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2025



RUTGERS-NEW BRUNSWICK  
Douglass Residential College

A PROGRAM FOR EXCELLENCE IN RESEARCH

**Opening Remarks**

Lorne S. Joseph, Ph.D.

Director of STEM Research, Health, and Engineering Initiatives

Lydia Prendergast, Ph.D.

Associate Dean of Douglass Women in Science and Engineering

**Welcome**

Meghan Rehbein Ed.D.

Dean of Douglass Residential College

Director of Institute for Women’s Leadership

**Remarks from**

Michael E. Zwick, Ph.D.

Senior Vice President for Research

**SUPER 32**

Poster Session

2025 SUPER Researchers

**Douglass Residential College** is an empowering, close-knit community within Rutgers that enhances the college experience for students of all majors by adding a feminist lens to their education. Douglass welcomes all undergraduate students, inspiring them to center women’s lived experience in their exploration of the world, examine inequality, and embolden women’s leadership.

**SUPER: Science for Undergraduates – a Program for Excellence in Research** is a STEM-focused enrichment program that offers undergraduate Douglass students the opportunity to participate in active research early in their academic careers. Since SUPER’s establishment in 1993, over 1000 Douglass students from over 60 STEM disciplines have had the opportunity to work on challenging STEM research projects. SUPER is part of Douglass’ strategy to increase gender diversity in STEM.



## A Message from Dean Meghan Rehbein

**Every great scientific breakthrough begins with a single result. At Douglass, we believe every great scientist forms from the single spark of a student's curiosity.** Douglass' SUPER Research Experience empowers students to lean into their questions and hone the power of their curiosity by offering them a unique opportunity: a paid, faculty-led undergraduate summer devoted entirely to research.

Through SUPER, students break into the research scene at Rutgers under the mentorship of a dedicated Rutgers faculty member. From pipetting and measuring to abstract writing, they build the foundational science skills necessary to thrive in the lab. In addition, our SUPER researchers develop valuable soft skills, such as teamwork, perseverance, patience, and statistical integrity. By the end of the program, students are equipped to present their findings and confidently approach new research challenges, helping shape them into well-rounded, socially conscious thinkers and inventors.

In this book, you'll find the voices of our 2025 SUPER Research students alongside the abstracts of their wide-ranging projects. Students have worked on ethical artificial intelligence to improve agriculture, examined waste products to reduce NJ river pollution, contributed to cutting-edge cancer research, and even helped develop machine learning models to predict features of earthquakes. Like me, I'm sure you'll be amazed not only by their intelligence, but their drive to discover for the common good.

A huge thank you to all who contribute to the SUPER Research Experience. From our generous donors to the faculty mentors who welcome our students into their labs, your partnership and dedication to moving science forward inspire us all.



**Dean Megan Rehbein, Ed.D.**  
Dean of Douglass Residential College  
Director of the Center for Women's Leadership

## Ready to make a difference for Douglass students in STEM?

Use this QR Code or visit [douglass.rutgers.edu/give](https://douglass.rutgers.edu/give) online and make your contribution. Your gift to the **Douglass Women are the Future of STEM** fund supports all Douglass students to receive special opportunities in STEM education.



## Donor Highlight:



The PSEG Foundation's generous support has been vital in funding professional mentoring, academic, and program support for Douglass STEM programs for many years. Thanks to this partnership, students attend conferences, engage in Living-Learning Communities, connect with industry professionals, and conduct full-time research through SUPER.

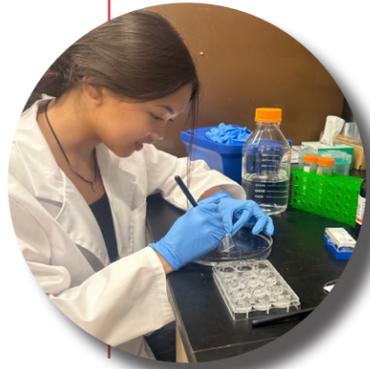
**Douglass is grateful to PSEG and the PSEG Foundation for their continued commitment to shaping the next generation of STEM leaders.**

## You are the catalysts for the next generation of STEM Leaders.

### Special thanks to:

Barbara DC'76 and Gary RC'74 Rodkin  
Joyce DC'79 and Les RC'65 Goodman  
The Reilly Douglass Engineering LLC Endowment  
PSEG & the PSEG Foundation  
Donors to the Douglass Women are the Future of STEM Fund  
Associate Alumnae of Douglass College and the Douglass Fund

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## FRANCHESCA AFRICA DRC'27

Dr. Bridget Matikainen-Ankney  
Department of Psychology

Obesity increases risk for serious diseases and alters brain function and behavioral mechanisms. Our preliminary data found that both obesity and diet-induced weight loss impair cognitive flexibility. This experiment uses a mouse model involving GLP-1R induced weight loss that we predict will similarly disrupt decision-making, revealing persistent brain changes regardless of weight loss method.

**Investigating Persistent Cognitive Impairments Following Obesogenic Diet and GLP-1R-Induced Weight Loss in Mice**

“**SUPER ignited my passion for research, teaching me to embrace curiosity and building my confidence as a budding scientist. Making new and meaningful connections truly enriched this experience and - while I aim for medical school, this summer unveiled new research avenues integral to my future.**”



## AREEBAH AHMAD DRC'26

Dr. David Barker  
Department of Psychology

The dorsal raphe nucleus is described as the pain inhibitory nucleus of the brain. Our research objective was to trace inputs to the dorsal raphe to identify pathways active during nociception. Cell counts mapped activity throughout the brain and revealed the most active inputs were from the midbrain and hypothalamus.

**Mapping Fluorescent Inputs from the Whole Brain Involved in Nociception**

“**Being a SUPER student has added an incredibly rewarding experience to my undergraduate journey. Working in the Barker Lab has shown me how science drives medicine and has deepened my understanding of discovery. This program has strengthened and reassured my commitment to pursuing a meaningful career in medicine.**”



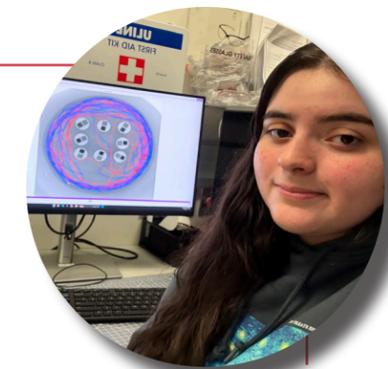
## VICTORIA ALDAZABAL DRC'27

Dr. Elodie Passeport  
Department of Environmental Sciences

In this work, we assessed the emission of recycled tire rubber from a kids' playground surface. We collected topsoil and core samples at multiple distances and depths around the playground over two separate campaigns and quantified their rubber particle content. Finally, we compared the two campaigns for an emission flux.

**Spatial Distribution and Emission Rate of Recycled Rubber Particles in a Kids' Playground**

“**This was indeed a SUPER experience! I learned a lot while having fun, and it was great to go through this experience as a community. This program gave me the confidence boost to continue to pursue research.**”



## JULIA ALVARADO DRC'27

Dr. Daniel Burbano Lombana  
Department of Electrical & Computer Engineering

Obstacle avoidance enables zebrafish to evade predators, navigate cluttered environments, and improve survival outcomes. This study investigates how zebrafish employ visual cues during avoidance of cylinders under varying illumination and grouping conditions. Behavioral analysis highlights how visual information affects fish navigation, applicable to the development of a vision-based control algorithm.

