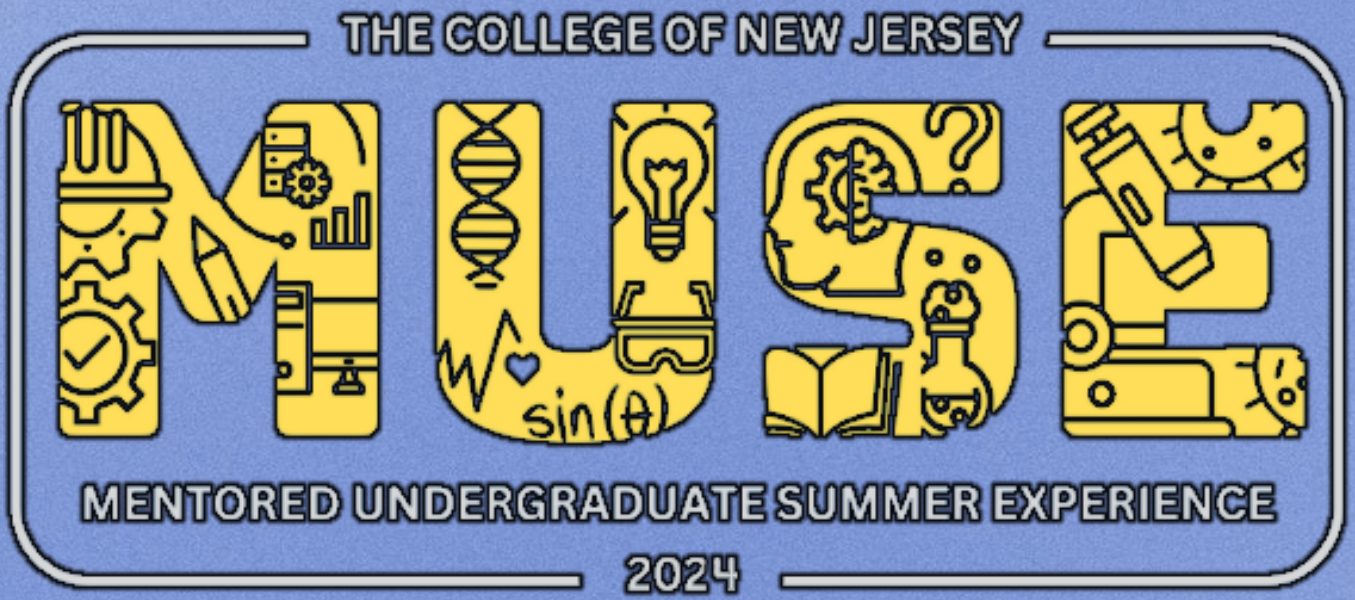
THE COLLEGE OF NEW JERSEY
MUSE
sin(θ)
MENTORED UNDERGRADUATE SUMMER EXPERIENCE
2024

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Visualization of Microbiological Phenomena in Dental Hygiene Education

Faculty Member: Professor. Sorraya Brashear-Evans
Student Researchers: Olivia Stark, Sammie Zhu

This project aims to enhance dental hygiene education by visualizing microbiological phenomena associated with oral health. Utilizing advanced imaging techniques, we will capture and illustrate the microscopic world within the human mouth, highlighting the impact of dental hygiene practices on microbial activity. The visualizations will be integrated into an engaging explainer video that educates viewers on effective dental hygiene techniques and the science behind them.

Delaware River, Ponds and Animations

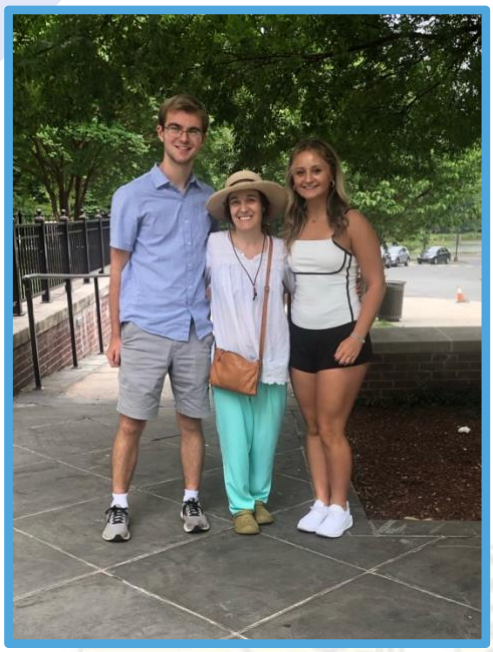
Faculty Member: Professor. Elizabeth Mackie
Student Researchers: Abigail Buckley, Sarah Romano

Exploring water as subject, water as the focus for research and water as a primary part of the creative process we investigated handmade paper in many different forms. Creating large sheets of paper layered to represent the textures, colors and forms emerging from the Delaware river during different times of day, weather conditions and locations we discovered new ways to express the energy of this body of water. The final twelve large sheets of sculpted paper were designed to be suspended away from the wall and float above the gallery floor.

Nearby ponds created from abandoned gravel pits, become the subject for works that combine in multiples to form hanging sculptures parallel to the floor that reflect the movement of water created by the wind. Two different handmade paper processes create various surfaces and sculptural elements that combine in groups of 6 for exhibition display.

The COVID-19 Pandemic and Mental Health: An Analysis of Mental Health by Income and Religion

Faculty Member: Dr. Donka Brodersen
Student Researchers: Shannon Stix, Ryan Thalwitzer



We conduct two OLS regressions for mental health disorders and religious affiliations, one zero-order model without the controls, and one full model containing all of the controls. Additionally, we examine the summary statistics across the year 2019, prior to the COVID-19 pandemic, and 2021, during the pandemic. Our study uses data from the Panel of Study Income Dynamics.

The COVID-19 Pandemic and Mental Health: An Analysis of Mental Health by Income

Faculty Member: Dr. Donka Brodersen
Student Researchers: Ryan Thalwitzer, Shannon Stix

We created regressions using data regarding mental health and income taken from a nationally representative survey to analyze correlations.

Fly among Friends? Race, Nation, and Africanization at East African Airways, 1964-1977

Faculty Member: Matthew Bender
Student Researchers: Anthony Lepore

This project documents the experiences of former personnel in East Africa's aviation industry during the early postcolonial period (1960s-1970s). The focus is East African Airways (EAAC), an airline that operated from 1946 to 1977. Created during the period of British colonial rule, it connected Britain's East African colonies (Kenya, Uganda, Tanganyika, and Zanzibar) with the world. As a colonial enterprise, it reflected prevailing notions of racial supremacy, staffed largely by European expatriates and serving a European clientele. When the East African colonies became the independent countries of Kenya, Tanzania, and Uganda in the early 1960s, the new political elite attempted to transform the airline. Rather than a symbol of colonial oppression, it would become tool of nation-building, one that would emphasize their emergence as modern nation-states. To this end, they embarked on an ambitious program of Africanization to replace expatriate staff with Africans.

To better understand the lives and experiences of these new staff, this project has generated a series of biosketches, life histories of former airline pilots, engineers, cabin crew members, and office staff. These biosketches add richness to our understanding of this period, by providing personalized and nuanced glimpses at broader historical processes.

