### Fall 2024 Faculty Opportunities Sorted by Department or Program

*Please see below for full position descriptions hyperlinked in the position title.*

Please *click here* to complete the SPRINT UTRA application by May 21st, at 12:00 PM EST

<table>
<thead>
<tr>
<th>Department or Program</th>
<th>Faculty Name</th>
<th>Project Code</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>American Studies</td>
<td>Elena Shih</td>
<td>AMEST-2</td>
<td>Visualizing long-term pandemic effects in Rhode Island</td>
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<td>American Studies</td>
<td>Robert Lee</td>
<td>AMEST-1</td>
<td>Against Invisibility, Asian American Family Photography</td>
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<td>American Studies and Population Studies and Training Center (PSTC)</td>
<td>Kevin Escudero</td>
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<td>Anthropology</td>
<td>Jessaca Leinaweaver</td>
<td>ANTHR-6</td>
<td>Researching the History of Brown's Anthropology Department</td>
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<td>Jordi Rivera Prince</td>
<td>ANTHR-4</td>
<td>Documenting Colonial burial records of Providence's North Burial Grounds</td>
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<td>Taphonomic assessment of historic Colonial tombstones at North Burial Ground</td>
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<td>Using AI Tools to Conduct Large-Scale Archaeological Survey in the Andes</td>
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<td>Studying Ancient Culinary Equipment to Track Taphonomy and Recovery of Microbotanical Residues</td>
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<td>Behavioral and Social Sciences</td>
<td>Alison Tovar</td>
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<td>Ethnoecology in Ancient Mesoamerica: Botanical Reference Libraries and Archaeological Residues</td>
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<td>Strong Families Start at Home</td>
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<td>Project PRISM: Peer Reactions in Sexual risk and Intoxication Moments</td>
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<td>Trauma and Eating Behaviors</td>
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<td>Creating data repository and conducting systematic reviews for mindfulness and integrative health interventions</td>
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<td>Chuck Toth</td>
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<td>Applications of Statistical Methods to Address Health Disparities</td>
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<td>Effects of Clinician-initiated delivery in 35-38 Week of Gestation among Diabetic Women</td>
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<td>Ying Ma</td>
<td>BCFCM-1</td>
<td>Comprehensive Statistical and Computational Tools for Analyzing and Visualizing Spatial Transcriptomics Data</td>
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<td>Dual Use of ENDS and Combustible Cigarettes: Shared, Distinct, and Cross-Conditioned Processes</td>
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<td>Jane Metrik</td>
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<td>Clinical Trial of Cannabis Derivatives in Neuropathic Pain</td>
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<td>CFMES-1</td>
<td>Israel-Palestine: Arts and Humanities in the Public Eye</td>
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<td>Chemistry</td>
<td>Amit Basu</td>
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<td>What's in a name? Well, a lot, it turns out - some chemistry, biology, history, and linguistics, to be more precise.</td>
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<td>Restructuring Advanced Organic Chemistry to Build Integrated Chemical Knowledge</td>
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<td>Phase Separated Polymers as Biomimetic Reaction Vessels</td>
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<td><em>Origin of Color in Cyanotype Printing and Toning: Translating Undergraduate Research into Teaching</em></td>
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<td>CLPSC-16</td>
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<td>Uncovering the strategic mechanisms of visuomotor adaptation with simultaneous eye- and reach-tracking</td>
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<td>Effects of action requirements on attentional biases with 3D objects</td>
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<td>How do children understand and use negation?</td>
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<td>How do children think about possibility and conditionals?</td>
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<td>Baylor Fox-Kemper</td>
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<td>Coastal Ocean Resilience through Observation-informed Modeling</td>
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<td>Research in sustainable camping and field gear for the Department of Earth, Environmental and Planetary Sciences</td>
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<td>The NASA Artemis Program Human Exploration of the Moon and Mars: Designing a 500-day Mars-Like Lunar Mission</td>
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<td>When the Mediterranean dried up</td>
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<td>Seda Salap-Ayca</td>
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<td>Teens and Curriculum: BookTok and the Humanities Reimagined Project</td>
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<td>How Climate Change is Increasing the Risks of K-12 School Closures Due to Extreme Weather Events.</td>
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<td>Family Engagement in First-Grade Children's Education and Schooling: A Comparative Study in Japan and the U.S.</td>
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<td>School of Engineering</td>
<td>Rick Fleeter</td>
<td>SCHEN-6</td>
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<td>School of Engineering</td>
<td>Rick Fleeter</td>
<td>SCHEN-2</td>
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<td>School of Engineering</td>
<td>Rick Fleeter</td>
<td>SCHEN-3</td>
<td>Combating detraining, bone loss and loss of fine motor dexterity in space using Neuromuscular electrical Stimulation (NMES)</td>
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<td>School of Engineering</td>
<td>Roberto Zenit</td>
<td>SCHEN-1</td>
<td>The mechanics of painting brushes</td>
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<tr>
<td>School of Engineering - Fluids and Thermal Sciences</td>
<td>Nils Tack</td>
<td>SEFTS-1</td>
<td>Exploring what makes metachronal swimming highly maneuverable using a bioinspired shrimp robot.</td>
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<td>David Lindstrom</td>
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Faculty Opportunities

**Elena Shih**
Department: American Studies  
Project Type: Research  
**Project Title:** Visualizing long-term pandemic effects in Rhode Island (AMEST-2)

*Project Description:*
This research project seeks a visual artist, Digital or hand illustrator, To create a graphic novel to illustrate the findings of a project on the long-term impacts of COVID-19 on communities in Rhode Island. The visual artist research assistance will work to Capture research findings through different short comic book style illustrations. We will aim to produce several small zine booklets, but will also supplement these with a visual digital data archive of the illustrations.

Required skills: Digital or hand drawn, illustration or graphic design experience. Experience translating qualitative data into different visual forms.

Preferred skills: Preference for who have taken courses and ethnic studies, gender and sexuality studies, and or, who have worked Community based organizations.

Is this project for more than one student: Yes

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**Robert Lee**
Department: American Studies  
Project Type: Research  
**Project Title:** Against Inviisibility, Asian American Family Photography (AMEST-1)

*Project Description:*
AGAINST INVISIBILITY. Asian American Family Photography is a digital archive of 5000+ photographs chronicling the history of two related families of Chinese ancestry in the United States from ca1890 to 1990. This summer we will be cataloging the digital archive, developing genealogies, and archiving correspondence and other materials. (for a fuller project description see attached link. https://ebookcentral-proquest-com.revproxy.brown.edu/lib/brown/reader.action?docID=6236004&ppg=164).

Is this project for more than one student: Yes
Kevin Escudero  
Department: American Studies and Population Studies and Training Center (PSTC)  
Project Type: Research  
Project Title: Immigrant Student Research Project Lab (ASPST-1)  

Project Description:
The Immigrant Student Research Project (ISRP) Lab is focused on examining the impact of immigrant legal status on immigrant graduate student experiences in higher education and during their transition into the U.S. workforce. Professor Escudero and other ISRP Lab members are currently in the process of launching a national online survey of U.S. citizen and undocumented/DACAmented students enrolled in such programs. At the completion of the survey, participants will be invited to participate in a follow up Zoom interview where they will be able to expand on topics/themes covered in the survey. During the fall 2024 semester, the selected student research assistants will work alongside other ISRP Lab members to analyze the survey data and recruit follow up interview participants.

Link to the lab’s website: https://brownisrp.squarespace.com/

Required skills: N/A

Preferred skills: 1) Previous coursework on the experiences of immigrant communities in the United States and/or volunteer experience working with immigrant communities

2) Prior coursework and/or research experience utilizing survey research methods and related forms of statistical analysis

3) Prior coursework and/or research experience utilizing interview methods

Is this project for more than one student: Yes

Jessaca Leinaweaver  
Department: Anthropology  
Project Type: Research  
Project Title: Researching the History of Brown's Anthropology Department (ANTHR-6)  

Project Description:
This research project will involve collecting and analyzing information about the history of Brown's
Anthropology Department. A brief history is here [https://anthropology.brown.edu/who-we-are/history]. The student researcher will work with some existing collections (e.g. searching the Brown Daily Herald archive) and create others (e.g. interviews with retired faculty). The student researcher will be learning and employing simple qualitative analysis techniques (open and closed coding of text passages, for example), and writing substantial portions of a fuller history. This project can take multiple, simultaneous forms and the student researcher is welcome to propose and carry out different presentation formats (visual, audio, text, etc.) resulting in a research portfolio.

Required skills: Interest in qualitative social science (e.g. anthropology, history, sociology, ethnomusicology, ethnic studies)

Preferred skills: N/A

Is this project for more than one student: No

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**Jordi Rivera Prince**  
Department: Anthropology  
Project Type: Research  
**Project Title:** Documenting Colonial burial records of Providence’s North Burial Grounds (ANTHR-4)

**Project Description:**  
The oldest civic institution in the city of Providence is the North Burial Ground, a common burial ground which started in 1700 – long before Providence was even chartered as a city. These grounds have long been integrated by class and race, which was atypical in early colonial history. Although the cemetery began in 1700, burials were not formally documented in a ledger 1849. Ledger documentation has continued to the present day. Within these ledgers, NBG directors past and present recorded information such as name, occupation, age, and other notes regarding the deceased. However, a majority of this hand-written information is not digitized or transcribed. As part of a community-engaged research project with North Burial Ground, I am seeking two researchers to assist with the digitization and transcription of the handwritten NBG burial ledgers that are currently housed at NBG’s head office. You will follow an already established protocol. Note: students will be expected to be present at NBG in order to digitize these documents.

Required skills: MUST be able to read cursive lettering, detail oriented, proficient in using google forms

Preferred skills: N/A

Is this project for more than one student: Yes

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**Jordi Rivera Prince**  
Department: Anthropology
Project Type: Research
Project Title: Taphonomic assessment of historic Colonial tombstones at North Burial Ground (ANTHR-5)

Project Description:
Providence’s North Burial Ground is home to over 100,000 tombstones. Importantly, different tombstone materials are subject to different deterioration processes. Assessing taphonomy, or how advanced these deterioration processes have affected particular tombstones, allows the director of NBG to make important decisions concerning preservation efforts of the historic tombstones. As part of a community-engaged research project, I am seeking two researchers to assist with documentation of tombstones within North Burial Ground, with particular focus on tombstones placed from the cemetery’s inception in 1700 through 1848, targeting the earliest and most vulnerable tombstones on the grounds. This project requires students to follow an already-existing data collection protocol, photograph tombstones, and enter data into a master database that will be shared with NBG’s director as part of the ongoing efforts to preserve this historical landmark. Note: students will be expected to be present at NBG in order to collect data.

Required skills: must be willing to work outdoors, detail oriented, proficient in using google forms

Preferred skills: N/A

Is this project for more than one student: Yes

Parker VanValkenburgh
Department: Anthropology
Project Type: Research
Project Title: Using AI Tools to Conduct Large-Scale Archaeological Survey in the Andes (ANTHR-3)

Project Description:
This UTRA project seeks to involve Brown undergraduate students in the process of applying cutting-edge AI tools to map archaeological sites at nearly continental scale. In doing so, we seek to address a longstanding problem in the field: the fact that while archaeologists work at relatively small scales, many of the past societies and political formations that we study extended over hundreds of thousands (even millions) of square kilometers. To make matters more complicated, archaeologists tend to manage project-specific databases that do not share common schemas, making it difficult to join them together. Even in those places where datasets from different regions can be aligned with one another, their sum totals do not typically constitute representative samples, because our projects are not systematically distributed across the territories of ancient social units.

This project is attempting to generate a series of complementary, interregional views of archaeological settlements and landscapes at a scale impossible to achieve through field research, by mapping sites that are visible in high-resolution satellite imagery using AI models. In collaboration with colleagues at universities in the US, Peru, Chile, Bolivia and Australia, we are conducting an “AI-assisted” archaeological imagery survey covering approximately 1.8 million square kilometers of the central Andes. In turn, our goal is to use these data to gain large-scale perspectives on settlement and land use in the
past and to enable novel insights into the long term history of Indigenous adaptations to the diverse environmental contexts of the Andean area.

This project is linked to larger, multi-institution research project funded by the National Endowment for the Humanities (https://apps.neh.gov/publicquery/AwardDetail.aspx?gn=HAA-293452-23) that is also detailed here: https://anthropology.brown.edu/news/2023-10-17/neh-digital-advancement-grant. The project website (http://www.geopacha.org) is currently undergoing a redesign and will be updated by the end of June.

To date, our team has developed a new AI foundation model for remote sensing data in the central Andes and tuned several models to identify key archaeological features (including buildings, terraces, and corrals). In summer 2024, we will deploy the models and begin the process of auditing their results. Participants in this UTRA project would join the team in fall 2024 to examine and enrich the resulting data through a revised version of our webapp GeoPACHA: Geospatial Platform for Andean Culture, History, and Archaeology. Specifically, they will work closely with Prof. Parker VanValkenburgh (Anthropology) to review survey data from the northern coastal region and northeastern highland regions of Peru.

Required skills: No experience is required.

Preferred skills: Candidates who have pursued coursework in anthropological archaeology or plan to concentrate in anthropological archaeology are preferred, as is knowledge of Spanish. No experience in computer science or deep learning is required, but students with such experience may find aspects of the project particularly rewarding.

Is this project for more than one student: Yes

Shanti Morell-Hart  
Department: Anthropology  
Project Type: Research  

**Project Title:** Studying Ancient Culinary Equipment to Track Taphonomy and Recovery of Microbotanical Residues (ANTHR-1)

**Project Description:**
In this project, we are researching how cooks in the ancient Maya area used prismatic obsidian blades, a common type of culinary equipment frequently recovered from archaeological excavations. We are seeking to 1) understand deposition on prismatic obsidian blades (formation processes from the paleoethnobotanical perspective), 2) observe transformations to prismatic obsidian blades from different sorts of plant taxa (formation processes and usewear from the lithic analyst perspective), and 3) describe the ways that (novices) attempt to use obsidian blades in culinary activities, to develop an understanding of sensory experiences and embodied practices. Students will 1) observe the placement of starch grains and phytoliths on new prismatic blades, 2) track the recovery rates of different plant residues in extractions, and 3) document usewear that results from different sorts of plant-based activities. Students will then 4) try to identify residues extracted from ancient obsidian blades. Students will also have the opportunity to document the experience of using prismatic blades in food preparation, in controlled experiments.
Shanti Morell-Hart  
Department: Anthropology  
Project Type: Research  
**Project Title:** Foodways and Ethnoecology in Ancient Mesoamerica: Botanical Reference Libraries and Archaeological Residues (ANTHR-2)  

*Project Description:*  
In this project, we are completing work on a plant reference library of economic species for archaeological investigations of foodways and ethnoecology in ancient Mesoamerica. These activities are part of an ongoing partnership between archaeologists, botanists, and local collaborators in Mexico, Guatemala, and Honduras. To answer questions related to subsistence and landscape management, we are developing this botanical reference collection to compare with ancient specimens found in archaeological excavations. Students will curate specimens and document key characteristics of the collections, through morphological analyses. In Fall 2024 we will be focusing on leaves, fibers, and phytoliths form palm species of the Southern Maya Lowlands; and carpological and starch specimens from the Maya, Mixtec, and Zapotec areas. Students will then compare the reference specimens with botanical residues extracted from excavated artifacts and sediments.

Required skills: N/A  
Preferred skills: Prior coursework in archaeology and/or biology; experience with microscopy; Spanish language (reading)  

Is this project for more than one student: Yes

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Alison Tovar  
Department: Behavioral and Social Sciences  
Project Type: Research  
**Project Title:** Strong Families Start at Home (BESS-10)  

*Project Description:*  
The Strong Families Start at Home/Familias Fuertes Comienzan en Casa, is a National Institute of Health funded randomized controlled trial (1R01HD108832-01A1) that is testing the impact of a home-based “nutrition/feeding” vs. a “reading readiness” intervention with low-income, Hispanic/Latinx families on the diet quality of preschool aged children. The intervention, delivered by community health workers, is
intended to empower caregivers to identify and implement positive feeding practices, tailor their feeding practices to their child’s appetitive traits, and use healthy food shopping and preparation strategies.

Required skills: N/A

Preferred skills: Attention to detail, knowledgeable about nutrition/diet

Is this project for more than one student: Yes

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**Alison Tovar**  
Department: Behavioral and Social Sciences  
Project Type: Research  
**Project Title:** What’s on Your Plate Study (BESS-9)  

*Project Description:*  
In 2022, the General Assembly of Rhode Island passed an amendment to the Public Assistance Act, which provides funding to administer and implement the Rhode Island Supplemental Nutrition Assistance Program’s (SNAP) Incentives Program (Eat Well be Well). The aim is to improve access to and encourage consumption of fruits and vegetables among SNAP participants. SNAP participants will receive a fifty-cent ($0.50) for every dollar ($1.00) spent on fruits and vegetables from qualified retailers directly to their EBT Card. This study is evaluating the impact of this legislation on dietary intake and also conducting follow-up interviews with participants to learn about their experiences with the program.

Required skills: N/A

Preferred skills: Interviewing, qualitative data collection and analysis

Is this project for more than one student: No

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**Cara Murphy**  
Department: Behavioral and Social Sciences  
Project Type: Research  
**Project Title:** Clinical Research Evaluating Smoking Cessation with E-Cigarettes, and Nicotine Therapy (CRESCENT) Study (BESS-8)  

*Project Description:*  
The Murphy Brown Lab (MBL) in the School of Public Health is seeking 1-2 students to join us! The MBL conducts rigorous research that can offer new insights to understand and address modifiable risks to health such as the use of tobacco and other addictive substances, and the intersection of addictive behaviors and weight-related behaviors that can contribute to obesity. In the fall of 2024, we will be launching a new project through the Brown Center for Addiction & Disease Risk Exacerbation to test the
Impact of e-cigarettes and nicotine replacement therapy on smoking, weight, and other clinical indicators like inflammation and exhaled carbon monoxide. This study, to be conducted fully remotely, will recruit individuals with obesity who smoke cigarettes from across the US and use Zoom for conducting remote research sessions. Students will have the opportunity for direct participant contact (human subjects research experience) including: 1) conducting study assessments with participants (following training) such as interviewing participants and guiding them through measurement of key study variables; 2) helping to update and maintain study databases; 3) coordinating participant appointments, materials, and compensation; 4) following participants throughout the study and promoting study retention via reminders and outreach; 5) being a liaison to participants throughout their time in the study. Students will attend weekly lab meetings with the study investigator and other students and staff contributing to the project. Our team website is: https://sites.brown.edu/murphybrownlab/

Required skills: Familiarity with Zoom, Microsoft Suite (Word, Excel), Google Suite (Gmail, Google Calendar, Google Voice, Google Drive), strong communication and interpersonal skills, ability to work independently and as part of a team, ability to develop rapport with research participants.

Preferred skills: Prior research experience with human subjects, at least one course in psychology or public health.

Is this project for more than one student: Yes

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**Diana Grigsby-Toussaint**  
Department: Behavioral and Social Sciences  
Project Type: Research  
**Project Title:** Green space, sleep, and mental health (BESS-7)  

*Project Description:*  
This study seeks to examine the relationship between the exposure to green space and the impact on sleep and mental health among elementary school children in Rhode Island. Students will have the opportunity to learn to take anthropometric measures, conduct surveys, and collect objective measures of sleep and physical activity.

Required skills: Students should have taken at least one course in statistics, and have some experience working with children

Preferred skills: Bilingual (Spanish or Portuguese)

Is this project for more than one student: No

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**Michelle Haikalis**  
Department: Behavioral and Social Sciences  
Project Type: Research
Project Title: Project PRISM: Peer Reactions in Sexual risk and Intoxication Moments (BESS-6)

Project Description:
Bystander-approaches to sexual violence prevention are increasingly common on college campuses, yet there is a need for research to understand the real-world situational factors that promote bystander behavior. The current study will use weekend morning reports to answer key questions about the within-person effects of alcohol intoxication and situational context on bystander behavior in social drinking contexts. This will allow us to understand the factors that drive changes in individuals' bystander behavior over time. Results will be valuable for the refinement of situational models of bystander behavior and the improvement of empirically-informed bystander-focused sexual violence prevention. This study has a few key components: (1) cognitive interviews, (2) weekend morning reports, (3) focus groups with the final set of weekend morning report participants. We are completing cognitive interviews this summer and will begin weekend morning reports in Fall 2024. UTRA students will be involved with preparing for delivery of the weekend morning reports. This includes assisting with finalizing the protocol, recruiting, scheduling and coordinating with participants to enhance retention. Students will also have the opportunity to engage with participants during online orientation sessions for the study, and to track participant compliance during data collection. As part of training in this lab, students will also gain familiarity with relevant literature focused on sexual violence, alcohol use, and bystander behavior and will have opportunities to develop a variety of research skills based on your interests.

Required skills: Strong interpersonal communication skills, good time management, flexibility & evening availability, good attention to detail

Preferred skills: Interest in/history of commitment to sexual violence prevention or sexual health is ideal, prior experience in social sciences research, strong computer skills, preferred prior coursework: social psychology, research methods

Is this project for more than one student: Yes

Patricia Risica
Department: Behavioral and Social Sciences
Project Type: Research
Project Title: Trauma and Eating Behaviors (BESS-4)

Project Description:
Trauma is experienced by a many people who proceed through life as survivors. The underlying health effects of trauma are not well understood. One way that trauma affects health outcomes is as a deterrent to healthy behaviors. People identifying as women may be less likely to be screened for breast or cervical cancer, less likely to breastfeed, and more likely to struggle with emotional eating, all of which increase the risk of obesity, cancer, finding cancers later. The students working on this project will conduct a structured review of studies linking trauma with eating behaviors among people identifying as women to elucidate the current literature on trauma as an antecedent to poor health behaviors. At this phase in the project, students will participate in abstract and title review, and begin reading papers included in this search.

Our team will meet weekly as a group. I will be available to answer questions via email or in person should they arise between team meetings. Students will also work with the Public Health Librarian and
other teams working on structured reviews who will help guide their process, answer questions and show examples.

Required skills: N/A

Preferred skills: Excellent writing, organization, and communication skills.

Is this project for more than one student: No

Patricia Risica
Department: Behavioral and Social Sciences
Project Type: Research
Project Title: Healthy Start (BESS-5)

Project Description:
Health Start is an 8-month intervention for English and Spanish-speaking family childcare providers (FCCP) training them to provide a healthy food and physical activity environment in their childcare home and to deliver messages about healthy eating and active living to parents using an existing childcare App, complemented with environmental cues and tailored print and videos delivered to parents. The student working on this project will work with the study team to accomplish one or more of these study tasks participating in the conduct of the study including recruiting participants, conducting surveys, and examining data of participating family childcare providers, parents and children.

Required skills: N/A

Preferred skills: The preferred student will have excellent written and oral communication and organizational skills.

Is this project for more than one student: No

Shufang Sun
Department: Behavioral and Social Sciences
Project Type: Research
Project Title: Adolescent mental health and suicide prevention in rural China (BESS-3)

Project Description:
"Together We Can" is a program that aims to reduce stigma related to mental health and suicide across multi-levels and increase socioemotional skills among adolescents in rural China. The student will be involved in Aim 1 of the project, which includes supporting the investigative team to conduct interviews to gather important data that will inform intervention development. The student will participate in international team meetings regularly on zoom, help China team problem solve potential issues related to project execution, conduct relevant reviews of the literature, and support the overall success of the
Project.

Required skills: Ability to effectively communicate with internal and external partners with integrity is required; ability to conduct relevant literature review is required

Preferred skills: Chinese language skills preferred; ability to work with culturally diverse team of investigators and collaborators is preferred

Is this project for more than one student: No

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**Shufang Sun**  
Department: Behavioral and Social Sciences  
Project Type: Research  
**Project Title:** Creating data repository and conducting systematic reviews for mindfulness and integrative health interventions (BESS-2)

**Project Description:**  
Mindfulness and Integrative Health Data Network (MINDNET), aims to create a highly usable and accessible data repository of complementary and integrative health (CIH) interventions and produce high-quality reviews. Students on this project may involve in the following aspects of the project: (a) coding qualitative interview data to produce a manuscript that will guide the key areas and features of MINDNET project and platform; (b) facilitating creation of study website; (c) supporting systematic reviews and meta-analyses on mindfulness interventions, including literature search, abstract coding, coding of full-text studies, and preparing tables and figures for publications.

Required skills: Proficiency in Excel is required; good communication skills and task/time management skills are required.

Preferred skills: Experiences conducting literature reviews are preferred

Is this project for more than one student: Yes

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**Tayla von Ash**  
Department: Behavioral and Social Sciences  
Project Type: Research  
**Project Title:** Sleep promotion research (BESS-1)

**Project Description:**  
Sleep is an important lifestyle behavior associated with obesity and various chronic diseases. This opportunity is for students interested in sleep promotion or sleep disparities who would like to gain tangible research skills. Students will work on my ongoing projects including a study examining sleep promotion in childcare and a study examining the relationship between sleep and physical activity among...
Latinas. Research activities will vary but may include recruitment, scoring objective sleep data, transcribing interview data, and conducting field observations. There may also be opportunities to analyze data and contribute as a co-author on a manuscript.

Required skills: Must be willing to travel to childcare facilities throughout the state for in-person site observations/assessments. These generally occur between the hours of 12 and 3pm, so availability during these hours at least one day per week is needed.

