

2026 Summer Research Projects

***Interested in getting started in research but don't know where to begin? You can find your own faculty mentor and program or browse some available projects here. If you find a project that interests you, please contact the faculty mentor directly to learn more.**

Please note, our programs are competitive; acceptance is not guaranteed. If a faculty member agrees to work with you, you must still apply directly to our Summer Scholars or Summer Fellows Program.

If none of these projects are of interest to you, or you have any further questions regarding getting started in research in general or about any of our programs, please schedule a meeting with our office using the link [here](#)

Project Title: Summer The Community Engagement and Ecological Restoration Internship Program

Project Description: The Community Engagement and Ecological Restoration internships provide a unique opportunity for students to gain hands-on experience in community engagement, ecological regeneration and environmental journalism projects around Maryland and Delaware.

In an era of dramatically compromised ecological systems, economically impoverished and minority communities have experienced the brunt of this environmental degradation, and are particularly vulnerable to stressors like flooding, droughts, heat waves, pollution, and disease caused by climate change. Through this internship, students will gain clinical experience in restoring our human and ecological communities; ecological science; social justice history and dynamics; non-profit operations; community development; and narrative storytelling.

Working alongside Delaware's Lenape and Nanticoke Indian Tribes, UD students have helped remove tons of trash and hundreds of invasive trees, and helped design and plant an Indigenous food forests and vegetable gardens. In West Baltimore, students have spent more than 2,500 hours working alongside local church groups, nonprofits, and the U.S. Forest Service to plant 4,000 trees, build hiking trails, and train elementary and high school students about ecological restoration. In central Baltimore, students have helped grow thousands of pounds of organic produce that is delivered free of charge to local community kitchens, where it is prepared and donated to some of the city's food insecure communities. In Baltimore County, we have helped a community of Nepalese immigrants build 80 raised beds and plant upwards of 100 fruit trees as they seek to establish a food

sovereignty farm.

Working closely with Professor McKay Jenkins and community partners in Delaware and Baltimore, student interns will join inspiring teams engaged in:

- v Indigenous land restoration
- v Urban reforestation, including invasive removals and tree planting
- v Food Justice Farming, including planting, harvesting, and delivery

Primary Responsibilities: Primary Responsibilities: Intern responsibilities will vary day by day to accommodate the needs and schedules of community partners but will likely include tasks such as:

- Building greenhouses and raised garden beds
- Planting trees in urban reforestation projects, and removing invasive plants
- Planting, harvesting, processing, and delivering locally grown food
- Teaching short environmental education courses to small groups of K-12 students
- Communicating their **internship** through an end-of-summer project, which might include an original piece of journalism; a presentation at the UD undergraduate research symposium; a poster; or other similar products.

Faculty Mentor: McKay Jenkins

Contact Information: mckay@udel.edu

Time Commitment: Part Time

Project Title: Initial Development of a Dual-Factor Progress-Monitoring Tool for School-Based Social, Emotional, and Behavioral Interventions

Project Description: Given the well-documented youth mental health crisis, schools are in urgent need of practical measures to evaluate students' responses to social, emotional, and behavioral (SEB) interventions within multi-tiered systems of support (MTSS). Currently available tools focus exclusively on SEB concerns, use deficit-based language, and lack sensitivity to short-term changes. Dual-factor mental health frameworks conceptualize SEB strengths and subjective well-being as distinct from the absence of symptoms and concerns. Assessment guided by dual-factor frameworks has the potential to reduce stigma and improve the nuanced measurement of socially significant intervention targets.

With this project, we seek to develop the foundation for a novel dual-factor progress monitoring tool—one that is sensitive to short-term changes in students' SEB strengths and

concerns; usable by both students and teachers; feasible for brief, weekly administration; and designed to support decision-making regarding Tier 2 and 3 SEB supports within MTSS.

Primary Responsibilities: Students will join a research team enthusiastic about partnering with Delaware school communities to develop and evaluate usable tools to support school mental health efforts.