Integrating Anthropological methods into world-language classrooms: Building student awareness of "culture" through digital ethnography projects in beginning-level Japanese courses

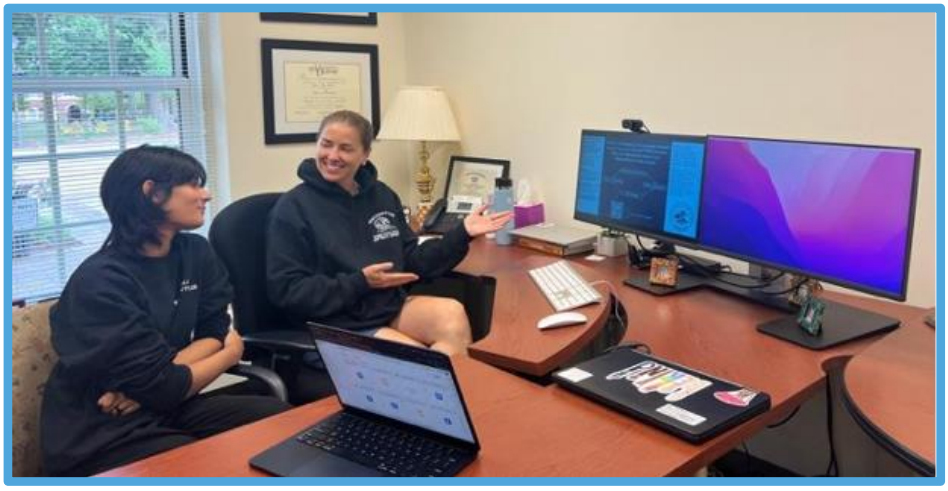
Faculty Member: Dr. Holly Didi-Ogren
Student Researchers: James Pan

This summer we started a new project centered on making "culture" a focal point of beginning language courses through incorporating ethnographic methods, based on the premise of "(l)anguage learning…as a conscious orientation towards the words and modes of thought of others, with ethnographic approaches allowing students to reflect more explicitly on what it means to inhabit and negotiate…languages and cultures" (Wells et al 2019: 3). We bridge the academic disciplines of language acquisition and anthropology by using digital ethnography, which allows students to engage with language embedded in communities of practice. Doing so enables us to both advance the "Cultures" aspect of language acquisition that are part of the American Council on the Teaching of Foreign Languages (ACTFL) World Language Readiness Standards, and give students effective tools to explore "culture" without reifying stereotypes. Our study investigates the efficacy of incorporating digital ethnography into two projects embedded in a first-semester college-level Japanese language course, in terms of both language acquisition and cultural competency.

An Examination of Victim Blaming and Self-Blame as Predictors of Severe PTSD Symptoms Following Tonic Immobility During Campus Sexual Assault

Faculty Member: Dr. Joanna Herres
Student Researchers: Chloe Yadav

Tonic immobility (TI), a common reaction during sexual assault (SA), is a state of involuntary paralysis and motor inhibition that occurs in response to extreme traumatic stress. Society tends to believe that the absence of forceful, consistent physical and verbal resistance from the victim during SA implies that the event was consensual. Thus, victims who experience TI and cannot resist are often blamed by others and themselves for not doing more to prevent the assault. Victims who experience TI during SA develop more severe posttraumatic stress disorder (PTSD) symptoms; however, no studies have examined why TI is associated with higher risk of PTSD. Summer MUSE activities included planning a survey study to assess whether victim-blaming and self-blame mediate a link between TI and PTSD symptoms. Under the mentorship of Dr. Joanna Herres, Chloe Yadav drafted and submitted an IRB proposal, which was approved for Fall 2024. Study participants will be recruited via email to complete an online survey to measure SA victimization, experiences of TI, victim blaming reactions, feelings of self-blame, and PTSD symptoms. This research will illuminate the very common, yet misunderstood phenomena of TI, and identify potential areas of intervention to reduce risk of PTSD symptoms following SA.



WGSS Archive Project: Archiving Women's, Gender, & Sexuality Studies at The College of New Jersey

Faculty Member: Dr. Marla L. Jaksch
Student Researchers: Madison Cavallo, Stephanie Martinez

The Women's, Gender, and Sexuality Studies (WGSS) Archive Project is a critical feminist digital archive and small physical collection consisting of interviews, historical documents, and material culture that chronicles the history of feminist education at Trenton State College and The College of New Jersey with the goal of making the archive accessible for students, researchers, and community members. The archive seeks to make visible the invisible labor, struggles, and impact of the discipline inside and outside the classroom, across the state and beyond. The archive is being collectively built by a group of co-creators that include: undergraduate student fellows, a faculty lead, the TCNJ archivist, a graphic designer, and archive allies.

Women's Candidate Training Organizations and the Racial and Ethnic Diversity of Women's Representation

Faculty Member: Dr. Sara Morell
Student Researchers: Abigail Gilder

This summer, Abigail Gilder and Dr. Sara Morell worked on a data collection project as part of a larger research agenda about the role of Women's Candidate Training Organizations (WCTOs) in shaping women's decisions to run for political office. Through prior research, Dr. Morell has shown that these organizations effectively signal to potential women candidates that they will center women's experiences and address women's barriers to running. This influences both women's interest in seeking these organizations out and ultimately women's descriptive representation in U.S. state legislatures. However, given the demographics of who runs these organizations and the types of women's experiences they may default to as a result, we are curious to test the effect of the founding of a Women's Candidate Training Organization separately on Asian American, Black, Hispanic, and white women's representation. This will allow us to say whether women's organizations are as effective at increasing women's representation across race and ethnicity, as they are overall. To help test this aspect of Dr. Morell's theory, Abigail Gilder has been helping to create a database of the race and ethnicity of women state legislative candidates, using internet research across campaign websites, newspaper articles, and candidate social media. Through this data collection process, Abigail has gained valuable skills in online research, database management, and social science thinking.

Partisan Influences on Environmental Policy in Congress: An Analysis of the 117th Congress and Natural Disasters

Faculty Member: Dr. Cadence Willse
Student Researchers: Emma Smith, Sydney Eltringham

Black Women's Liberation Through Art

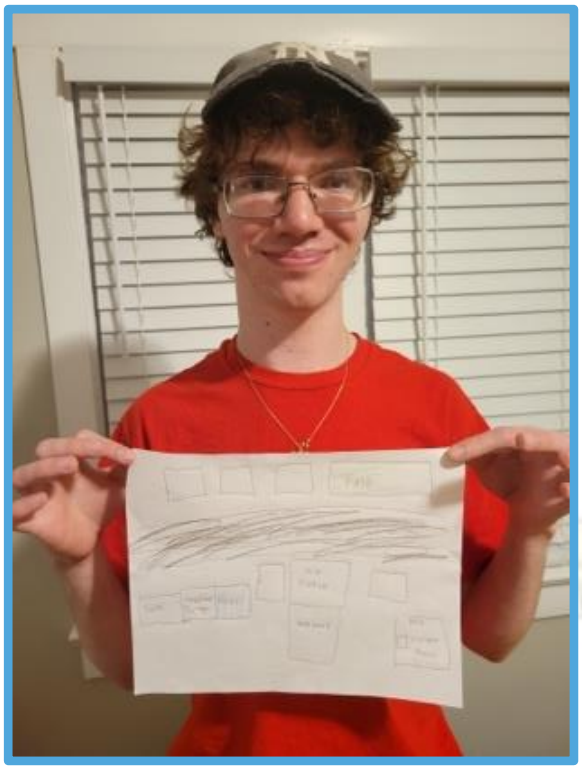
Faculty Member: Dr. Piper Kendrix Williams
Student Researchers: Zenaiya Burgess, Kaitlyn Yetman