Preferred skills: Attention to detail, strong writing, data analysis (familiarity with STATA and/or qualitative is a plus)

Is this project for more than one student: No

Chuck Toth
Department: Biology Undergraduate Education
Project Type: Course Development
Project Title: Human Stem Cell Biology Course Development (BIUE-1)

Project Description:
This fall 2024 Course Development UTRA is looking for an undergraduate interested in human disease research to develop mammalian cell culture skills with a goal in being a UTA in the spring of 2025. I will be teaching a brand new CURE course entitled “Modeling Human Disease Using Stem Cells.” The course will use human induced pluripotent stem cells (iPSC) as a tool for students to design and complete their own stem cell research projects. Since it is a new course, I would like to train a student in the fall on the techniques required to assist in the spring course. Techniques would include iPSC cell culture and differentiation, real-time PCR, microscopy, and protocol development. Once the student is familiarized with these skills, they will be then able to serve as a UTA in the spring. These skills are also transferrable to a research lab at Brown or in the biotech industry if a student is looking for research, an internship or employment post-Brown.

The position will run for 8-10 weeks, approximately 4-6 hours per week. There is the potential for a small amount of weekend work in the laboratory.

Here is a copy of the proposed syllabus: https://docs.google.com/document/d/11XxGUhQO0rzmb-ASlqV4H-fXqx0pisFX/edit?usp=sharing&ouid=11727028491355306546&rtpof=true&sd=true

Required skills: Previous coursework required: BIOL0280 OR BIOL0285 OR BIOL0470 OR BIOL1310

Preferred skills: Research experience, specifically cell culture experience or aseptic technique.

Is this project for more than one student: Yes

Anarina Murillo
**Project Title:** Applications of Statistical Methods to Address Health Disparities (BIOST-3)

**Project Description:**
In this project, we will develop tutorials to explore applications of statistical methods to address health disparities and chronic disease outcomes. We will use publicly available data to develop educational modules to be used in classroom teaching that describe statistical methods, assumptions, strengths/limitations of each approach. The target audience for the tutorials include students in public health, medicine, biostatistics and/or data science.

Required skills: Experience with statistical software (R/R Studio preferred), Complete at least one course in Biostatistics, Statistics or Data Science

Preferred skills: Two or more courses in Biostatistics, Statistics or Data Science

Is this project for more than one student: No

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**Project Title:** Examining different distance measures for field comparison when linking individuals (BIOST-1)

**Project Description:**
Record linkage is the process of identifying similar units across multiple data sources, when unique identifiers (e.g. social security number) are not available. These record linkage algorithms can be computationally intensive processes. In some of these applications one compares names across datasets. However, it is not clear what is the best distance measures to use when the names contain multiple parts. In this project we will examine multiple distance measures to compare names across two files. This will entail estimating mixture models and using Markov chain Monte Carlo methods.

Required skills: Programming, APMA 1650, APMA 1660

Preferred skills: Implementing mixture models, MCMC sampling

Is this project for more than one student: Yes

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**Project Title:** Effects of Clinician-initiated delivery in 35-38 Week of Gestation among Diabetic
**Women (BIOST-2)**

*Project Description:*
Clinician-initiated delivery through labor induction or pre-labor cesarean is commonly performed. In 2018, 27% all pregnancies in the US were delivered following labor induction and an additional 10%–24% by pre-labor cesarean delivery. Decisions depend on the balance between the benefits of continued pregnancy for fetal maturity against evolving health concerns for the mother and fetus from allowing the pregnancy to continue. As full-term approaches, the negative consequences of interventional delivery decline and by 39 weeks the benefits of delivery generally outweigh risks. Randomized clinical trials are the gold standard for learning about such effect, but they may be unethical to perform on pregnant women. Thus, we need to rely on observational data to learn such effects. However, using observational data may result in confounding between the decision to undergo clinician-initiated delivery and the potential outcomes of such decision. We have performed an analysis to examine the benefits/harms of clinician-initiated delivery in 35-38 weeks of pregnancy among a cohort of hypertensive women using large cohort study. We are interested in applying similar methodology to examine the effects of clinician-initiated delivery among women with diabetes. This will entail learning about propensity score analysis, programming with R, and learning how to implement various plots and tables for eventual publication.

Required skills: Logistic regression; knowledge of R

Preferred skills: Causal Inference, propensity score

Is this project for more than one student: Yes

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**Ying Ma**
Department: Biostatistics / Center for Computational Molecular Biology
Project Type: Research
Project Title: **Comprehensive Statistical and Computational Tools for Analyzing and Visualizing Spatial Transcriptomics Data (BCFCM-1)**

*Project Description:*
Recent advances in spatially resolved transcriptomics (SRT) have revolutionized our ability to characterize gene expression across tissue locations while preserving spatial context. This progress has been transformative across various fields, such as neuroscience, cancer biology, and regenerative medicine, offering unprecedented insights into cellular ecosystems and their spatial organization. The Ma Lab at Brown has developed several tailored statistical methods for SRT data analysis [1] [2]. Integrating these methods into a comprehensive computational pipeline [3] would be beneficial for the transcriptomics community. The Ma Lab at Brown is seeking two student researchers with coding competency to integrate the statistical methods developed by the Ma Lab into a comprehensive computational pipeline. The methods cover data preprocessing, transformation, cell type deconvolution, spatial domain detection, and spatial data integration, with all code available. The student researchers will use the existing code to convert and integrate it into a comprehensive and easy-to-use pipeline. During the project, the student researcher may be required to apply these methods to analyze new SRT datasets to provide thorough biological insight. If completed successfully, we plan to publish a scientific journal paper on this project. This project is ideal for students interested in statistics, computational biology, and applying their technical skills to
provide a guide on the optimal integration methods for researchers. Beyond working on the project, students will be expected to attend weekly lab meetings and provide updates to the PI and other students. For details of our diverse and collaborative lab, please visit our website at https://yingma0107.github.io/.

References:
[1] Ying Ma and Xiang Zhou, Spatially informed cell type deconvolution for spatial transcriptomics, Nature Biotechnology 2022

Required skills: Strong programing language ability (preferably in R and Python, C++ is a plus) Experience working with Github Basic UNIX/Linux competency Courses: Linear algebra, Statistics

Preferred skills: Experience with building statistical models and computational software, running scripts, and submitting Slurm jobs on OSCAR Grid Skilled in data visualization, and pipeline design Courses: Machine Learning, Statistical Inference, deep learning

Is this project for more than one student: Yes

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**Avery Willis Hoffman**
Department: Brown Arts Institute
Project Type: Research
**Project Title:** BAI: IGNITE PVD+ Resource Guide (BRAI-1)

**Project Description:**
The Brown Arts Institute (BAI) has successfully launched Brown Arts IGNITE, a new multi-year series of creative activations, interventions, and investigations produced by communities across Brown, Providence, the Rhode Island region, and beyond. Launching with the opening of The Lindemann Performing Arts Center in October 2023, the IGNITE Series showcases a diverse array of offerings from across our Brown Arts ecosystem, including projects by students, student groups, faculty and departments, Brown alumni, Brown Arts Institute collaborations with other campus units and Artistic Innovators, as well as projects by local and regional artists and arts organizations. Over 30 projects were accepted as part of the Open Call: Campus and Open Call: PVD+ for production in 2024 as part of IGNITE. The IGNITE UTRA will be responsible for assisting Avery Willis Hoffman, BAI Artistic Director, and IGNITE Producer, Melissa Kievman, in researching the work and accomplishments of Fall '24 IGNITE Open Call PVD+ participants (7 projects) in order to suggest programmatic and curricular interfaces for each artist or project, as well as to assist in putting together promotional materials, researching and compiling potential audience building resources.

Required skills: The desirable candidate will possess the following: Knowledge of contemporary visual and performing arts Excellent research and organizational skills, with strong attention to detail Strong writing skills and communication skills Ability to work independently and in partnership with others Professionalism and ability to work under pressure Ability to manage multiple projects in a timely manner
preferred skills: awareness of art-making activity on campus and in providence
knowledge of the work of famous and emerging artists, scholars, and cultural change-makers
proficiency in microsoft office and adobe software suites preferred
advanced multimedia skills (video, audio, image, etc.)

is this project for more than one student: yes

avery willis hoffman
department: brown arts institute
project type: research
project title: bai: ignite campus resource guide (brai-2)

project description:
the brown arts institute (bai) has successfully launched brown arts ignite, a new multi-year series of creative activations, interventions, and investigations produced by communities across brown, providence, the rhode island region, and beyond. launching with the opening of the lindemann performing arts center in october 2023, the ignite series showcases a diverse array of offerings from across our brown arts ecosystem, including projects by students, student groups, faculty and departments, brown alumni, brown arts institute collaborations with other campus units and artistic innovators, as well as projects by local and regional artists and arts organizations. over 30 projects were accepted as part of the open call: campus and open call: pvd+ for production in 2024 as part of ignite. the ignite utra will be responsible for assisting avery willis hoffman, bai artistic director, and ignite producer, melissa kievman, in researching the work and accomplishments of fall ’24 ignite open call campus participants (13 projects) in order to suggest programmatic and curricular interfaces for each artist or project, as well as to assist in putting together promotional materials, researching and compiling potential audience building resources.

required skills: the desirable candidate will possess the following: knowledge of contemporary visual and performing arts excellent research and organizational skills, with strong attention to detail strong writing skills and communication skills ability to work independently and in partnership with others professionalism and ability to work under pressure ability to manage multiple projects in a timely manner

preferred skills: awareness of art-making activity on campus and in providence
knowledge of the work of famous and emerging artists, scholars, and cultural change-makers
proficiency in microsoft office and adobe software suites preferred
advanced multimedia skills (video, audio, image, etc.)

is this project for more than one student: yes

avery willis hoffman
department: brown arts institute
Project Type: Research

**Project Title:** BAI: ETERNAL SEPTEMBER (BRAI-3)

**Project Description:**
Brown Arts Institute (BAI) is seeking two UTRAs to assist BAI Artistic Innovator William Brittelle, the creative director and instigator of ETERNAL SEPTEMBER, an alternate digital reality consisting of interlocking music, video, image, and text. The UTRA will assist William and the project’s team of artists and creative technologists to expand the development, presentation, and digital documentation of new content for the alternate digital reality. The UTRA will assist with research related to the construction of ETERNAL SEPTEMBER’s project-specific wiki system, methods of text and image generation, and media, performance, and film-based content-building. Special focus will be on the development of spatialized audio using gaming engine design. The UTRA will be in close contact with the William and the ETERNAL SEPTEMBER team throughout the semester, and will be responsible for assisting Jessica Wasilewski, BAI Producing Director, in researching resources at the university and in the local Providence and Rhode Island communities to facilitate programmatic and curricular interfaces for the project.

Preference for candidates with experience with Vanilla JavaScript, HTML, CSS, gaming engine design and/or Git/Github as well as an interest in AI image/text generation, vintage Nintendo, vaporware, Pokémon, Biblical Apocrypha, Andrei Tarkovsky, No Wave music, abandoned digital malls, quantum loop gravity, ARGs, and all things old internet.

Required skills: Some knowledge of contemporary visual and performing arts. Good research and organizational skills, with strong attention to detail. Strong writing skills and communication skills. Ability to work

Preferred skills: Experience with Vanilla JavaScript, HTML, CSS, and Git/Github Coding + web development A.I. Image Generation (Dall-E II and Midjourney), Game design engines + 3D Modeling (Unreal Engine and Blender) Awareness of art-making activity on campus and in Providence Proficiency in Microsoft Office and Adobe software suites preferred Advanced multimedia skills (video, audio, image, etc.)

Is this project for more than one student: Yes

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**Alexander Sokolovsky**
Department: Center for Alcohol and Addiction Studies
Project Type: Research

**Project Title:** Dual Use of ENDS and Combustible Cigarettes: Shared, Distinct, and Cross-Conditioned Processes (CFAAS-4)

**Project Description:**
The study aims to examine incentive sensitization-related processes (attentional bias; cue reactivity) in response to electronic nicotine delivery systems (ENDS) and combustible cigarettes (CC), along with cross-conditioning across these products in a laboratory and real-world setting. The study also aims to examine whether positive and negative affect change the effects associated with these processes. With the growing public health concern around ENDS, the changing regulatory environment of tobacco, and the widespread dual use of ENDS and CC in young adults, this study provides critical insights into the complex interplay between tobacco products and an understanding of the basic processes associated
with how young adult users of either product become compulsive users of the other product. Using ENDS doubles the risk for smoking in youth and young adults. Although transitions between different patterns of tobacco product use in the US are increasingly well characterized thanks largely to the Population Assessment of Tobacco and Health, there remains a crucial gap in understanding how the basic behavioral processes that contribute to craving and use of combustible cigarettes generalize to ENDS and whether these processes can become cross-conditioned.

Required skills: - Course in research methods

Preferred skills: - CITI training (human subjects research)
- Literature search/review
- Course in elementary statistics
- Course in statistical programming

Is this project for more than one student: No
part of a team, comfort working with research participants and Veterans.

Preferred skills: Research experience (especially with human subjects) and psychology, public health, or biomed coursework.

Is this project for more than one student: No

Jane Metrik  
Department: Center for Alcohol and Addiction Studies  
Project Type: Research  
Project Title: Cannabis' Impact on Alcohol Consumption (Project MARS) (CFAAS-2)

Project Description:  
The student will work on NIH-funded research study on cannabis and alcohol co-use. This FDA placebo-controlled randomized clinical trial involves cannabis and alcohol administration to participants in our smoking laboratory and a simulated barlab at Brown. The study also collects data on cannabis use in the natural environment with daily surveys completed on participants’ smartphones. The study uses mixed-methods ranging from experimental procedures, as part of a randomized clinical trial, to observational field data to qualitative interviews, extraction, and coding of data.

The student will have the opportunity to work with both people and data. The intern will learn how to assess and determine study eligibility, conduct participant outreach, and state-of-the-art methods for laboratory and field research. Tasks include (1) participant recruitment (e.g., posting advertisements, social media recruitment, responding to interested contacts), 2) screening participants on the phone; 3) maintaining study databases; 4) tracking participant data in real-time; 5) promoting study retention via regular contact with participants; 6) coding interview data; 7) assisting with the laboratory experimental sessions with study participants; and 8) basic data management and analyses. Students will attend weekly lab meetings with the study investigator, co-investigators, and other undergraduate and graduate students, postdoctoral fellows, and full-time staff contributing to the project. The intern will participate in team meetings and all discussions pertaining to conducting human subject research, IRB oversight, and state- and federal-level organizations overseeing cannabis regulations.

Required skills: Knowledge of Microsoft Suite (Word, Excel, PowerPoint) and Google Suite (Gmail, google calendar, google voice, google drive); strong communication and interpersonal skills, excellent organizational skills, attention to detail, maturity and responsibility, ability to work independently and as part of a team, comfort working with research participants and discussing substance use. Must be available to work onsite at Brown University.

Preferred skills: Research experience (especially with human subjects) and psychology or public health coursework.

Is this project for more than one student: Yes
**Jane Metrik**  
Department: Center for Alcohol and Addiction Studies  
Project Type: Research  
**Project Title:** Cannabis Use and Driving in Daily Life (the CAR Study) (CFAAS-3)  

**Project Description:**  
The student will work on NIH-funded research study that investigates driving under the influence of cannabis. This study aims to understand decisions people make about driving when using cannabis, with real-time objective data on driving behaviors collected from a GPS tracking device installed in their vehicle. The study also collects data on cannabis use in the natural environment with daily surveys completed on participants’ smartphones. The study uses mixed-methods ranging from laboratory assessment to observational field data to qualitative interviews, extraction, and coding of data.

The student will have the opportunity to work with both people and data. The intern will learn how to assess and determine study eligibility, conduct participant outreach, and state-of-the-art methods for laboratory and field research. Tasks include (1) participant recruitment (e.g., posting advertisements, social media recruitment, responding to interested contacts), 2) screening participants on the phone; 3) maintaining study databases; 4) tracking participant data in real-time; 5) promoting study retention via regular contact with participants; 6) coding interview data; 7) assisting with the laboratory sessions with study participants; and 8) basic data management and analyses. Students will attend weekly lab meetings with the study investigator, co-investigators, and other undergraduate and graduate students, postdoctoral fellows, and full-time staff contributing to the project. The intern will participate in team meetings and all discussions pertaining to conducting human subject research, IRB oversight, and state- and federal-level organizations overseeing cannabis regulations.

Required skills: Knowledge of Microsoft Suite (Word, Excel, PowerPoint) and Google Suite (Gmail, google calendar, google voice, google drive); strong communication and interpersonal skills, excellent organizational skills, attention to detail, maturity and responsibility, ability to work independently and as part of a team, comfort working with research participants and discussing substance use. Must be available to work onsite at Brown University.

Preferred skills: Research experience (especially with human subjects) and psychology or public health coursework.

Is this project for more than one student: Yes

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**Tayla von Ash**  
Department: Center for Health Promotion and Health Equity  
Project Type: Research  
**Project Title:** RI Teen Institute (CFPHH-1)  

**Project Description:**  
Looking for research assistants to work on a community-engaged research project called Rhode Island Teen Institute (RITI). RITI is a statewide leadership and prevention program that targets high school-aged peer leaders, whether traditional or nontraditional, from a broad range of community settings, training
them in individual and community advocacy, decision-making, and interpersonal and leadership skill development. RITI reinforces leaders’ commitment to a healthy lifestyle and organizes their peers to advocate for prevention in their communities. The residential training component is five days and focuses on personal skill-building in the following areas: conflict resolution, problem solving, decision making, communication, assessing high-risk behavior, and community action planning. You can learn more about RITI at https://risas.org/our-programs/teen-institute/. Research assistants will focus on program evaluation (e.g., data entry, cleaning, analysis, and writing up results). Research assistants will also have the opportunity to attend/staff the program August 11th-16th.

Required skills: N/A

Preferred skills: 1. Quantitative data analysis (preferably using STATA)
2. Prior experience with youth from diverse backgrounds
3. Skills in advertising and/or web design
4. Past experience with teen programs and/or summer camps is a bonus :)

Is this project for more than one student: No

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**Tayla von Ash**  
Department: Center for Health Promotion and Health Equity  
Project Type: Research  
**Project Title:** Moms on the Move (CFPH-2)

**Project Description:**  
Physical activity is a well-established health behavior that impacts risk for obesity and related chronic diseases. Racial and ethnic minorities, as well as individuals with low socioeconomic status, experience more barriers to engaging in physical activity. Moms often report too many responsibilities and prioritizing their children’s needs as barriers to engaging in more physical activity. Moms on the Move is an innovative physical activity intervention for parents attending their children’s sports practices. Through a partnership with the Mount Hope Cowboys, a local youth football organization in Providence, RI, that predominantly serves Black and Hispanic families, we will be pilot testing the intervention. This opportunity is for students interested in health equity and/or physical activity disparities specifically, who would like to gain experience interacting with research participants. Students will be responsible for overseeing the physical activity training sessions during practice (generally weeknights from 6-8pm at the Collyer St. Field in Providence). This includes help with set up and clean up, taking attendance, reminding participants about evaluations, and providing childcare to participants’ children as needed. Students will also assist in various other tasks such as recruitment and data collection, and there may be opportunities to contribute as a co-author on a published manuscript.

Required skills: Must be available at least 3 nights per week from 6-8pm to attend practice at a field in Providence (transportation not provided)

Preferred skills: Responsible, attention to detail, effective communication, experience with young children is a plus

Is this project for more than one student: Yes
**Katherine Kang**  
Department: Center for Language Studies  
Project Type: Course Development  
**Project Title:** Teaching English to Speakers of Other Languages (TESOL) Course Development (CEFLS-2)  

*Project Description:*  
This project involves developing a new undergraduate course on Teaching English to Speakers of Other Languages (TESOL). The course will provide an overview of the theory and practice of TESOL and will likely involve an engaged learning component. The student collaborator will assist in course development by performing tasks such as:  

1. Providing a student's perspective on selected course readings, in-class activities, and assignments  
2. Proposing in-class activities and assignments to align with course learning goals  
3. Identifying engaged learning opportunities available to Brown students and researching and compiling a list of local organizations or sites where students could volunteer  
4. Helping with Canvas site creation and design  

Through the project, the student collaborator will gain experience with course development as well as develop an understanding of the TESOL field and profession.  

Required skills: Previous experience and strong interest in teaching English as a second or foreign language (experience can range from tutoring to classroom teaching)  

Preferred skills: N/A  

Is this project for more than one student: No

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**Michelle Quay**  
Department: Center for Language Studies  
Project Type: Course Development  
**Project Title:** Kirkor Minassian & Collecting Persian Manuscripts in America c. 1900 - 1937 (CEFLS-1)  

*Project Description:*  
This Fall 2024 UTRA, entitled “Kirkor Minassian & Collecting Persian Manuscripts in America c. 1900 - 1937” is part of a larger research project which aims to properly identify Persian manuscripts held in the John Hay Library as part of the Minassian Collection. These manuscript pages, particularly the illuminations, have been removed from their original context to be sold as individual pieces for the art market. As such, their connections to their historical provenance have been lost, and many of them are
Unfortunately mislabelled and misidentified within the existing catalog. This project aims to reunite these stranded artworks with their manuscripts of provenance, even if only in digital form, and reintroduce them into the global scholarly conversation surrounding important literary works, such as the 11-century epic poem, the Shahnameh. It also aims to investigate how these artworks were deconstructed -- often literally cut into pieces -- and then reconfigured to appeal to Western buyers' tastes.

This UTRA in particular will focus on curriculum development for the Spring 2025 course PRSN 1150 Persian Historical Texts and Codicology. Applicants need not have direct experience in working with manuscripts. However the student should have proficiency in written Persian and should be prepared to conduct independent research in primary historical sources from the early modern and premodern periods, with weekly instructor guidelines and discussion. The research will take the form primarily of reading, summarizing, and tracking down possible source manuscripts for individual illuminations or pieces of calligraphy. The student will also be asked to identify catalog entries that contain errors and need to be re-written. The outcomes of their research will be incorporated into PRSN 1150, which will include a newly-designed unit on the fraught relationship between Western catalogs and the source materials of the Persian manuscript tradition. Students in PRSN 1150 will visit the Hay Special Collections together as part of their course work.

Required skills: Knowledge of written Persian.

Preferred skills: Good working knowledge of research database use and searching techniques. Strong organizational skills. Familiarity with archival work.

Is this project for more than one student: No

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Katharina Galor
Department: Center for Middle East Studies
Project Type: Course Development
Project Title: Israel-Palestine: Arts and Humanities in the Public Eye (CFMES-1)

Project Description:
The aim of this project is to develop a newly designed seminar titled Israel-Palestine: Public Humanities MES 1051 to be taught for the first time in the fall of 2024. The seminar as currently designed establishes the academic and theoretical frame of the subject matter, which I hope in the future will be able to integrate dimensions that will do more fully justice to its title of "public humanities." With guidance from staff from the Swearer Center, and with help of the UTRA awarded student(s), I intend to plan several outreach activities or events, that in the current year, will serve as an addendum to the seminar as advertised in banner, but that in the future, when taught again, will be integrated into the syllabus and course requirements. The outreach activities will be centered around the heritage, traditions, history, and societies of Israel-Palestine exploring shared, similar, and differing cultural and artistic spheres. The student(s) will help identify scholars and/or artists who engage Israel-Palestine in their work. They will assist in planning, promoting, and executing the events which will be attended by the students enrolled in the seminar, and that will be open to the Brown as well as the larger Rhode Island community. To enhance the educational and informative aspect of the planned activities, the student(s) will help produce informative and educational material, such as a brochure and website. The aim of the events will be to bridge the divide of the region's diverse ethnic and religious populations through cultural dialogue. The
Amit Basu
Department: Chemistry
Project Type: Course Development
Project Title: What's in a name? Well, a lot, it turns out - some chemistry, biology, history, and linguistics, to be more precise. (CHEMI-5)

Project Description:
Bird droppings and DNA; Goat's milk and sutures; Butter and Zippo lighters - seemingly disparate pairings, yet linked chemically and etymologically. This project delves into the history of common names of organic molecules. There are two primary objectives to this work – 1) scientific communication in the classroom and beyond to explain and popularize everyday science; and 2) generation of the histories of both chemical etymologies and chemical processes and theories. The work involves a deep dive into the primary chemical literature, largely from the 19th century. Much of this literature is in French and German. This project lies at the intersection of chemistry, history, and language, and the work coming out of this project can be used in variety of courses in Chemistry.

Required skills: Chem 0350 - A basic understanding of fundamental organic transformations is required

Preferred skills: Working knowledge of French and/or German in order to translate key passages into English; familiarity with navigating databases of scientific literature.

Is this project for more than one student: No

Ben McDonald
Department: Chemistry
Project Type: Course Development
Project Title: Restructuring Advanced Organic Chemistry to Build Integrated Chemical Knowledge (CHEMI-4)

Project Description:
CHEM 1450 is a small, interactive course designed to build upon students’ understanding of fundamental reactivity patterns of small organic molecules, explore how these have been translated in to a “logic” or rule-based approach to synthetic design, and study the application of this logic to the synthesis of complex natural products. Assistance is sought to expand course materials and enhance student engagement. Specifically, the aim is to create a consistent connection between mechanisms, tactics, and strategic applications of chemistry in complex synthesis. Activities in this project will include reading literature, transcribing slides, and communicating with Professor McDonald.