As a part of this team, students will have opportunities to:

- Provide feedback on measure and material prototypes
- Conduct literature searches and reviews in the area of school mental health assessment and intervention
- Enter and analyze school implementation and outcome data
- Prepare visual materials to support study outreach and recruitment as well as tool implementation and technical assistance
- Support IRB protocol and continuing report development
- Serve as co-presenter/co-author in project dissemination efforts

Additional Requirements Needed:

- Use Excel to enter and analyze data (preferred: SPSS or R experience)
- Navigate UD library resources to conduct literature searches
- Apply APA style (7th edition) to prepare citations and reference lists

Major in psychology, education, and/or human services; interest in pursuing school psychology/school mental health preferred

Faculty Mentor: Brittany Zakszeski

Contact Information: bnz@udel.edu

Time Commitment: Part Time

Project Title: Advancing School Climate Measurement and Improvement Planning in Delaware

Project Description: The Delaware School Climate Survey (DSCS; <https://www.delawarepbs.org/de-school-climate-survey/>) has been administered in Delaware schools for many years, with approximately 150 schools participating annually in recent years. This project, a partnership between the Center for Disabilities Studies and School of Education faculty, will evaluate opportunities for refining the DSCS to be more

relevant and usable by Delaware schools, with particular emphasis on the DSCS's utility in shaping school improvement efforts.

Primary Responsibilities: Students will join a research team enthusiastic about partnering with Delaware school communities to develop and evaluate usable tools to support climate promotion efforts.

As a part of this team, students will have opportunities to:

- Conduct literature searches and reviews in the area of school climate and assessment
- Analyze survey data and prepare data summaries
- Prepare visual materials to support study outreach and recruitment as well as tool implementation and technical assistance
- Support IRB protocol and continuing report development
- Serve as co-presenter/co-author in project dissemination efforts

Additional Requirements Needed:

- Use Excel to enter and analyze data (preferred: SPSS or R experience)
- Navigate UD library resources to conduct literature searches
- Apply APA style (7th edition) to prepare citations and reference lists

Faculty Mentor: Brittany Zakszeski

Contact Information: bnz@udel.edu

Time Commitment: Part Time

Project Title: Increasing Resilience of Social Systems to Public Health Disasters and Emergencies

Project Description: Individuals, social and physical infrastructures, and communities experience significant loss of many types of resources (e.g., income, safe spaces, social support, housing, healthcare, and social networks) during a disaster or emergency. These losses intensify the negative health impacts of disasters, particularly among those who are most physically and socially vulnerable to disasters. Applying theories from disaster research, we will explore different social infrastructures by collecting qualitative and quantitative data. Findings will be used to improve preparedness, planning, response, and recovery and reduce the public health impacts of disasters.

Primary Responsibilities: Working with an interdisciplinary team of Principal Investigators, the student would gain experience in all phases of the research process from

developing research questions, institutional review board protocols, collecting and analyzing qualitative and quantitative data, and writing for peer-reviewed conferences or publications.

Additional Requirements Needed: Public Health, Interest in Disasters and Emergencies

Faculty Mentor: Jennifer Horney

Contact Information: horney@udel.edu

Time Commitment: Full Time

Project Title: The role of Six1 and Six1-associated proteins in development and disease

Project Description: SIX1 is a homeodomain-containing transcription factor that acts as either an activator or repressor depending on its interaction with co-activators or co-repressors. Because SIX1 alone cannot induce transcription, modulation by co-factors is essential for its function. In humans, mutations in SIX1 and its co-factor EYA1 account for roughly 50% of branchio-oto-renal (BOR) syndrome cases, a disorder characterized by craniofacial defects and hearing loss. The remaining ~50% of cases lack a known genetic cause. Since SIX1 activity depends on protein–protein interactions, we are investigating newly identified Six1-interacting proteins as potential novel BOR-associated genes. To evaluate the in vivo and in vitro function of these candidate co-factors and the impact of Six1 mutations in craniofacial development, we use two model organisms in which our lab has extensive expertise: mouse and Xenopus; as well as culture of cell lines relevant to craniofacial development. By integrating rapid in vitro assays with in vivo functional studies, this work will identify which putative Six1-interacting proteins are true co-factors and determine how they contribute to Six1-mediated developmental processes. This approach has the potential to uncover new genes involved in BOR pathogenesis without relying on scarce patient samples, thereby expanding our understanding of the molecular mechanisms underlying this congenital disorder.

Primary Responsibilities: Students would be performing molecular cloning, solution making, cell culture-based assays, processing of samples collected by PhD students, and tissue sectioning of samples for histology.