**Vision-Based Collective Group Formations in Fish Schools**

“**SUPER has given me the opportunity to further my knowledge of mathematics and its applications to technology. Research taught me to accept uncertainty, as results often come from testing and refining ideas solely based on our existing understanding. Moving forward, this experience has solidified my decision to pursue graduate studies.**”

“**My research on quantum computing deepened my interest in the development of new technologies and their real-world applications. It has inspired me to pursue graduate studies in quantum engineering and shaped my goal to work on both computer engineering and quantum systems, specifically driving innovation in future computing technologies.**”

**Quantum Computing Developments**

This research explores quantum computing's potential to revolutionize data processing through qubits and quantum parallelism. Through the examination of quantum algorithms and hardware developments, it highlights breakthroughs in speed, efficiency, and cryptography. The study contributes to scalable, fault tolerant systems, advancing solutions to complex problems classical computers struggle to solve.

## KARLA AOUGA DRC'28

Dr. Prosenjit Bagchi  
Department of Mechanical & Aerospace Engineering





Carbon nanotube membranes are cylindrical nanomaterials known for their exceptional mechanical and electrical properties. This study aimed to improve the efficiency of the pressure testing process used for membrane evaluation by identifying configurations that can withstand the highest pressure before failure. Further testing is needed to complete the investigation.

## RANA ARTIS DRC'28

Dr. Jerry Shan  
Department of Mechanical and Aerospace Engineering

Investigation of Mesh Backing Configurations for Pressure Testing of Carbon Nanotube Membranes

Overall, I had a very positive experience during SUPER. I was able to get hands-on experience learning what a researcher does day to day. My takeaway from this experience is time management and being able to acknowledge that sometimes it may take longer to obtain results.



Multiple sclerosis is an autoimmune disease characterized by demyelination. Recent studies have suggested that gut microbiota are involved in the disease progression. We hypothesize that bacterial extracellular vesicles (bEVs) produced by the bacteria contribute to disease progression. In this study, we developed a method to isolate bEVs from MS patients.

## PAVNI BHARDWAJ DRC'27

Dr. Kouichi Ito  
Department of Neurology, RWJMS

bEV Extraction and Analysis

SUPER was instrumental in getting my first research experience. I have learned lab techniques that will be helpful in my career, and more importantly, learned how to understand and write papers. This program has definitely encouraged me to pursue an MD/PHD.



Photosynthesis and respiration are major carbon fluxes, however measuring gross primary production-carbon uptake-is complex. Leaf litter, both a carbon source and sink, also absorbs carbonyl sulfide (COS), a proxy for carbon intake. Incubating litter samples under varying conditions showed species-specific CO<sub>2</sub> and COS flux responses, influencing forest carbon cycling.

## TORIAN BUNN DRC'28

Dr. Mary Whelan  
School of Environmental and Biological Sciences

Species-Specific Responses of Leaf Litter CO<sub>2</sub> And COS Fluxes to Environmental Conditions

SUPER provided me with an immersive experience, showing me that research is both challenging and rewarding. It solidified my interest in epidemiology, a research-intensive field. Hypothesizing, investigating, and sharing findings have been both fulfilling and enlightening, boosting my confidence to pursue graduate studies in this area.

I started SUPER unfamiliar with university research, but I'm leaving with foundational skills to last a lifetime. Designing and implementing agents in real-world contexts deepened my passion for developing artificial intelligence for social impact. I plan to continue my research and potentially present my findings at leading global conferences.

AgroAskAI: A Multi-Agentic AI Framework for Supporting Smallholder Farmers' Enquiries Globally

Agricultural regions heavily impacted by climate-related risks require advanced risk-management strategies. This study introduces AgroAskAI, a modular, multi-agent artificial intelligence framework employing role-specialized agents and chain-of-responsibility reasoning. By integrating real-time scientific toolchains, AgroAskAI enhances complex decision-making, outperforming single-agent systems by 33% and traditional decision pipelines by 50% in solution coverage.



## NADINE CANTONJOS DRC'27

Dr. Arpita Biswas  
Department of Computer Science

Understanding problem architecture, framing solutions, and documenting processes are essential to progressing. Exploring quantum computing, a field beyond my initial scope of interest, taught me to approach unfamiliar fields with confidence and persistence despite knowledge barriers. Given the chance, I would eagerly pursue research again later in my career.

Quantum Circuit Optimization

Quantum circuit optimization is vital for NISQ computers. Merging phase polynomial subcircuits can produce optimal circuits with lesser gate depth. We co-optimize phase parity and linear reversible synthesis using a priority-queue-based method on binary parity matrices. This reveals synthesis limitations and enables optimized quantum algorithms for cryptography and industrial tasks.



## VANNESSA CHAN DRC'27

Dr. Zhang Zheng  
Department of Computer Science

SUPER has given me invaluable research experience—challenging, rewarding, and constantly pushing me to investigate concepts more deeply. I've learned to think critically, analyze carefully, and embrace uncertainty. I'm only beginning to discover the depth of science and can't wait to continue growing as an emerging scientist!

Optimized Kindlin-2 F0 Domain Expression in E. coli for NMR-Based Structural Analysis

Kindlin-2 (K2) co-activates integrin, a key cell signal regulator, via phosphatidylinositol (3,4,5)-triphosphate (PIP3) binding at its F0 domain. This study optimizes F0 expression using double colony selection and various cell lines. Future work includes optimizing purification and <sup>13</sup>C-<sup>15</sup>N labeling for NMR analysis, enabling structural modeling of K2-lipid interactions.



## ALINA CHEN DRC'30

Dr. Andrew Nieuwkoop  
Department of Chemistry and Chemical Biology



## JASLEEN CHHATWAL DRC'27

Dr. Shirin Jalali  
Department of Electrical and Computer Engineering

I am using machine learning (ML) techniques, starting with linear regression, to estimate snow water equivalents (SWE) from remote sensing data such as InSAR phase, elevation, and vegetation height. I write Python scripts and assess model accuracy on large datasets, improving understanding of ML methods for terrestrial snow depth monitoring.

**“ SUPER confirmed my interest in research and shaped how I approach problem solving. It showed me how classroom knowledge connects to real-world challenges. I’ve become increasingly interested in machine learning and can see myself applying the skills I gained through this experience to both my future studies and career. ”**

Using Machine Learning and Remote Sensing Data to Estimate Snow Water Equivalents



## JESSICA CHIDAMBARANATHAN DRC'27

Dr. David Zald  
Center for Advanced Human Brain Imaging Research

A rare mutation in an individual's DNA, known as 3Q29 deletion, can cause intellectual disabilities, developmental delays and confers an~40-fold increase in risk for schizophrenia. Statistical analysis of MRI data revealed that 3q29 deletion was associated with smaller anterior ventral thalamic nuclei and smaller overall brain size.

**“ Research has impacted me in many ways. It has taught me the importance of perseverance, willingness to learn new concepts, and the ability to think critically. Research has enabled me to grow as a thinker, learner, and contributor to a greater purpose. I am truly grateful for this experience. ”**

The Impact of 3q29 Deletion on Subcortical Human Brain Structure and Function



## ABIGAIL CINQUE DRC'28

Dr. Philip Parker  
Department of Psychology

Building on the relationship between visual computations and motor output, we investigated brain regions associated with distance estimation in freely moving mice. Using an ethological visuomotor task, we unexpectedly found active neurons in both visual and motor regions in both variable and fixed distance jumpers.