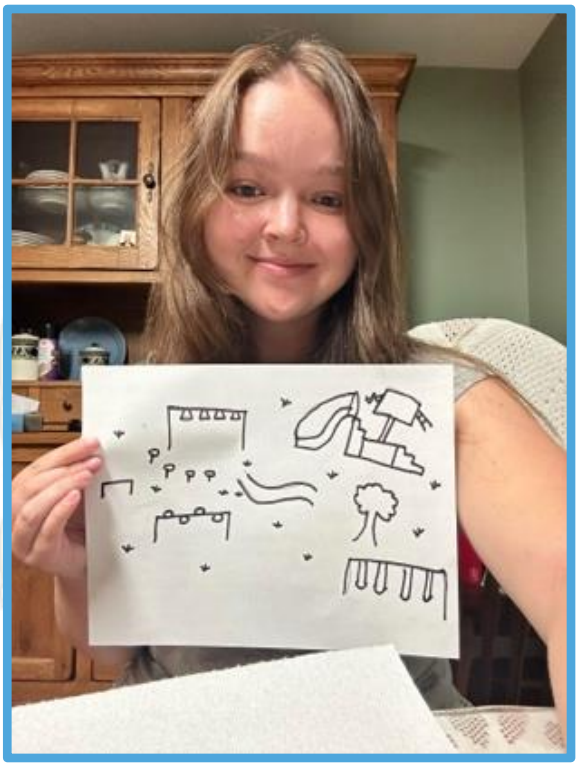
We live in a time haunted by the past. The shadow of slavery is long; the memories of rape and murder exist just under surface of our consciousness; and the killing of Black women is a consistent reality across the centuries. To capture the notion that Black people in America, and for this project, Black women and girls especially, simultaneously live in the past, present and future, this project will use Afrofuturism as a critical lens. While a relatively new concept for literary analysis, especially for non-science fiction works, Afrofuturism can be used to examine and analyze Black art more broadly and posits that the freer expression of Black subjectivity occurs in the imaginations of a future that is Black. While repressive realities fuel the creation of fantastic Afrofuturistic visions, hope in the feasibility of these imagined futures fuels one's determination to actively achieve them. Afrofuturism is, by nature, Womanist; in imagining worlds where no social or systemic obstacles stand as inhibitors of Black potential, it endorses the empowerment of Black women and girls. These two ideological movements seek to not only restore power to marginalized groups, but also disassemble current systems which have allowed for gross imbalances of power in the first place. Identification and understanding of the aforementioned ties between Afrofuturism and Womanism become important to outlining how afrofuturism amplifies Black female voices and seeks to empower them. The art of Myrtle Williams will form a throughline throughout this book. Myrtle Williams, who has been creating art for over 35 years, has made over 300 female figures out of clay, capturing Black women through time. As such Williams' art presents a powerful subject to be viewed through the lens of Afrofuturism. Black, Womanist voices are deeply embedded in the visions imagined and accomplished by Afrofuturism. As Williams says about a detail of her figures: "You see those lips -they have a voice because otherwise you're gone." This book is not art criticism, rather it is an interdisciplinary examination of images and representations of Black women, through time, connecting the art to narrative, music, TV and film in the Black cultural tradition.

Early Childhood Teachers' Notions of Play Through Map Construction

Faculty Member: Dr. Jody Eberly & Dr. Arti Joshi
Student Researchers: Benjamin Lieberman, Madeline Reynolds

This research aims to explore practicing teachers' childhood memories regarding their neighborhood and the play spaces they navigated on a regular basis. Through a thoughtful analysis of these maps, the participants are encouraged to think about their play experiences and how the spaces supported different kinds of play. The study serves as a medium for teachers to explore their notions of play as situated in their childhood and adult lives and its influence (if any) on their professional views about role of play in early childhood education classrooms.





Why First Generation College Students Choose to Pursue Majors in Education

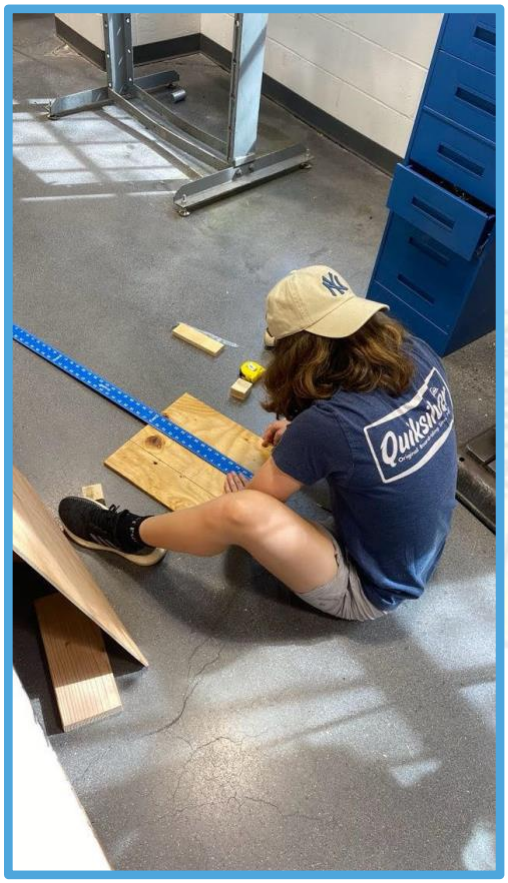
Faculty Member: Dr. Nadya Pancsofar
Student Researchers: Lisa Falvey, Christian Perez

In this project, we coded 20 qualitative interviews with first-generation college students majoring in Education. Coding was focused on applying the community cultural wealth theoretical framework (Yosso, 2005) to answer our research questions and illuminate how these students chose to pursue academic and professional work in Education. Through this work, we were able to identify and extend Yosso's work to include an additional form of community cultural wealth, opportunity capital, demonstrated by these students.

Design of a Solar Powered Frost Prevention Device

Faculty Member: Dr. Ardeshir Tabrizi
Student Researchers: Leah Sklar

This research evaluates current frost prevention methods on a local farm and aims to design a green and sustainable alternative. The project develops a proof of concept using solar power to heat and circulate water through outdoor pipes, providing radiative heat to protect crops from frost damage. This eco-friendly solution integrates principles of heat transfer and thermodynamics, along with practical skills in woodworking and machining to demonstrate that a solar-powered hydronic radiant heating system can effectively and sustainably prevent frost.



Implementation Performance Metrics for Converting Signalized Arterial Roadways into Human Centric Transportation Systems