Faculty Mentor: Andre Luiz Pasqua Tavares

Contact Information: tavaresa@udel.edu

Time Commitment: Part Time

Project Title: The interface between cellular metabolism and regulation of RNA transcription

Project Description: Our lab has recently focused our efforts on a newly discovered form of RNA "capping" whereby RNA polymerases initiate transcription with cellular metabolites such as NAD resulting in RNAs that carry a 5' metabolite cap. This new type of RNA capping has the ability to directly affect cellular gene expression by linking cellular metabolism with RNA transcription and by affecting the function, localization and stability of capped transcripts. Our research group is working on projects to better understand why and when RNA polymerases will choose metabolites over standard NTPs to initiate transcription and also to figure out what happens to RNAs that carry these metabolite caps once they are made.

We primarily use the bacterium *Escherichia coli* and brewers yeast *Saccharomyces cerevisiae* as model systems for this work as they are both genetically tractable (easy to genetically manipulate) and we can easily control their metabolic state based on how we grow them. Current undergraduate projects in the lab include: assessing overall levels of NAD and other metabolite capping in vivo, purification and characterization of known capped RNA interacting proteins in vitro, determining cellular localization and function of capped RNA interacting proteins in vivo and projects studying the mechanism of RNA polymerase as an enzyme.

Primary Responsibilities: Students will be assigned their own independent research projects that could involve molecular cloning, protein purification, performing bacterial screens, in vitro transcription and other biochemical assays, bioinformatics and possibly microscopy. There are a variety of projects for students to choose from depending on their personal interests. Each student will be directly mentored by one of the graduate students in the lab who will provide training and guidance in pursuing their individual projects.

Additional Requirements Needed: Students must have taken and passed BISC207 and 208, CHEM103 and 104, or equivalent integrated intro courses. Completion of some upper-level Biological Sciences or Chemistry coursework also preferred (BISC300, or 303, or 401, CHEM214, or 527 or 641).

Faculty Mentor: Jeremy Bird

Contact Information: jgbird@udel.edu

Time Commitment: Full Time

Project Title: Real Time Context-aware Risk Index Engine for Autonomous Vehicle

Project Description: This project implements the Context aware Risk Index (CRI) framework in a real autonomous driving stack using ROS 2 and C plus plus / python. CRI is a modular, lightweight risk estimation method that converts sensor data into directional measures of collision risk and uses them to guide safer driving behavior. It builds a dynamic safety envelope from Responsibility Sensitive Safety rules, computes per object risk from relative orientation, speed, and time to collision, and aggregates these into an interpretable scene level risk score and dominant risk direction.

Students will translate this framework from the paper into a practical ROS 2 package that runs on realistic autonomous vehicle sensor inputs. The system will subscribe to LiDAR, camera, and IMU topics, extract the required kinematic and road parameters, and compute the CRI values at each control cycle. The final goal is a real time node that outputs context aware risk indices and dominant risk directions that can be consumed by downstream modules such as AutoRecall, planning, or supervisory control. Students will also profile runtime latency and validate that CRI can run within strict real time constraints. This project sits at the intersection of perception, vehicle dynamics, and safety aware control and provides a complete path from algorithmic paper to working robotic software.

Primary Responsibilities: Students will first study the CRI paper to identify all required inputs, including ego speed, relative position and velocity of objects, road speed limit, lane count, and object orientation.

Next, they will design a ROS 2 node graph that connects to existing IMU, LiDAR, and camera pipelines. This includes writing C plus plus subscribers to common message types (for example sensor msgs and nav msgs), transforming detections into the ego centered frame, and computing relative kinematic quantities needed by the CRI equations.

Students will then implement the full CRI calculation in C plus plus: construction of the RSS based safety envelope, orientation risk, longitudinal and lateral time to collision risk, speed related risk, spatial fusion into a per object CRI, and eight direction sector aggregation into a final scene level risk score and dominant risk direction.

Finally they will pack the whole CRI implementation into a ros2 node, which subscribe to sensors data, output real-time CRI value to CRI topic. The whole process should be done in at least 10Hz.

Required Skills:

1. Solid programming experience in C plus plus or python.
2. Basic familiarity with ROS 2 concepts such as nodes, topics, and messages.
3. Comfort working in Linux with command line tools, CMake builds, and Git.
4. Background in linear algebra and basic physics, especially kinematics and relative motion.
5. Willingness to read research papers and translate equations into efficient code.