**“ SUPER was a wonderful introduction to my research career at Rutgers. Not only did I learn laboratory skills, such as animal handling and fluorescent imaging analysis, but my experience encouraged me to consider different branches of scientific research, especially areas in behavioral neuroscience, as potential career options. ”**

Identifying Neurons Involved In Distance Estimation Using An Ethological Visuomotor Task

**“ SUPER has transformed my experience at Rutgers by allowing me to live out my dream of research. This experience has taught me a lot of valuable skills, graced me with hands-on experience, and a chance to live out my dream of scientific research. ”**

Henry's Law Constant and Its Role in Atmospheric Chemistry

Henry's Law constant influences the solubility, phase preference and lifetime of biogenic VOC like isoprene. This work involves using a flow-through setup coupled to an Iodide-CIMS to determine the Henry's Law constant of 4,3-ISOPROOH, a gas-phase oxidation product of isoprene.



## ASHLEY CRUZ DRC'26

Dr. Jean Rivera-Rios  
Department of Chemistry

**“ SUPER deepened my interest in research and gave me confidence in my scientific abilities. I gained valuable technical and analytical skills and confirmed my desire to continue learning through graduate school. It also helped me better understand what a research career might look like and how to pursue it. ”**

A Computational Method using Gromacs for Molecular Dynamics Simulations and Python Scripting

Determining molecular structures via X-ray diffraction, while important for material behavior, is costly and time-consuming. This project presents a computational method using Gromacs for molecular dynamics simulations and Python scripting to calculate structure functions of polymers efficiently. The approach provides a faster, cost-effective alternative for structural analysis in polymer research.



## KAAVYAA DAVE DRC'27

Dr. Meenakshi Dutt  
Department of Chemical and Biochemical Engineering

**“ SUPER has given me the opportunity to do research in engineering while having a support system. Thanks to SUPER, I've joined an amazing lab that taught me how to think like a scientist and gain skills that I will carry with me all the way through my career. ”**

Microplastic analysis in NJ wastewater treatment systems & receiving water bodies

This research project analyzes microplastics (MPs) from four New Jersey wastewater treatment plants. Samples were taken upstream and downstream, as well as from the influent, before tertiary treatment, and final effluent. The results will report MP concentrations and evaluate whether these facilities contribute to river pollution and if improved filtration systems are needed.



## ISABELLA DE LA CRUZ DRC'28

Dr. Nicole Fahrenfeld  
Department of Civil and Environmental Engineering



## ARUSHI DEVPURA DRC'27

Dr. Peter Jin  
Department of Civil and Environmental Engineering

We developed a new LiDAR detection method using Open3D and machine learning to identify vehicles and pedestrians while excluding static infrastructure. This improves real-time object recognition in smart mobility environments. Our results show increased detection accuracy, supporting safer and more efficient transportation systems through better data-driven insights.

### LiDAR Detection Method Using Open3D and Machine Learning to Identify Vehicles and Pedestrians

**SUPER has been a transformative experience for both my academic and personal growth. It gave me the opportunity to engage in hands-on research and real-world data analysis. Through mentorship, I gained confidence in navigating research environments, presenting technical work, and asking critical questions. One of the biggest takeaways was realizing how interdisciplinary research can be.**



## LYLA DIMINO DRC'28

Dr. Eileen White  
Rutgers Cancer Institute

By utilizing in-vivo techniques, scientists can analyze how dietary factors can shrink tumors in addition to medicinal treatments. Fasting can limit the nutrients cancer cells use to survive. In younger cohorts, tumor growth was slowed in fasted mice; the same is expected in the older cohort of this experiment.

### Utilizing in-vivo Techniques to Analyze Dietary Factors in Shrinking Tumors

**Participating in this research experience has allowed me to expand on the knowledge I have gained from my science courses. I hope to continue assisting in research and branch out to different departments where I can better understand why mechanisms of the human body work the way they do.**



## JADE DUNKLEY DAVIS DRC'26

Dr. John McLaughlin  
Department of Plant Biology

Fungal pathogens pose a significant threat to medicinal/aromatic plants, such as catnip (*Nepeta cataria*). This study identified mysterious fungi affecting catnip. Using DNA isolation and sequencing, the pathogen identified was *Golovinomyces salviae*, a powdery mildew. This research helps protect future plant species and facilitate early detection of pathogens.

### Unmasking the Fungus: Identifying the Pathogen Behind Catnip Disease

**SUPER has had a tremendous impact on me. It has introduced me to hands-on research and new skills that will support my future in health and veterinary medicine. This experience has boosted my confidence, broadened my career outlook, and inspired me to apply this knowledge to make a real-world impact.**



### Optimizing Nanocomposite Thermosets for Energetic Applications

**SUPER has greatly shaped my research career by deepening my material formulation, mechanical characterization, and interdisciplinary collaboration expertise. I gained critical insights, strengthening my chemical and materials engineering foundation while working alongside experts across disciplines. This experience solidified my passion for research and graduate studies.**

This research advances the optimization of macropore-infused nanocomposite thermosets (MINETs) for energetic applications by exploring novel surfactant formulations. Through systematic testing of rheological properties, modulus, and microstructure, we evaluate the impact of new surfactants on MINET performance. Results aim to enhance tunable reactivity, mechanical strength, and combustion kinetics, offering scalable solutions for multifunctional energetic composites.

## LAM DUONG DRC'28

Dr. Jonathan Singer  
Department of Mechanical and Aerospace Engineering



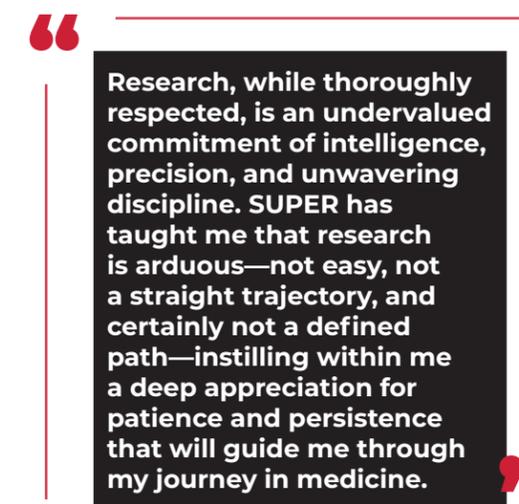
### Effects of Manipulating Synthesis Factors on the Optical Properties of Perylene

**Coming from a background with little to no practical science experience, SUPER allowed me to explore my interest in research without consequence. The endless resources, support, and community gave me the confidence to continue pursuing a career in biotechnology and helped me establish connections with those in my field.**

Perylene is an organic molecule with valuable applications in optoelectronics due to its distinctive optical properties. This study aims to investigate how the manipulation of synthesis factors impacts those properties. By optimizing this process, exploration can be made into further improving the use of perylene in optoelectronic devices.

## JAYLA ELIAS DRC'28

Dr. Deirdre O'Carroll  
Department of Materials Science and Engineering



### Nucleosome Repositioner, CHD4, Associates with Heterochromatin during Hair Cell Maturation

**Research, while thoroughly respected, is an undervalued commitment of intelligence, precision, and unwavering discipline. SUPER has taught me that research is arduous—not easy, not a straight trajectory, and certainly not a defined path—instilling within me a deep appreciation for patience and persistence that will guide me through my journey in medicine.**

The chromatin remodeling protein, CHD4, is expressed in the cochlea. A change in CHD4 immunofluorescence labeling was observed in hair cells at post-natal time points from associating with DAPI-marked heterochromatin to a diffuse nuclear pattern. I propose that CHD4 organizes higher order heterochromatin structures during hair cell maturation.

## DHVANI GANDHI DRC'27

Dr. Kelvin Kwan  
W.M. Keck Center for Collaborative Neuroscience



## RAADHA GARG DRC'28

Dr. Shishir Chundawat  
Department of Chemical and Biochemical Engineering

Sargassum is a brown algae species whose growth has proliferated in non-native areas causing harm to the local ecosystem. This study explored gene cloning of enzymes which can break sargassum into its constituent polysaccharides, alginate and fucoidan. Preliminary results include applications to clean e-waste because of alginate's metal biosorption capacity.