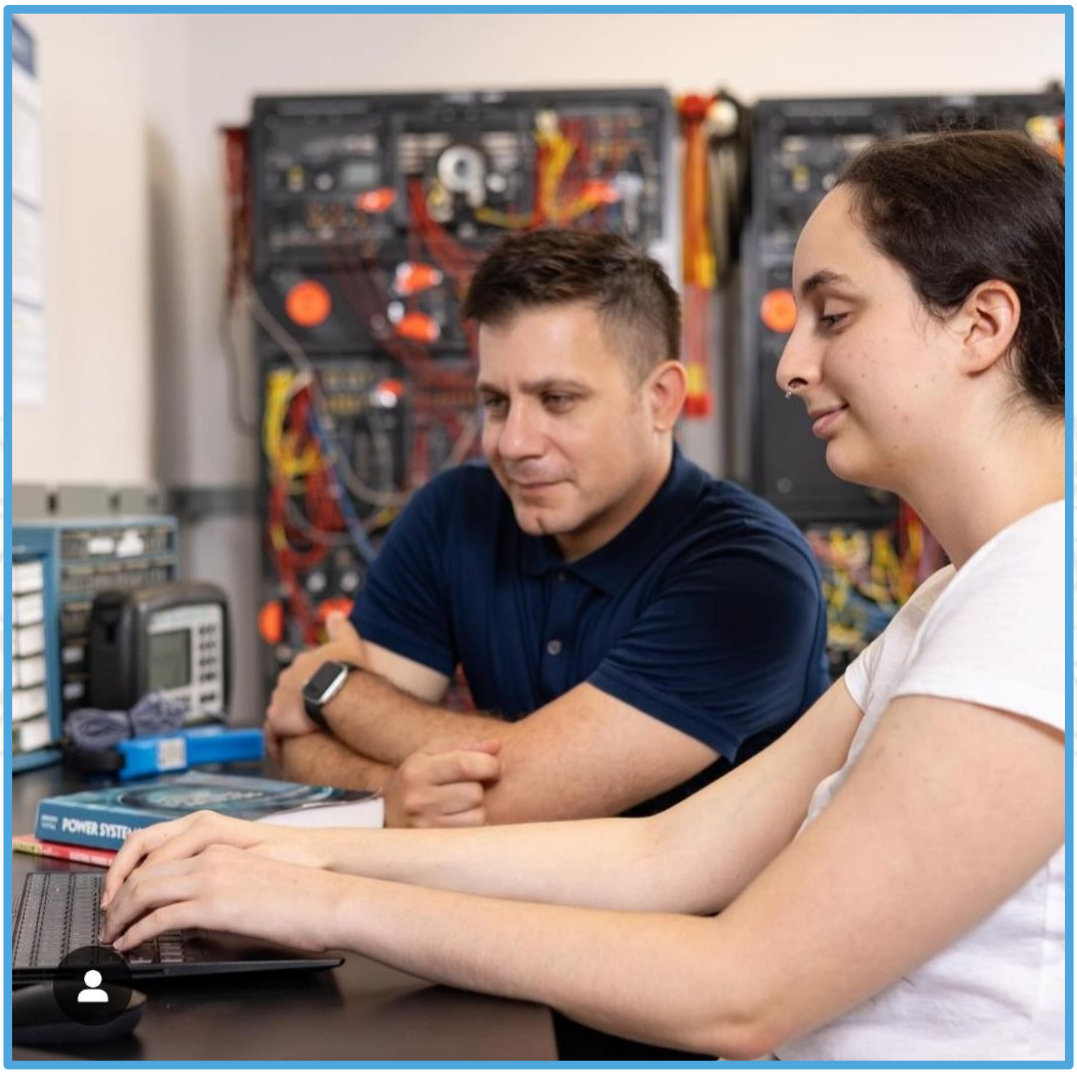
Faculty Member: Dr. Thomas Brennan
Student Researchers: Alexia Watson

The research will be used to support long term roadway planning goals that address the needs of underserved and underrepresented community members at the local level. By understanding how arterial streets can evolve to become a social space for a town while also utilizing the infrastructure in a manner that improves the community, safety, and socioeconomic vitality of the area, all part of America's infrastructure, such streets can be systematically improved.

Modeling the TCNJ Power Grid for Advanced Optimization and Maximization of Renewability

Faculty Member: Dr. Anthony Deese
Student Researchers: Cheyenne Torraca

The objective of the project is to create an accurate model of the TCNJ power grid, including renewable energy generation and the effect of time of day (or day of week etc...) on those generation/demand curves. Also, to create an optimization tool that would allow us to effectively control these components as well as place new ones.



Design and Simulation of Organic Thin-Film Transistor and Diode

Faculty Member: Dr. Wudyalew Wondmagegn
Student Researchers: Toluwanimi Akinosho

In this MUSE project, Organic Thin Film Transistors (OTFTs) and diodes are simulated and analyzed in terms of parameter variation. PDPP4T polymers are used as the active material for the transistor channels. The drift-diffusion (DD) simulation model, implemented in Silvaco's Atlas software, is used for the simulations. First, the transistors are simulated, and the threshold voltage and equivalent linear resistance are extracted. Next, device and material parameters are varied to determine their impact on transistor performance. The thicknesses of the active polymer and gate dielectric are varied from 130 nm to 30 nm in steps of 30 nm. Different metals are also tested as Source/Drain materials to select the optimum Source/Drain metal work function for the transistor. The simulation results indicate a significant impact of the gate insulator thickness and S/D material on the transistor's performance.

Studying the Effect of Vertical Green Walls on the Thermal Regulation of TCNJ Dorms

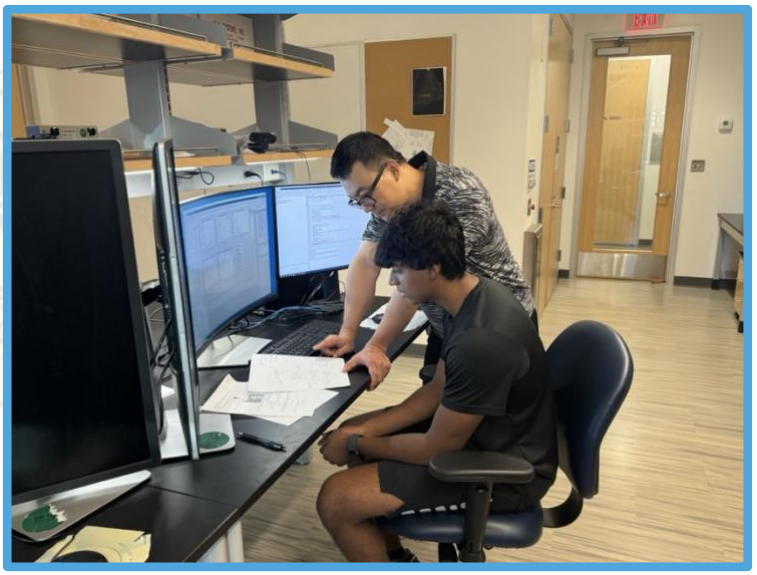
Faculty Member: Dr. Manuel Figueroa
Student Researchers: Shayaan Makki, Sahir Tehseen

The project goal was to study how vertical foliage in green walls could help reduce the amount of solar irradiation that hits a building and thereby affect the internal temperature of the building. This could lead to HVAC savings in buildings during the summer months and even an extra added layer of insulation during the winter months. We built three dorm room models and placed temperature probes in each layer of the building envelope to measure how temperature varied throughout the day.

Development of an Educational Tool Simulating Excitable Nerve Cells

Faculty Member: Dr. Xuefeng Wei
Student Researchers: Sathya Kummarapurugu

High school students often struggle to grasp how neurons function due to the limited focus on neuroscience in standard curricula. This research aims to create a user-friendly computational tool to help students learn about neuroscience and electrophysiology through hands-on experience. The tool simulates action potentials—electrical signals crucial for nerve function—using differential equations that represent key aspects like voltage, current, duration, probability. These equations were solved and modeled in MATLAB, then turned into an app that runs on various desktop devices. Two high school students tested the app and reported an improved understanding of neurobiology. We hope this tool will eventually help enhance neurobiology education in high schools nationwide.



Effects of Continuous, Low Dose-Rate Neutron Radiation Exposure on Maternal Bone Microstructure During Pregnancy

Faculty Member: Dr. Anthony G. Lau

Student Researchers: Jeremy K. Liegner, Laura C. Bowman, Lauren Wolstenholme, Heather C.M. Allaway

This study investigated the effects of exposure to continuous, low dose-rate neutron radiation exposure on tibial bone microstructure during pregnancy across two different gestational time points in murine models through image processing. Investigated parameters included bone volume fraction (BV/TV), trabecular thickness, and connectivity density.