Preferred but not required: major in Computer Science, Electrical and Computer Engineering, Mechanical Engineering with robotics focus, or a related field.

Faculty Mentor: Weisong Shi

Contact Information: weisong@udel.edu

Time Commitment: Full Time

Project Title: Crime Law Gender Justice

Project Description: Women's pathways into crime are profoundly gendered, and are distinctly influenced by trauma and gender-based violence. Women convicted of crimes are stigmatized with the double bind of feminine expectations that assume caregiving and promote stereotypical morality and condemn when criminal convictions confound these expectations; women face compounded obstacles to re-entering their communities as a function of gender. At the same time, our previous research shows that people convicted of criminal offenses depend on women (often their mothers, wives or girlfriends) to manage the re-entry experience and smooth the way to housing, employment and family re-integration; through this unpaid labor, they themselves fall under correctional surveillance and control. Thus gender is integral to understanding both the experience of women re-entering after prison and the experience of supporting re-entering loved ones and community members. This research therefore takes a two-pronged approach to examine the experiences of women with criminal convictions when they have joined or tried to participate in programming, education or religious community and of women who volunteer in supporting roles to facilitate re-entry. What sustains their efforts? How did they experience stigmatization and/or acceptance? We will focus on the unpaid and highly gendered work of re-entry, with special attention to the role religion plays in motivating and sustaining women in re-entry. A URP student researcher will allow more targeted collection and dissemination of data on women's re-entry experiences in Delaware. Since 2022 I have worked with an intergenerational team of students (Crime/Law/Gender/Justice research group) to explore women's prison re-entry experiences., With two undergraduate researchers, I have completed 75 interviews to date on what happens when people leaving

prison seek belonging (20 with women who serve in volunteer roles that support re-entry, and 13 with women re-entrants). With additional support, we can continue this productive collaboration and extend our reach.

Primary Responsibilities: The URP student researcher will need to be available to attend in person, weekly meetings at 2:30 PM on campus. The student will join our research team as we finalize an article about religious support in prisoner newsletters, and begin new data analysis. It may be possible to join interviews with volunteers as well. It is also possible that we will launch a new oral history project that interviews Delaware professionals who have worked in corrections (I'm applying for humanities funding that would pay those research participants).

Additional Requirements Needed: Some background in criminal justice, either from classes or from personal experience. Ability to work in a small group with others (and to attend in person meetings Tuesday 2:30), ability to work on tasks independently, and the ability to speak up about your questions, insights and concerns.

Faculty Mentor: Chrysanthi Leon

Contact Information: santhi@udel.edu

Time Commitment: Part Time

Project Title: Investigation of the Earth's Mantle

Project Description: Student will join the Mantle Processes Group to work on a project using field samples of mantle rocks to study the interior of the Earth. Research projects will explore questions such as: (1) What do sample microstructures indicate about fault-zone deformation? (2) How does sample petrography constrain hydrothermal alteration? (3) What extent of prior melting is indicated by the rock's chemical composition?

Primary Responsibility: Students will meet regularly with their project mentor and will participate in weekly lab meetings to gain familiarity with geoscience research. Students will analyze hand samples and thin sections to identify areas of interest for compositional or microstructural analyses. Students may have opportunities to collect data by either laser-ablation inductively coupled plasma mass spectrometry (for compositional data) or by electron backscatter diffraction (for microstructural data).

Additional Requirements Needed: Students will participate in cataloging and organizing field samples, organizing data in Excel spreadsheets, and assisting with keeping the research laboratory in order.

Students need to have taken GEOL302 (Petrology) so that they have experience using a petrographic microscope for the identification and interpretation of minerals in thin sections.

Faculty Mentor: Jessica Warren

Contact Information: warrenj@udel.edu

Time Commitment: Part Time

Project Title: The Racial Geography of Childcare

Project Description: This project uses a combination of administrative data, in-depth interviews, and policy research to understand how access to childcare varies across communities based on racial composition. The project will examine childcare ecologies at the neighborhood level in majority Black cities in four states with varying policy contexts.

Primary Responsibilities: Students would help with literature reviews, input of administrative data, and policy background research.

Additional Requirements Needed: While no specific skills would be required, students would be expected to clearly synthesize and articulate existing scholarship.