### Bioabsorption of Rare Earth Metals by Polysaccharides in Brown Algae

**“ SUPER has really allowed me to immerse myself in the research and engineering process. I don't think I will pursue graduate school or research as a career, but this has been a great experience for me to start doing engineering work. ”**



## KAAVYA GOLLAPUDI DRC'27

Dr. Pamela McElwee  
Department of Human Ecology

The study compares how Cambodia and Malaysia govern ecosystem services through PES, REDD+, EIA, and SEA frameworks. Cambodia emphasizes poverty reduction initiatives, while Malaysia possesses stronger institutions and financing. Both face challenges within their governments. However, with transparent and well-financed policies, integrating ecosystem services within each country's development is possible.

### Cambodia and Malaysia Govern Ecosystem Services Through PES, REDD+, EIA, and SEA Frameworks

**“ SUPER has had a profound positive effect on me and my research career. As a research assistant, I was able to learn from the best in the field. The program sharpened my ability to critically engage with scientific literature and has advanced my aspirations in medicine and research. ”**



## SHREYA IYER DRC'28

Dr. Prosenjit Bagchi  
Department of Mechanical and Aerospace Engineering

Quantum computing leverages quantum mechanical principles to solve problems faster than classical computers. A promising application is Computational Fluid Dynamics, which requires solving complex mathematical models, such as the Navier-Stokes equations. My research uses IBM's Qiskit platform to develop quantum circuits in Python for solving differential equations in fluid dynamics.

### Using Quantum Computing to Solve Differential Equations

**“ SUPER provided me with my first experience in formal research and laboratory work. I have gained confidence in my ability to independently navigate complex topics, analyze data, and communicate findings. This experience has shown me that research is iterative, and setbacks are valuable learning opportunities, rather than failures. ”**



**“ I have gained a lot more knowledge about how to isolate bacteria and sequence their DNA. Even though I took biology lab, it was difficult to put that information to use without practice. This program helped me realize research is not the career path for me. ”**

### Bacterial Colonies Found Within the Mouse Gut Microbiome

The project focuses on the type of bacterial colonies found within the mouse gut microbiome. Shake tubes were cultivated early on, followed by PCR and gel electrophoresis to prepare for sequencing. There were many types of colonies found depending on the medium used to grow them. This way, researchers know what the target bacteria prefer to consume.



## MYA JAMES DRC'28

Dr. Max Haggblom  
Department of Biochemistry and Microbiology



**“ SUPER was my gateway to the research world at Rutgers. Through this research experience, I have gained many skills that I will carry with me as I continue my research journey, and it has solidified my interest in pursuing developmental pediatrics. ”**

### The Influence of Visual Features on Children's Proportional Reasoning

Children's developing cognitive abilities influence their perception of proportions. This study tested how children's developing cognitive abilities influence proportional reasoning when presented in different formats. Participants compared two proportions and selected the larger one. Results showed that numerator interference affected reasoning, regardless of formats, and did not decrease with age.



## HAILEY JANI DRC'28

Dr. Michelle Hurst  
Department of Psychology



**“ SUPER helped me explore research in a way I hadn't before. While I may not pursue research long-term, I'm now seriously considering graduate school. This experience taught me how rewarding it is to solve new problems and reminded me how even small data issues can completely shift a project's direction. ”**

### Development Of an Initial Model to Estimate Slope Displacement for Subduction Earthquakes Using Machine Learning Guided Regression

This project developed an initial model to estimate slope displacement for subduction earthquakes using machine learning guided regression. Predictor variables were selected with recursive feature elimination. The model performs like other common models and future work will focus on improving its accuracy, reducing uncertainty, and extending to other earthquake sources.



## AYUSHI JOSHI DRC'27

Dr. Tyler Oathes  
Department of Civil and Environmental Engineering



## MEHARDEEP KAHLON DRC'27

Dr. Steven Malin  
Department of Kinesiology and Health

Neuronal extracellular vesicles (nEVs) offer novel insight into brain insulin resistance. We tested whether prediabetes impacts nEV insulin signaling compared with normoglycemic controls. We observed that prediabetes had higher nEV signaling proteins involved in metabolism and neuronal development. This work may help optimize treatments that prevent and/or delay neurological disorders.

### Effect of Prediabetes on Neuronal Extracellular Vesicles

“Participating in this program broadened my perspective on how research can be integrated into my future career in medicine. This experience has empowered me to think critically, ask meaningful questions, and envision a path where I can contribute to advancing science while serving others.”



## SANJANA KALOTH DRC'28

Dr. Andrew Westbrook  
Center for Advanced Human Brain Imaging Research

The brain maximizes cognitive function at the critical point phase transition in neural activity. This study tests whether the brain diverges from criticality with increasing cognitive effort by comparing responses to easy and hard division problems. Results are expected to show greater deviation from criticality during hard tasks, driving participants' preference for the easy task.

### Does the Brain Diverge from Criticality With Increasing Cognitive Effort by Comparing Responses to Easy and Hard Division Problems?

“SUPER has shown me a different perspective of research. Being a student researcher is a great academic experience, but it's also a chance to connect with others, form a community, and commit to a better future.”

## MEHREEN KAUR DRC'28

Dr. Lisa Klein  
Department of Materials Science

This study improves non-invasive acetone sensing of metabolic conditions through a PANI-CA hydrogel with melting gel and SiO<sub>2</sub> treatment. The approach reduced skin irritation and enhanced surface properties. Contact angle and weight loss data showed increased hydrophobicity and stability, supporting the strip's durability and suitability for wearable, skin-contact diagnostic applications.

### Improving Durability and Biocompatibility of PANI-CA Hydrogels for Metabolic Sensing

“SUPER helped me grow confidence as a researcher and clarified my interest in biomaterials, diagnostics, and health-tech. It strengthened my skills in hands-on problem-solving and data-driven design. I'm leaving with a clearer focus on pursuing impact-driven research that improves healthcare access through non-invasive, user-centered technologies.”

“ ”

The SUPER Research Experience taught me lessons far beyond craniotomies and electrophysiology in mice. I learned perseverance in the face of uncertainty and how to confront the intimidation of approaching an unsolved question. By presenting me with challenges, SUPER deepened my curiosity and solidified my commitment to pursuing research throughout graduate or medical school.

### Mapping Motor-Visual Circuits: Effects of LGN Stimulation on Jumping Behavior

To investigate the role of the lateral geniculate nucleus (LGN) in sensory-motor transformations, we surgically implanted optical fibers into the LGN of mice. Mice were trained to perform a visually guided jumping task that required distance estimation and motor coordination. During the task, we used optogenetics to deactivate/activate the LGN selectively and assessed how stimulation influenced performance.



## AFIA LATEEF DRC'27

Dr. Philip Parker  
Department of Psychology

“SUPER has given me the opportunity to experience research, a field that I never would have seen myself in, while providing a support system and guidance. I was impressed with the level of independence, organization, and resilience required for research. A deep dive into scientific research is as fascinating as it is challenging.”

### Investigation of Mosquito Chemosensory Organ Microbe's Influence

Mosquito-borne diseases kill >700,000 people annually. We investigate how microbes in mosquito chemosensory organs influence vectorial capacity. Field-collected larvae from diverse NJ habitats are reared in the lab to isolate, identify, and study microbial secretions that shape olfactory development, revealing how microbial signals modulate mosquito behavior and disease transmission.



## JOSELYN LEE DRC'28

Dr. Jennifer Sun  
Department of Biochemistry and Microbiology

“ ”

SUPER allowed me to take away problem-solving strategies, better communication, and how to collaborate in a research setting. Working on semantic search with Professor Hang Liu and his PhD students taught me so much and inspired me to consider graduate school in ECE instead of entering the workforce.