Exploring Bone Health Changes from Radiation Exposure

Faculty Member: Dr. Anthony G. Lau
Student Researchers: Stephanie Frolio, Jeremy Liegner, Gia Perdikis

Our lab investigates the biomechanical strength changes from bone for different biomedical conditions. This summer, two projects studied the effects of different types of ionizing radiation exposure on the mechanical and material properties of bone in rats. Another project investigated the combine effects of low-does neutron radiation exposure and pregnancy on the maternal bone health. We also traveled to collect these bone specimens at our Collaborator's lab at Uniformed Services University.

Beyond the Horizon: Restructuring Breast Cancer Education and Screening for a Healthier Tomorrow

Faculty Member: Dr. Vicki Brzoza
Student Researchers: Elyse Ryan

Our goal was to assess and overcome barriers to breast cancer screenings and education in vulnerable populations. We collaborated with the local community in providing education and resources.

Cultivating Community Collaborations for Diverse Populations: Ongoing Strategies to Sustain Academic-Community Partnerships for the Next Generation of Civically Engaged Nursing Students who Service Children with Disabilities

Faculty Member: Dr. Rahshida Atkins
Student Researchers: Aliyah Beckford, Kelly Quinn, Tyler Conn, Simranjot Mann, Chelsea Lebo

This project focuses on strengthening an academic community partnership with a community organization that services children with physical and mental disabilities.

Nursing Student's Perspectives of Civic Engagement with Diverse Populations: Evaluating the Impact of Intervention Modifications: Developing and Implementing Orientation Materials for Enhanced Interaction with Children Who Have Disabilities

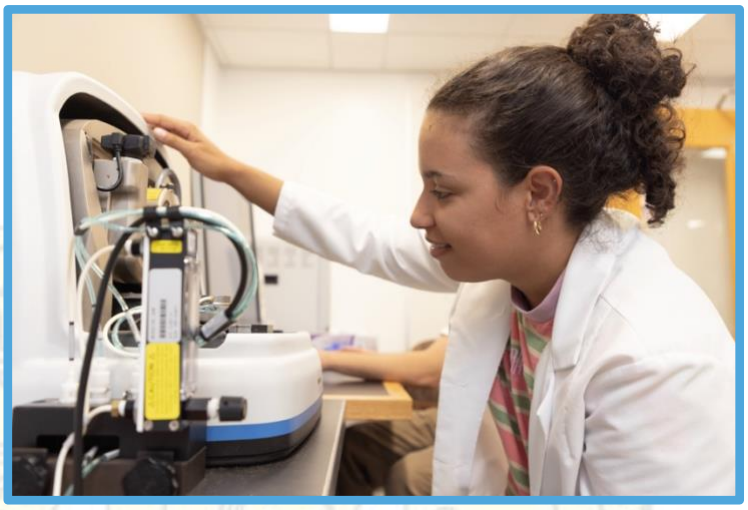
Faculty Member: Dr. Rahshida Atkins
Student Researchers: Kelly Quinn, Aliyah Beckford, Tyler Conn, Simranjot Mann, Chelsea Lebo

This project evaluates the impact of program modifications based on students' voices for the purpose of enhancing student engagement with children who have special needs and strengthening and academic community partnership to care for children with mental and physical disabilities.

The effects of water quality parameters on the persistence of Legionella pneumophila in biofilms.

Faculty Member: Dr. Alexis Mraz
Student Researchers: Steven Araujo Vinueza, Amrutha Banda, Kirthana Krishnamurthy, Vinisha Patel, Kayla Shorter

Biofilms were grown on three different substrates (PVC, galvanized steel, and copper) utilizing CDC bioreactors under varying water quality parameters. The growth and persistence of Legionella pneumophila was monitored in the biofilm and bulk water using culture and molecular methods to determine the effects of water quality on the bacteria in the biofilm, the bulk water, and the relationship between the two.



Studying the nanomechanics of bacterial pili using molecular simulations

Faculty Member: Dr. Joe Baker

Student Researchers: Iknoor Grewal, Nicole Rojas, Akshita Anupam, Kiara Robles, Rocky Lu

The Baker Lab investigates the nanomechanical properties of bacterial pili, which are long sticky protein-based filaments that extend from the surface of bacterial cells, using large-scale atomistic and coarse-grained molecular dynamics simulations. Our calculations are carried out on the TCNJ supercomputer, the Electronic Laboratory for Science and Analysis (ELSA), which is funded by the National Science Foundation. This summer our group studied a variety of aspects of bacterial pili, including their tensile strength, their resistance to chemical denaturants and desiccated environments, and their interaction with a proposed small peptide therapeutic. Simulations provide molecular-scale insights into pilus dynamics that cannot be achieved using experimental methods. Therefore, the discoveries that emerge from our computer simulations help to shed light on the basic physics of pilus dynamics as well as inform new directions of research with our experimental collaborators.

Investigating the formation of radicals relevant to a human enzyme

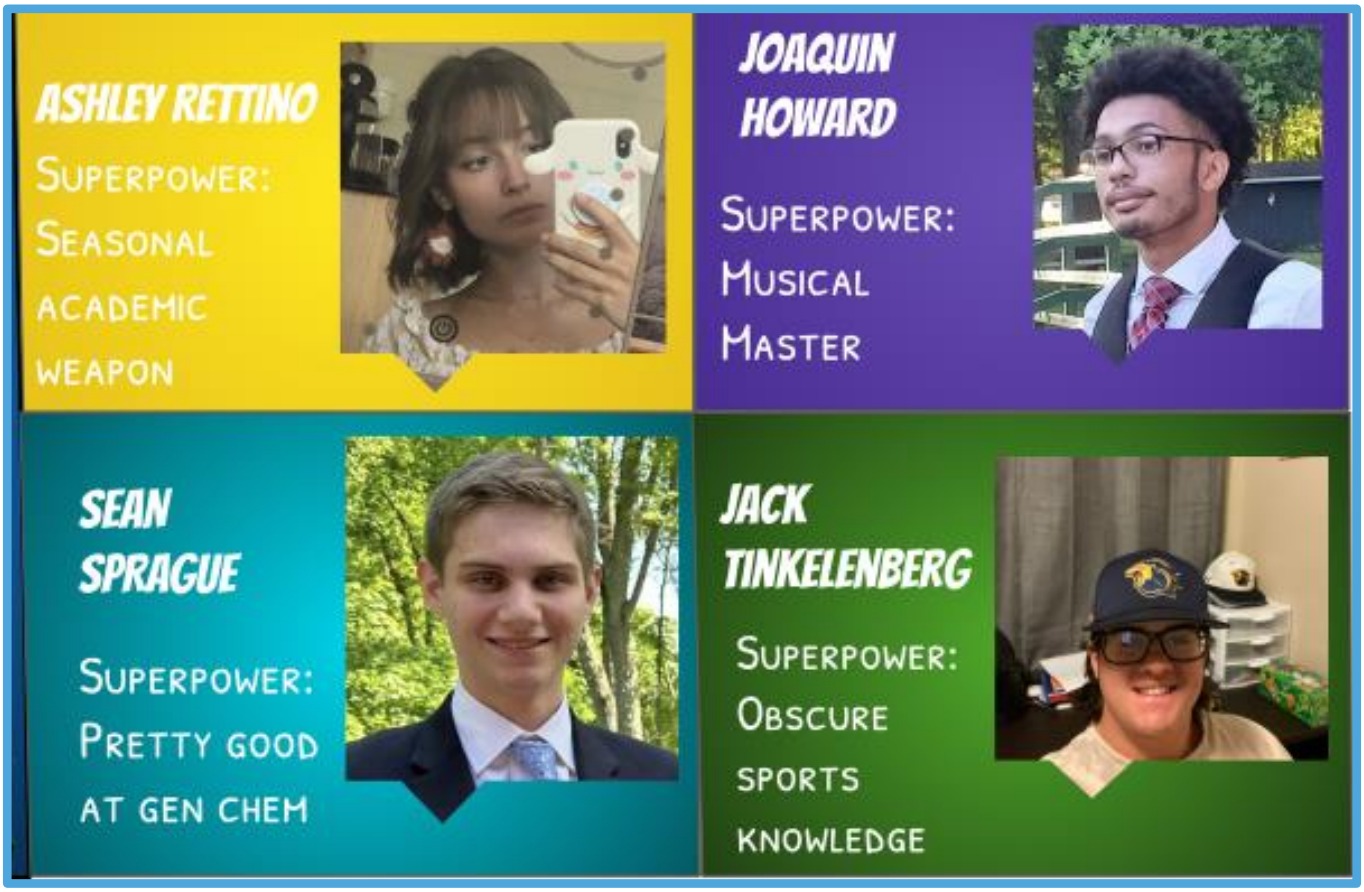
Faculty Member: Dr. Levi Ekanger
Student Researchers: Makenna Heslin, Marianna Medina