Required skills: CHEM 1450

Preferred skills: Proficiency in construction of powerpoint slides

Is this project for more than one student: No

**Benjamin McDonald**  
Department: Chemistry  
Project Type: Research  
**Project Title:** Phase Separated Polymers as Biomimetic Reaction Vessels (CHEMI-2)

**Project Description:**
Biological systems employ the triggered phase separation of macromolecules as a means to dynamically arrange reactive molecules within liquid compartments. Among these compartments, membraneless organelles play a crucial role in enhancing biochemical reactions by spatially concentrating substrates and enzymes. Our objective is to adapt this approach to traditional organic reactions, where reactive or catalytic sites would be affixed to polymers capable of forming fluid droplets in organic solvents. This innovative approach facilitates the integration of heterogeneous and homogeneous catalysis, paving the way for the development of more environmentally friendly reactors for the production of valuable chemical substances. Students engaging in this project will focus on developing polymers and conditions that yield fluid droplets, while also evaluating catalyst immobilization techniques to generate catalytic droplets.

Required skills: Chem 350/360

Preferred skills: Experience working in a laboratory setting

Is this project for more than one student: No

**Benjamin McDonald**  
Department: Chemistry  
Project Type: Research  
**Project Title:** Bioinspired Double Networks for Robust, Energy Dissipating Materials (CHEMI-3)

**Project Description:**
Commonly employed bulk polymeric materials typically behave as soft rubbery materials or as stiff thermoplastics. Polymer networks able to switch between these states upon a stimulus are greatly desired to mimic the responsive and adaptive behaviors found in living materials and are further anticipated to provide key opportunities towards the next generation of “smart” materials. This project will use cation-π interactions, the electrostatic interaction of cationic moieties and the electron rich π clouds of arenes, to create ion responsive hydrogels. These structures will be utilized as templates for the formation of secondary constituent networks. These materials will be designed to mimic the energy dissipating behavior of cartilage, in which viscous fluid trapped in a porous network creates a poroelastic behavior. The resulting gels will be tested using a variety of mechanical testing techniques. This will entail the synthesis of polymers, characterization of their phase behavior, and mechanical testing of samples.

Required skills: Chem 350/360, Chemical laboratory experience

Preferred skills: Microscopy and mechanical testing

Is this project for more than one student: Yes

**Li-Qiong Wang**
Department: Chemistry
Project Type: Course Development
**Project Title:** Exploring the Molecular Origin of Color in Cyanotype Printing and Toning: Translating Undergraduate Research into Teaching (CHEMI-1)

**Project Description:**
The interplay between research and teaching is fundamental; each enhances the other's effectiveness. Creativity and critical thinking serve as pivotal elements in both realms, fostering the generation of fresh research insights and pedagogically valuable materials.

In this UTRA project, we aim to investigate the molecular origins of color in cyanotype printing and toning, employing a diverse array of analytical techniques, including infrared and reflective UV spectroscopy. While Prussian blue is known to impart the characteristic blue hue in cyanotype printing, scant attention has been given to the chemical transformations occurring during the toning process.

Our research endeavors hold promise for both the artistic community and industry, offering a deeper comprehension of the toning process. Furthermore, these findings are likely to culminate in a publication, contributing to the scholarly discourse.

Of equal significance is the integration of our research outcomes into the curriculum of our newly developed course, 'From Molecules to Masterpieces: Chemistry's Influence on Culture and Art.' This course delves into the intricate intersections of chemistry and art within their historical contexts. Students will engage in cyanotype printing and toning exercises during this course, where our research insights will elucidate the underlying chemical principles driving color changes.

By bridging research and teaching in this manner, we aim to empower students with a comprehensive understanding of the chemical underpinnings of artistic processes.
**Brenda Rubenstein**  
Department: Chemistry and Physics  
Project Type: Research  
**Project Title**: Quantum Computing the Dynamics of Enzymes (CHEPH-1)

**Project Description:**  
Quantum computers promise to revolutionize modern computing by accelerating the solution of equations with exponentially complexity, most prominently including the Schrödinger Equation that governs the interactions among electrons. In this project, we will developing new combined machine learning and quantum computing techniques to solve biological problems on quantum hardware for the first time. We will be selecting enzymatic reactions that have complicated quantum entanglement and attempting to learn their dynamics on quantum computers. This is a larger team project involving researchers from Brown, Stanford, and NASA. Our website is rubenstein.group.

Required skills: CH0330, PH0050/PH0070.

Preferred skills: Highly preferred: a quantum mechanics course in chemistry, engineering, or physics; a programming course; familiarity with machine learning; familiarity with organic/bioinorganic chemistry.

Is this project for more than one student: No

**Brenda Rubenstein**  
Department: Chemistry and Physics  
Project Type: Course Development  
**Project Title**: Enabling Active Introductory Courses through Machine Learning (CHEPH-2)

**Project Description:**  
For decades, large introductory classes such as CH0330 have suffered from a lack of active feedback on assignments and for everyday questions because of their scale. Students often have to submit free response questions, but rarely receive feedback unless large teams of TAs are hired. Students also often have to wait for office hours to be able to get their questions answered. In this project, we will be developing large language models to more automatically provide feedback on free response questions tailored to the course content. We will ultimately also develop fully adaptive free response questions to challenge students at all levels and enable fully mastery-based learning.
Required skills: CH0330, programming courses, machine learning courses.

Preferred skills: CH0350. As much machine learning and teaching experience as possible!

Is this project for more than one student: No

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**Brenda Rubenstein**  
Department: Chemistry and Physics  
Project Type: Research  
**Project Title:** Determining the Transport Mechanisms of Nucleotide-Based Nanotubes (CHEPH-3)

*Project Description:*  
Carbon nanotubes are well-known to be outstanding conductors. Recently, collaborators at UConn have developed novel nucleotide-based nanotubes that also exhibit high conduction while still remaining biologically-compatible. However, it is unclear what these nanotubes’ conduction mechanisms are. In this work, we will use a combination of quantum mechanics and statistical modeling to determine how these tubes are form and conduct. We will compare with experiments to explain the mechanism. More information about our group can be found at rubenstein.group.

Required skills: CH0330, PH0050/PH0070.

Preferred skills: Preferred: A programming course, a quantum mechanics course in chemistry, engineering, or physics, CH0350, biochemistry.

Is this project for more than one student: No

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**Elsa Amanatidou**  
Department: Classics  
Project Type: Course Development  
**Project Title:** Greek online (CLASS-2)

*Project Description:*  
This will be phase III of an ongoing project housed in the Top Hat and Canvas platforms that aims at providing opportunities for self-directed study and self-assessment interactive tasks for students seeking to improve their Greek language skills or accelerate progress through the proficiency continuum. An integral part of the project concerns  
a) the digitization of vocabulary specific to themes and functions, as they appear in the textbook series for MGRK0100/0200 and MGK0300/400.  
b) a text annotation project, complete with vocabulary, grammar and culture specific annotations, to enable interested students to access literary texts, video and other authentic sources of currency  
c) the development of web-based tasks that review the linguistic structures in each textbook module for
MGRK100/200/300/400 and provide opportunity for independent work and self-paced study in a hybrid class environment.

Required skills: Students must be familiar with the pedagogical approach used in Modern Greek classes at Brown and must have completed at least two years of study (ideally MGRK0100 through to 0500). Must be familiar with the textbooks Ελληνικά στο Π και Φ, 1 και 2

Preferred skills: Familiarity with the Top Hat and Canvas tools.

Is this project for more than one student: No

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**John Bodel**  
Department: Classics  
Project Type: Research  
**Project Title:** U.S. Epigraphy Project encoder (CLASS-1)  
**Project Description:**  
This opportunity is for anyone interested in the material cultural heritage of the ancient Mediterranean world and its preservation in the USA or for anyone interested in learning about the peoples of the ancient Mediterranean world through writing that is not “literary”. The focus is on inscriptions, but no special knowledge of epigraphy (the study of inscriptions) or of ancient artefacts is required; nor is any prior experience with digital humanities expected: relevant skills will be taught, and training is part of the assignment. The job is to perform semantic encoding markup of Greek and Latin inscriptions (both objects and texts) held in American public and private collections for the U.S. Epigraphy Project (USEP). The job entails learning how to use a basic xml software editor (oXygen) along with the system of categorizing data (texts) and metadata (information about the texts or the objects on which they are written) according to an international set of guidelines (EpiDoc) and then applying those skills to encoding texts written in languages of the ancient Mediterranean. In addition to meeting regularly with the Project Director (John Bodel), USEP encoders meet weekly (via Zoom) with a small team of digital humanities researchers working on different parts of the Project, including the Project Manager, Scott DiGiulio (Brown Ph.D. 2015); Project Technical Supervisor, Elli Mylonas (formerly Director of Brown's Center for Digital Scholarship); and Head Encoder, Sophia Papandonatou (Brown BA 2022, BSc 2023). The opportunity thus involves becoming engaged with a small team of digital humanists comprised of researchers from every stage of academic experience. Encoders learn semantic encoding skills applicable to a wide range of academic and non-academic work and will gain first-hand experience of working on a research team.

Required skills: Basic knowledge of either classical Greek or Latin and a willingness to learn the grammar of a similarly constructed xml markup language.

Preferred skills: Some knowledge of Greek or Latin inscriptions and any of the following: experience with any form of semantic mark-up, familiarity with oXygen xml editor or EpiDoc guidelines, basic Photoshop skills.

Is this project for more than one student: No
Daphna Buchsbaum  
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)  
Project Type: Research

**Project Title:** Web development and programming for experiments in child cognition research (CLPSC-16)

**Project Description:**
We are looking for motivated students with a background in computer science, web development and UI design, to build and program web-based interactive experiments for studying children’s and adults’ cognition.

These experiments may involve clicking, dragging, and dropping of objects, drawing with a mouse, integrated presentation of videos/pictures, randomized presentation of stimuli, and the organization and storage of response data to be analyzed. These experiments may be conducted on a laptop or a tablet device. Students’ responsibilities may involve adapting existing HTML5, Javascript/React experiments or developing new ones from scratch.

This opportunity will require the student(s) to commit about 8 - 12 hours/week to the lab. To learn more about our research, please visit www.cocodevlab.com. For brief meetings with the lab manager to discuss our research, please email manager-buchsbaum@brown.edu with the subject [UTRA Research Opportunity].

**Required skills:** Previous coursework in computer science; Experience with front-end web development, especially with one or more of HTML5, Javascript, Typescript, or React.

**Preferred skills:** Previous web development experience (please specify platform and language); Full-stack and/or back-end web development; Previous coursework in psychology, cognitive science, or statistics; Previous experience interacting with children (either formally or informally); Access to a computer and stable internet connection for web development and video calls; Previous research experience; Commitment to working in the lab for at least 2 semesters.

**Is this project for more than one student:** No

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Daphna Buchsbaum  
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)  
Project Type: Research

**Project Title:** How do dogs think and learn about the physical and social world around them? (CLPSC-17)

**Project Description:**
Our canine cognition research explores dogs' learning and reasoning abilities. We investigate dogs' learning in a variety of contexts including dogs' physical problem-solving abilities (e.g., how to get treats...
out of puzzles) and their understanding of social information (e.g., following a pointing gesture or learning from a demonstration). Our research takes the form of short, interactive games and training exercises that are designed to be fun and engaging to dogs. We record dogs’ actions when interacting with people, toys, and puzzles, and the choices they make, to learn more about their understanding of the world. As a research assistant, you will have the opportunity to help with conducting online and in-person behavioral experiments with dogs, coding of behavioral experiments, inputting and assisting with data collection, and recruitment of canine participants and their owners. This opportunity will require the student(s) to commit about 10 hours/week to the lab (including committing to regular weekend, and some evening hours, as this is when owners and their dogs are most often available to participate). You can learn more about our research at sites.brown.edu/browndoglab. For brief meetings with the lab managers to discuss our research, please email manager-buchsbaum@brown.edu with the subject [SPRINT/UTRA Research Opportunity].

Required skills: Commitment to work in the lab for at least 2 semesters/terms. This is necessary due to the training and learning curve necessary to assist with research with dogs; Be able to commit regular weekend and some evening hours (this is when owners and dogs are most often available to participate); Previous experience interacting with dogs (either formally or informally); Previous coursework in psychology, animal behavior and/or comparative cognition.

Preferred skills: Previous experience working with dogs (in a research or non-research setting) is highly desirable; Previous recruiting or customer service experience (either formal or informal); Previous research experience; Statistics, programming or web design experience (a bonus but not required). Access to a computer and stable internet access capable of running online experiments via Zoom.

Is this project for more than one student: No

Daphna Buchsbaum
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research
Project Title: How do children think and learn about the physical and social world around them? (CLPSC-18)

Project Description:
Our lab conducts cognitive development research on a variety of topics within children’s thinking and learning, with a particular focus on how young children learn about categories such as colors and animals, how they understand cause and effect relationships, and on how they learn socially (both from and about other people). As an undergraduate researcher, you will have the opportunity to participate in all aspects of research in the lab. This includes assisting with conducting in-person (and occasionally online) behavioral experiments with children, coding and transcribing data, updating lab materials, contributing to participant newsletter and lab social media, and recruitment and scheduling of child participants (aged 3 - 9), in person and over phone and email. Our research takes the form of short, interactive games that are designed to be fun and engaging to children. We record children’s actions when interacting with others, toys and puzzles, and the choices they make, to learn more about their understanding of the world. This opportunity will require the student(s) to commit approximately 10 hours/week to the lab (including committing to a regular shift on one weekend day, as this is when
children are most often available to participate in research). You can learn more about our research at www.cocodevlab.com. For brief meetings with the lab manager to discuss our research, please email manager-buchsbaum@brown.edu with the subject [SPRINT Research Opportunity].

Required skills: Commitment to work in the lab for at least 2 semesters/terms. This is necessary due to the training and learning curve necessary to assist with research with child participants; Be able to commit some regular weekend and some evening hours (this is when children are most often available to participate); Previous experience working with children (in a research or non-research capacity); Previous coursework in psychology, development, and/or cognition.

Preferred skills: Previous recruiting or customer service experience (either formal or informal); Previous research experience; Experience with statistics, programming or web design; Artistic or craft skills or Maker/design skills; Access to a computer and stable internet access capable of running online experiments via Zoom.

Is this project for more than one student: No
Elena Festa
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Course Development
**Project Title:** Developing an Eye-Tracking and Pupillometry Lab Course (CLPSC-15)

**Project Description:**
Eye-tracking and pupillometry methods have become increasingly common research tools in psychological research. This new laboratory course that will be offered for the first time in Spring 2025. The learning goal for this course is to provide students with the background knowledge and practical experience to design, execute, and analyze eye-tracking experiments to study cognition. This course will explore the behavioral and neural basis of these measures, consider experimental design and methodological issues, teach methods for data processing and analyses, and provide hands-on experience using an eye-tracking system. Psychological research studies using these methods will be read and critically discussed. Students will design a research project using one of these methods, collect and analyze data, give oral presentations, and prepare a written report of their research.

The student on this project will collaborate with me in developing hands-on lab activities that demonstrate key concepts in eye-tracking and pupillometry research. They will help in preparing instructional materials and resources for students to design their research projects, and will develop exercises and tutorials to teach students how to process and analyze eye-tracking and pupillometry data. Specific responsibilities include (1) conducting a literature review on eye-tracking and pupillometry methods in psychological research; (2) structuring hands-on activities and step-by-step procedures for students to follow; (3) designing assignments and assessments; (4) developing the CANVAS course website; and (5) reviewing and providing feedback on course materials for accuracy, clarity and alignment with learning objectives.

Required skills: Completed any of the following courses: CLPS0010, CLPS0200, CLPS0400; CLPS0450 or CLPS0500

Preferred skills: Experience coding in MATLAB and/or working with eye-tracking equipment

Is this project for more than one student: No

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Joo-Hyun Song
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research
**Project Title:** Uncovering the strategic mechanisms of visuomotor adaptation with simultaneous eye- and reach-tracking (CLPSC-12)

**Project Description:**
Visuomotor adaptation describes our ability to overcome changes in the environment that disrupt the outcomes associated with a well-learned motor behavior. This project will focus on revealing the cognitive mechanisms that underlie individual differences often observed in a visuomotor rotation (VMR) task using combined eye- and reach-tracking methods. Recent research in our laboratory established two distinct predictors of individual performance in VMR: 1) Spatial working memory capacity, which may support
faster learning through explicit strategies such as aiming, and 2) task-evoked pupil diameter, which may reflect fluctuations in the effort required to implement such strategies. For example, individuals with lower working memory capacity may bolster their performance by putting forth more cognitive effort, as reflected via pupil diameter. Our ongoing research will explore how different visuomotor learning contexts, such as those where visual the feedback associated with reach movements is delayed or unreliable, may change the relationships between working memory capacity, cognitive effort, and learning rates in VMR. This research project offers an outstanding opportunity for undergraduate researchers to gain experience with cutting-edge physiological recording methods and learn how this physiological data is used to establish brain-behavior relationships. Mentees will also gain initial experience with programming and computational methods that are fundamental in cognitive neuroscience research.

Required skills: A minimum of 1+ semester(s) research or course experience in psychology/biomedical sciences is required.

Preferred skills: Experience working with human research participants in a laboratory setting is preferred. Introductory knowledge of programming and/or statistics is a plus, but not required.

Is this project for more than one student: Yes

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**Joo-Hyun Song**  
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)  
Project Type: Research  
**Project Title:** Effects of joint action on attentional biases (CLPSC-13)

**Project Description:**  
The ability to coordinate one’s action with a partner is a crucial skill that underlies a wide range of activities, from dancing to playing sport to working with teammates in the workplace. Previous research showed that joint action, activities in which we perform coordinated action with a partner to achieve a goal, can result in surprising changes to perceptual and cognitive processes. For example, after working with a partner to saw through a block of wax, our attention becomes biased towards their hand, heightening sensitivity to events occurring near that hand. In this project, we examine in detail factors that produce this effect by disassociating information streams that are available during the joint action task. Participants will perform a joint cutting activity using a wire saw. Using a virtual display, we systematically manipulate the amount of information they have access to during the interaction. Attentional bias will be measured before and after the joint task to isolate the effects of potential factors such as haptic feedback or visual information. The project will involve collecting and analyzing dyad motion capture data along with cognitive behavioral data. In addition to standard cognitive test analysis, student will also learn to analyze kinematic and dynamic synchronization in movement data. Future direction includes examining joint action with an advanced humanoid robot. Overall, the project will provide a foundational understanding of the ecological perspective in psychology as well as processes and mechanisms that enable coordination between perception, cognition, and action.

Required skills: N/A

Preferred skills: Prior experience working with human research participants is preferred. Introductory knowledge of statistics and/or programming is a plus but not required.
Project Title: Effects of action requirements on attentional biases with 3D objects (CLPSC-14)

Project Description:
Action plays a crucial role in perception and cognition. Crossing a busy intersection successfully requires coordination of visual and auditory information, knowledge of movement patterns between pedestrian and vehicles, and one’s own movement capability. Recent findings have highlighted the effects of moving and acting on a variety of cognitive processes, from perception of time and orientation to memory and learning. In this project, we extend this line of research to study the effect of action on attentional regulation. Specifically, we will explore whether movement constraint or training can bias attention towards salient actionable targets. Participants will perform simple reach and grasp motions in a variety of contexts. Their ability to appropriately allocate attentional resources will be tested before and after performing actions. The project will involve comprehensive analysis of a multivariate dataset containing motion capture data, priming effect, visual and object popout effect, and attentional cognitive test. Future projects will explore the action effect on decision making and human-robot interaction. Overall, the project will provide a foundational understanding of the ecological perspective in psychology as well as processes and mechanisms that enable coordination between perception, cognition, and action.

Required skills: N/A

Preferred skills: Prior experience working with human research participants is preferred. Introductory knowledge of statistics and/or programming is a plus but not required.

Is this project for more than one student: No

Project Title: Transfer from motor learning to perceptual timing in a virtual throwing task (CLPSC-11)

Project Description:
The ability to accurately estimate time is critical in both perception and action. For instance, timing the approach of an oncoming vehicle and timing one’s own movement determine whether we can safely cross a busy intersection. Similar coordination between perceptual and motor timing is important in dance, music, sport, and many other daily activities. While previous research has treated perception as a separate process that precedes action, we posited that perception and action are inseparable. As such,
effects on motor performance should also affect perceptual performance. For example, recent findings showed that movements executed concurrently with auditory time estimation resulted in biases in timing judgements. Specifically, we will explore whether motor timing learning will transfer to improvements in perceptual timing. Participants will train on a throwing task that implicitly requires precise timing. Their ability to discriminate time intervals will be tested after motor training to determine whether there is transfer from motor timing to perceptual timing. An understanding of this multivariate dataset will require analysis of participants’ movement trajectories, strategy selections in a solution manifold, and parameters derived from perceptual psychophysics. We will further explore factors that facilitate or interfere with such transfer, such as with observational learning, visual feedback delay, movement affordance. Overall, the project will provide a foundational understanding of the ecological perspective in psychology as well as the processes and mechanisms that enable coordination between perception and action.

Required skills: N/A

Preferred skills: Prior experience working with human research participants is preferred. Introductory knowledge of statistics and/or programming is a plus but not required.

Is this project for more than one student: Yes

Malik Boykin
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research
**Project Title:** Exploring Race/Ethnicity and Gender Identity in Schools’ Psychology Syllabi: Impacts on Diversity, Equity, and Inclusion. (CLPSC-10)

**Project Description:**
The RISE Lab at Brown University’s Department of Cognitive, Linguistic, and Psychological Sciences investigates how race/ethnicity and gender identities are represented in school curricula and how these representations affect diversity, equity, and inclusion within academic environments. This project examines the syllabi from various educational institutions to assess the diversity of readings and materials and explore their influence on fostering an inclusive atmosphere conducive to engagement in STEM and psychological fields.

Significant research indicates a persistent gender gap in STEM, where women and non-binary individuals, especially those of color, are markedly underrepresented. This project incorporates principles from role model theory and the stereotype inoculation model. We aim to understand how the visibility of diverse role models within educational materials can enhance feelings of social belonging, build resilience against prevailing stereotypes, and ultimately encourage more women and non-binary individuals to pursue and remain in STEM careers.

By conducting comprehensive literature reviews, engaging in rigorous data collection and analysis, and fostering thoughtful discussions within the academic community, the RISE Lab aims to contribute significantly to the scholarship of educational diversity. This project highlights the gaps and opportunities within current educational practices and proposes actionable strategies for incorporating more inclusive materials into school syllabi.
The RISE Lab is committed to fostering diversity and equality in education and research. We strongly encourage individuals from all backgrounds, particularly those underrepresented in academia, to apply.

Required skills: Current enrollment in an undergraduate concentration in psychology, sociology, or a related field. Strong organizational and communication skills, especially in handling email correspondence and managing data. Ability to discern relevant information from research articles.

Preferred skills: Experience with qualitative and quantitative research methods. Interest in developmental and social psychology, educational diversity and inclusion, and STEM engagement. Understanding of role model theory and stereotype inoculation and their implications for gender and racial equity in education.

Is this project for more than one student: No

Malik Boykin
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research
Project Title: Investigating the Impact of Professor Identities on College Student STEM Engagement (CLPSC-9)

Project Description:
The RISE Lab at Brown University's Department of Cognitive, Linguistic, and Psychological Sciences intends to explore how the identities and narratives within professor background narratives influence college students' perceptions and engagement in STEM fields. This investigation addresses the persistent gender gap in STEM, where women and non-binary individuals are significantly underrepresented and face disparities in career advancement and pay. The project leverages role model theory to examine how professor stories of overcoming obstacles and achieving success in STEM might inspire students, particularly women and underrepresented minorities, to pursue and persist in STEM careers.

Utilizing a comprehensive approach that includes demographic surveys, modified measures of interest in STEM versus non-STEM fields, and analysis of perceived identity compatibility, this study aims to uncover how narratives of success and failure impact student identity formation, role model outcomes, and overall engagement with STEM. The research seeks to highlight the critical role of professors' visibility and relatability in bridging the gender gap in STEM by fostering an environment where diverse students feel a sense of belonging and resilience against stereotypes.

*The RISE Lab values diversity and equality and is committed to creating an inclusive environment for all members. We strongly encourage applications from individuals of diverse backgrounds, particularly those who are underrepresented in STEM fields.

Required skills: Enrollment in an undergraduate program in psychology, sociology, or a related discipline.; Demonstrated interest in developmental psychology, STEM education, and diversity in academic contexts.; Experience with or willingness to learn data collection and analysis software, including Qualtrics.
Preferred skills: Strong organizational, communication, and teamwork skills.; Ability to commit to the project's timeline and participate in lab activities, including a regular weekly schedule.; Knowledgeable in R and/or SPSS.

Is this project for more than one student: No

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**Roman Feiman**  
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)  
Project Type: Research  
**Project Title:** How do children understand and use negation? (CLPSC-5)

**Project Description:**  
Language may be the most obvious way we express and understand complex thoughts, but is it the only way? Does it play a special role in enabling thinking, or is it just how we communicate our thoughts? When kids learn a new word, do they gain the ability to think about a new idea — or do they only learn to label what they could already think about? Exploring these questions means exploring our shared humanity — how all of us can think new thoughts so quickly and productively, and how we communicate those thoughts to each other. This is what we study in the Brown Language & Thought Lab.

When children start to say the word "no" they generally use it exclusively to object to things that are happening to or near them. Only much later do they start to use "no" to say that something is false, as adults do. This study is investigating whether children's comprehension of "no" follows the same trajectory. We will be playing a game with children where they have to interpret clues involving "yes" and "no" to give the right toy to the right person. This will help us to understand what young children think "no" really means.

As an undergraduate researcher, you will have the opportunity to participate in all aspects of research in the lab. This includes assisting with conducting in-person and online behavioral experiments with children, coding and transcribing data, creating study stimuli, and recruitment and scheduling of child participants (aged 1.5 - 4 years old), in-person and over phone and email. You will also have the opportunity to attend lab meetings and present your work to the lab at the end of the semester.