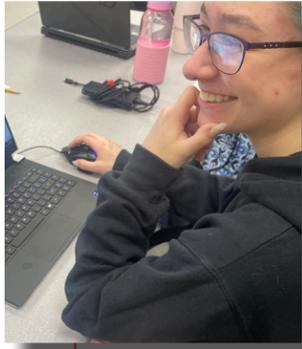
### Semantic Search in iPapers.ai

Amidst emerging AI technologies, policymakers often struggle to understand complex documentation. iPapers.ai addresses this by using semantic search and AI-generated explanations to simplify technical content. This tool helps make AI documentation more accessible, enabling more informed, transparent, and responsible policy decisions by those without a technical background.



## VICKY LIN DRC'27

Dr. Hang Liu  
Department of Electrical and Computer Engineering



My research was on floating offshore wind turbines and challenges involved in their deployment. My goal is to design a spar-platform and validate its dynamics at model scale before studying it at full scale. Following initial-conditions testing and post-processing, I validated three of my model's six rigid-body degrees of freedom.

My research experience has made me reevaluate what I may do with my career in the future. I enjoy the research I'm doing, though initially I didn't think I would enjoy it as much as I do. I plan on continuing with this research during the school year.

## EVELYN LOGAN DRC'27

Dr. Onur Bilgen  
Department of Mechanical and Aerospace Engineering

### Model-Scale Experiments on a Spar Platform for Floating Offshore Wind Turbine



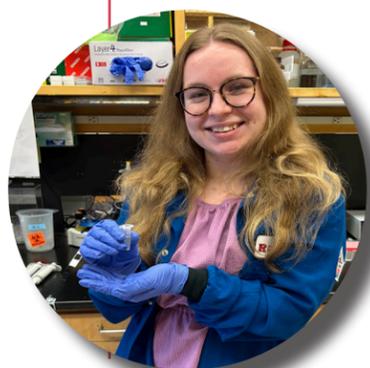
Understanding chromatin changes during stem cell replacement therapies is vital for establishing strategies to treat hearing loss. Immunofluorescent labeling of CTCF revealed its proximity to DAPI-marked heterochromatin. I propose cell-state dependent changes in CTCF binding at boundaries are essential for separating heterochromatic and active euchromatic topologically associated domains.

SUPER was pivotal in my academic journey. I built meaningful relationships with mentors and learned lessons to apply to my present and future aspirations. I learned about the connection between research and practice which deepened my passion for medicine and has made me more driven towards my goals.

## SHEEBA MATHANBABU DRC'26

Dr. Kelvin Kwan  
W.M. Keck Center for Collaborative Neuroscience

### CTCF Distribution and Enrichment is Altered During Neuronal Differentiation



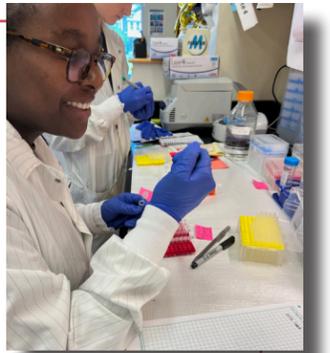
A novel cancer immunotherapy was developed using a hybrid viral vector to insert a foreign gene (Ggta1) into pancreatic neuroendocrine tumors, triggering an immune response. Immunohistochemistry staining revealed an increase in macrophage immune cells following treatment, with more doses producing stronger immune responses. Additional immune cell types will be stained to assess overall therapeutic potential.

I am grateful to SUPER. It has helped me build confidence in my abilities, encouraging me to advocate for myself and recognize my potential. Connecting education with hands-on training deepened my understanding of science, and starting research early is preparing me for an exciting future in graduate school and beyond!

## PATRICIA MAYER DRC'27

Dr. Steven K. Libutti; Dr. Ziqiang Yuan  
Rutgers Cancer Institute of New Jersey

### Comparative Analysis of Macrophages in Mouse Pancreatic Neuroendocrine Tumors Treated with Alpha-Galactosyltransferase Gene Therapy



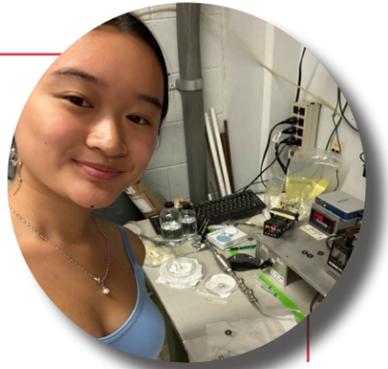
Cancer cachexia is a severe wasting syndrome, predominantly associated with lung cancer. In cancer, the role of autophagy is to maintain metabolism and prevent inflammation. To investigate the role of autophagy in lung cancer, we performed immunohistochemistry of autophagy marker p62 in tissues and tumors from wild-type fasted, non-tumor, and tumor-bearing mice, and we found elevated expression.

This experience gave me a realistic view of the work that goes into coming up with experiments, determining next steps, and the importance of science communication. After SUPER, it's clear that my goal of getting a PhD is possible and achievable. SUPER has inspired me even more to work towards it.

## TAFFY MBITHI DRC'28

Dr. Eileen White  
Rutgers Cancer Institute

### An Investigation Into the Relationship Between Non-Small Cell Lung Cancer Cachexia And Levels Of Autophagy Markers



Carbon nanotube membranes are cylindrical nanomaterials known for their exceptional mechanical and electrical properties. This study aimed to improve the efficiency of the pressure testing process used for membrane evaluation by identifying configurations that can withstand the highest pressure before failure. Further testing is needed to complete the investigation.

SUPER introduced me to an area of Mechanical Engineering that was previously unfamiliar to me. I gained valuable experience through hands-on lab work and immersion in a scientific research setting. This experience will guide my future career decisions and growth as I continue exploring the broader Mechanical Engineering field.

## PHOEBE NGUYEN DRC'27

Dr. Jerry Shan  
Department of Mechanical and Aerospace Engineering

### Investigation of Mesh Backing Configurations for Pressure



This study demonstrates that MCT1, a primary lactate transporter localized to the plasma membrane, is also present in the mitochondrial membrane of HCT116 colorectal cancer cells. Chemiluminescent imaging of isolated membranes confirmed MCT1 localization, suggesting active mitochondrial lactate transport with clinical implications in cancer, hypertrophy, and heart failure treatment.

SUPER introduced me to research and connected me with a lab that feels like family. It has strengthened my technical, critical thinking, and adaptability skills. Through this opportunity, I've expanded my network, deepened my medical interests, and am now inspired to pursue a combined MD/PhD program.

## ANALEA NYKTAS DRC'28

Dr. Ahmad Cluntun  
Department of Molecular Biology and Biochemistry, RWJMS

### Distribution of MCT1 in Cancerous Cell Populations

## YOYINSOLA OLOGBOSERE DRC'28

Dr. Vassiliki Demetracopoulou  
Department of Civil and Environmental Engineering

Flash floods have increased in the U.S and result in damage to personal vehicles. These impacts are not well documented in literature. The goal of this study is to address this gap through literature review and expert interviews. Results underline that electrical systems in cars are vulnerable to flooding damage.

### Vehicle During Flood

**“ SUPER provided me with hands-on research experience and the confidence to pursue interdisciplinary work between engineering and climate resilience. It clarified my interest in automotive systems and inspired me to explore studies focused on sustainability that directly impact communities and the auto industry. ”**

“ ”

**The SUPER program gave me the opportunity to take my first step into research and helped me start thinking about what I want to do after I graduate. It also allowed me to connect with some incredibly inspiring faculty and graduate students, and I really learned a lot from them!**

This study examines the activation of two main proteostatic pathways across a 24-hour circadian cycle under acute amino acid deficiency. After collecting samples of liver tissue from mice, we used western blots and antibody detection to quantify the concentration of key indicative proteins of each pathway.

