri
Faculty Advisor: Dr. Sarah Rosati, Assistant Professor of Special Education

Amidst ongoing educational advancements (and setbacks), it is essential to evaluate whether schools are addressing students' needs beyond academics and moving towards supporting the whole child across general, integrated co-teaching (ICT), and self-contained settings. Despite well-intentioned efforts by school personnel, inequities in learning and social opportunities persist for students with disabilities across a variety of educational settings. This study explores effective strategies for supporting students with disabilities in accessing grade-level curricula alongside their same-age peers. Students with disabilities in the public school system are required by law to be educated in the least restrictive environment (LRE); that is, they are included with same-age peers to the maximum extent possible. Using a qualitative approach, this study analyzes in-person interviews conducted with general education, ICT, and self-contained teachers, alongside anonymous parent surveys submitted electronically. This study investigates instructional strategies that effectively support access to curricula for students with disabilities across various class settings, and additionally examines the social opportunities available to these students across different classroom settings. In analyzing both the academic and social factors of inclusion, this study's goals are to a) identify the best practices for ensuring equitable curricular access across classroom types and b) to promote the integration of students with disabilities alongside same-age peers.

When Proteins Misbehave: Yeast Responses to Heat-Shock-Induced Aggregation

Presenter: Trenyce Scott
Faculty Advisor: Dr. Stephanie Lauer, Assistant Professor of Biology

Neurodegenerative diseases (NDs) such as Alzheimer's and Parkinsons are those categorized by a loss of function and the eventual death of nerve cells in the brain or peripheral nervous system. A defining characteristic of most NDs is the misfolding of critical proteins, which leads to the formation of protein aggregates. Understanding how cells respond to oxidative stress is important for identifying processes that contribute to neurodegeneration. This project investigates the effects of heat-shock-induced protein aggregation on the cellular stress response systems in the budding yeast, Saccharomyces cerevisiae. Specifically, this study assesses how yeast cells recover from heat shock and whether recovery restores cellular stress response systems to optimal function. These findings provide insight into how cells manage protein aggregation and stress, with potential relevance to human neurodegenerative disease mechanisms.

Measuring a Distant World: Transit Analysis of Hot Jupiter Qatar-1b

Presenter: Trishita Dey
Faculty Advisor: Alfredo Viegas, Astronomer and Observatory Coordinator

We present a photometric analysis of the hot Jupiter Qatar-1b using ground-based light curve observations. By applying a transit model, we estimate key parameters including the planet-to-start radius ratio (Rp/Rs) and mid-transit timing. Our analysis yields Rp/Rs = 0.1305 ± 0.0095, compared to the literature value of 0.1463 ± 0.0006, showing agreement within uncertainty. The observed-minus-calculated (O–C) timing deviation is 5.35 ± 2.88 minutes. Diagnostic metrics support the reliability of the detection, with a transit signal-to-noise ratio of 6.91, low autocorrelation (0.237), and a Shapiro statistic of 0.012, suggesting minimal systematics and few outliers. The Rp/Rs deviation of −1.66σ further confirms consistency with published results. These findings validate the transit detection and highlight the effectiveness of light curve modeling in characterizing exoplanetary systems.



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