Required skills: Strong organizational skills, attention to detail; desire to learn new software programs, with the ability to learn independently; Proficiency with Word, Excel, Powerpoint.

Preferred skills: Prior experience working in a lab, working with children, and/or conducting independent research is strongly preferred, but not required. Experience with Slack, Filemaker, OSF, Prolific, R, Python, HTML are all preferred but not required.

Is this project for more than one student: Yes
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research

**Project Title:** How do children think about possibility and conditionals? (CLPSC-6)

**Project Description:**
Language may be the most obvious way we express and understand complex thoughts, but is it the only way? Does it play a special role in enabling thinking, or is it just how we communicate our thoughts? When kids learn a new word, do they gain the ability to think about a new idea — or do they only learn to label what they could already think about? Exploring these questions means exploring our shared humanity — how all of us can think new thoughts so quickly and productively, and how we communicate those thoughts to each other. This is what we study in the Brown Language and Thought lab.

One type of linguistic expression that encodes possibility is conditionals (“If/When A, (then) C”). In adult speech, “when” conditional clauses are often used by speakers to talk about antecedent scenarios A that they think are going to happen, while “if” conditional clauses are often used to talk about antecedent scenarios A that they are uncertain about. The goal of the experiment is to test children’s concept of possibility by examining what inferences they make about “if” and “when” conditionals.

As an undergraduate researcher, you will have the opportunity to participate in all aspects of research in the lab. This includes assisting with conducting in-person and online behavioral experiments with children, coding and transcribing data, creating study stimuli, and recruitment and scheduling of child participants (aged 1.5 - 4 years old), in-person and over phone and email. You will also have the opportunity to attend lab meetings and present your work to the lab at the end of the semester.

Required skills: Strong organizational skills, attention to detail; desire to learn new software programs, with the ability to learn independently; Proficiency with Word, Excel, Powerpoint.

Preferred skills: Prior experience working in a lab, working with children, and/or conducting independent research is strongly preferred, but not required. Experience with Slack, Filemaker, OSF, Prolific, R, Python, HTML are all preferred but not required.

Is this project for more than one student: Yes

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**Roman Feiman**
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research

**Project Title:** How do children learn to reason by exclusion? (CLPSC-7)

**Project Description:**
Language may be the most obvious way we express and understand complex thoughts, but is it the only way? Does it play a special role in enabling thinking, or is it just how we communicate our thoughts? When kids learn a new word, do they gain the ability to think about a new idea — or do they only learn to label what they could already think about? Exploring these questions means exploring our shared humanity — how all of us can think new thoughts so quickly and productively, and how we communicate those thoughts to each other. This is what we study in the Brown Language & Thought Lab.
This study explores children’s ability to reason by exclusion in different domains of thought. The study involves two short games—one where children search for a ball in two containers, and one where they try to make a magic box light up. We are interested in whether children solve the tasks in the two games using the same reasoning process, and so we are testing to see if exposure to one of the games improves their performance on the other one. This will help us to understand how the ability to think logically emerges in infancy.

As an undergraduate researcher, you will have the opportunity to participate in all aspects of research in the lab. This includes assisting with conducting in-person and online behavioral experiments with children, coding and transcribing data, creating study stimuli, and recruitment and scheduling of child participants (aged 1.5 - 4 years old), in-person and over phone and email. You will also have the opportunity to attend lab meetings and present your work to the lab at the end of the semester.

Required skills: Strong organizational skills, attention to detail; desire to learn new software programs, with the ability to learn independently; Proficiency with Word, Excel, Powerpoint.

Preferred skills: Prior experience working in a lab, working with children, and/or conducting independent research is strongly preferred, but not required. Experience with Slack, Filemaker, OSF, Prolific, R, Python, HTML are all preferred but not required.

Is this project for more than one student: Yes
Preferred skills: Prior experience working in a lab, working with children, and/or conducting independent research is strongly preferred, but not required. Experience with Slack, Filemaker, OSF, Prolific, R, Python, HTML are all preferred but not required.

Is this project for more than one student: Yes

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**Ruth Colwill**  
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)  
Project Type: Research  
Project Title: *Zebrafish models of clinical disorders related to pesticide exposure (CLPSC-2)*

*Project Description:*  
The developing zebrafish has been used extensively in developmental neurobiology, toxicology, pharmacology and genetic research. However, studies of its behavior which are crucial to linking mechanism and function are still relatively rare and those attempting to look at learned behavior are frequently marred by poor experimental design. My laboratory has developed several assays to study learning and behavior in very young (one week old) zebrafish larvae. I am looking for students to join our team to help advance our studies of the effects of temperature-modulated embryonic exposure to various anthropogenic pollutants on neurodevelopment, behavior, and gene expression. This project will provide opportunities for an authentic research experience in which the UTRA students will learn about disciplinary methods used to develop a zebrafish model of clinical disorders including anxiety disorders, Parkinson’s and Alzheimer’s disease, and autism spectrum disorders. Building on our recent work and that of students in my CURE course CLPS 1195 (Life under water in the Anthropocene), the UTRA students will have the opportunity to collaborate on formulating a hypothesis, designing an experiment, collecting and analyzing data, learning how to interpret scientific evidence and how to present the results of these experiments as a research paper and conference poster. Their studies will help fill a void in the behavioral literature on this important model system. The benefits of this experience include becoming familiar with experimental design and disciplinary practices, learning how to troubleshoot and interpret experiments and learning how to work collaboratively.

Required skills: N/A  

Preferred skills: Any coursework with a lab component or equivalent experience; experience handling/working with small animals; familiarity with Excel, SPSS or Python

Is this project for more than one student: No

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**Ruth Colwill**  
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)  
Project Type: Course Development  
Project Title: *Learning in action (CLPSC-3)*
**Project Description:**
This project will develop ten weekly low stakes assignments for CLPS 0100 Learning & Conditioning. The goal of these assignments is to make salient the relevance of the course material to daily life. The ideal UTRA student for this position will have taken CLPS 0100 and be overflowing with ideas for using active learning strategies to foster engagement and understanding of concepts, principles and theories of associative learning.

Required skills: CLPS 0100

Preferred skills: Artistic and digital skills

Is this project for more than one student: Yes

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**Ruth Colwill**
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research
**Project Title:** Intentional actions and behavioral autonomy (CLPSC-4)

*Project Description:*
This project explores the relationship between intentional, goal-directed actions and habits that are performed without thought for their consequences. This action-habit distinction has depended almost entirely on whether or not the behavior is sensitive to the current value of its outcome. Behaviors that are sensitive are considered goal-directed and those that are insensitive are categorized as habits. Using a rodent model (mice), the aim of this project is to develop a new method to distinguish between actions and habits that does not rely on the failure of a manipulation to impact performance. You will be part of a team and involved in all aspects of the research process from design to interpretation.

Required skills: N/A

Preferred skills: CLPS 10 or CLPS 0100; experience handling small animals; willingness to write code for experiments.

Is this project for more than one student: No

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**Steven Sloman**
Department: Cognitive, Linguistic & Psychological Sciences (CLPS)
Project Type: Research
**Project Title:** Online Experimental Research in Collective Cognition (CLPSC-1)

*Project Description:*
Purpose or objective of the project: Our lab is researching how small groups of people reason together to
perform various intellectual tasks. We are interested in exploring whether collective performance can be boosted by "adversarial cooperation," disagreeing parties exchanging arguments and evidence with each other to find out what is true. We vary the number and similarity of the people in the groups.

Specific examples of the tasks the student(s) will work on: Our research takes the form of online behavioral experiments in which people are asked to solve problems that involve video games and other forms of reasoning. As a research assistant, your job will be to help design the experiments (e.g. conceptual development, experimental stimuli), supervising their execution, and analyzing the results using statistical techniques. This opportunity will require students to commit about 10 hours/week to the lab. You can learn more about our lab’s research at https://sites.google.com/site/slomanlab/home. For brief meetings with the project manager to discuss this research opportunity, please email almos_molnar@brown.edu with the subject [SPRINT UTRA Research Opportunity].

Skills or knowledge the student will obtain: Students will learn about the study of collective cognition in cognitive science, they will develop experimental skills, and they will develop data analysis skills. They may also develop writing skills.

How or why this specific project is important to the overall work being completed: We are developing and testing a framework for effective group behavior. The studies we want to do are a necessary step in that process.

Required skills: organizational skills, attention to detail, ability to work independently, willingness to learn new skills and software programs

Preferred skills: Prior experience working in a lab, experience conducting independent research (e.g. an honors thesis project, an independent study), have taken CLPS0220 or equivalent (i.e. familiarity with psychological research on judgment and decision-making), introductory knowledge of programming and statistics, with the following software/languages: Excel, JASP, SPSS, R, Qualtrics, Prolific

Is this project for more than one student: Yes

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Chen Sun
Department: Computer Science
Project Type: Research
Project Title: Multimodal Video Understanding (COMSC-8)

Project Description:
Brown PALM Lab (Perception, Action, Learning in Machines) is looking for student researchers to work on multimodal video understanding problems. We have three ongoing efforts that would appreciate additional contributions from passionate UTRAs: (1) tracking objects that undergo state transformations (reference paper: https://arxiv.org/abs/2212.06200); (2) collecting a video-question answering dataset for NASA spacewalk videos (reference: https://arxiv.org/abs/2311.18773); (3) learning structured video representation for reasoning (reference: https://github.com/google-deepmind/perception_test).

Required skills: The students are expected to have taken Deep Learning, and one of Machine Learning / Computational Linguistics / Computer Vision.

Preferred skills: N/A
Ellis Hershkowitz
Department: Computer Science
Project Type: Research
Project Title: Graph Sparsification for Steiner Tree (COMSC-7)

Project Description:
Learn to do algorithms research! This project aims to introduce students to mathematically-rigorous research in (graph) algorithms.

Specifically, this project is on graph sparsification, one of the most successful paradigms in modern graph algorithms. Generally speaking, graph sparsification aims to solve computationally hard problems on an input graph by simplifying the structure of the graph while (approximately) preserving essential properties of the graph until the input problem becomes easy to solve.

This project aims to develop new graph sparsification techniques for a classic graph problem---Steiner tree. Roughly, the goal is to understand the tradeoff between how simple graphs can be made and how effectively the "connectivity structure" of a graph can be preserved.

We are seeking students who are excited about algorithms and ideally have a strong algorithms, theoretical computer science and math background.

Required skills: Has taken CSCI 1570 (Design and Analysis of Algorithms) or equivalent

Preferred skills: Strong math background (especially probability) and upper-level algorithms and theoretical computer science coursework

Is this project for more than one student: Yes

Nora Ayanian
Department: Computer Science
Project Type: Research
Project Title: Humanoid Robot Development (COMSC-6)

Project Description:
The project involves engineering a life size humanoid robot and developing an open source library to control the robot. The Inmoov robot project, which serves as a template, would provide undergraduate students with a hands-on opportunity to gain experience in robotics, mechanical engineering, electrical engineering, and computer programming. Students would work in teams to 3D print and assemble the various components of the open-source Inmoov robot according to the provided designs and instructions. They would integrate servo motors, arduino controllers, and programming to make the robot capable of
basic movements and functions. This multidisciplinary project would allow students to apply classroom knowledge to a tangible robotic system while developing skills in project management, teamwork, troubleshooting, and design iteration.

Required skills: Python programming, ROS2

Preferred skills: C programming, CAD (AutoCAD, Shapr3D, Fusion 360)

Is this project for more than one student: Yes

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**Srinath Sridhar**  
Department: Computer Science  
Project Type: Research  
**Project Title:** Neural Fields for 3D Computer Vision and Artificial Intelligence (COMSC-4)

**Project Description:**  
We are looking for motivated undergraduate researchers who are interested in doing cutting edge research in 3D computer vision and deep learning. Specifically, we are looking for students to advance the state of the art in 'neural fields' -- neural networks that model visual and physical quantities of scenes and objects. This kind of research drives practical applications robotics, augmented/virtual reality, autonomous vehicles, etc. Please see the URLs below for more information on related projects.

Required skills: Must have taken 2 or more of CSCI 1430, 1230, 1470 or related AI/Robotics/Visual Computing courses. Programming experience and strong technical skills expected.

Preferred skills: Prior experience in computer vision, deep learning or robotics is a plus.

Is this project for more than one student: Yes

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**Srinath Sridhar**  
Department: Computer Science  
Project Type: Research  
**Project Title:** Multi-Camera Capture System for 3D Artificial Intelligence - BRown Interaction Capture System (BRICS) (COMSC-5)

**Project Description:**  
We are looking for students to help us design, build, and maintain the next generation of multi-camera capture systems. Specifically, we have already built a system called BRICS (BRown Interaction Capture System) with 50+ cameras and microphones to record rich data about human interactions. We are not scaling this up to 300+ cameras to capture robots and humans. Students participating in this project will get exposed to the latest in hardware/software camera designs and learn.
Required skills: Previous experience in 3D design, 3D printing; or, experience in electronics design; or, hardware skills; basic python/C++ programming skills

Preferred skills: Previous experience designing, building, and maintaining hardware. Previous experience with camera and sensor systems.

Is this project for more than one student: Yes

Steven Reiss
Department: Computer Science
Project Type: Research
Project Title: Creating a Package Designer in Code Bubbles (COMSC-3)

Project Description:
We want to create a new tool within the Code Bubbles Integrated Development Environment that creates an implementation of a Java package. The tool will start with a natural language description of what the package should do. This could be a set of interfaces representing or a more complex system or just the set of classes needed for the implementation of a particular system. This description will be given to a LLM model (probably Claude) which will be asked to provide an initial set of classes and interfaces. These will be displayed on the screen as a group of bubbles so that the user can get an overview and understanding of the result. The user will then be able to edit the results and to ask the LLM to make appropriate changes. The project concentrates on creating packages because this reflects a larger and more intricate chunk of code than current interfaces to LLMs are able to generate.

A prior UTRA project (from Spring 24) did preliminary work that demonstrated that this was feasible in that it was possible to get the LLM to generated appropriate classes and interfaces and to have it modify the result based on user requests. This project is an attempt to make this practical and generally usable.

The work will involve developing an appropriate user interface for specifying the initial project and for requesting changes; determining how to best provide the current implementation (with edits) to the LLM; determining how to include information about the rest of the system (if the package is to be part of an existing system); and evaluating the results. For the latter, we will choose a set of 3-5 applications. Then we will use the new tool generate the interface using different types of prompts. If this is successful, we will plan a user study to evaluate the usability of the tool.

Required skills: CSCI0320 or Significant Java programming background

Preferred skills: Experience with LLMs; knowledge of concurrent programming

Is this project for more than one student: Yes

Ugur Cetintemel
**Project Title:** Scalable Vector Databases for AI and Machine Learning (COMSC-1)

**Project Description:**
This project is developing techniques for the efficient management of large-scale vector data to support AI and machine learning applications. Specifically, the students will help to develop new approaches for real-time processing of vector data and enable new database functionality that can co-manage vectors along with relational data.

The students will work on the design and development of various components of this system, which involves working with open-source vector databases and state-of-the-art machine learning algorithms. Students will get deep exposure to such cutting-edge technologies, which will give them an edge for industry positions, and gain experience in CS systems research, which will make them more competitive for graduate programs.

Required skills: Database and AI related coursework/project experience, strong working knowledge of Java/Python.

Preferred skills: Coursework/project experience with computer systems, as well as AI and machine learning. Experience working with open-source software.

Is this project for more than one student: Yes

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**Project Title:** LLM Agents for Medical Data Management (COMSC-2)

**Project Description:**
Large Language Models (LLMs) have emerged as powerful tools for a wide variety of tasks that we tackle everyday. In this project, we are exploring solutions based on LLM agents to support a variety of data-centric medical applications. LLM agents stand apart from conventional chatbot applications due to their advanced reasoning capabilities, long-term memory use, and access to external tools. This project is a collaboration with researchers and clinicians from the neurosurgery and imaging departments at the RI Hospital.

Students will work on LLM Agents for various medical data tasks that will be integrated into natural-language based dashboards for clinical use. Students will get exposure to and use state-of-the-art LLMs, agent architectures and relevant AI tools and services, while developing familiarity with medical data and applications. Students will also develop code to implement the components of this system.

Required skills: Database/Data Science/AI related coursework/project experience, strong programming skills (Python), willingness to work with a multidisciplinary team.

Preferred skills: NLP, Computer vision coursework/project experience. Interest in the clinical applications.
Shekhar Pradhan  
Department: Data Science Institute  
Project Type: Research  
**Project Title:** Semantically Richer Embedding Project (DASI-1)  

**Project Description:**  
Conversational AI Lab, headed by Shekhar Pradhan, is looking for 2 students to work on the Semantically Richer Embedding Project, housed in the the Conversational AI Lab and led by Dr. Shekhar Pradhan and Dr. Ritambhara Singh. This project was started in the Summer of '23 and we have continued work on it since then. The basic thrust of the project is to incorporate world and linguistic knowledge as well representational knowledge (what linguistic units represent about the world) in the very process of creating embeddings using deep learning methods. We plan to do this by starting with computing the embeddings of sentences and deriving the embeddings of words in terms of them since it is sentences and other such larger linguistic units that express world knowledge, incorporate linguistic structure, and represent world states.

Required skills: Strong Python coding skills and experience in training deep learning models. Must have taken the Deep Learning course (CSCI 1470) with an A grade.

Preferred skills: Familiarity with Visual Language and other multi-modal models such as CLIP, BLIP, etc. Experience programming on Oscar (Brown's high-performance computing environment).

Is this project for more than one student: Yes

Baylor Fox-Kemper  
Department: Earth, Environmental & Planetary Sciences  
Project Type: Research  
**Project Title:** Coastal Ocean Resilience through Observation-informed Modeling (EAEPS-8)  

**Project Description:**  
The Coastal Ocean Resilience Research group at Brown University (Fox-Kemper and Di Lorenzo, faculty leads) is working with URI scientists and RISD artists to model the Narragansett Bay to Block Island Sound, Martha’s Vineyard, Fishers Island and up into the estuaries of the Providence River. A goal of their research is improving the Ocean State Ocean Model (OSOM) and the Regional Hydrological Integrated Modeling System (RHIMS), which take into account all parts of the bay and regional landform to show the past and present of how the region is changing. Important research tasks are (1) evaluating the behavior of the OSOM/RHIMS versus observations and finding and preparing observations that can be used to initialize forecasts, (2) downscaling climate projections for 2050 and 2100 from large-scale...
coupled Earth System Models (ESMs), and (3) linking the physical variability of the model to social-ecological impacts in the Bay. The overarching goal is to be able to accurately project changes in climate of the bay and RI over years and decades and forecast weather changes up to 2 weeks. Scientists working with Fox-Kemper, Di Lorenzo, and other group researchers have analyzed variables from buoys, in situ measurements, drones, and satellites including salinity, water level, water density, water pressure, chlorophyll, bacteria growth, algae bloom frequency, spectral reflectance and wave velocities in order to help model the Narragansett Bay and the inner coastal shelf. Many of these projects have led to visualization extensions in collaboration with Brown’s CCV and the Nature Lab at RISD.

Required skills: Coding experience

Preferred skills: Coursework or experience in oceanic & atmospheric sciences, statistics and dynamical systems, physics and engineering, data sciences and machine learning.

Is this project for more than one student: Yes

Christopher Horvat
Department: Earth, Environmental & Planetary Sciences
Project Type: Course Development
Project Title: Climate Modeling II course development (EAEPS-7)

Project Description:
Climate modeling II is an in-development course which will concern the application of climate modeling techniques to address important societal and scientific questions. It will be targeted at advanced undergraduates and early-stage graduate students, specifically those who have completed a coordinated course, Climate modeling I - in the fall.

In CMII, students will be expected to learn how to download, compile, and run a climate model and address a scientific question about the impact of geophysical phenomena on Earth’s climate system. Students will learn about the numericization of physical equations, the development of model code, and the theory behind how to perform experiments with large, coupled, climate models.

The course is co-taught with a series of professors in DEEPS - led by Prof. Christopher Horvat, and co-taught with Professors Mara Freilich, Baylor Fox-Kemper, Amanda Lynch, Jung-Eun Lee, and Manu di Lorenzo. We would like to work with an UTRA student to develop GitHub-based course documentation and interactive computing experiments, as well as creating example codes for running climate model simulations. This will follow an existing CESM tutorial for running and understanding climate model output.

The UTRA student will work with the instructor team to develop the labs. Key tasks include (1) writing documentation, (2) troubleshooting code, and (3) curating datasets. This UTRA is well suited for a student who is interested in teaching and learning using open source tools, and understanding the mechanics of modern climate models.

Required skills: Knowledge of Python
Preferred skills: An interest in climate science and climate modeling, and a desire to improve teaching tools using open source and public frameworks.

Is this project for more than one student: No

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**Emily Cooperdock**  
Department: Earth, Environmental & Planetary Sciences  
Project Type: Research  
**Project Title:** Research in sustainable camping and field gear for the Department of Earth, Environmental and Planetary Sciences (EAEPS-6)

**Project Description:**  
Field trips are a key component of the undergraduate education in the Department of Earth, Environmental and Planetary Sciences (DEEPS). Every year, students have the opportunity to camp, hike, and conduct field work as they learn about fundamental earth and environmental processes. In order to reduce the barriers of cost and make field trips more inclusive, the DEEPS provides camping gear to those who need it. This UTRA research project’s goal is to update the DEEPS gear collection with sustainable, ethically resourced gear tailored to the needs of the department. The work will involve cataloging the existing gear collection and field work needs, researching sustainable brands, and making recommendations on new purchases. Beyond these essentials, other components could include researching gear management in other geoscience departments and exploring other sustainable and inclusive initiatives such as gear donation and scholarships. The opportunity to participate in class and/or research-related DEEPS field trips during the UTRA will be available with the goal of gaining insight into the gear needs. You will be supervised by Profs. Emily H. G. Cooperdock and (Eben) Blake Hodgin.

Required skills: No specific course work or camping experience is required. The student must be able to complete online research, interview existing students, faculty and staff about field gear needs. Strong organizational and communication skills are required.

Preferred skills: Camping experience or knowledge of camping and field gear is preferred.

Is this project for more than one student: No

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**James Head**  
Department: Earth, Environmental & Planetary Sciences  
Project Type: Research  
**Project Title:** The NASA Artemis Program Human Exploration of the Moon and Mars: Designing a 500-day Mars-Like Lunar Mission (EAEPS-5)

**Project Description:**  
Artemis Exploration of the Moon (https://www.nasa.gov/specials/artemis/) and on to Mars (https://www.nasa.gov/humans-in-space/humans-to-mars/) is underway! In our research lab at Brown, we
have examined the 13 candidate landing sites for the first Artemis human landing in over 50 years. But how can we learn from the Artemis missions to the Moon about how to explore Mars, which is likely to involve a 500-day long mission duration? To accomplish this, we have undertaken a “500-day Design Reference Mission (DRM)” to the Hadley-Apennine region of the Moon, the exploration site for the Apollo 15 mission, the first scientific expedition to the Moon. We are asking: What are the unanswered questions remaining from Apollo 15 exploration? How can we gain access to the answers? What type of mobility and infrastructure do we need to address these questions? What type of base and remote habitats are needed and where should they be placed? What innovative types of materials (e.g., Myco-Architecture) can be used for building habitats?

On the basis of my personal involvement and experience (Apollo 11-17) in the Apollo Lunar Exploration Program site selection, astronaut training, mission planning and operations, we undertook a “500-day Design Reference Mission (DRM)” to the Hadley-Apennine region of the Moon, with the involvement of Astronaut David Scott (Brown Visiting Professor), and Brown Undergraduates/Graduate Students, including UTRA grantees. We are interacting with NASA Astrobiologist (Adjunct Professor) Lynn Rothschild (https://www.nasa.gov/people/lynn-j-rothschild/) on the use of MycoArchitecture (https://www.nasa.gov/general/myco-architecture-off-planet-growing-surface-structures-at-destination/) as an innovative low mass, in situ building material for Moon/Mars.

In this continuing research, we are using our experience with the six Apollo landed missions to examining various remote sensing data sets (images, altimetry, slope, roughness, geology, spectral properties, etc.) to develop a strategy and plan for the “500-day Design Reference Mission (DRM)” to the Hadley-Apennine region, and outlining lessons for Mars.

Required skills: See below

Preferred skills: The SPRINT/UTRA candidate should have some experience in science/geology/computer science, and data processing and analysis; image processing experience is useful. The selected candidate will work directly with Professor Jim Head and members of his lab in the analysis and synthesis of the DRM.

Is this project for more than one student: No

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**Timothy Herbert**  
Department: Earth, Environmental & Planetary Sciences  
Project Type: Research  
**Project Title: When the Mediterranean dried up (EAEPS-3)**

*Project Description:*  
The gateway from the Atlantic Ocean to the Mediterranean became partially to fully closed from ~6.3 to 5.3 million years ago. Today, the Mediterranean contributes dense salty water that sinks into the deep North Atlantic and is believed to influence ocean circulation. The Mediterranean isolation provides a "natural experiment " to see how important this flow is, since it was cut off for nearly a million years in the past. This project will look at records of ocean temperature and circulation in the North Atlantic, using geochemical analyses of new sediment records from off the coast of Portugal.