## HIMA PENUKONDA DRC'27

Dr. Tracy Anthony  
Department of Nutritional Sciences

### Hepatic Proteostatic Response to Feeding vs. Fasting Under Acute Amino Acid Deficiency



## RIDDHEE PATEL DRC'27

Dr. Maribel Vazquez  
Department of Biomedical Engineering

We developed a PDMS microfluidic device to model fluid flow and interface dynamics in a simulated gingival environment. This platform enables real-time study of fluid interactions under laminar flow, providing fundamental insights into transport phenomena and mechanical behavior relevant to oral health and periodontal microenvironments.

**“ SUPER deepened my hands-on research skills and expanded my understanding of biomedical engineering. It taught me that while having a strong passion is important, being open to exploring different fields can lead to unexpected opportunities and valuable growth in my research career. ”**

### A PDMS Microfluidic Platform for Simulating Gingival Flow Dynamics in Oral Health Applications

**“ SUPER gave me the opportunity to engage in research at Rutgers' Psychoneuroimmunology Lab. I gained a deeper understanding of the research process and practical skills in EEG and data analysis. This experience clarified the importance and impact of research for my future career in healthcare. ”**

This study explores how anxiety, mood, attention, and obsessive-compulsive traits relate to cognitive control. Participants completed psychological surveys and performed 12 Stroop tasks while electroencephalography (EEG) and eye-tracking data were recorded. Eye-tracking focused on Areas of Interest (AOIs). Results suggest mental health symptoms shape neural and visual responses during cognitive processing.



## HAMNA RAFIQUE DRC'27

Dr. Alexander Kusnecov  
Department of Psychology

### Mental Health and Cognitive Function: An EEG and Eye-Tracking Study Using Stroop Tasks



## SIDDHI PATEL DRC'28

Dr. Noshir Langrana  
Department of Biomedical Engineering

We developed a polyelectrolyte complex film dressing made of chitosan and polygalacturonic acid (PGA) to improve diabetic wound healing while serving as a drug delivery mechanism for diabetic treatment. I am investigating the nanoparticle release through 2 fluorescence molecules. The rate of release observed by the one of nano-particles Rhodamine provides a different rate than the Nanoparticles, suggesting a bigger molecule be investigated.

**“ SUPER has provided me with the resources and support to network and succeed in STEM. Through the Introduction to Scientific Research course, I found a community of women that share a passion for research. Through my time in the lab, I learned important skills like problem solving and critical thinking outside the technical lab skills. ”**

### Modeling Nanoparticle Release with Fluorescent Particles in Chitosan-Polygalacturonic Acid Polyelectrolyte Complex (PEC) Film

“ ”

**SUPER has provided me with the foundation I needed to start my research journey as an undergraduate student. Through this experience, I learned how to apply my knowledge in a real-world setting. I look forward to continuing my research throughout college and into my future career as a physician!**

The HoxA gene cluster regulates limb patterning and provides insight into the fin-to-limb transition. We identified sixteen HoxA enhancer regions conserved between skate and gar fishes, and cloned ten regions into vectors. These constructs will be used to study the role of these enhancer regions during fin development.



## AASHI RANA DRC'28

Dr. Tetsuya Nakamura  
Department of Genetics

### Investigating HoxA Enhancers in Fin Development



## JULIA REBELLO DRC'27

Dr. Kiran Chada  
Department of Biochemistry and Molecular Biology

The Classical subtype of Papillary Thyroid Carcinoma makes up about 80% of cases. We conducted a statistical analysis to find 35 genes highly expressed with HMGA2 and IGF2BP2 among 312 samples. We found groups of coexpressed genes that may help understand the biological pathways involved in PTC and possible biomarkers.

“ My experience in SUPER has shown me the different ways in which research can be conducted. I now feel more prepared for my future coursework in bioinformatics and excited to participate in more research. This program has taught me about collaborative work, applying my knowledge, and the research process. ”

### Coexpression Analysis of Genes Highly Expressed with HMGA2 and IGF2BP2 in Classical Papillary Thyroid Carcinoma



## AZARIN REID DRC'28

Dr. Meenakshi Dutt  
Department of Chemical and Biochemical Engineering

Determining a molecule's structure is necessary for drug delivery research. While this can be determined experimentally through X-ray diffraction, it is time consuming and costly. By using GROMACS, a software for molecular dynamic simulations, and Python programming language, a method for successfully identifying molecules' structure function was developed computationally.

“ SUPER has been an invaluable experience as a gateway to research. Through this experience, I've developed my independence, critical thinking, and project management skills. Before, I didn't know what computational research was, nor the application to chemical engineering. Now, I want to explore even more. ”

### Enzyme Polymer Simulation Project



## SHREYA REWAR DRC'28

Dr. Prosenjit Bagchi  
Department of Mechanical and Aerospace Engineering

This research examines how various diseases affect the shape and size of blood cells. By analyzing peer-reviewed studies, patterns linking specific conditions to cell changes are identified. Collaborating with modelers, findings support computer simulations. Results may improve accurate diagnoses and enhance visual tools for recognizing disease-related cellular transformations in blood.

“ SUPER has given me my first-ever research project. I've learned to be disciplined, patient, and resilient, especially when findings did not make sense to me. I learned to communicate, gain confidence, and understand the interdisciplinary aspects of our work. I have discovered that cell biology can have a profound impact on our health. This has awakened my curiosity and ambition to understand, discover, and solve more. ”

### Blood Cell Size Changes



## MERLYN ROY DRC'27

Dr. Shishir P. S. Chundawat  
Department of Chemical and Biochemical Engineering

For optimal breakdown of carbohydrates, Carbohydrate Binding Modules (CBMs) should have ideal characteristics, in terms of expressibility, stability, and binding. To evaluate these qualities, De Novo computationally designed CBMs were cloned into the pET45b+ vector, expressed in BL21 (DE3) E. coli, and tested for binding to microcrystalline cellulose.

“ SUPER provided me with the opportunity to determine whether research and graduate school were the right paths for me to pursue. The program offered support and resources to guide me through my first research experience, while also helping me develop valuable personal and hands-on lab skills. ”

### Characterization of the Binding Strength of De Novo Carbohydrate Binding Modules



## KALYANI SAMUDRA DRC'28

Dr. Paul Meers  
Department of Plant Biology

Lysobacter enzymogenes strain C3, a gram-negative soil bacterium, produces outer membrane vesicles (OMVs) carrying anti-fungal compounds. We found that Fusarium subglutinans, a pathogenic fungus, produces extracellular vesicles (EVs). Our data shows C3 OMVs and Fusarium EVs can act against each other's parent cells but may also help each other's activity.

“ SUPER was my first experience working in a lab and understanding the research process. It helped me find community within a larger school and form friendships with peers in STEM. I learned from scientists in chemical and plant biology, igniting a passion that complements my pre-medical goals. ”

### Exploring Extracellular Vesicle Interactions between Fusarium Subglutinans and Lysobacter Enzymogenes C3



## LILIA SCHELL DRC'28

Dr. Eileen White  
Rutgers Cancer Institute

Cachexia, a condition that causes fat and muscle wasting, is responsible for roughly one third of pancreatic cancer deaths. By studying metabolic imbalance in mice with pancreatic cancer with the use of EchoMRI and a metabolic cage, it is clear that this type of cachexia causes lower food intake and activity.