Faculty Mentor: Jennifer Bouek

Contact Information: jbouek@udel.edu

Time Commitment: Part Time

Project Title: Supporting New Teachers' Equity Learning: A Longitudinal Study of Sensemaking and Development

Project Description: How do future teachers make sense of equity and their role in creating more equitable schools? How do organizations support them in this sensemaking and learning? This longitudinal research project follows pre-service teachers over time to understand how their thinking about equity evolves throughout their teacher preparation program and into their early teaching careers. It seeks to understand how future educators make sense of how equity-focused preparation content (does not) connect across their various courses and relates to their future work in classrooms.

The study uses qualitative methods—including ongoing semi-structured interviews and artifact analysis—to trace how pre-service teachers' understanding of equity-related issues

develops in response to their coursework, field experiences, and the broader contexts in which they're learning to teach. By following participants over time and across various courses, we can examine not just what they learn, but how their sensemaking processes unfold over time. The ultimate goal is to generate insights that can inform teacher education practice and theories of learning: What experiences are most formative for developing equity-oriented practice? How do aspiring teachers integrate (or struggle to integrate) equity principles into their emerging teacher identities? What supports do they need as they navigate politically charged terrain? It also contributes to broader conversations in education research about teacher learning, professional development, and the relationship between teacher beliefs and classroom practice. While an ongoing study, the invitation for undergraduate participation would be for a slice of this study, as described below.

Primary Responsibilities: Undergraduate researchers will participate in the current stage of the data collection of the study, with opportunities to develop skills in qualitative research methods. Depending on your interests and experience level, you may engage in several activities:

- **Interview Work:** Upon approval and certification, a student could help recruit participants, potentially conduct or co-conduct interviews with pre-service teachers, and transcribe interview recordings. This offers direct experience with human subjects research (upon approval and certification).
- **Document and Artifact Analysis:** A student could review and analyze materials such as lesson plans, teaching philosophies, course assignments, and other documents that illuminate how participants think about equity in their teaching.
- **Literature Review:** A student could help identify and synthesize relevant research on teacher learning, equity in education, and sensemaking.

Throughout the project, student(s) would meet regularly with me to discuss their work, learn about qualitative research methods, and reflect on what we're learning from the data. Given interests and skillsets, student(s) may also have opportunities to contribute to research decisions, develop independence as a researcher, and potentially co-present findings at research symposia.

Additional Requirements Needed: No specific skills required, but students' useful skills include strong written and oral communication skills; attention to detail; ability to work both independently and collaboratively; genuine interest in education and equity issues; respect for confidentiality and research ethics. Prior research experience is helpful but not required.

This experience is a best match for students interested in education, teaching, social justice, or qualitative research methods. While students majoring in education, sociology, human development, or related fields may find this particularly relevant to their interests, students from any major are welcome to apply.

Faculty Mentor: Joy Esboldt

Contact Information: jesboldt@udel.edu

Time Commitment: Part Time

Project Title: The Poison Book Project

Project Description: This highly interdisciplinary initiative investigates the materiality of Victorian-era, mass-produced bookbindings in Europe and North America. Research focuses on identifying toxic heavy metal pigments through instrumental and chemical analysis; inventorying confirmed arsenic-containing bookbindings and developing infographics to communicate trends; exploring the art historical context of the production and use of heavy metal pigments at an industrial scale during the 19th and early 20th centuries; and developing health and safety guidelines for hazardous collections. For more information, visit the Poison Book Project website at <https://sites.udel.edu/poisonbookproject/>.

Primary Responsibilities: Our interdisciplinary topic has needs in diverse areas, including scientific analysis, historical research, data inventory and management, and environmental health and safety. The summer scholar is invited to explore whichever aspect of the project best fits their skills and interests. Project leads Dr. Melissa Tedone (conservator/book historian) and Dr. Rosie Grayburn (heritage scientist) look forward to helping the summer scholar develop a project with appropriate scope and mentor student research in any of the above-described areas.