Required skills: Basic familiarity with earth science
Timothy Herbert
Department: Earth, Environmental & Planetary Sciences
Project Type: Research
Project Title: Past Mediterranean climate: a window into evolution in Northern Africa (EAEPS-4)

Project Description:
This project will analyze marine sediments originally deposited in the deep Mediterranean ocean, now uplifted along the coast of southern Sicily. The age of the sediments covers major milestones in climate evolution from the warm Pliocene into the glacial world of the Pleistocene. Our work investigates the evolution of temperature and salinity, which trace variations in climate closely related to environmental conditions in Northern Africa (the time span covers the transition from more forest-dominated landscapes to more grasslands, and also the evolution of human ancestors to bipedal locomotion, change in diet etc.). The project will involve organic and inorganic (stable isotope) geochemistry of these sediments to compile a continuous record of past environmental change in the Mediterranean/Northern African region.

Required skills: Some familiarity with earth climate, past and present, interest in acquiring laboratory skills, EEPS 0240 as baseline background

Preferred skills: Some familiarity with basic laboratory skills, spreadsheets and scientific graphing

Is this project for more than one student: No

Yongsong Huang
Department: Earth, Environmental & Planetary Sciences
Project Type: Research
Project Title: When biomarkers meet artificial intelligence: a revolutionary approach for proxy discovery in paleoclimatology and paleoceanography (EAEPS-1)

Project Description:
This project aims to develop new computational tools that associate large amounts of biomarker mass spectral data collected from global ocean surface sediments with site-specific climatic and environmental variables. Accurate reconstruction of past climate and oceanographic changes is critical for parameterization and calibration of climate model projections. However, there is a major scarcity in accurate and quantitative proxies for reconstructing past climate and oceanographic changes. Our new approach combines the rapidly evolving artificial intelligence capabilities with vast amounts of biomarker data to discover new and more quantitative proxies for reconstructing past changes in critical climate and oceanographic variables such as sea surface temperature (SST), sea ice extent, productivity (i.e., nutrients) and oceanic anoxia. Artificial intelligence (AI) is rapidly revolutionizing biomarker discovery from
multi-omics data, and in particular lipidomics mass spectral data, for biomedical research. However, AI has yet to be applied to discovering paleoclimate and paleoceanographic biomarkers.

Required skills: Computer science courses, strong interest in dealing with climate change issues

Preferred skills: Courses on Deep learning, statistics

Is this project for more than one student: No

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**Yongsong Huang**  
Department: Earth, Environmental & Planetary Sciences  
Project Type: Research  
**Project Title:** Validation of tetra unsaturated alkenones as a sea ice proxy around Antarctica ocean (EAEPS-2)

**Project Description:**  
Sea ice around Antarctica reached its minimum area in January 2024 since satellite observation starting in 1978. Whether this sea ice decline is unprecedented, or a temporary phenomenon due to natural causes is a critical question. Answering this questions requires longer term sea ice records, over hundreds to thousands of years in the past, for comparison with satellite observations. But we lack good proxies for quantitative reconstruction of past sea ice variations. This study will analyze surface sediments from around Antarctica with different percentage of sea ice coverage, to test the hypothesis a class of haptophyte algae-produced biomarkers, called alkenones, can quantitatively record past sea ice changes.

Required skills: Major interest in climate change studies, good lab skills

Preferred skills: Courses in chemistry (especially organic chemistry, high school level is also ok), earth science, environmental science

Is this project for more than one student: No

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**Daniel Ibarra**  
Department: Earth, Environmental & Planetary Sciences / Institute at Brown for Environment and Society  
Project Type: Research  
**Project Title:** Utilizing stable isotopes to trace hydrological processes in the environment (EEPSI-2)

**Project Description:**  
The climate and water cycle are intimately linked, regulating processes such as precipitation and evaporation. Understanding this relationship is crucial for water management, especially in a warming world. The stable isotopes of water (17O, 18O, and 2H) can serve as powerful tracers of regional to local hydroclimate, providing insights into hydrological regimes that can affect water resources and surface
processes such as chemical weathering. This project will examine the isotopic composition of meteoric waters from locations such as: (1) the Zambales Ophiolite Complex in the Philippines and the Columbia River Basin, with the aim to better understand ongoing weathering processes; (2) the dry western United States, to understand the sensitivity of the region to the El Niño Southern Oscillation (ENSO); and (3) various cave monitoring sites in the Philippines to inform the interpretation of isotope records from cave deposits that date back to glacial-interglacial cycles.

This project will entail the following components listed below, with the opportunity to tailor efforts based on mutual interests of the undergraduate student, graduate students (Justin Custado and Mónica Geraldes Vega), faculty advisor (Daniel Ibarra), and collaborators. These will include:

1) Preparation and analysis of water samples for $\delta^{17}O$, $\delta^{18}O$, and $\delta^2H$: You will be involved in preparing and analyzing the isotopic composition of water samples sent by collaborators.

2) Geospatial analysis of isotopic data: You will be involved in compiling and analysis of previously published isotopic data with newly generated data from the sampling locations.

3) Multiproxy analysis of modern cave processes: You will be involved in data analysis to interpret the seasonal hydroclimate pacing in the tropical Philippines.

Required skills: N/A

Preferred skills: N/A

Is this project for more than one student: No

Daniel Ibarra
Department: Earth, Environmental & Planetary Sciences / Institute at Brown for Environment and Society
Project Type: Research
Project Title: Geospatial controls on Weathering and Clay formation In the Columbia Basin (EEPSI-3)

Project Description:
Rock weathering influences the global carbon cycle by regulating atmospheric CO2 levels and serving as the thermostat which has maintained earth's climate within a habitable range despite numerous perturbations. Additionally, the secondary byproducts of weathering—clays and amorphous oxides—further influence climate and alter biogeochemical cycling due to their ability to sorb metals and organic matter. They can increase weathering rates by removing ions from solution, or slow weathering rates by shielding weatherable minerals and have been shown to slow the decay of organic matter, and potentially control the capability of soils to retain carbon. In this way secondary mineral (clay and amorphous oxides) formation emerges in equal importance to rock weathering in understanding both long and short term carbon cycling, which both have implications for understanding past climate as well as future adaptations and carbon stock management. In this project, we will take advantage of the extensive USGS water chemistry database and geospatial analysis to understand how weathering and secondary mineral formation varies across the Columbia river basin.
This project will test how landscape position influences weathering and secondary mineral formation by
quantifying the sources and sinks of solutes across a landscape and attributing this to primary mineral weathering and secondary clay formation. The Columbia river watershed serves as an ideal natural laboratory due to its historic water chemistry data availability, its well studied lithology as part of the cascade subduction zone, and its climate and erosional gradients. This project will entail three components (listed below) with the opportunity to tailor efforts based on the mutual interests of the student PhD student mentor (Sebastian Munoz), faculty advisor (Daniel Ibarra), and collaborators. These will include:

1) Major and Trace metal Analysis of river waters on ICP-OES and ICP-MS
   You will learn how to dilute samples, prepare calibration curves, and run instruments to quantify the trace and major elements of river waters
2) Remote sensing/Geospatial analysis
   You will categorize watersheds due to their bedrock lithology, land cover, and other geospatial attributes and combine this with meta-analysis of water chemistry data to understand the factors driving changes in water chemistry across the entire basin.
3) Water Isotope Analysis
   Water Isotopes are valuable tracers of flowpath, and You will learn how to measure and interpret water isotopes for 18O and 2H.

Required skills: N/A
Preferred skills: N/A
Is this project for more than one student: No

Seda Salap-Ayca
Department: Earth, Environmental & Planetary Sciences / Institute at Brown for Environment and Society
Project Type: Research
Project Title: Mapping Vulnerability: Addressing Coastal Population Dynamics in the Face of Sea Level Rise (EEPSI-1)

Project Description:
As the world’s climate has been changing at an unprecedented rate in the last century, sea level rise has become a growing concern. The degree to which sea levels are projected to rise varies greatly around the world. In the United States, the state projected to experience the greatest losses from sea level rise if trends continue is Florida. Sea level rise in Florida has been increasing at unprecedented rates, particularly in South Florida. This region has experienced an annual sea level rise of 9.41mm from 2010 to 2021, a sharp increase compared to the average of 3.9mm from 1900 to 2021 (Parkinson 2022). The state’s peninsula geometry, along with much of its population living near the coast have resulted in a projection of a loss of 2.5 million residents by 2100 (Hines 2020). Of these residents, many consist of underprivileged communities, such as racial minorities, low-income populations, and communities lacking English proficiency. While everybody living in an area impacted by sea level rise will be negatively impacted, underprivileged groups are often more heavily impacted from the costs of damages. For low-income communities, the cost of relocating after a flood is a heavier relative burden than higher income individuals and families, with fewer options available. When determining potential damages from sea level rise, one of the most crucial aspects to consider is population density in an affected area. Knowing both population density and distribution are crucial in formulating effective hazard mitigation plans and
estimating damages from impacts like flooding (Calka 2017).

Understanding the distribution and density of populations in vulnerable coastal zones is paramount for effective mitigation and adaptation strategies. Traditional choropleth maps, while useful, often oversimplify population distribution within designated boundaries. This limitation led to the development of dasymetric mapping, a technique that integrates population data with ancillary information to provide a more nuanced portrayal of population distribution (Mennis 2009).

The research task that we are seeking to engage undergraduates in producing is a dasymetric mapping for population density that will enable to visualize the vulnerable population in coastal zones better. Students will gain knowledge about resilience to disasters related to sea level rise, coastal storms, and temperature extremes as well as technical expertise in Geographic Information Systems (GIS) and spatial data analysis.

Required skills: Students applying for this position should be willing to learn how to use spreadsheets, do web research, and apply basic statistics and quantitative data analysis. Experience with geographic information systems (GIS) programs such as ArcGIS Pro or QGIS or scripting and programming with Python and Jupyter Notebooks for documentation are required.

Preferred skills: N/A

Is this project for more than one student: No

Atsuko Borgmann
Department: East Asian Studies
Project Type: Course Development
Project Title: Using games to enhance intransitive/transitive verb learning in Japanese. (EAAS-5)

Project Description:
Objectives:

This project, designed for course JAPN0300 and above, aims to address the challenges learners face with intransitive and transitive verbs in Japanese. The project aims to create audio-visual materials for learning the usage of intransitive and transitive verbs and develop an online game for practicing these verbs.

The project is intended for intermediate-level learners of Japanese and I intend to use the audio visual materials in class. The gaming materials will be assigned as homework. Multimodal materials (such as video clips and games) will be used to introduce the verb use along with context which enhances the understanding of proper usage. These materials will help expand learning opportunities outside the classroom.

Implementation:

The first step involves creating a comprehensive website housing all audio-visual materials. UTRA students will play a pivotal role in reviewing and translating verbs, as well as contributing to the website's
design with appropriate images and audio files. The second step focuses on developing online games accessible via laptops, phones and tablets, facilitating remote learning and practice.

Benefits and Impact:

Through active participation, UTRA students will deepen their understanding of intransitive and transitive verbs, while the resulting materials will significantly enhance the learning experience for students above JAPN0300.

This project can be done remotely as long as all collaborators meet routinely over Zoom and have meetings.

Required skills: The UTRA students should know intransitive/transitive verbs, and possess intermediate-level proficiency in Japanese; JAPN0500 or greater or Equivalency testing; Heritage learners of Japanese with Equivalency testing. The students should have experience in creating online games and can expertly handle web design.

Preferred skills: The UTRA candidates should have created online games. In their application, please describe what kind of online games you are capable of creating for learning intransitive/transitive verbs.

Is this project for more than one student: Yes

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**Heeyeong Jung**  
Department: East Asian Studies  
Project Type: Research  
**Project Title:** Speech style shifts occurring during cooking club activities among non-native and native speakers of Korean (EAAS-4)

**Project Description:**  
Speech styles in Korean, which generally correspond to speech registers in English, do not change the propositional meaning of an utterance, but convey its social meaning within a given context. Honorific-rich language like Korean is renowned for complex addressee honorifics reflected on verbal endings, providing the speaker with multiple options when creating an utterance toward addressee. The Korean language offers six different speech styles for the speaker to choose from, depending on the relationship between speaker and addressee. This interesting phenomenon is often observed among native speakers, who shifts to a different speech style in the same context to obtain their discursive goals and construct or develop desired identities in each moment.

The current study examines the style shifts occurring during cooking club activities among both non-native and native speakers of Korean. Spoken data were collected from participants of a cooking club that I led as part of the co-curricular activities offered during a Korean language summer immersion program. These activities took place weekly for two hours over a span of seven weeks, resulting in approximately 14 hours of recorded material per year. With data collected over two consecutive years, the total amounted to 28 hours.

The study aims to investigate three key questions pertaining to speech style shifts occurring in
interactions among non-native and native speakers of Korean during these cooking club activities. First, it seeks to identify the situations prompting participants to shift their speech styles. Secondly, it examines the involvement of prosody in these speech style shifts, particularly in relation to factors, such as ethnicity, gender, and language proficiency. Lastly, the study explores potential variations in participation frames between non-native and native speakers, seeking uncover any distinctions in their level of engagement within the context of the cooking club environment.

The student involved in this study will transcribe the recordings, translate selected portions of interactions into English, and code the speech styles for the analysis of participants' utterances. Working closely with faculty, he or she will have the opportunity to learn how to analyze spoken data from an indexical perspective, utilizing analysis tools such as CLAN (Computerized Language ANalysis), Praat, and a transcription tool, Daglo.

Required skills: Advanced Korean language proficiency, especially near-native in listening skills, proficiency in computer software (i.e., MS Office), strong communication skills, organizational skills, and good work ethics are required.

Preferred skills: Knowledge with research analysis tools (i.e., SPSS) is preferred but not required.

Is this project for more than one student: No

Hye-Sook Wang
Department: East Asian Studies
Project Type: Research
Project Title: Impact of Hallyu on Korean Heritage Learners' Korean Language Learning Motivations (EAAS-3)

Project Description:
With the increasing popularity of Korean popular culture called 'Hallyu' and media representations of it globally, student enrollments in Korean classes in U.S. higher education institutes have been surging in recent years. Such notable increase is mainly due to the growing number of 'non-heritage learners' who are coming from non-Korean backgrounds. However, heritage learners who register for the class have also been on the rise although their number is significantly smaller than that of non-heritage learners.

Previous research has shown that Korean language learning motivations for heritage learners predominantly had to do with maintaining their ethnic identity, wishing to remain connected to their kins and better communicating with their family members. Interest in Korean popular culture has not been an attractive motivator for them. And yet virtually few to no studies to date looked into heritage learners’ views of Korean culture in general and popular culture in particular and whether or not, or how their views of Korean popular culture motivated their Korean language learning.

The purpose of this research is therefore to investigate heritage learners’ attitude towards and perceptions of 'Hallyu' and their impact on Korean language learning through a qualitative method (i.e., in-depth interviews). First round of data collection with students who have taken or are taking Korean language course(s) has been completed and second round of data with students who have not taken any Korean language courses will be collected this time.
Trang Tran  
Department: East Asian Studies  
Project Type: Course Development  
**Project Title:** "Vietnamese Language and Culture Enrichment Project: Enhancing VIET 400 Course Materials" (EAAS-2)  

**Project Description:**  
Our project aims to enhance and update the course materials for VIET 400, Intermediate Vietnamese, focusing on Language and Culture. We seek to enrich students' learning experiences by compiling authentic texts and listening passages covering various aspects of the Vietnamese language and culture.

Key topics include:  
1. The history and evolution of the Vietnamese language, including "chữ Nôm" and "chữ quốc ngữ"  
2. Dialect and Tone studies  
3. Brief history of Vietnam and important historical figures  
4. Ethnic groups in Vietnam and their religions  
5. Traditional Vietnamese performing arts  
6. Folk paintings  
7. Contemporary arts and fine arts

Students involved in this project will curate these materials and provide English translations for vocabulary, useful expressions, grammar explanations, and cultural insights. Additionally, they will update an Open Educational Resource (OER) web platform to host these resources, making them accessible to a wider audience.

This project offers a unique opportunity for students to contribute to the improvement of course materials while gaining valuable skills in research, communication, and collaboration.

Required skills: Ideal candidates should possess a strong understanding of or demonstrate familiarity with the Vietnamese language and culture and have web design experience. Exceptional communication and organizational skills are crucial for effective collaboration in this project. A diligent work ethic is essential to meeting project milestones and goals.

Preferred skills: Priority will be given to candidates who have completed VIET0400 or equivalent courses. Proficiency in graphic design or illustration would be advantageous in enhancing the visual appeal of the modules. Independent research skills are also valued for sourcing and validating authentic materials.

Is this project for more than one student: Yes
**Heeyeong Jung**  
Department: East Asian Studies  
Project Type: Course Development  
**Project Title:** Developing a performance-based, digital textbook for Korean language learners (EAAS-1)

**Project Description:**  
Traditional Korean language textbooks are not sufficient to immediately reflect the constantly changing societal values and linguistic shifts that have emerged in modern times. To overcome this challenge, the textbook has been developed in a digital format, offering flexibility and ease when updating and revising materials. Unlike major European languages, digital textbooks or course materials are rarely available in Korean, especially those written for English-speaking learners of Korean. This performance-based digital textbook has been developed based on the Integrated Performance Assessment (IPA), where learners engage in interconnected multi-tasks under one overarching theme, employing authentic, real-life tasks reflecting real-world communication.

Eight modules of the digital textbook have been developed on various themes and topic areas such as contemporary life (i.e., K-food, K-fashion), travel, hobbies, intercultural communication, environment and sustainability, workplace culture, and DEI, etc. Additionally, relevant and significant topics such as health & wellbeing, science & technology, gender & diversity, identity & diaspora will be included in the topic modules. The digital textbook aims to provide Korean language learners with the necessary skills to communicate effectively across cultures while building digital literacy and community connections.

The student working on this project will edit and format Word documents, transcribe video clips into Korean, and translate content from Korean to English while maintaining the original meaning and context. The student involved in this project will have the opportunity to acquire advanced knowledge of contemporary Korean language, society, and culture. Furthermore, he or she will learn about the important pedagogical practices (i.e., IPA) and the developmental process of instructional materials using authentic content.

Required skills: Intermediate or above Korean language proficiency, proficiency in computer software (i.e., MS Office), strong communication skills, organizational skills, and good work ethics are required.

Preferred skills: Successful completion of KREA0400, knowledge of Korean society and culture, experience in translating Korean into English, and familiarity with Photoshop are preferred but not required.

Is this project for more than one student: No

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**Elizabeth Brainerd**  
Department: Ecology, Evolution, and Organismal Biology
Project Type: Research
Project Title: MicroXROMM methods development for mouse mastication models (ECEOB-3)

Project Description:
The purpose of this project is to continue our development of micro-surgical methods for implanting tiny metal beads into the bones of the head of a mouse. The student will develop and test surgical approaches ex-vivo and then perform sterile surgery on live mice. The student will assess implantation success with microCT scanning. The student will gain anatomical knowledge, microsurgical skills, and microCT scanning and interpretation skills. The work will contribute toward developing microXROMM as a method for studying chewing movements of the jaw in live mice for mouse models of TMJ disorder and dysphagia. The student will present their work in lab meetings and potentially at a scientific conference, thereby gaining science communication skills.

Required skills: Some mouse surgery or micro-dissection experience is required. Students must be able to manage their time and project effort without supervision.

Preferred skills: Computer coding in R or MATLAB experience preferred.

Is this project for more than one student: No

Tyler Kartzinel
Department: Ecology, Evolution, and Organismal Biology
Project Type: Research
Project Title: Protecting wildlife health and nutrition using DNA-based forensic data (ECEOB-1)

Project Description:
What foods sustain the populations of protected and endangered species? This question is central to our research in the T. Kartzinel lab (www.kartzinellab.com) and our conservation partners around the world. This fall, we intend to offer unique, team-oriented research opportunities to learn about the health and nutrition of wildlife species around the world. You will have opportunities to learn how cutting-edge genomic technologies are bringing forensic capabilities into conservation science in a changing world. In order to help address research priorities of governmental and non-profit partners, we anticipate studies focusing on bison from Yellowstone National Park (USA), small mammals from Fray Jorge National Park (Chile), and/or sloths from La Selva Biological Station (Costa Rica)—among others. Skills that we will develop and practice include, but are not limited to, DNA extraction, PCR, and gel electrophoresis. You will be invited to join the T. Kartzinel lab as a full-fledged member, where you will find many role models and mentors to help you succeed in this type of research. This will be a highly engaging position where you can expect to be fully immersed in the inner workings of what goes on in an active molecular ecology lab.

Required skills: Laboratory experience based on prior course work, lab safety training, and/or research opportunities

Preferred skills: Experience with sterile technique; interest in molecular ecology and conservation biology

Is this project for more than one student: Yes
**Tyler Kartzinel**  
Department: Ecology, Evolution, and Organismal Biology  
Project Type: Research  
**Project Title:** How plants respond to climatic variation and why it matters for wildlife (ECEOB-2)  

**Project Description:**  
What wild foods sustain wildlife during their epic migrations? The goal of this project is to understand how wildlife of Yellowstone National Park select plants to maintain year-round nutrition. In partnership with the National Park Service, we have tracked the food plants that bison, elk, and other wildlife eat throughout the park. Our current research priority is to conduct an experiment involving these food plants in the greenhouses at Brown University, where we will simulate different seasonal conditions that the plants encounter at Yellowstone in order to determine how these conditions may alter their nutritional value to wildlife. Results of this research have the potential to directly contribute to wildlife conservation and management in Yellowstone and across the United States as climates change. The skills and knowledge that will be gained include experimental design, maintenance of plant cultures in greenhouse facilities, and statistical analysis. For more information about the lab and our projects, please visit: www.kartzinellab.com/research.

Required skills: Coursework in ecology, plant biology, and/or environmental science

Preferred skills: Familiarity with excel, R, or other data handling and analysis software.

Is this project for more than one student: No

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**Louis Putterman**  
Department: Economics  
Project Type: Research  
**Project Title:** Research assistance in comparative development and behavioral economics. (ECONO-1)  

**Project Description:**  
Help Professor Putterman on tasks arising in his ongoing research projects on very long run history (dating back to the origin of agrarian societies or at least to year 1500 CE) and impacts on differences in economic and political development among world regions today, or on his research projects on behavioral and experimental economics (which mainly concern choices between cooperation and pursuit of private gains), or on both. The exact projects in which tasks are arising will be unknown until close to initiation of the RA-ship.

Required skills: Student should have strong basic skills in data management and running multivariate regression models, preferably in STATA. Knowledge of R or Python or ArcGIS can be helpful. Most qualified applicants for similar past RA positions have been rising juniors taking courses required in the
Applied Math - Economics or Computer Science - Economics concentration or in APMA or CSCI. A rising sophomore who has skills nearly comparable to typical juniors in those concentrations can also be competitive.

Preferred skills: Interest in economics applications other than finance, for example economics of development, public policy, and health (among others), is a plus. Applicants having a genuine interest in an academic career are preferred, although this is not very common in the economics discipline so the factor is not so likely to be decisive to who is selected.

Is this project for more than one student: Yes

Emily Qazilbash  
Department: Education  
Project Type: Course Development  
Project Title: EDUC0750 Data and Evidence in Education course development (EDUCA-6)

Project Description:
As part of a 2019 redesign of the education concentration, concentrators are required to take “Data and Evidence in Education,” a course that provides students with exposure to the big questions we ask in education and the types of data we might collect and analyze to answer different types of questions. I have taught this course four times now and am still refining the way that I scaffold student thinking to help shape their mindsets and skillsets about creating and answering critical questions about the field of education. A student working with me would research different frameworks used for education research, helping think through how we teach students about formulating good research questions and also how we teach students about the benefits, drawbacks and uses of quantitative and qualitative data.

This project is ideal for a student who took the course in either 2023 or 2024 and has experience or likes to think about creating learning opportunities for undergraduate students. As part of this project, the student will (1) investigate frameworks used by education researchers in order to choose one to use to teach the course content, (2) examine syllabi of similar courses at other universities, (3) review and select research papers that students will be using in the course to apply their learning, and (4) ensure that class lessons and activities are engaging and tied to the framework chosen.

This project will enable an undergraduate student to be part of the process of strengthening the curriculum and pedagogy of a course required for education concentrators at Brown and to apply knowledge from the literature on thinking critically about quantitative and qualitative research. Ideally the student would attend the course on T/Th 10:30-11:50 in Fall 2024 if interested but does not need to.

Required skills: Took EDUC0750 in Spring 2023 or Spring 2024

Preferred skills: Can attend EDUC0750 in fall 2024 (though not necessary)

Is this project for more than one student: Yes (2)
**Jacques Lesure**  
Department: Education  
Project Type: Research  
**Project Title:** Progressive Black Masculinities and Higher Education (EDUCA-5)

*Project Description:*
This research project explores the sense-making and resistance of collegiate Black men in a nonprofit’s academic year leadership program designed for “high-achieving” Black men. The purpose of doing so is to better understand the complex experiences, and identities, of Black men within higher education.

Utilizing an analytical framework called Critical Black Masc Analysis in Education, this study will examine semi-structured interview data and explore 1) diverse conceptions of Black masculinities 2) the ways that students exhibited resistance to the program’s formal design 3) emerging progressive politics of collegiate Black men.

The student’s role will be to assist in the review of literature and the qualitative coding process. This student researcher assigned to this project may have the opportunity to co-write and publish findings from this study. In general, this project is well suited for students interested in researching topics of race, gender, and class. This project is also fitting for students with expertise and lived experience with, living amongst and/or working with, people from diverse backgrounds. This experience is best suited for advanced undergraduate students, although all students are welcome to apply.

Required skills: Having taken at least two classes that engage topics of race and/or gender and inequality is required.

Preferred skills: N/A

Is this project for more than one student: No

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**Laura Snyder**  
Department: Education  
Project Type: Research  
**Project Title:** Teens and Curriculum: BookTok and the Humanities Reimagined Project (EDUCA-4)

*Project Description:*
Students engaging in this UTRA/Sprint will become curriculum designers to design culturally sustaining curriculum for middle and high school Humanities classrooms and assist local high school students prepare for presentations at the National Council of Teachers of English Conference in Boston.