A human enzyme called cysteamine dioxygenase (ADO) exhibits an unexpected side reaction that is speculated to produce a thiyl radical intermediate. Using a model system based on an Fe(III)-containing complex and a variety of thiol substrates, we tested hypotheses about the ability of Fe(III) to generate thiyl radicals from thiols. To accomplish these experiments, we relied heavily on electron paramagnetic resonance (EPR) spectroscopy. Our model system is not only capable of producing thiyl radicals, but we also observed trends that will help rationalize the unexpected side reaction of human ADO.

Proton-coupled electron transfer of stabilized C–centered radicals

Faculty Member: Dr. Giovanny Parada
Student Researchers: Ashley Rettino, Joaquin Howard, Sean Sprague, Jack Tinkelenberg

Free-radicals can be highly reactive chemical species. We have designed molecules that are able to stabilize radicals centered on carbon atoms. These molecules allow to readily study processes of formation and cleavage single hydrocarbon units under very mild conditions.



Enhancing the Sensitivity & Selectivity of a 3D Sensor for Direct Detection of Cell Signaling

Faculty Member: Dr. Rebecca Hunter
Student Researchers: Nikolas Romano, Kimberly Liu

The aim of this research is to design new tools to help understand the interactions between engineered nanomaterials (ENMs) and living systems. Specifically, we are developing of a 3D electrochemical sensing platform capable of accommodating live cell culture, allowing us to monitor real-time changes in cell signaling patterns during exposure to environmental hazards such as ENMs.

MICRO CURE: Method Development of Microfluidic Devices for Analytical Chemistry Courses

Faculty Member: Dr. Rebecca Hunter
Student Researchers: Katie Chan, Sydney Crawbuck

Paper-based microfluidic devices are relatively easy to make and are accessible for all. In addition to the devices being cheap and easy to use, they require only small volumes of sample and reagent. Because they are low cost and easy to fabricate, paper microfluidic devices are an excellent platform for teaching the analytical problem-solving process and engaging students with research as a course-based undergraduate experience (CURE). Many solution-phase colorimetric assays can be successfully adapted to a paper platform. This project seeks aims to develop a networked CURE to enhance student engagement with scientific practices in analytical chemistry courses.

User-Adjustable Stopping of Active Learning

Faculty Member: Dr. Michael Bloodgood
Student Researchers: Demetri Bichara, Vijay Manchiraju

The goal of this project is to develop methods that can reliably provide user-adjustable stopping for the active learning subfield of machine learning. Acquiring labeled training data is time-consuming and expensive so it is useful to have methods that can detect when to stop data acquisition. Different users can have different preferences for how aggressively they want to stop the active learning process so it is useful if users can adjust stopping methods to meet their preferences. Our team will conduct our research by reading relevant past work, implementing new methods, analyzing the performance of our new methods in comparison with past methods, and preparing posters and papers to disseminate our findings.

Measuring Cybersickness with EEG

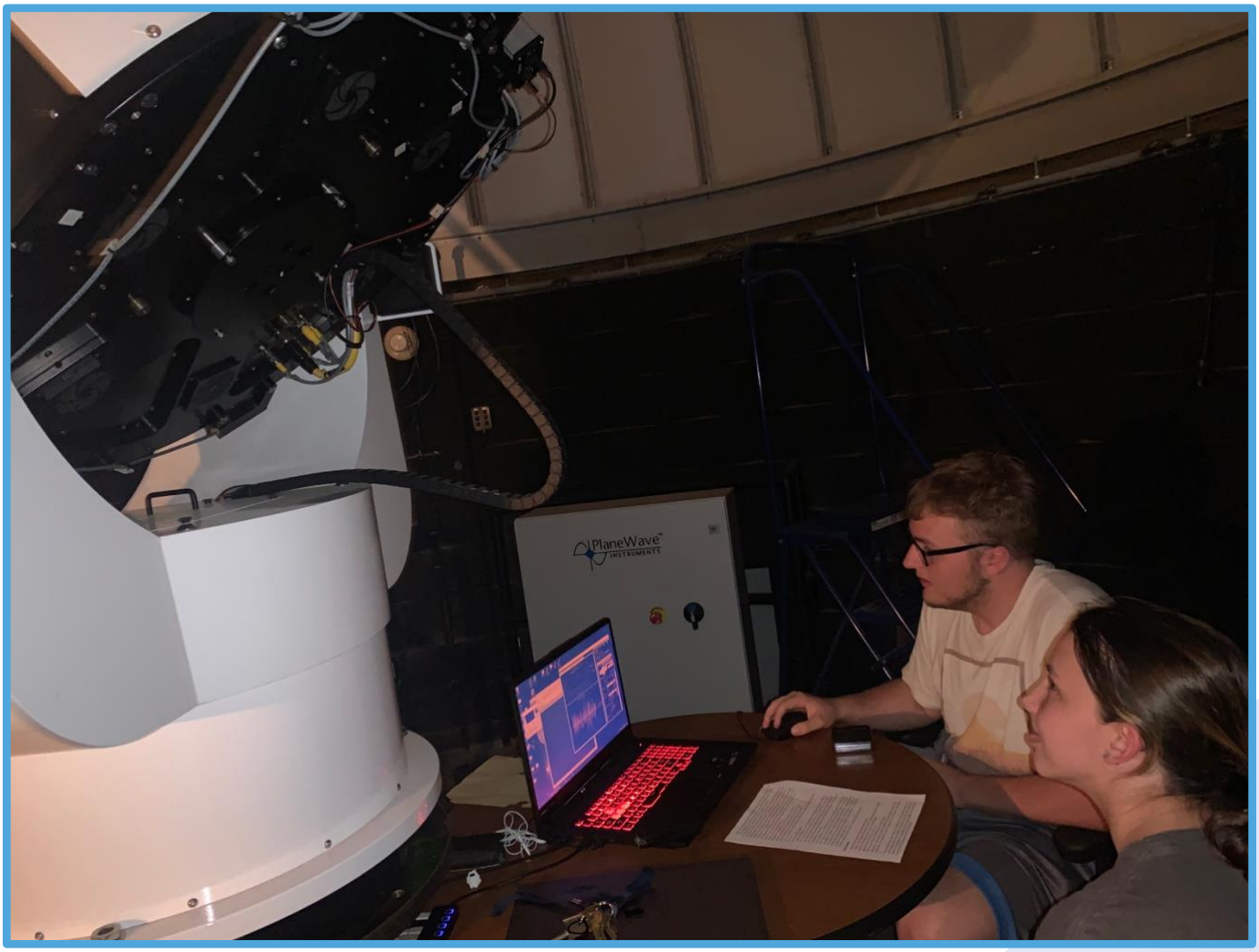
Faculty Member: Dr. Sharif Mohammad Shahnewaz Ferdous
Student Researchers: Elias Ananiadis

Cybersickness is a form of motion sickness that results from exposure to virtual reality (VR) environments. This research aims to gain insight into the causes of cybersickness with an electroencephalogram (EEG) machine by recording electrical activity in the brain during a 10-minute VR rollercoaster simulation. We also aim to test a few techniques that have been proven to mitigate cybersickness. These techniques are: Authentic Nose, Dynamic Gaussian Blur, Dynamic Field of View, and Dot Effect. The goal is to reduce or prevent cybersickness in VR applications by detecting early signs from brain activity and then administering mitigation techniques.