Additional Requirements Needed: Students should have strong attention to detail and time management skills. Additionally, students should have skills in at least ONE of the following areas:

- Historical research using primary sources
- Experience with library or museum databases as a back-end user
- Experience using analytical instrumentation (such as x-ray fluorescence, Raman

spectroscopy, GCMS, or FORS) and interpreting results – or a basic foundation in chemistry/physics that will support learning how to use such instrumentation

This internship is open to all students in the College of Arts and Sciences, but is particularly well-suited to those with an interest in material culture. Students will be required to complete health and safety training to participate in this project. Students will need to provide their own transportation to Winterthur Museum, Garden & Library.

Faculty Mentor: Melissa Tedone

Contact Information: mtedone@udel.edu

Time Commitment: Part Time

Project Title: Department of Education Research Projects

Project Description:

Primary Responsibilities: Students would assist by providing basic statistical analysis, copy editing, analysis of results (typically descriptive statistics) and some minor qualitative data work.

Additional Requirements Needed: Basic stats or good writing skills is very helpful. Knowledge of the American education system is a must.

Faculty Mentor: Jeff Klein

Contact Information: kleinjef@udel.edu

Time Commitment: Part Time

Project Title: Multilateral Participation and Practices in Asia

Project Description: At the global level, the intensification of US-China rivalry at the regional level is understood to have injected fragmenting pressures on global multilateral institutions and practices. This examines multilateralism at the regional level and specifically at the level of Northeast and Southeast Asia. It does so by 1) identifying patterns of participation by individual states and 2) chronically different kinds of multilateral adaptation.

Key questions asked are: what does multilateralism look like at the regional level, compared to the global level? Are the concerns and threats identified at the global level the same for the regional level? What do

regional multilateral practices and adaptations tell us about alternative pathways to rule making and governance at a time when global multilateralism is especially challenged?

Primary Responsibilities: Work may involve any of the following: a) tallying or coding participation by individual states; b) chronicling multilateral activity of specific states via official government documents or websites; and c) identifying available materials on multilateral practices

Additional Requirements Needed: Solid grade performance in political science or international relations. Some coursework in international relations or Asia. Ability to work with tables and charts preferred.

Faculty Mentor: Alice Ba

Contact Information: aliceba@udel.edu

Time Commitment: Part Time

Project Title: CRISPR editing in mammalian cells to improve non-standard amino acid incorporation

Project Description: Biopharmaceuticals produced in mammalian cells can benefit greatly from non-standard amino acids (nsAAs). These nsAAs act like new Lego bricks with unique chemical properties, allowing us to build better vaccines and cancer therapies. However, incorporating them is difficult. We typically encode nsAAs by hijacking a genetic "stop" signal, but the cell's natural machinery (specifically a protein called a "release factor") often reads this signal and stops protein production prematurely.

To fix this, we can introduce a mutant release factor that is less aggressive at stopping production, giving a better opportunity for nsAA to incorporate. Unfortunately, simply flooding the cell with this mutant protein is counterproductive – it can still decode the “stop” signal, especially if it outnumbers the nsAA incorporation machinery. Our proposed solution is to use a CRISPR-Cas9 guided base editor to tweak the cell's own DNA. This allows the cell to produce the mutant release factor at native levels.

In this project, you will use CRISPR to edit cells that contain a genomic "sensor"—a reporter system that allows us to easily measure how well the nsAA is being incorporated. This project is ideal for students with molecular cloning experience who are eager to learn mammalian cell culture, CRISPR editing, and protein engineering.

Additional Requirements Needed: Preference for some prior experience in a biological research laboratory or with sterile technique

Preference towards University of Delaware Engineers in the Honors College

Faculty Mentor: Aditya Kunjapur

Contact Information: kunjapur@udel.edu

Time Commitment: Full Time

Project Title: Mixed Methods Synthesis of Teacher Professional Learning

Project Description: We invite undergraduate students to join our research team where they will be exposed to research on teacher learning and learn how to code in Dedoose (a qualitative data analysis software). Our project seeks to understand how to best shape teacher learning in mathematics and science and literacy to improve instruction for students. Hours are flexible.

Primary Responsibilities: Students would be a part of our research team - they will learn how to code text in Dedoose, discuss key themes from the research articles and develop ideas for how to improve how we support teachers in improving their instruction in ways that support student learning. Hours are flexible.

Additional Requirements Needed: No previous experience or skills necessary - just an interest in learning how to summarize research literature, and code text based on key themes and ideas.

Faculty Mentor: Laura Desimone

Contact Information: lauramd@udel.edu

Time Commitment: Part Time