Do you enjoy reading literature and looking for primary sources that can make connections to contemporary life? Are you passionate about providing high school students with a curriculum that more adequately reflects them, their community, and the diversity of the world around them? You will curate material and you will create an e-book and a publicly accessible unit and lesson archive for teachers. Researchers will assist the professor to revise and create new culturally sustaining materials based around essential questions and contemporary adolescent fiction.
You will also help a group of 5-12 students from diverse backgrounds and high schools prepare their own ideas about the books that teachers should read and teach as they prepare for a presentation in November. Each teen will read one book with the group, suggest one group that teachers should read, and propose one book that teachers should teach.

Required skills: Skills in lesson and unit planning, interpretation of literature, understanding of primary source analysis, and clear writing and communication skills. Knowledge of: contemporary adolescent fiction, culturally relevant pedagogy. Also, you should have the ability to pass a background check to participate in the Teen BookTok program as part of the research.

Preferred skills: Students with preparation in curriculum design from course work or work experience will be prioritized. Technology expertise is desired including: proficiency in the Google suite for education, Canva, Adobe InDesign and Spark, Zotero, and Google Classroom. Ability to navigate library archives for primary sources.

Is this project for more than one student: Yes

Matthew Kraft
Department: Education
Project Type: Research
Project Title: How Climate Change is Increasing the Risks of K-12 School Closures Due to Extreme Weather Events. (EDUCA-3)

Project Description:
The emerging risks posed by climate change are not thoroughly understood by education policymakers or widely reflected in education policy or practice. As one of the first projects of my new Education Systems and Climate Change Initiative housed at the Annenberg Institute, I am examining the risks posed to schools by climate change. Schools are increasingly becoming susceptible to damage caused by flooding, wildfire activity, irregular weather patterns, and natural hazards. In addition to physical damage caused to school infrastructure, erratic weather behavior results in school closures and a loss of instructional time for students in the classroom. This project will result in an academic paper summarizing such risks and outlining the schools and student demographics that are most vulnerable to the effects of climate change. This project will use data from a number of sources, including the National Center for Education Statistics, the Federal Emergency Management Agency, the Environmental Protection Agency, and First Street Foundation. I also hope to provide predictions of forecasted risk to schools to highlight the urgent need to address these issues. My aim is for this information to be used by policymakers to prepare public schools for, and adapt to, climate change so they can ensure productive learning environments for all students.

Required skills: None.

Preferred skills: Knowledge of earth systems, environmental sciences and/or education policy are a plus.

Is this project for more than one student: Yes
**Yoko Yamamoto**  
Department: Education  
Project Type: Research  
**Project Title:** Family Engagement in First-Grade Children’s Education and Schooling: A Comparative Study in Japan and the U.S. (EDUCA-2)  

**Project Description:**
Research underscores the critical roles played by families in children’s educational experiences and outcomes through family engagement, or parental involvement in children’s education. Although extensive research has been conducted in the U.S. context, there is a limited understanding of how school-family relations are conceptualized and what factors increase family engagement in other countries. Addressing this gap, our study seeks to unveil the cultural, institutional, and individual factors that uniquely and significantly shape family-school relations and families’ school-based engagement in Japan and the U.S. Specifically, the current study examines parents’ beliefs about parental and teacher roles, expectations of and interactions with teachers, and elements and practices that influence family engagement in children’s education among parents with first graders in the two countries. Additionally, we aim to examine within-country variations, such as those related to children’s gender and family backgrounds. The students engaged in this project will analyze survey data collected in Japan and the U.S. After understanding survey questions, variables, and data structures, the student will conduct descriptive and comparative analyses to examine family-school relations and families’ school-based involvement, followed by analyzing factors associated with family engagement under the guidance of the faculty. Through these research experiences, the student will gain skills to conduct data analysis, critically evaluate and interpret research findings, and communicate them effectively (e.g., visual presentations). Additionally, students will deepen their understanding of the meanings and dynamics of family engagement and family-school relations in distinct sociocultural contexts.

Required skills: Has taken at least one quantitative research method course or statistics course, or has experience with quantitative analysis.

Preferred skills: Has an interest in cross-cultural research.

Is this project for more than one student: No

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**Andrea Flores**  
Department: Education  
Project Type: Research  
**Project Title:** First-Gen Experiences of Covid (EDUCA-1)  

**Project Description:**
This anthropological research project focuses on the ongoing effects of the Covid pandemic on first-generation college students and their parents nationwide. First-generation college student families have
been more greatly impacted by Covid-based interruptions to education than their continuing education families. We examine how this pathbreaking population of students and their parents, together, negotiate changes to education, new caretaking routines in their families, and disrupted paid work. Ultimately, we seek to understand how the members of this important dyadic relationship work together to achieve shared goals in and beyond education for their shared futures. Research participants will take part in the study for two years. The methods for this project are online journaling and interviews conducted via zoom in order to track the effects of the pandemic longitudinally. The UTRA student for this project will assist in recruiting research participants; tracking research participants' online journaling and other data management tasks; undertaking literature reviews; conducting interviews, data analysis, and coding; and other duties as necessary. The student would also interface with a dynamic group of research assistants from the broader Pandemic Journaling Project, located at both Brown and the University of Connecticut. Please see our website: https://pandemic-journaling-project.chip.uconn.edu/ for more information on the Pandemic Journaling Project.

Required skills: excellent communication, ability to multitask

Preferred skills: fluency in Spanish

Is this project for more than one student: No

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**Christelle Alvarez**
Department: Egyptology and Assyriology
Project Type: Course development
**Project Title:** Developing Digital Tools for Hieroglyphic Script and Language (EGYAS-1)

**Project Description:**
The project aims to enhance and facilitate the learning experience for students enrolled in EGYT 1310 “Introduction to Classical Hieroglyphic Egyptian Writing and Language (Middle Egyptian I)” by developing digital resources for learning hieroglyphs throughout the Fall semester. The UTRA Fellow(s) will undertake various tasks, including researching and crafting exercises, exploring and adapting existing online tools, and collaborating with the instructor to introduce innovative features. These digital tools will be invaluable resources for students in the class navigating the complexities of learning a new script and comprehending a remote language. It will facilitate their learning of hieroglyphic signs as well as their usage in words and sentences, while receiving prompt feedback through interactive digital platforms like Canvas.

UTRA Fellow(s) will gain a comprehensive learning experience, developing skills in curriculum design, instructional technology, and strategic problem-solving. They will also gain experience as consultants, offering solutions and enhancements that have a direct impact on concurrent classroom instruction. The skills and tools developed during this project will not only enrich the current course but will also be applicable in various academic disciplines, extending beyond traditional language studies.

Required skills: Required qualifications for applicants include at least one semester of hieroglyphic language study (EGYT 1310) or some basic knowledge of the hieroglyphic script and knowledge in computer science.
Preferred skills: basic skills in language programming.

Is this project for more than one student: The project is ideally suited for a single student but could benefit from the partnership of two, allowing for shared creative efforts and a balanced workload, especially considering an implementation of the digital tools directly during the Fall semester.

Meagan Barry
Department: Emergency Medicine
Project Type: Research
Project Title: Breast milk composition in maternal undernutrition and helminth infection (EMEME-1)

Project Description:
My laboratory is focused on global infectious diseases and maternal-child health. I am currently investigating how maternal undernutrition and intestinal helminth infection change breast milk composition and what effects this might have on the infant, with a cohort of women and babies from the Philippines. Students will be involved in literature reviews and bench work to include RNA extraction and Illumina sequencing. Note: international travel will not be a part of this opportunity. Students will be invited to attend the Center for International Health Research bimonthly Journal Club. Successful completion of this project will provide students with the opportunity for authorship on a paper and/or presentation at a national conference.

Required skills: Basic wet lab experience (pipetting, etc), basic literature review knowledge

Preferred skills: DNA/RNA extraction, Illumina sequencing

Is this project for more than one student: No

Adam Levine
Department: Emergency Medicine/ Watson Institute of International and Public Affairs
Project Type: Research
Project Title: Understanding current practice in the use of armed escorts for humanitarian convoys (EMWII-1)

Project Description:
Problem statement and objective of the research: The humanitarian community lacks data on the current practice around the use (or lack of use) of armed escorts for humanitarian convoys. No database exists that can provide an overview of where armed escorts are used, in how many contexts, and under which circumstances. Members of the UN Civil-Military Coordination Consultative Group flagged this as an impediment to their ability to ensure consistency in their approaches to the use of armed escorts across all humanitarian operations. This research project will attempt to fill this information gap.
Scope of the research: The research project will look at the provision of armed escorts to humanitarian convoys as defined in the IASC Non-Binding Guidelines on the Use of Armed Escorts for humanitarian convoys. The following will be taken as core definitions to limit the research scope:

**Armed Escort:** a security measure that serves as a visible deterrent to a potential attack and, if necessary, acts in self-defense against an attack. Armed escorts can be provided by military as well as non-military actors, such as, police, private security companies or non-State actors.

**Humanitarian Convoy:** the movement of humanitarian supplies, goods and assets, including humanitarian personnel, by land between fixed locations.

The research presented in this concept note will be limited to humanitarian organizations that are part of the Inter-Agency Standing Committee System, and/or the humanitarian architecture in-country and thus are represented in the Humanitarian Country Team and the Security Management Team in-country.

The following contexts will be taken into consideration in the research plan. They have been selected based on being contexts where 1) OCHA has an established presence, and 2) there is an established Humanitarian Country Team.

Asia & the Pacific: Afghanistan, Myanmar, Pakistan, Philippines, DPRK.
Europe: Ukraine.
MENA: North-West Syria, Lebanon, OpT, Syria, Yemen, Libya, Iraq.
Latin America and the Caribbean: Colombia, El Salvador, Haiti, Honduras, Venezuela.
Southern and Eastern Africa: Burundi, Eritrea, Ethiopia, Madagascar, Malawi, Mozambique, Somalia, South Sudan, Sudan.
West and Central Africa: Burkina Faso, Cameroon, CAR, Chad, DRC, Mali, Niger, Nigeria.

Required skills: N/A

Preferred skills: Completion of prior humanitarian coursework

Is this project for more than one student: Yes

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**Kate Schapira**
Department: English Department, Nonfiction Writing Program
Project Type: Course Development
Project Title: Writing Climate, Writing Community (ENNWP-1)

**Project Description:**
For over a year, I’ve been supporting community climate resilience in the town of Warren, RI, where rising seas, storm surges and intense periods of rainfall are increasingly flooding whole neighborhoods, and where some of those neighborhoods are projected to be inundated and unlivable by 2100. The town is embarking on an ambitious managed retreat program for one of these neighborhoods, on and around Market St, and resident reactions are mixed and complex. In the Spring of 2023 I joined the Warren HEZ and my colleague Elizabeth Rush in holding a series of workshops on climate, storytelling and emotion at the George Hail Library. Resident interest led to the formation of a the Climate, Safety and Resilience Working Group within the Warren HEZ, meeting monthly since Fall 2023.
In Spring 2024, students in my Writing Climate, Writing Community course slowly and carefully determined what members of the Working Group, HEZ workers, and other local agencies would want to do if they had student support, including written support. Some things that have come from these collaborations:

A preschool science session at the library on soil permeability, in partnership with the Youth Services librarian (completed)

A workshop for homeowners on lowering flood insurance and making your home storm-ready, led by a 20-year veteran of FEMA and a member of the Department of Public Works (both Working Group members) (upcoming 5/7)

A survey on sump pump use, efficacy, and need, led by a Working Group member (in progress)

Two story-recording sessions for seniors, in partnership with the library and the senior center (in progress)

A plain-language resource on the town’s plans, compiled by a HEZ worker with student support, to be distributed in print and posted on the town website (in progress)

An article in the Warren Times-Gazette about climate impacts on recreation (in progress)

The fall course will follow a similar structure, but will differ from the spring one in that student-resident teams will be set from the beginning, based on the progress and relationships built in the fall. Students can choose one or more of these teams to join, document, and write for, depending on capacity and interest.

Required skills: Ease and comfort speaking and writing in English; experience commenting constructively on others’ writing

Preferred skills: Journalism and/or oral history experience; familiarity with GIS mapping tools; facilitation experience; community organizing experience; ease and comfort speaking and writing in Spanish or Portuguese

Is this project for more than one student: Yes

Hannah Ziobrowski
Department: Epidemiology
Project Type: Research
Project Title: A systematic review to improve estimates of disordered eating burden in the US (EPIDE-1)

Project Description:
The proposed project is a systematic review (and possibly a meta-analysis) to examine the prevalence of disordered eating behaviors among women and men from community-based samples over the last 10 years in the United States. This project is unique in that previous reviews have focused on eating disorder diagnoses, but there are significant accuracy limitations around such diagnostic measures. As a result, many people with clinically significant disordered eating have failed to be represented in prior estimates and the true burden of disordered eating is suspected to be severely underestimated. Improved estimates are essential to better inform policies for disordered eating screening and to potentially influence research funding priorities. While “disordered eating” is not always consistently defined, these behaviors include binge eating, purging, and fasting. Other unhealthy weight control behaviors such as diet pill use and
excessive exercise may also be included.

This project has a clear scope, with a tangible output of a peer-reviewed publication for which interested students will have the opportunity to be included as co-authors.

Students will be co-mentored by two faculty members (Drs. Shilo McBurney and Hannah Ziobrowski) in the School of Public Health. Their research profiles can be found here:

https://vivo.brown.edu/display/hziobrow
https://vivo.brown.edu/display/smcburne

Required skills: Ability to work both collaboratively and independently.

Preferred skills: Strong writing skills and previous experience with literature reviews is an asset. This project is ideal for students interested in mental health, public health, and epidemiology. Students will ideally have a basic understanding of measures of disease occurrence and observational study designs.

Is this project for more than one student: Yes

Melissa Palma
Department: Family Medicine
Project Type: Research
Project Title: TayoHelp.com Culturally Tailored Health Education for Filipinx/a/o Americans (FAMME-1)

Project Description:
TayoHelp.com is a project of the Filipino Young Leaders Program (FYLPRO). Tayo’s online platform serves as a trustworthy resource for Filipino American communities founded in the COVID-19 pandemic, providing culturally-tailored information regarding public health education and linkages to community resources. Join a disciplinary team of public health physicians, behavioral health professionals, journalists, policy experts, technologists, and Filipino community members working to address Asian American health disparities combatting mis-and dis-information via community-based participatory research, community engagement, and participation in our FYLPRO summer fellowship. More information on ongoing projects at link below.
https://docs.google.com/document/d/1y6VdBA73Fef53JRhdR4st3z6E0rvERnUIZpisp67Xhl/edit?usp=sharing

Required skills: Interest in health disparities research and community health engagement.

Preferred skills: Willingness to learn about Filipino community, quantitative survey design, or qualitative research methods.

Is this project for more than one student: Yes
Brad Brockmann
Department: Health Services, Policy & Practice
Project Type: Research
Project Title: Digitization of Your Healthcare Inside+Out guidebook to support medically underserved populations navigate RI’s healthcare system (HESPP-10)

Project Description:
Incarcerated individuals have a significantly higher burden of infectious diseases, chronic conditions, mental health conditions, and substance use disorders than the general population; however, following release from incarceration, only a fraction of these individuals have access to the full range of medical and behavioral health care services they need. Students taking my courses over the past several years developed a comprehensive 32-page educational booklet titled “Your Healthcare Inside and Out.” The full-color booklet provides information about how to obtain and use health insurance, access primary and urgent care, access specialized care, obtain medical records, fill prescriptions and read labels, self-advocate in medical settings, and other skills needed to navigate and utilize the health care system in RI. End users of the guidebook, including the RI Dept. of Corrections (RIDOC), community based clinics that provide healthcare services to formerly incarcerated individuals, community organizations that offer recovery services to this population as well as to homeless individuals, and the RI Department of Health team that offers services to migrant and refugee populations, among others, have all expressed interest in having the guidebook digitized for ease of use and increased accessibility. The guidebook was successfully digitized by my students this semester, but needs to be tested through focus groups with clinicians and other end users to determine where changes and additions need to be made and incorporated into the website where the guidebook prototype now resides. The two students who receive UTRAs will conduct the focus groups and interviews that will prepare the digitized versions of the guidebook for adoption by community clinics and state agencies, and will help to modify the website prototype accordingly. Two versions of the guidebook will be tested: one for use at RIDOC; the other by service organizations and clinics in the community.

Required skills: Successful candidates will have taken one or more courses with me including PHP1820 (Designing Education for Better Prisoner and Community Health; PHP1821 (Incarceration, Disparities, and Health), and/or PHP1822, Effective Health Communication for Medically Underserved Populations in an Applied Learning Setting. Students will also have experience conducting focus groups and/or key informant interviews with members of the community who have been directly impacted by incarceration, and will have experience summarizing the results of qualitative data gathering for reports, etc.

Preferred skills: See above.

Is this project for more than one student: Yes

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Elyse Couch
Department: Health Services, Policy & Practice
Project Type: Research
Project Title: Unsupported people with cognitive impairment (HESPP-9)
**Project Description:**
People with cognitive impairment, and particularly those with dementia, often have high care needs. Most care for people with cognitive impairment is provided by informal caregivers who are typically close family members. However, the number of older adults with reduced social or familial support for providing care is growing. These older adults might be described as “unsupported” Initial evidence suggests being unsupported in old age is associated with poorer health and wellbeing outcomes. However, the needs of unsupported people with cognitive impairment are less well understood. One key barrier in the existing research in this area is the wide range of definitions used to describe unsupported individuals.

This student will assist in a scoping review, exploring existing definitions and needs of unsupported adults with cognitive impairment. Tasks may include screening studies for inclusion in the scoping review, data extraction, creating results tables, and assisting with preparing the manuscript for submission to a peer-reviewed journal. Training in systematic/scoping reviews will be provided.

Required skills: Good organizational skills, experience with Microsoft Word and Excel, interest in Alzheimer’s disease or other dementias

Preferred skills: Experience with scoping/systematic reviews or using Covidence is a plus, but not required

Is this project for more than one student: No

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**Emily Gadbois**
Department: Health Services, Policy & Practice
Project Type: Research
**Project Title:** Building community partner engagement on climate change and healthy aging (HESPP-8)

**Project Description:**
Study Objectives:
This Diamond Fund study aims to ascertain the climate-change related health issues Rhode Island community members are most impacted by, centering community member voices in the process of identifying and prioritizing such issues. A series of semi-structured interviews will be conducted with leaders of organizations that serve older adults and organizations committed to climate change initiatives.

Example of Student Tasks:
The student will work primarily on developing public-facing materials that come out of this work. Specifically, the student will help with making fliers, visualizing data, infographics, and potentially building a website. The student may also participate in conducting interviews and analyzing qualitative data resulting from these interviews.

Skills & Knowledge Student Will Obtain:
Through their involvement in this project, the student will develop an understanding of qualitative research methods, community-centered research, and topics related to climate change and aging. The student will also get practice developing and creating public health materials that are common in communication toolkits (i.e., fliers, data visualization, infographics, website development).
Eric Jutkowitz  
Department: Health Services, Policy & Practice  
Project Type: Research  
Project Title: **Memory Care in Assisted Living: Does it Improve Quality Outcomes? (HESPP-6)**  

*Project Description:*  
Nearly 25% of assisted living (AL) facilities provide specialized care for people living with dementia (also known as "memory care"). Very little is known about the quality of memory care. Under the direction of Dr. Eric Jutkowitz, Dr. Kali Thomas and study team members at Johns Hopkins University, this project will understand whether the quality provided in memory care settings, at a surcharge of almost 36% compared to a room in general AL, is worth the cost. The student will have the opportunity to work with the multi-site study team to identify and review state level regulations of AL, assist in sourcing in-depth descriptions of assisted living facilities, participate in qualitative interview planning and opportunities for manuscript authorship are possible!

Required skills:  
- Ability to present and summarize results  
- Ability to prioritize multiple research tasks

Preferred skills:  
N/A

Is this project for more than one student: Yes

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Eric Jutkowitz  
Department: Health Services, Policy & Practice  
Project Type: Course Development  
Project Title: **Cost-Effectiveness in Health and Medicine (HESPP-7)**  

*Project Description:*  
I am developing a new course on cost-effectiveness in health and medicine. This future course will give an overview of the theory and application of different methods of economic evaluations in health (e.g., cost-effectiveness, cost-utility, and cost-benefit). Topics will cover the theoretical basis and applied examples on how to conduct an economic evaluation. The UTRA student will work with Dr. Jutkowitz to develop the syllabus, identify key content areas, outline course content / exercises and identify subject matter experts in the RI who could provide a guest lecture. This opportunity is ideal for a student interested in public health, medicine or economics and/or who wants to learn about role of cost-effectiveness in health in medicine.
Maricruz Rivera-Hernandez  
Department: Health Services, Policy & Practice  
Project Type: Research  
Project Title: Health care availability and provider migration in Puerto Rico (HESPP-3)  

Project Description:  
Puerto Rico continues to experience a healthcare crisis as a result of social inequities, chronic underfunding and the long-term effects of colonialism. Poverty rates and the median household income in Puerto Rico are lower than in the US mainland. Yet the federal government continues to exclude Puerto Rico regarding social welfare policies. In addition, Funding for Medicaid is more constrained than in any US state. The lack of funding for Medicare and Medicaid has resulted in physician shortages, poorly coordinated care and long wait times. According to data from Puerto Rico’s College of Physicians and Surgeons, there are about 11,000 specialists to serve Puerto Rico’s population of 3.2 million. Referrals to specialty care are minimized. Physicians describe this as not only a problem for the healthcare system, but as a humanitarian crisis. Our research has shown that migration trends among older adults, Medicare beneficiaries, have increased over the past decade, including those with special needs. Thus, more information is needed regarding health services and provider availability in Puerto Rico. Thus, the objective of this project is to examine health data from Puerto Rico and explore trends over time. We will use data from the Area Health Resources Files. We expect that these results will provide understanding regarding the health care infrastructure, and the ability to administer care in Puerto Rico, as well as context regarding outmigration among beneficiaries.  

https://vivo.brown.edu/display/mriverah

Required skills: Strong written communication skills; able to conduct literature reviews and summarize results; statistics knowledge; organized, flexible and able to prioritize multiple research activities.  

Preferred skills: Coursework in Public Health and/or economics preferred; statistical programming experience (Stata, SAS, R or similar); willingness to learn and work with big datasets.  

Is this project for more than one student: No
**Maricruz Rivera-Hernandez**  
Department: Health Services, Policy & Practice  
Project Type: Research  
**Project Title: A qualitative study of dialysis providers' strategies and barriers to mitigating the Hurricane’s effects on patients with kidney failure in Puerto Rico (HESPP-4)**

**Project Description:**  
Disaster planning for health services has gained importance in the wake of climate change. Hurricane Maria has been described as one of the worst natural disasters in US history. Hurricane Maria’s strong winds spanned the entire island, and every resident lost electricity. The island suffered a major humanitarian crisis due to the massive damage to the island’s economic stability, health care infrastructure, and the ability to administer care. This disrupted care included essential health services for the kidney disease population, such as predialysis nephrology care, and other specialty care services. Therefore, the objective of this project is to examine dialysis providers’ strategies and perceived barriers to mitigating the Hurricane’s effects on patients with kidney failure and understand the long-term consequences for dialysis provider organizations and staff through qualitative analysis. We expect these interviews will provide in-depth, novel insights into providers’ strategies to maintain continuity of care and avoid dialysis facility closures.

Required skills: Strong written communication skills; able to conduct literature reviews and summarize results; use Google to find providers based on Medicare data and/or other websites; able to conduct qualitative interviews; organized, flexible and able to prioritize multiple research activities.

Preferred skills: Coursework in Public Health, sociology and/or social sciences preferred; Qualitative research methods and/or skills; reading literature in Spanish is a plus; communicating with providers or contacts in Spanish is a plus; familiarity with Nvivo (willingness to learn Nvivo) is a plus.

Is this project for more than one student: Yes

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**Maricruz Rivera-Hernandez**  
Department: Health Services, Policy & Practice  
Project Type: Research  
**Project Title: Healthcare quality and outcomes in Puerto Rico (HESPP-5)**

**Project Description:**  
Puerto Rico continues to experience inequities in healthcare funding from the federal government. The lack of funding for Medicare and Medicaid has resulted in physician shortages, poorly coordinated care and long wait times. Of note, Puerto Rico has highest MA penetration rate in the US (~98%). Our prior studies have found disparities in access to care and outcomes among Medicare enrollees in Puerto Rico compared to their US counterparts. In addition, Hurricane Maria caused severe damage that affected delivery of care in the island. With lower funding for federal programs older Puerto Ricans may encounter significant barriers to services and supports and may have worse access to care and outcomes than their US counterparts. Thus, the objective of this study is to reassess the quality of care provided to Medicare Advantage enrollees in Puerto Rico and the US using data from Medicare.

Required skills: Strong written communication skills; able to conduct literature reviews and summarize...
results; statistics knowledge; organized, flexible and able to prioritize multiple research activities.

Preferred skills: Coursework in Public Health and/or economics preferred; statistical programming experience (Stata, SAS, R or similar); willingness to learn and work with big datasets.