Fainter, Fuller, Faster: Expanding Detections with TCNJ's Telescope

Faculty Member: Dr. Lauranne Lanz
Student Researchers: Vincent Territo

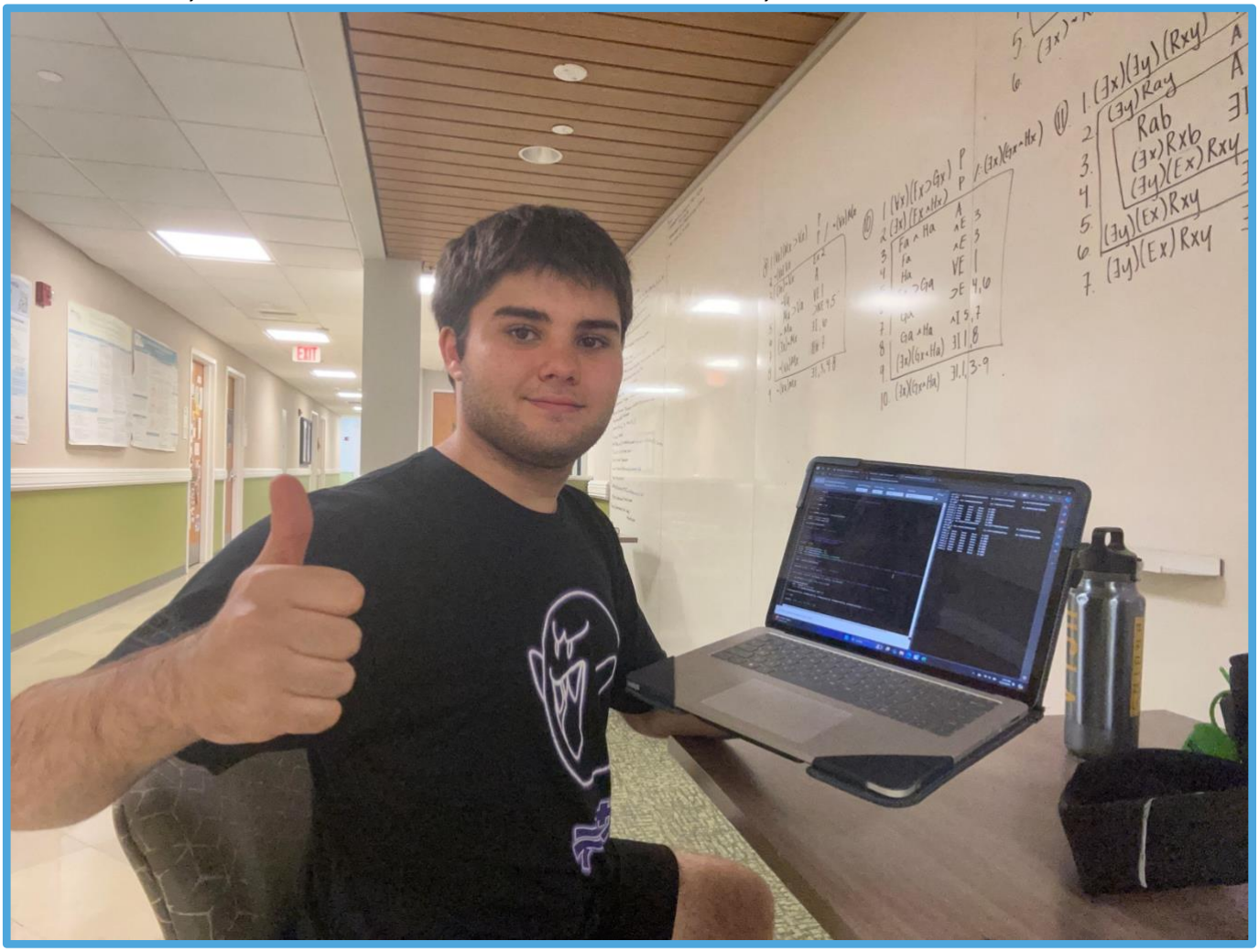
TCNJ is one of the few primarily undergraduate institutions to own a large research telescope. Our project this summer is to build computational tools to enhance the use of the digital images we can capture with this telescope, testing these tools on new observations of a supernova, an exploding star. The two computational tools we focused on this summer are a coadding code and a photometry code. The first takes the many short exposures we take with the telescope -- we are limited to ~60 seconds per image to ensure good tracking by the telescope and minimize the effects of artifacts such as planes or satellites -- and coadd them into a single deep image showing fainter objects not visible in individual frames. This process has also been developed to work on the computing cluster ELSA, reducing the time this analysis takes. We have also made progress developing a code that identifies the objects in an image in order to measure their brightness. (In the attached picture, Emily Harms sat in on our observation session).



Expanding software to find, confirm, and form exoplanet resonances

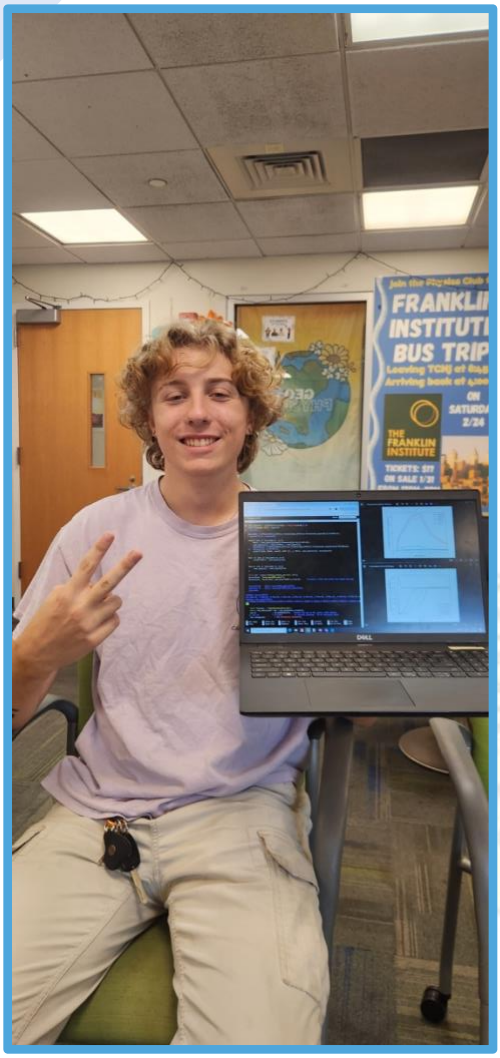
Faculty Member: Dr. Mariah MacDonald
Student Researchers: Dan Patterson, Jake Sendao

When exoplanets are in resonance--a unique dynamical configuration that allows planets to exchange energy with each other--we are able to study the planets' bulk compositions, stability, and better understand how they formed. This summer, we found the quickest and most accurate method for determining resonance, compiled a database of all resonant systems, and generated thousands of synthetic systems to later study how to recover their formation history.