“ During SUPER, I learned valuable lab skills and applied knowledge from my academic courses, which deepened my understanding. In addition, being immersed in a clinical environment during my research, along with my medically focused topic, has encouraged me to pursue medicine and continue with cancer research. ”

### Defining Metabolic Imbalances in Pancreatic Cancer Cachexia



## PAULINE SEMIRA DRC'27

Dr. Shishir P. S. Chundawat  
Department of Chemical and Biochemical Engineering

Exosomes are extracellular vesicles known to contain RNA and recently discovered to harbor glycoproteins. This study attempts exosome extraction from Chinese hamster ovary cells using two unconventional methods: sodium acetate precipitation and a commercial solution. Size and protein concentration was examined using dynamic light scattering and SDS page.

### Extracting And Characterizing Exosomes From Chinese Hamster Ovary Cells

**“ SUPER allowed me to get involved in projects related to the pharmaceutical industry, which I have always been interested in. I'm so grateful for the valuable skills I've learned and the great people I've met through this program and am now considering pursuing research after undergrad! ”**



## ALICE SHAIKHUT-DINOVA DRC'28

Dr. Deirdre O'Carroll  
Department of Materials Science and Engineering

Despite being around 17% of annual global plastic production, only about 3% of polypropylene is recycled. In this process waste polypropylene can be converted into graphite. Polypropylene (PP) is converted into polypropylene nanoparticles (PP-NP) through a nonsolvent induced phase separation (NIPS) process. The PP-NPs then undergo hydrothermal treatment and are carbonized into polypropylene carbon dots. Finally, through a second post processing step, the PP-CDs are converted into graphite.

### Graphitization of Polypropylene-Derived Carbon Dots

**“ SUPER has helped me feel confident and comfortable in exploring research as a career. I think the environment and the people in my research lab really helped me adjust to the work. I'll be taking away the skills I learned, especially in literature review, and a lot of facts about plastics. ”**

## Sherry Shuster DRC'26

Dr. Lisa Klein  
Mathematics, Department of Material Science and Engineering

In materials science, ImageJ is the standard for extracting quantitative information from micrographs. This approach is limited in its ability to make predictions. This project explores alternatives, especially for limited data sets. By using tools made for machine learning, it is possible to analyze information from images and link them to physical properties.

### Analyzing Information from Images and Linking Them to Physical Properties

**“ I am extremely grateful to SUPER for allowing me to gain hands-on experience. This summer, I had the privilege of learning the ropes of research and getting familiar with the processes. I feel more prepared to enter the workforce, knowing research is something I'm excited about. ”**

**“ SUPER deepened my interest in socially impactful research by showing how data can improve public safety and infrastructure. It strengthened my technical and analytical skills while fostering my passion for data-driven problem solving. This affirmed my goal to pursue a research-focused career in quantitative analytics or applied data science. ”**

### Optimizing Vehicle and Conflict Detection Through Data Reduction

We aim to improve public safety by identifying road conflicts before they occur using LiDAR data. By filtering out static elements through map overlay and tracking moving vehicles across frames, we reduced data by 500MB. This allows for more efficient storage and analysis of critical traffic information.



## REEYA SINGH DRC'27

Dr. Peter Jin  
Department of Civil and Environmental Engineering

**“ SUPER gave me research experience that was hands-on in both simulation and experimental work, building not only technical skills but my confidence as well. This experience confirmed my passion to do research and clarified my goal to pursue graduate school. ”**

### Heat Flow in Lithium-Ion Batteries and Carbon Fiber Structures

This research explores thermal behavior in energy systems through experiments using the glovebox on lithium-ion batteries and COMSOL simulations on carbon fiber to measure thermal anisotropy. Battery tests showed heat degradation under varying voltages, while simulations revealed directional heat dissipation. Findings support safer, more sustainable thermal management strategies for advanced energy technologies.



## SHARAN SINGH DRC'28

Dr. Amin Reihani  
Department of Mechanical and Aerospace Engineering

**“ SUPER was an incredible opportunity for me to explore research at Rutgers beyond my major. Guided by welcoming mentors and peers, I actively helped plan innovative experiments and collect crucial data. My SUPER experience ignited my interest in engineering research, which I hope to continue pursuing through future opportunities. ”**

### Effects of Bentonite and Ball Clay Additions on the Plasticity of Wollastonite Mixtures

Plasticity is crucial for forming and mass-producing ceramic materials. Wollastonite is poorly malleable due to its irregular shape and small size. This study assesses the effectiveness of adding bentonite and ball clay powders to increase wollastonite's plasticity. Results indicate that increased formability compromises green strength and packing density.



## SOPHIA SNYDER DRC'28

Dr. Richard Rimani  
Department of Materials Science and Engineering



## SARISHA SOMASHEKAR DRC'28

Dr. Ahmad Cluntun  
Biochemistry and Molecular  
Biology, RWJMS

MCTI was recently proven to import lactate directly into mitochondria. To further research this protein accurately, mitochondrial isolation and storage must be optimized. This study tests various storing conditions, temperatures of 4°C and -80°C, and isolation methods, manual versus mechanical. Results indicate that -80°C mechanical best preserves mitochondrial integrity.

**Optimizing Mitochondrial Isolation and Storing Conditions**



**The research lab SUPER placed me in helped me understand the expectations of a workplace environment while also introducing me to the world of research. After learning invaluable techniques from my research mentors, I feel confident in my ability to ask insightful questions and conduct research thoroughly.**



## KATHLEEN SULLIVAN DRC'27

Dr. Richard Riman  
Department of Materials  
Science and Engineering

In carbonation, calcium silicate and carbon dioxide react to form calcium carbonate and silica. Fourier transform infrared spectroscopy (FTIR) is used to create fingerprints of minerals based on the frequencies of light that cause bond vibrations. This research utilizes FTIR to identify the presence of minerals after carbonation reactions.



**SUPER has been a wonderful experience that allowed me to learn so many lab and research skills from all of my advisors and mentors. I've also made amazing connections with my SUPER peers and other undergraduate students in my lab throughout the experience.**



**Identifying Mineral Phases using Fourier Transform Infrared Spectroscopy (FTIR)**



## SAMIKHA SRINIVASAN DRC'27

Dr. Judith Storch  
Department of Nutritional Sciences

This study investigates how tissue-specific deletion of liver fatty acid-binding protein (LFABP) influences gut microbiota and metabolic health. Using 16S rRNA sequencing, we found distinct microbiome structures across genotypes. Results suggest gut microbial shifts may mediate improved endurance and metabolic resilience, highlighting gut-muscle axis contributions to metabolically healthy obesity.

**Contribution of the Gut Microbiome to the Metabolically Healthy Obese (MHO) Phenotype of Tissue-Specific Liver Fatty Acid-Binding Protein (LFABP) Null Mice**



**SUPER strengthened my interest in biomedical research and enhanced my skills in data-driven analysis. It gave me confidence in conducting independent research and shaped my goal to explore intersections between data science and health, particularly through studying the gut microbiome's role in metabolic health.**



**SUPER gave me the opportunity to begin my research career at Rutgers. Applying classroom knowledge to real scientific work was incredibly rewarding. I learned teamwork, discovered my strengths and weaknesses, and gained inspiring mentors. This experience deepened my passion for the real-world impact of science.**

**Genome-Wide Heterochromatin Changes Affect Nuclear Structure During Otic Neuronal Regeneration**

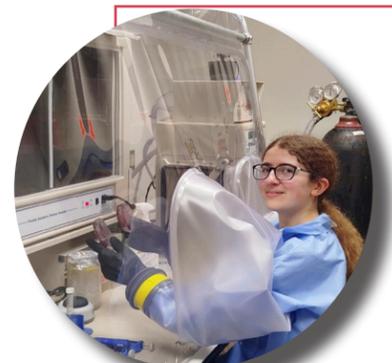


Stem cell therapy for sensorineural hearing loss requires understanding the cell-state-specific changes. Changes in heterochromatin marks were identified by immunofluorescence labeling and genome-wide histone binding. I propose that heterochromatin changes at topologically associating domain boundaries influence the global nuclear structure during otic neuron regeneration.