Is this project for more than one student: No

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**Melissa Clark**  
Department: Health Services, Policy & Practice  
Project Type: Research  
**Project Title:** Deliver-EE: Evaluating The Effectiveness Of Mode Of Meal Delivery On The Ability Of Homebound Older Adults To Remain In The Community (HESPP-2)

**Project Description:**  
The Brown University School of Public Health and the Johns Hopkins School of Nursing are conducting a clinical trial comparing the two most popular modes of home-delivered meals. Homebound older adults are recruited from waiting lists at Meals on Wheels programs in Florida, Texas, California, North Carolina, and South Carolina. 2,300 participants will be randomized to receive either hot daily-delivered meals, or frozen mailed meals for six months. Participants' Medicare claims data will be analyzed, and they will participate in surveys and interviews.

UTRA students will be helping the research team analyze open-ended survey responses of the research participants concerning their meal preferences and socialization experiences with Meals on Wheels delivery drivers. Students will also help the team implement an analysis plan for the driver delivery field notes. This is the first time a clinical trial has examined the content of these field notes. The UTRA student will gain experience in pragmatic research, survey research methods, working with unstructured data sets, and summarizing research findings for technical and non-technical audiences. Students will be encouraged to assist in the dissemination of research findings in conference presentations and manuscript development.

For more information:

https://sites.brown.edu/deliveree/

Required skills: Student has completed related coursework in topics such as: qualitative methods, survey methods, computer science, statistics, and/or mathematics; Ability to communicate clearly by email, Zoom, and phone; Ability to break down complex transactions into elementary tasks; Interest in the techniques for manipulating data fields for analysis; Interest in best practices for data management, data analysis, and archiving; Ability to maintain confidentiality of sensitive information

Preferred skills: Familiarity with software such as NVivo, R, Stata, SPSS, and Excel  
Familiarity with AI powered tools  
Familiarity with research ethics/CITI trained

Is this project for more than one student: Yes
**Momotazur Rahman**  
Department: Health Services, Policy & Practice  
Project Type: Research  
**Project Title:** Private Equity Expansion in Assisted Living: Implications for Dementia Care (HESPP-1)  

**Project Description:**  
Assisted living (AL) is a growing long-term care industry providing housing and supportive services to almost one million frail and functionally impaired older adults - 49% of whom are living with Alzheimer’s disease or a related dementia (ADRD). Demographic projections of increased demand for AL, and especially dementia care (also referred to as “memory care”), has attracted notice from private equity (PE) firms. PE ownership advocates argue that PE firms bring much needed capital, allowing providers to update facilities, invest in new technology, and gain economies of scale to enhance efficiency, increase profitability, and improve care quality. However, the growing concern is that some PE firms’ focus on short-term profits may compromise the quality of care of AL residents, particularly those living with dementia. Research findings on the effects of PE acquisitions of nursing homes are mixed: while some studies found negative effects (e.g., decreased staffing, increased mortality) others have found no change in staffing or quality outcomes. However, unlike nursing homes, there is no national framework of regulations, payment policies, or public reporting of care quality in AL to work as “guardrails” against the possible negative impacts of PE acquisitions as there are in nursing homes. UTRA students will assist and be exposed to all manner of mixed methods research, including qualitative methods (semi structured interviews with key stakeholders) and quantitative methods (building private equity acquisition databases, linking assisted living facilities to owners and operators), and will work with a large, multi-site research team with expertise in long-term care, health economics, business, and gerontology. Students who excel in this position will have opportunities to continue working with this team and partner on peer-reviewed scientific manuscripts.

**Required skills:**  
- Excellent communication skills  
- Interest in senior housing and healthcare financing  
- Attention to detail  
- Ability to work within teams  
- Proficiency with G-Suite and Microsoft Office

**Preferred skills:** N/A

Is this project for more than one student: No

**Alejandra Rosenberg Navarro**  
Department: Hispanic Studies  
Project Type: Course Development  
**Project Title:** Gossip in Spanish Film and Literature (19th-20th cent) (HISST-2)  

**Project Description:**  
The goal of this UTRA project is to design a course from scratch tentatively titled “Gossip: Modalities of
Anti-Rigor in Spanish Literature, Film, and Ephemera. Understanding “gossip” through its feminist potential and as an alternative network of data exchange that fosters kinship, this course analyzes Spanish film, literature, and ephemera of the 19th and 20th centuries where gossip acts, in the words of José Esteban Muñoz, as a “modality of anti-rigor.”

I am seeking for a student collaborator to assist in organizing the class sessions, as well as searching for, gathering, analyzing, summarizing, and digitizing primary and secondary sources through an array of platforms. During the collaboration, the student will deepen their understanding of Spanish cultural studies, feminist and gender theory, as well as hone their analytical and research skills. By the end of the project, the syllabus will be ready.

Required skills: Reading knowledge of Spanish; excellent textual and analytical skills; past coursework in Humanities courses; excellent organization skills; ability to meet deadlines; motivation to work with interdisciplinary materials.

Preferred skills: Preferred skills: Past coursework with Professor Rosenberg Navarro; interest in literary/film studies; familiarity with BruKnow, scholarly databases, and library catalogues.

Is this project for more than one student: No

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**Iris Montero**
Department: Hispanic Studies
Project Type: Research
**Project Title: Decoding the Florentine Codex (HISST-1)**

**Project Description:**
The General History of the Things of New Spain, otherwise known as the Florentine Codex, is the most complete compendium of New World nature produced by Indigenous intellectuals in the sixteenth century. It was put together in a college in what is now Mexico City by a multilingual group that brought together various kinds of influences: from Indigenous painted books and oral histories to classical European sources. Amongst the latter was Pliny’s Historia naturalis (c. 79 CE), an encyclopedic compendium of the world during the Roman Empire. Pliny was particularly useful to the team composing the Florentine Codex and provided a means of organizing information. But it also provided certain tropes, turns of phrase, and even full anecdotes that informed how and where Indigenous intellectuals would include their own notions about nature in the Codex. This UTRA project will analyze both works side by side to find instances in which Indigenous Mexican naturalists used Pliny's entries to codify their own ideas about nature in the Florentine Codex.

Professor Montero would like students to help: 1) identify entries in which Pliny is used as a model for a description in the Florentine Codex; 2) identify instances in which Pliny is used as a cross reference to two different entries in the Florentine Codex; and 3) contribute to an ongoing list of both types of indexing between the text.

Required skills: Excellent textual analytical skills; attention to detail; past coursework in History; past coursework in Renaissance studies

Preferred skills: Preferred skills: Reading knowledge of Latin; reading knowledge of Classical Nahuatl;
is this project for more than one student: Yes

Lukas Rieppel  
Department: History & Science and Technology Studies  
Project Type: Research  
Project Title: A Deep History of the 1868 Treaty Lands (HISTS-1)

Project Description: 
As part of its effort to colonize the North American interior, the US Federal Government sent countless geological & topographical surveys to map the Great Plains & Rocky Mountain region during the 19th century. Working with tribal collaborators from the Pine Ridge Reservation, this project will combine historical research with GIS to produce a publicly accessible record of the role these surveys played in the imperial expansion of the United States during the period after the Civil War. We will especially examine the history of a region in the Northern Great Plains called the 1868 Treaty Lands, which encompasses large parts of present-day North & South Dakota, Montana, Wyoming, Nebraska, Utah, and Colorado. This region owes its name to an important treaty that was signed at Fort Laramie in 1868, after an alliance of Native nations including the Lakota, Cheyenne, and Arapaho defeated the US military in a conflict over the harassment of buffalo by white settlers moving West on the recently opened “Bozeman Trail.” However, Federal recognition of Indigenous sovereignty did not prevent white settlers from coveting the treaty lands for their stunning aesthetic beauty as well as the rich mineral resources they contain. To facilitate the settlement and, eventually, dispossession of sovereign Indigenous lands, the United States invested enormous resources to document its physical geography through government surveys. Our first goal in this project will be to collect archival materials (maps, government reports, scientific publications, etc.) that describe these efforts. We will then use that material to create a GIS map showing the routes taken by different surveys & military expeditions. Finally, we will design a website to present these maps, as well as some of the underlying documents, to interested audiences, especially the Native communities most immediately impacted by this history.

Required skills: Historical Research Skills, Attention to Detail, Self-directed and able to work collaboratively, Interested in Indigenous History and working with tribal partners

Preferred skills: GIS mapping skills (e.g. ArcGIS), Javascript and Leaflet, graphic design

Is this project for more than one student: Yes

Gretel Rodríguez  
Department: History of Art & Architecture  
Project Type: Course Development  
Project Title: Water Sanctuaries of the Ancient World (HIAA-1)
Project Description:
This collaboration will result in the development of a new seminar in History of Art and Architecture entitled, The Architecture of Water Sanctuaries in the Ancient World. The course explores the relationship between art, religion, and water landscapes in the ancient Mediterranean and other pre-modern locations. It considers how ancient peoples engaged with places they considered sacred due to the presence of sacred water bodies and deities, and the types of art, architecture, and material culture they produced in connection with such beliefs and ritual practices.

The student will assist the professor in organizing the themes of the class, gathering primary and secondary literature, finding images, suggesting assignments and hands-on activities, and assisting in creating class power-points. In the process, the student will deepen their understanding of ancient Mediterranean history, with a focus on religious art and architecture, and will develop and/or strengthen advanced library research skills.

Required skills: At least two humanities courses related to any aspect of the ancient world (history of art and architecture, religious studies, archaeology, classics, epigraphy, history, anthropology, egyptology, etc.)

Preferred skills: Previous research on an ancient topic, including a seminar paper or similar advanced work. Knowledge of French, Italian, or any ancient Mediterranean language is a plus.

Is this project for more than one student: No
**Kathleen Forste**
Department: Joukowsky Institute for Archaeology and the Ancient World
Project Type: Research
**Project Title:** Archaeobotanical Evidence of Agricultural Practices in the Late Antique and Medieval Mediterranean (JIFAT-5)

**Project Description:**
This project is part of a larger comparative study of agricultural systems across the eastern and western Mediterranean during the late antique and medieval periods (4th-13th centuries). During this time, there is a generalized, large-scale pattern of new crops and irrigation technology being introduced across the Mediterranean from the Middle East. It is not clear how individual communities adopted or rejected these new introductions, but archaeological investigations of plant remains from individual sites can trace these changes and help us understand the agricultural choices people made in the past.

This project is a first step towards creating a reference database for interpreting archaeological plant data, specifically collating information on wild seeds to use as a proxy to study ecological conditions (e.g., soil types, humidity levels) and seasonality of agricultural tasks (e.g., planting, harvesting). The undergraduate researcher will work with published archaeobotanical references and comparative specimens to (1) index wild plants and crops identified archaeologically, (2) assist in management of comparative collections, (3) assist in identifying archaeological plant remains. Through this work the undergraduate researcher will receive hands-on training in archaeological science and will contribute to active archaeological research of agricultural change.

Required skills: coursework in archaeology, anthropology, history, plant biology, environmental studies, or other relevant topics

Preferred skills: prior experience with plant scientific nomenclature and agricultural systems

Is this project for more than one student: No

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**Robyn Price**
Department: Joukowsky Institute for Archaeology and the Ancient World
Project Type: Course Development
**Project Title:** Scent and Society: Constructing Worlds (JIFAT-2)

**Project Description:**
In this project, we will develop the materials for a new course on the senses for Spring 2025. The course description is as follows: The manner in which a culture constructs their ideological, economic, social, and political (IESP) systems is inevitably impacted by the way people value sensory experience. This course will be designed to explore the implications of this statement with a case study on smell. We will begin by exploring the silent role smell plays in the US and how it has contributed to the organization of a variety of
IESP concerns. You will reflect on how scent figures in your own life, noting how it impacts your daily routines and beliefs about hygiene, social relationships, and material wealth. Afterward, we will apply our new sensory-awareness to archaeological research, looking to see how scent both impacted ancient lives and how we study ancient lives today. Meanwhile, you will begin developing your own projects on scent in an ancient society of your choosing.

As an UTRA recipient, your experience at Brown will help shape the course to resonate with the current undergraduate class. You will be asked to help identify and assess the quality of readings, podcasts, videos, etc. to be assigned as homework for the course, building an up-to-date bibliography of current literature. You can help organize the Canvas page and syllabus, as well as propose suggested assignments or activities to support the established learning goals. I will work with you regularly throughout the semester to introduce you to current pedagogical strategies and practices, providing you with experience developing courses to be inclusive and accessible for all students. You will also learn about what the senses are and how they impact the lives we live.

Required skills: interest in course development

Preferred skills: experience taking courses in ancient history, archaeology, or anthropology

Is this project for more than one student: No

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**Robyn Price**  
Department: Joukowsky Institute for Archaeology and the Ancient World  
Project Type: Research  
**Project Title:** Crafting History: Ancient Egyptian Stone Vessels (JIFAT-3)

**Project Description:**  
Ancient Egypt is a past civilization renowned for its exquisite material culture and long history. Though we can learn much from studying the remains of mummified persons and pyramids, the reality of the people who lived there can be better understood through the mundane remains of everyday life. Through analysis of the built relationships between people and material, we can begin to recognize how the materialization of belief systems contributes to the organization of societies and to the intentional control of populations.

In particular, stone vessels from pharaonic Egypt are a desperately understudied artifact. Assumptions regarding their functions, forms, and contents are rampant in the literature and need closer investigation. Namely, information on how these products were made, who commissioned them and organized the collection of raw materials, and what was contained within them remains unclear. In this project, we will first identify what has been published regarding these vessel types and then begin organizing excavated examples into a coherent typology across time periods. Of particular interest is the similarity in form of stone to ceramic vessels as a means for better understanding the accessibility of materials to the ancient Egyptian population.

Students will help collect, read, summarize, and collate data from published material on excavated stone vessels. Because this is a developing research project, students will participate in the whole research process from revising research questions based on new data to assessing the quality of sources to
making decisions on how to organize, code, and record data. This project would be particularly useful to students wishing to gain familiarity with the state of archaeological excavations in the Mediterranean during the Bronze and Iron Ages. However, students do not need to be specialists in the discipline though familiarity with archaeology, Egyptology, ancient history, and/or material science would be helpful.

Required skills: N/A

Preferred skills: Familiarity with ancient history research methods/coursework helpful, some French, German, Arabic, or Russian could be useful but absolutely not required,

Is this project for more than one student: Yes

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**Zachary Silvia**
Department: Joukowsky Institute for Archaeology and the Ancient World  
Project Type: Research  
**Project Title:** Documenting Central Asia’s threatened archaeological heritage through declassified spy satellite imagery (JIFAT-1)

**Project Description:**  
This project documents Central Asia’s vanishing archaeological heritage through analysis of high resolution declassified spy satellite imagery available through the U.S. Geological Survey. The post-Soviet republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan are collectively some of the least well-known regions to the global archaeological community despite exceptional preservation and otherwise being historically integral to pan-Asian human inter-communicative networks referred to as the “Silk Road”. Declassified high-resolution historical satellite reconnaissance imagery is an exceptional way to document changes to surface archaeology across the 20th century. I am seeking assistance from one student to process and interpret imagery obtained from the U.S. Geological Survey, particularly the KH-1 HEXAGON reconnaissance mission, with the aim of tracking site destruction since the 1970’s. Since the late 1970’s Central Asia’s urban oases have experienced periods of rapid development and infrastructural collapse, processes that have been equally detrimental to the region’s wide range of ancient monuments (architecture, burial sites, irrigation networks, mounds). The student will learn requisite skills that involve loading and georeferencing historical image scenes into a GIS environment. The student will learn how to identify and label archaeological sites from these historical satellite scenes and compare it to more recent open-access satellite imagery. We will then divide site identification labor in documenting sites that have been demolished since the date of photography, which are critical skills for students who wish to continue working with non-destructive archaeological methods. These skills are transferable and applicable to a wide-range of GIS and remote sensing applications in academia and industry.

Required skills: Diligence, organization, and attention to detail is critical. As are effective time management and an ability to meet structured deadlines. Comfort working with computational workflows is highly desirable. Students should have previously taken at least once course in Archaeology before Fall 2024. This project suits current archaeology, anthropology, IBES, urban studies majors (or students in archaeology-adjacent fields). Preference should be given to students in archaeology and anthropology.

Preferred skills: Experience with QGIS or ArcGIS at a beginner to intermediate level through coursework.
Chaya Nove  
Department: Linguistics  
Project Type: Research  
**Project Title:** The social meaning of u-fronting in Hasidic Yiddish (LINGU-3)  

*Project Description:*

Sociolinguistic research has shown that the /u/ vowel in many American English dialects, including those spoken in New York City, is increasingly produced further forward in the mouth, as evidenced by higher F2 frequencies. This phonetic shift, known as /u/-fronting, has been similarly observed in some minority languages in contact with English, such as Spanish in the Mid- and Southwestern United States. This project extends the research on /u/-fronting to Hasidic Yiddish speakers in New York, investigating its sociolinguistic relevance. It asks: Is /u/-fronting indexing a particular Hasidic identity? Building on findings from Nove (2021), which suggest that individuals less oriented towards the Hasidic community are more likely to front their /u/ vowels, this study will use the matched guise technique to examine community perceptions of variable /u/ pronunciation. The results will provide insights into the sociocultural factors that drive language change in tightly-knit minority language communities.

The student will contribute to the project in the following ways: 1) Consult existing literature to identify best practices for implementing the matched guise test, taking cultural norms of the Hasidic community into account; 2) evaluate the naturalness of synthesized speech samples; 3) research and assess various web-based platforms (e.g. PC Ibex) designed for conducting linguistic experiments and select the one most suitable for the task; 4) set up and manage the digital platform, inserting stimuli, overseeing data collection and troubleshooting as needed; 5) compile and help analyze participant responses. Additionally, students committed to seeing the project through to completion may have the chance to co-author a conference presentation.

**Required skills:** 1) Ability to learn independently from existing online resources; 2) proficiency in the use of digital tools and basic familiarity with programming languages; 3) strong attention to detail; 4) ability to work both independently and collaboratively; and 5) effective communication skills

**Preferred skills:** 1) previous coursework in linguistics, particularly in phonetics or sociolinguistics; 2) an interest in sociophonetics; and 3) proficiency in Yiddish, or an interest in Yiddish language studies.

Is this project for more than one student: No

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Chaya Nove  
Department: Linguistics  
Project Type: Research  
**Project Title:** Acoustic analysis of word-final devoicing in Yiddish (LINGU-4)
Project Description:
This research project will investigate word-final devoicing in Central Yiddish (CY) dialects historically spoken in Poland and the former Austro-Hungarian Empire; as well as in contemporary Hasidic Yiddish (HY) in New York, which derives from CY. Final obstruent devoicing, although extensively discussed in the Yiddish linguistics literature, has not been analyzed acoustically in any Yiddish dialect. Despite a noted word-final devoicing rule in CY, there is impressionistic evidence suggesting that HY maintains a voicing contrast in similar contexts. Utilizing data from the Corpus of Spoken Yiddish in Europe (CSYE) and sociolinguistic interviews with HY speakers aged 7 to 72, this study will conduct an acoustic analysis to explore regional variation in word-final devoicing of prewar dialects and document the current status of voicing contrast in HY. Findings from this research will contribute to Yiddish dialectology by providing a detailed examination of the geographical distribution of this phonetic feature in the prewar era, including areas that have been previously overlooked, and possibly identifying evidence of dialect divergence during that period. Additionally, the results could shed light on the process of HY formation and its ongoing development in a new contact environment.

The student will be asked to: 1) participate in weekly informational sessions; 2) consult current literature on methods for analyzing acoustic cues of voicing contrast; 3) code relevant linguistic tokens for voicing status using Praat software; and 4) conduct a preliminary analysis of the results. The student will receive training in phonological theory and phonetic analysis, and gain extensive experience using Praat software. For students interested in further data analysis and interpretation, there may be an opportunity to co-author a conference presentation.

Required skills: 1) basic knowledge of acoustic phonetics; 2) strong attention to detail; 3) ability to work independently and collaboratively.

Preferred skills: 1) experience with Praat software is preferable but not mandatory; 2) previous coursework in linguistics, particularly phonetics or sociolinguistics; and 3) an interest in Yiddish language and dialect studies.

Is this project for more than one student: No

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Scott AnderBois
Department: Linguistics
Project Type: Research
Project Title: The grammar of crossword puzzle cluing (LINGU-1)

Project Description:
Solvers of crossword puzzles have a complex set of expectations concerning the kinds of clues that they expect to find in crossword puzzles to clue different kinds of entries. These expectations are due to a mix of grammatical knowledge of everyday English (or whatever other language a crossword is in) and crossword-specific conventions learned implicitly through experience (my collaborators and I have written on this here: https://www.theatlantic.com/science/archive/2023/08/writing-crossword-puzzle-clues-rules-grammar-compositionality/674938/). In addition to their “grammar”, crossword cluing styles also reflect a particular perspective on the cultural canon and how it evolves over time (e.g. consider clues with modifiers like “in slang” vs. without). Although this has perhaps been changing in recent years, for
crossword puzzles like the New York Times, this particular perspective has often been biased based on factors like class, race, gender identity, and sexual orientation.

In this project, we aim to examine the evolution of grammatical and cultural norms in crossword clues, by analyzing trends in cluing practices over time within mainstream puzzles, between mainstream and indie puzzles with more diverse constructors, and depending on the interest and background of the UTRA student, across languages.

Required skills: Introduction to Linguistics or CLPS 0350 Playing with words - the linguistic principles behind word games and puzzles

Preferred skills: Additional coursework in Syntax and/or Semantics; Basic knowledge of Python

Is this project for more than one student: No

**Scott AnderBois**
Department: Linguistics
Project Type: Research
Project Title: Describing motion events in A’ingae narratives (LINGU-2)

*Project Description:*
Over the past 8 years, the A’ingae Language Documentation Project (ALDP) has collected a large collection (https://cofan-aldp.github.io/LingView/#/about) of annotated audio/video recordings of traditional narratives, oral histories, autobiographies, and other interviews in A’ingae (an indigenous isolate language spoken in Amazonian Ecuador). The ALDP team comprised of academics, US-based students, and A’i community members continues to expand this resource as well as using it to answer scientific questions about the language’s grammar and to meet community language goals (e.g. creating pedagogical materials).

Currently, I am investigating the range of constructions in A’ingae that involve multiple verbs or clauses combining to create complex descriptions of events. In recent publications with colleagues, I have explored one such construction known as clause-chaining, and a recent BA thesis investigated a quite different construction in detail, serial verbs. Clause-chaining involves complex events comprised of sequences of events (e.g. “I came, I saw, I conquered”). Serial verbs also allow for this interpretation, but additionally allow the individual event descriptions to describe different aspects of the same event (e.g. “I came by riding my bike”).

In the current project, the goal is to investigate associated motion constructions, comparing them with what we know about clause-chaining and serial verbs. This comparison is especially interesting since with motion verbs, these options all exist alongside each other. The plan for this project would be to figure out how these constructions work by examining texts in our database and conducting elicitations with native speakers via zoom. In addition to basic description, the project could (but need not) additionally involve syntactic or compositional semantic analysis.

Required skills: Introduction to Linguistics or other similar course background
Preferred skills: Additional coursework in Syntax and/or Semantics; Solid Spanish language proficiency

Is this project for more than one student: No

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**Deborah Hurley**  
Department: Master of Science in Cybersecurity Program, Computer Science Department  
Project Type: Research  
**Project Title:** Cybersecurity Redesign to Address Global Economic and Societal Needs (MSICP-1)

*Project Description:*  
Cybersecurity is a cutting-edge technological area with significant economic and social impacts. As we progress toward the Ubiquitous Information Environment, there is an acute shortage of qualified individuals to respond to the cybersecurity demands of this pervasive global information sphere. Brown is uniquely qualified to meet the moment. The Computer Science Department is internationally known for its cybersecurity expertise. The Master of Science in Cybersecurity program was founded three years ago, as Brown’s first fully online degree program. It was preceded by a hybrid program, which began in 2016.

The Provost’s Office plans to scale the current program significantly, with a launch of this more ambitious program in Fall 2025. The implementation phase will occur in the 2024 – 2025 academic year. Every part of the current program will be examined, from admissions to curriculum to market trends and demands.

Students will gain knowledge of cybersecurity and the establishment of an entrepreneurial venture within the large enterprise of Brown University. Students will undertake research on cybersecurity, including global technological developments and trends, as well as demand and market trends for goods, services, and workers. Students will work with Deborah Hurley, Director of Graduate Studies, Master of Science in Cybersecurity Program, and Professor of the Practice of Computer Science, and will also be supported in their work by the Computer Science Department, the School of Professional Studies, and the Provost’s Office.

Required skills: N/A  
Preferred skills: N/A  
Is this project for more than one student: Yes

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**Dan Abramovich**  
Department: Mathematics  
Project Type: Research  
**Project Title:** Bergh’s destackification algorithm (MATHE-1)
**Project Description:**
Bergh’s destackification algorithm takes a structure in algebraic geometry called a smooth stack and transformed it into a smooth variety approximating the stack, a more concrete structure often needed in the theory. Bergh’s destackification algorithm is the final step in a resolution of singularities algorithm devised by Abramovich, Temkin and Włodarczyk.

In 2021 a group of students implemented parts of the algorithm in a computer algebra system called OSCAR. More recently, two students picked up its continuation. The current project aims, in the long run, to complete the implementation, and, if time permits, address a number of theoretical and computational questions. The project is integral to my research program.

Students will deepen their understanding of basic algebraic geometry, toric geometry, fans and stacky fans, and resolution of singularities through coding the algorithm, through proving that the turns we took are rigorous, and through integrating it with earlier implementations of resolution of singularities, which themselves will need to be upgraded to OSCAR.

I will provide expertise as far as algebraic geometry is concerned. Mentoring on the programming side will be provided by key members of the development team of OSCAR, including Dr. Lars Kastner of TU Berlin who advised the original team, and Prof. Anne Frühbis-Krüger of Oldenburg who advised an earlier project on resolution of singularities.