Simulating planet formation to predict plate tectonics in exoplanetary systems

Faculty Member: Dr. Mariah MacDonald
Student Researchers: Logan Bennett

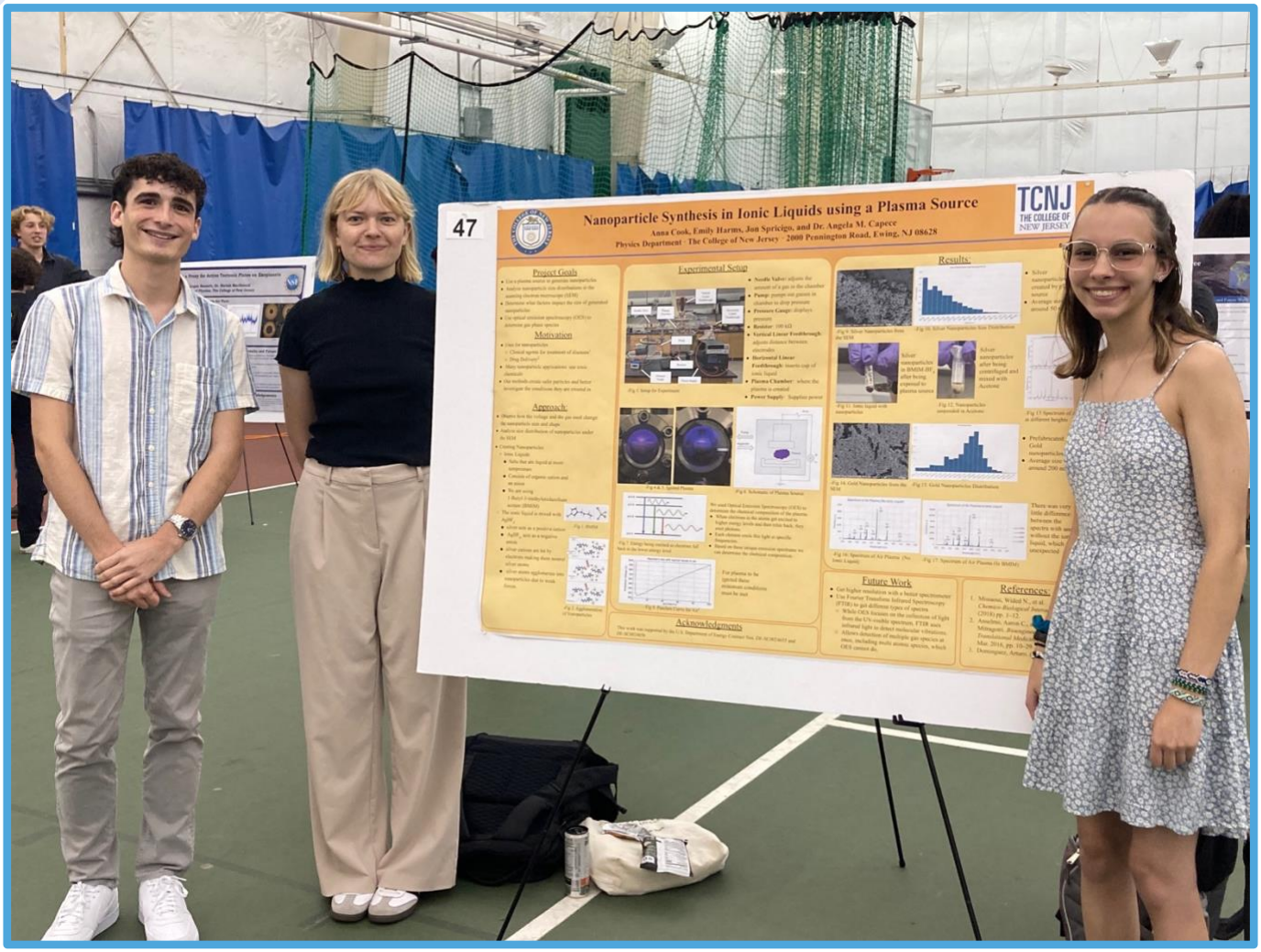


Earth's plate tectonics are an integral part of our carbon-silicate cycle which is responsible for the removal and reintroduction of carbon to our atmosphere. This cycle is key to our planet's long-term stable climate, suggesting that it is necessary for life. Despite its importance, the confirmation of plate tectonics requires data that we are not able to collect on planets outside of the Solar System. We therefore require some observable proxy that indicates tectonic state. In search of such an observable, we aim to simulate the formation of thousands of planets under various conditions, tracking the evolution of each planet's composition. Once formed, we model the interior of each planet to determine if it could host plate tectonics. We have finished the development of our software pipeline to form and study these synthetic planets and will soon be creating thousands of alien worlds, linking observables to the ability to maintain a stable climate.

Nanoparticle Synthesis in Ionic Liquids using a Plasma Source

Faculty Member: Dr. Angela Capece
Student Researchers: Anna Cook, Emily Harms, Jon Spricigo

This project uses a plasma source to synthesize nanoparticles in ionic liquids. Size distributions are measured in the scanning electron microscope and optical emission spectroscopy is used to determine the species in the plasma.



Nanoparticle Motion in Ionic Liquids Under the Scanning Electron Microscope

Faculty Member: Dr. Angela Capece
Student Researchers: Christopher A. Baker, Nicholas J. Calabrese

The goal of this project is to use the scanning electron microscope (SEM) at TCNJ to observe and understand how nanoparticles move in ionic liquids during exposure to the electron beam at different voltages.

Secondary Electron Emission Measurements from Imidazolium-Based Ionic Liquids

Faculty Member: Dr. Angela Capece
Student Researchers: Angela Enriquez

The goal of this project was to use molecular orbital calculations to explain the difference in secondary electron emission yields observed for three imidazolium-based ionic liquids.

Investigating Glutamylation in C. elegans

Faculty Member: Dr. Nina Peel
Student Researchers: Genis Espinal, Matt Tsodikov

The microtubules are an important component of the cellular cytoskeleton and post translational modifications of microtubules are important in fine-tuning microtubule function. The addition of glutamates to the microtubules is carried out by TTLL enzymes, whereas the removal is catalyzed by CCPP-1. In C. elegans a mutation in ccpp-1 leads to hyperglutamylation and cilia dysfunction. In addition, we have found that ccpp-1 mutants have a reduced brood size. We are carrying out experiments to determine whether this brood size defect is downstream of the loss of cilia, or due to an additional function of CCPP-1. Initial results suggest a temperature-dependent requirement for cilia in brood size regulation. In addition to microtubules, other cellular proteins are potential targets of glutamylation. We have found that glutamylation is enriched in the nucleolus, a subnuclear compartment devoid of microtubules, suggesting the existence of a nucleolar substrate for glutamylation. We have made dual labelled strains of worms that will allow us to determine if the TTLL-5 enzyme is nucleolar-localized. To determine whether loss of TTLL-5 alters nucleolar morphology we have made a strain which combines a ttll-5 mutation with a nucleolar marker. Since dysregulated glutamylation is associated with neurodegeneration and retinopathies our findings will contribute to our understanding of human disease.