## SHIVANI SUYAMBURAJAN DRC'26

Dr. Kelvin Kwan  
W.M. Keck Center for  
Collaborative Neuroscience



## JACQUELINE STRICKLAND DRC'28

Dr. Santiago Cuesta  
Department of Cell Biology and Neuroscience

Gut bacteria can produce or metabolize neurotransmitters, but whether this affects brain levels remains unclear. We investigated whether changes in gut dopamine influence cocaine addiction. Antibiotic-treated mice were colonized with an engineered *Lactobacillus gasseri* strain that lowers gut dopamine precursor and tested using cocaine sensitization and conditioned place preference.

**Microbiota Modulation of Dopamine Precursor in Cocaine Addiction**



**SUPER has built my appreciation for the challenges and joys of research. Through learning techniques related to bacteria and mice models, I have discovered how to navigate problems and evaluate new data. I am excited to continue research to expand my knowledge of cellular and neurological mechanisms.**



**SUPER was a wonderful introduction to scientific research. I enjoy the problem-solving aspect of science and I'm glad I got to apply it in this program. I saw myself going to graduate school even as a high school student and SUPER reinforced this goal for me.**

**Mouse Microbiome**

To study the mouse gut microbiome, we must understand what different species of gut bacteria contribute. We attempted to cultivate bacteria from mouse fecal pellets in several anaerobic media in hopes of finding ways to grow novel species. The cultures grown should give insight into the gut microbiome's composition.



## ANASTASIA TOPOROVA DRC'28

Dr. Max Haggblom  
Department of Biochemistry  
and Microbiology



## GAURI VAIDYA DRC'28

Dr. Natalya Voloshchuk  
Department of Biochemistry and Microbiology

This study compares the purification of Phosphoglycerate Kinase (PGK) in two buffers. We hypothesized that PGK can be purified without NaCl, simplifying the process without reducing yield. PGK was purified using Metal Affinity Chromatography and Ion Exchange Chromatography, resulting in PGK having 2x more recovery in Buffer 1 than 2.

### Comparing Yield of PGK in Two Buffer Systems

**“SUPER gave me a clear pathway to start my research career at RU, building my confidence and independence in the lab. With Dr. Voloshchuk's incredible support, I've grown as a scientist and now feel excited and prepared to pursue graduate school and a future in research.”**



## SYMPHONY WATFORD DRC'28

Dr. Steven Malin  
Department of Kinesiology and Health

Allostatic load is a physiologic measure of chronic stress relating to obesity. Whether allostatic load differs across prediabetes phenotypes and relates to appetite is unknown. We show prediabetes severity related to higher stress, obesity, insulin resistance, and lower fasting ghrelin despite unaltered hunger. These findings suggest chronic stress dysregulates appetite.

### Chronic Stress and Appetite Dysregulation Across Prediabetes Phenotypes

**“SUPER helped me connect research to physical therapy and reminded me why I care so much about helping people take care of their bodies. I've learned how much consistency and communication matter, especially in healthcare. This experience made me even more excited to pursue PT and serve others well.”**



## SOPHIA YOUNG DRC'30

Dr. Ravendra Singh  
Department of Chemical and Biochemical Engineering

Pharmaceutical machinery depends on accuracy to ensure that albuterol sulfate is stored and appropriately absorbed. Modeling is used to encapsulate the pH levels and how important they are. This study aims to investigate the change of pH, how pH is manipulated, and its role in the body.

### Modeling pH Dynamics in a Multi-Component Albuterol Sulfate Solution

**“SUPER has allowed me to learn new things, like understanding the importance of modeling pharmaceutical machinery. Overall, this experience has changed my future, whether it is understanding other people's roles or how pharmaceutical machinery is approved. Research may not be for me to continue as a job, rather a hobby.”**



## PEGGY YOU DRC'27

Dr. Shauna Downs  
Department of Health Behavior, Society and Policy

Food system studies examine food production, consumption, and waste management, often using participatory methodologies to involve communities in the research process. However, how stakeholder feedback is integrated remains unclear. To address this, we conducted a scoping review to examine how participatory methods and systems thinking are applied in these areas.

### The Use of Participatory Methods in Food Systems Research: A Scoping Review

**“Participating in this program was an invaluable opportunity to actively engage in research while receiving support and mentorship. Working on the scoping review project helped expand my knowledge and challenged my critical thinking and analytical skills. In the process, I also developed a newfound interest in public health and nutrition.”**



## ANNELIESE ZHU DRC'29

Dr. Kristine Schmitz  
Dr. Nancy Reichman  
Child Health Institute of NJ

Paternal depression affects child outcomes but is often overlooked. Mapping 21 New Jersey fatherhood programs showed most offer parenting support and peer groups, but none provide clinical mental health services. Programs cluster in high-need urban areas, while rural regions remain underserved. Future efforts should expand reach and include clinical care.

### Addressing Paternal Depression: Mapping Gaps in Fatherhood Programs Across New Jersey

**“SUPER gave me my first college-level research experience, helping me build confidence in data analysis and public health work. It also showed me how research can drive real-world impact. This experience has encouraged me to pursue more public health-oriented graduate studies in pharmacy and in my career.”**



SUPER students won second place in a Rutgers Research event.



**SUPER Mentors serve as near peer mentors and program support for the incoming SUPER cohort. These mentors help implement the initiatives that promote the success of the SUPER Research Experience.**

**Alex Logan (DRC 2022) Head SUPER Mentor**

“Being a mentor for SUPER is full circle for me. I was an undergraduate student in the program, and that opportunity pointed me in the direction of a PhD program. Mentoring allows me to be a part of SUPER’s directive to foster the young women scientists of tomorrow.”

**Maryam Mohammed (DRC 2025)**

“From being a SUPER student to serving as a SUPER mentor for two years, my time with SUPER has given me a thorough understanding and appreciation for scientific research. It was an honor to gain invaluable leadership experience serving as a mentor to the SUPER 32 cohort.”

**Sarah Rajan (DRC 2026)**

“Given three years with SUPER and two as a mentor, I see each of us as a cart pulled forward by those who’ve shaped our paths. My mentors moved me with their knowledge, patience, and belief—and now I hope to do the same for the students I support.”

**Nathalia Soares (DRC 2026)**

SUPER has provided me with an incredible opportunity to assist young researchers in enriching their understanding of science throughout the spring and summer. Through the students, I have been able to reciprocate the wonderful experiences I’ve been given by fostering curiosity and confidence in young minds.

**Isabelle Mietus (DRC 2026)**

I’m incredibly grateful to be a SUPER alum. Through Douglass, I joined a lab where I’ve spent hundreds of hours and will complete my senior thesis. Mentoring undergraduates through their first research experiences has been an inspiring and fulfilling role that has strengthened my leadership and deepened my passion for research.

# S U P E R

# 2025



## **Douglass Women in Science and Engineering (WiSE)**

continues to center the experiences of women pursuing STEM at Rutgers University. Through initiatives like the SUPER Research Experience, we foster a vibrant community of undergraduates engaged in authentic research experiences. As we continue to celebrate over three decades of impact, we remain committed to expanding pathways for Douglass students in graduate STEM programs and careers by supporting their persistence and success as undergraduates.

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Douglass students  
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