**Required skills:** Students are expected to have knowledge of basic algebraic geometry and toric geometry. Students are expected to have experience in scientific computing and programming.

**Preferred skills:** Experience with programming in Julia is preferred.

**Is this project for more than one student:** Yes

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**Alexandrea Craft**
Department: Medical School; Department of Pediatrics
Project Type: Research
**Project Title: NICU Balancing Act (MESP-1)**

**Project Description:**
The NICU Family Transitions Project (WFTP) The Neonatal Intensive Care Unit (NICU) family transition Project is a study, funded by the Advance RI-CTR supported by the IDeA-CTR grant (U54GM115677) that explores how families cope with navigating parenthood as a NICU parent of a infant born preterm and the return to paid employment soon after their child's birth. We are especially interested in the challenges that low-income working parents face as they manage work and family responsibilities and the toll these stressors may take on new parents' mental health. We want to know how workplace policies and work conditions support and/or discourage new parents at this critical time in their lives. We will recruit 96 NICU families (48 two-parent and and 48 single mothers) and interview them 3 times over the first year of their baby's life (approximately 1-month post NICU birth, NICU discharge and at 12-months corrected age).

Undergraduate RA role and expectations
Research assistants will learn about all aspects of the research process. Weekly lab tasks will primarily include (a) interviewing families in the NICU (b) transcribing participant interviews, (b) assisting Dr. Craft and the research team in maintaining a thorough and accurate database, and (c) meeting weekly with the research team to discuss our work as well as relevant research.

In order to complete these tasks, students will be trained to conduct family interviews in the NICU as well as transcribe and code open-ended audio recorded interviews from participants. In addition, students will be trained to assist the research team in data checking and other forms of data management. At times, students may be asked to conduct literature searches and conduct clerical tasks (i.e., organizing research materials). All students will attend weekly project meetings with Dr. Craft and the research team.

Required skills: N/A

Preferred skills: N/A

Is this project for more than one student: Yes

Jeremy Warner
Department: Medicine and Biostatistics
Project Type: Research
Project Title: The COVID-19 and Cancer Consortium (CCC19) (MEDBI-1)

Project Description:
The COVID-19 and Cancer Consortium (CCC19) was created in 2020 and has created the largest registry of its kind, with more than 20,000 case reports. We are particularly interested in looking at heterogeneity of reported variables between sites, including differences in the degree of missing and unknown data. Such heterogeneity might impact the generalizability of results, and is important to understand for any project sourcing from multiple EHRs.

Required skills: At least one biostatistics course.

Preferred skills: Familiarity with R is a plus.

Is this project for more than one student: No

Regina Longo
Department: Modern Culture and Media/Haffenreffer Museum
Project Type: Research
Project Title: Restoration and Repatriation of Giddings and Anderson Alaskan Anthropology Media (MOCMM-1)

Project Description:
In January 2024, working with anthropologists and staff of the Haffenreffer Museum at Brown University, Dr. Regina Longo, Curator and Lecturer in the Department of Modern Culture and Media (MCM) initiated a project in her course MCM0700D: Introduction to Film Preservation and Restoration. Throughout the Spring 2024 semester, a group of ten students have been working on a film preservation project in collaboration with the Haffenreffer Museum and the National Park Service (NPS). This project focuses on the archeological expeditions of James Louis Giddings and Douglas Anderson in Alaska in the 1950s and 60s, who partnered with Inupiat communities to research and preserve their cultural history through archaeological excavation and ethnographic documentation. The films were originally shot on 16mm and the team is digitizing them to 4K video for further documentation. MCM has a state of the art film scanner with a 5.6K camera that outputs to 4K digital video files. One of the end goals is to digitally repatriate and share the footage with the Inupiat communities featured in the films with support and guidance from the NPS who manage ongoing research and preservation on the Alaskan lands.

Thanks to James Whitney, Laboratory for Circumpolar Studies (LCS) Manager at the Haffenreffer Museum, we have established a working relationship with Brown University professors emeritus Douglas Anderson and Wanni Anderson, key members of the Circumpolar Lab from its inception. Douglas and Wanni Anderson have visited our class, taken part in an oral history video recording session where they also aided the students in identifying Inupiat community members featured in the footage, and they have donated more still photographic slides as well as analog Hi-8 video footage and audio cassette recordings of their early to mid 1990s research expeditions to the region. The video and audio cassette materials were digitized by the students in MCM0700D, and the color slide film will be digitized by the Haffenreffer at their Bristol facility. Some of the video footage features elders in the Inupiat community sharing their stories and legends with the Andersons. These ethnographic recordings are invaluable, and further flesh out the story of the settlement of this region of Alaska over 6000 or more years. Through consultation with the NPS, the Inupiat communities have expressed interest in viewing photographs, video, and audio recordings made during their collaboration on these projects. Additionally, Douglas Anderson has donated another 10 reels of 16mm footage from a made-for-television documentary that was filmed on site in Alaska in 1969 titled The First Americans. It is hosted by Hugh Downs and was broadcast on NBC in the mid 1970s. Douglas Anderson holds a variety of the image and sound elements, including outtakes. Research has revealed that only about 3 16mm film prints of this show survive, and none are available for loan.

While the Haffenreffer Museum at Brown University has multiple rolls of unedited film from these expeditions, it is our understanding that an edited 50 minute film (16mm, color, silent) was screened and narrated by J.L. Giddings at a conference of the Society for American Archeology hosted at UNC Chapel Hill in 1964. We have the abstract for this film, but we do not have an edit list, shot list, or any other information that would help us to piece together this film as it was originally presented. The students have contacted several archives outside of Brown to pursue leads on this footage. One of the goals for the LCS Manager is to reconstruct this film. Upon viewing some of the digitized materials, it became evident that objects featured in the films, such as a kayak and articles of clothing made by the Inupiat, are now in the Haffenreffer Museum’s collections. Upon further viewing, the students and Professors Douglas and Wanni Anderson were able to identify local individuals, anthropologists from Brown and other universities, doctoral students, excavation sites, and more. The Haffenreffer Museum is seeking to organize as much of this material as possible for future exhibitions, for further work in the region, and to prepare for a more extensive oral history interview session with Douglas and Wanni Anderson.

As an expert in film identification, handling, preservation, and restoration, Dr. Longo has been guiding the students and the Haffenreffer as we piece together this puzzle. There is much more to document and
preserve in relation to the Circumpolar Lab, the expeditions, and the participation of Inupiat peoples in these decades-long studies. The time in the course and lab has helped to advance the project, but the project is by no means complete. Students and the Haffenreffer team have expressed interest in continuing the project. With the support of MCM’s Department chair, and under Dr. Longo’s guidance, we aim to further restore, clean, adjust color, and edit the footage, and to prepare materials for exhibition in Alaska and in Providence.

Required skills: A working knowledge of film preservation and digitization workflows. Good communication, research, and writing skills

Preferred skills: A working knowledge of anthropological fieldwork practices in the Alaskan region
Experience creating spreadsheets, performing data entry and data analysis
Some photo or video editing experience

Is this project for more than one student: Yes

Mandar Naik
Department: Molecular Biology, Cell Biology and Biochemistry
Project Type: Research
Project Title: Site directed mutagenesis to validate computation predictions. (MBCBB-2)

Project Description:
We are interested in structure-based peptidomimetic inhibitor design against protein PSD-95 as a treatment for Angelman syndrome and other neurological disorders. We use NMR spectroscopy, biophysical assays, and molecular modeling. Based on our findings we have identified important residues that can be exploited to improve the affinity of our compounds. This project involves site-directed mutagenesis to prepare a series of mutants that will be further characterized by NMR and DSC

Required skills: Molecular biology and biophysics

Preferred skills: EHS lab safety and biohazard training

Is this project for more than one student: No

Mark Johnson
Department: Molecular Biology, Cell Biology and Biochemistry
Project Type: Research
Project Title: Gamete fusion and the block to polyspermy (MBCBB-1)

Project Description:
Sexual reproduction occurs when two gamete plasma membranes fuse with each other, allowing two unique parental genomes to begin the life of a new individual. This process is fundamental, but we’ve only
recently discovered a protein that seems to be responsible for merging the gamete membranes. Now, we can ask interesting questions about how this process is regulated to ensure that gametes fuse in pairs. We have a collaborative team that is taking a combination of genetic (CRISPR-cas mutagenesis, transgenesis) genomic (RNA-seq analysis), and imaging (confocal microscopy of ion and protein dynamics) approaches to test the hypothesis that gamete plasma membrane fusion is negatively regulated by depolarization of the female gamete membrane upon fertilization. Further, we propose that the sperm-expressed fusion protein (HAP2/GCS1) is disabled by membrane depolarization. Thus, only one sperm can fuse with an egg.

Required skills: a commitment to learning about the research process and building research skills, work experience, experience setting goals and keeping records, experience working as part of a team, introductory coursework in Biology and/or Chemistry

Preferred skills: Bioinformatics (experience with R), microscopy/imaging/image analysis, making chemical solutions, basic molecular biology (PCR, gel electrophoresis). Some of the following courses would be helpful: Biol 0470, Chem 330, Biol 0500, Biol 0280

Is this project for more than one student: No

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**Karthikeyani Chellappa**
Department: Molecular Microbiology and Immunology
Project Type: Research
Project Title: **Elucidating the transport mechanism of nicotinamide into gut lumen (MOMI-1)**

*Project Description:*
Nicotinamide adenine dinucleotide (NAD) is an essential redox factor in mammals and microbes. We recently established that host-derived nicotinamide (NAM) enters the gut lumen to provide NAD precursor for bacterial species cohabiting in the mammalian gut. In this project, we propose to establish an air-liquid interface (ALI) model using human epithelial cell lines and mouse organoids to understand the mechanism of NAM transport across the epithelial barrier. Intestinal epithelial cells adopt a columnar morphology to actively regulate the nutrients, ions, metals, and hormones. In the traditional transwell model cells are grown as a tight monolayer submerged in media, whereas in the ALI model, the media on top of the monolayer would be removed, leaving the cells exposed to the incubating air. ALI model better represents human intestinal epithelial cell barrier function. We will first establish an ALI model using a human colorectal cancer line, Caco-2. The integrity of the epithelial barrier will be confirmed by measuring transepithelial electrical resistance (TEER). We will immunostain the epithelial layer for cell junction proteins such as zonula occludins (ZO-1), claudins, and F-actin to validate the integrity of the model.

To conduct the transport assay, we will add radiolabeled or stable-isotope tracers of NAM to the media in the lower chamber and measure the amount of NAM detected in the media of the upper chamber using a scintillation counter and liquid chromatography-mass spectrometry (LC/MS), respectively. We will perform dose and time-course experiments to establish the kinetics of NAM transport. Next, we will establish the ALI using mouse intestinal organoids to recapitulate the complexity of epithelial cell types in the intestine and use it for transport studies. Collectively, the ALI model proposed in this UTRA project will be a valuable tool for the future studies in the lab.
Required skills: Biochemistry knowledge, cell culture, mouse work

Preferred skills: Biochemistry

Is this project for more than one student: No

Karthikeyani Chellappa
Department: Molecular Microbiology and Immunology
Project Type: Research
Project Title: Comparative metabolomics analysis to predict biological age across mammals (MOMI-2)

Project Description:
This is a collaborative project between the Chellappa lab (Department of Molecular Microbiology and Immunology/ Center on the Biology of Aging) and Singh Lab (Computer Science/ Center for the Computational Biology).

The rise in the aging population worldwide poses a major healthcare and economic burden. Metabolism, the sum of all chemical reactions in the body, drives all biological processes across the tree of life and metabolic aberration underlies all known human diseases. Complex phenomenon such as aging is highly driven by the loss of metabolic resilience.

The project we propose here is an extension of the Summer UTRA-funded proposal. In the summer, we plan to use deep learning (DL) and machine learning (ML) models to establish a metabolic signature of chronological and biological age using metabolomics datasets from human aging studies. My lab uses mouse models to study the mechanisms of aging. We measure the overall health of the mice using a 31-parameter metric referred to as the frailty index (FI), which correlates with age and predicts lifespan. We recently measured the FI of 100 mice across lifespan and we are performing metabolomics analysis of the serum samples in-house using LC/MS (lab-funded research). Here, we propose to perform comparative metabolomics analysis of human and mouse datasets to identify metabolic pathways and metabolites that are relevant to aging across species. We will employ DL/ML models that we have developed from human aging studies to validate in mouse aging metabolome datasets we have accrued. Furthermore, we will develop computational tools to improve the analysis of mass spectrometry data for novel compound discovery. This project will have high impact as we use comparative biology to identify pathways relevant to human aging. The findings from this proposal will help us design intervention and genetic studies to test in mouse models.

Required skills: Biochemistry student with computational biology skillset

Preferred skills: Coding, DL/ML models, strong biochemistry and/or chemistry knowledge

Is this project for more than one student: Yes
**Frederick Jodry**  
Department: Music  
Project Type: Course Development  
**Project Title:** Choral research cataloger - MU600 (MUSIC-1)  

*Project Description:*  
The brown university chorus maintains a library of about 2000 items. A database exist for a majority, but not all of these pieces of music. With my pending entire retirement after 33 years, I would like to request an assistant to help me completely finish and correct our current catalog of items held, and leave the coral library in excellent shape for my successor.

Required skills: Excel knowledge, musical knowledge

Preferred skills: Clear handwriting!

Is this project for more than one student: No

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**Christoph Stretz**  
Department: Neurology  
Project Type: Research  
**Project Title:** Obstructive sleep apnea as a modifiable risk factor for intracerebral hemorrhage (NEURO-8)  

*Project Description:*  
Intracerebral hemorrhage (ICH) carries the highest morbidity and mortality of all stroke subtypes. Addressing risk factors for ICH, both in primary and secondary prevention, is paramount. Obstructive sleep apnea (OSA) has recently been elucidated as a risk factor for ICH. This project seeks to study prevalence of OSA, among other risk factors, in patients admitted with ICH to Rhode Island Hospital, a comprehensive stroke center, and management practices for patients suspected to have a diagnosis of OSA. Research activities will include literature review, data abstraction, analysis and manuscript writing. Through this research, we hope to better understand current prevalence and treatment practices, potentially offering opportunities to better assess and address risk factors for ICH such as OSA.

Required skills: Required - interest in clinical stroke research, prior use of excel for data collection, basic writing skills for manuscript preparation

Preferred skills: Preferred - prior clinical research experience with data collection and analysis

Is this project for more than one student: No

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**Liqi Shu**
Department: Neurology
Project Type: Research

**Project Title:** Neurotechnology: Enhancing Medical Care through Machine Learning and Computer Vision (NEURO-6)

**Project Description:**
In our neurotechnology research at Brown University’s Neurology Department, we are dedicated to leveraging advancements in computer vision, machine learning, and large language models to revolutionize medical care. Our diverse range of projects includes kinematic analysis of stroke recovery and real-time medical conversation analysis. By integrating these technologies, we aim to develop sophisticated tools for assessing and enhancing stroke rehabilitation, as well as improving the accuracy and efficiency of medical documentation and communication. Our approach is multidisciplinary, combining clinical insights with cutting-edge computational techniques to create innovative solutions for complex medical challenges. This program offers students the opportunity to be at the forefront of neurotechnological research, contributing to projects that have the potential to significantly impact patient care and treatment outcomes.

Required skills: Proficiency in programming (Matlab/Python) Fundamental knowledge of machine learning and data analysis

Preferred skills: Experience with computer vision, audio processing, natural language processing, or large language models
Advanced coursework or projects in computer science, engineering, data science, or related fields

Is this project for more than one student: Yes

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**Liqi Shu**
Department: Neurology
Project Type: Research

**Project Title:** National Database Analysis for Cerebrovascular Disease (NEURO-7)

**Project Description:**
Our neurology research team at Brown University is engaged in a comprehensive analysis of cerebrovascular disease, focusing on acute ischemic stroke. Utilizing the National (Nationwide) Inpatient Sample (NIS) database, we aim to enhance the management, treatment, and prevention of this condition. Students will participate in literature reviews, data management, and statistical analysis, employing software tools like Stata and SAS. This project offers a valuable opportunity for students interested in neurology and clinical research to gain hands-on experience and contribute to impactful studies.

Required skills: Basic understanding of neuroscience; Statistical analysis

Preferred skills: Experience with statistical software (SAS, R, Stata, Python)

Is this project for more than one student: No
**Saud Alhusaini**  
Department: Neurology  
Project Type: Research  
**Project Title:** The association between essential tremor genetic risk variants subclinical traits (NEURO-5)  

*Project Description:*  
This project aims to apply a multimodal approach to investigate the endophenotypic potential of essential tremor (ET) cerebellar phenotypes. A multimodal approach will be applied to examine the following cerebellar subclinical traits, including EEG and MRI-based neuroimaging traits in ET patients and match healthy controls. Next, targeted next-generation sequencing will be applied to genotype ET genetic risk variants to examine their association with ET cerebellar subclinical phenotypes.

Required skills: Basic computational skills.

Preferred skills: Familiarity with R, Python, and Matlab is desirable

Is this project for more than one student: Yes

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**David Sheinberg**  
Department: Neuroscience  
Project Type: Research  
**Project Title:** Learning to Simulate (NEURO-3)  

*Project Description:*  
We have shown that people and animals can use internal "mental simulations" to solve complex problems that have not yet occurred. For this part of the project, we will expand the environments within which simulation may occur by integrating physical "motors" into our simulated worlds. We will then ask how prior experience can alter simulation ability. The experiments involve the creation of complex environments, with outcomes computed using physics engines, and the goal is to help develop metrics for difficulty based on uncertainty.

Required skills: Willingness to work on a team; basic knowledge of sensory processing

Preferred skills: Preferred skills: Working knowledge of probability and statistics; interest in computation; comfort with computers

Is this project for more than one student: Yes
**David Sheinberg**  
Department: Neuroscience  
Project Type: Course Development  
**Project Title:** Defining the TA Role for a New Course in Computational Neuroscience (NEURO-4)

*Project Description:*
We have recently established a new concentration in computational neuroscience. A new prerequisite for this concentration will be a reworked "Introduction to Computational Neuroscience Course" to be offered in Spring 2025. The basic course objectives have been outlined and a rough plan for readings have been completed. In this fall UTRA, we will work to complete the assignments with a focus on organizing the final project, which is a key component of the course. As part of this process, we will define the role of the course TA’s and work out details about the content of the assignments and final project.

Required skills: Students should have taken relevant coursework in computational neuroscience, including relevant coding experience

Preferred skills: Previous TA experience would be helpful

Is this project for more than one student: Yes

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**James Simmons**  
Department: Neuroscience  
Project Type: Research  
**Project Title:** Bat biosonar sounds and biosonar perception (NEURO-2)

*Project Description:*
The research project is on the biosonar sounds emitted by echolocating bats. The purpose is to determine what bats can perceive of objects and of their surroundings using the signals recorded in different situations by assuming the echoes are processed in the bat’s auditory system with a computational model of biosonar developed in our laboratory. Multiple sets of sound recordings made in different locations and new sound recordings will be made to create a library of signals and the perceptions they generate. These will be archived in Brown’s data storage site. University library assistance will be employed to make the data sets available for general use, including explanations of the perceptual and signal processing basis for the association between each sound type and its corresponding perception.

Required skills: Prior experience using MatLab

Preferred skills: previously taken courses in computer science, animal behavior, hearing, or neuroethology

Is this project for more than one student: Yes
**Monica Linden**  
Department: Neuroscience  
Project Type: Course Development  
**Project Title:** Development of a Neuroscience Research Opportunities List (NEURO-1)

**Project Description:**  
This project is based on redesigning the process by which undergraduate neuroscience students find available research labs. The student will conduct student and faculty surveys and gather additional data to inform a new process. They will also create a new research database, get initial entries from faculty, and advertise the new process.

Required skills: Excellent organizational skills. Confidence communicating with faculty.

Preferred skills: N/A

Is this project for more than one student: No

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**Wael Asaad**  
Department: Neurosurgery & Neuroscience  
Project Type: Research  
**Project Title:** Research in Neurophysiology & Neuromodulation (NEUNE-1)

**Project Description:**  
We undertake a variety of neurophysiology and neuromodulation research studies in humans undergoing relevant neurosurgical procedures (e.g., deep brain stimulation for parkinson's disease; intracranial electrodes for seizure mapping; focused ultrasound for tremor, etc.). Our goals are: 1) to understand normal brain circuit function related to various aspects of motor function, cognition, attention, and memory; 2) identify neurophysiological signatures of particular disease states; 3) develop new circuit-modulation strategies to better treat brain disease.

Required skills: Students should have some background in neuroscience or cognitive science, be comfortable with quantitative analysis.

Preferred skills: Students with solid coding skills (e.g., Python, Matlab, etc.) and strong quantitative skills (e.g., linear algebra, machine learning, etc.), or who are in the process of actively developing these skills, will be given preference.

Is this project for more than one student: Yes

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**Wael Asaad**  
Department: Neurosurgery & Neuroscience
**Project Type:** Research  
**Project Title:** Artificial Intelligence to Advance the Clinical Neurosciences (NEUNE-2)  

**Project Description:**  
We have developed a multimodal registry representing the combined clinical experience of the departments of neurosurgery, neurology, and psychiatry and encompassing hundreds of thousands of records. We seek to use this powerful platform to enhance clinical and academic work in the applied neurosciences, including the application of LLMs to summarize clinic notes and patient history, to identify "red flags" and thus serve as an early warning system for clinical care, to accelerate clinical research by more quickly and accurately identifying clinical trial cohorts, etc. We aim to be a leader in the application of AI to healthcare and are seeking highly motivated, enthusiastic students to contribute to our efforts in this very fast-moving field.

Required skills: Existing or developing strong skills in data science, machine learning, applied math, and coding.

Preferred skills: Additional strong interest in clinical care, particularly neuroscience, is helpful.

Is this project for more than one student: Yes

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**Robert Sobol**  
Department: Pathology and Laboratory Medicine  
**Project Type:** Research  
**Project Title:** Replication-dependent base excision repair modulation of the cellular response to genotoxins, DNA damaging agents and DNA repair inhibitors (PALM-1)  

**Project Description:**  
The base excision repair (BER) pathway is one of five major genome maintenance mechanisms in each cell that provide protection from exogenous and endogenous sources of DNA damage, e.g., oxidative stress, radiation, cigarette smoking. Specifically, genes and proteins of the BER pathway are essential for the repair and resolution of approximately 20,000 base lesions per cell per day in both the nuclear and mitochondrial genomes and facilitates active gene demethylation that can impact transcription. More recently, we have shown that a major role of these BER pathway proteins in cancer cells is to function in concert with the replication machinery and to then help in the response to replication stress that can come about from genotoxin exposure or cancer genome mutations. In this regard, BER pathway proteins regulate the formation of protein complexes that facilitate the intra-S phase checkpoint (https://pubmed.ncbi.nlm.nih.gov/34806016/) and the response to PARP and PARG inhibitors (manuscript in preparation). Using panels of isogenic wild-type and BER gene KO cells, the goal is to characterize the cellular response of the KO cells, as compared to the WT cells, upon exposure to a library of genotoxins, DNA damaging agents and DNA repair inhibitors. To aid in this project, the students will participate in studies involving human cancer cell line culture, genotoxin treatment and evaluation of cell viability. More details about the research goals and focus of the lab can be found at: https://sites.brown.edu/sobollab/.

Required skills: Past coursework that includes an understanding of basic biology, cell biology and molecular biology.
Preferred skills: Experience in a cell biology lab setting and/or experience working with cells in culture.

Is this project for more than one student: No

Robert Sobol  
Department: Pathology and Laboratory Medicine  
Project Type: Research  
Project Title: Identification and validation of replication-stress and DNA damage dependent base excision repair protein complexes (PALM-2)

Project Description:  
The base excision repair (BER) pathway is one of five major genome maintenance mechanisms in each cell that provide protection from exogenous and endogenous sources of DNA damage, e.g., oxidative stress, radiation, cigarette smoking. Specifically, genes and proteins of the BER pathway are essential for the repair and resolution of approximately 20,000 base lesions per cell per day in both the nuclear and mitochondrial genomes and facilitates active gene demethylation that can impact transcription. More recently, we have shown that a major role of these BER pathway proteins in cancer cells is to function in concert with the replication machinery and to then help in the response to replication stress that can come about from genotoxin exposure or cancer genome mutations. In this regard, BER pathway proteins regulate the formation of protein complexes that facilitate the intra-S phase checkpoint (https://pubmed.ncbi.nlm.nih.gov/34806016/) and the response to PARP and PARG inhibitors (manuscript in preparation). Using cancer cell lines expression TurboID fusion proteins, the goal is to characterize the protein complexes that associate with each of the BER proteins. To aid in this project, the students will participate in studies involving human cancer cell line culture, protein complex isolation via biotin-capture protocols, immunoblotting and validation of protein complex association. More details about the research goals and focus of the lab can be found at: https://sites.brown.edu/sobollab/.

Required skills: Past coursework that includes an understanding of basic biology, cell biology and molecular biology.

Preferred skills: Experience in a cell biology lab setting and/or experience working with cells in culture.

Is this project for more than one student: No

Robert Sobol  
Department: Pathology and Laboratory Medicine  
Project Type: Research  
Project Title: Characterization of a novel mouse model of DNA polymerase beta deficiency for the study of active gene demethylation at neuronal enhancers and the impact on senescence and neurodegeneration (PALM-3)

Project Description:
The base excision repair (BER) pathway is one of five major genome maintenance mechanisms in each cell that provide protection from exogenous and endogenous sources of DNA damage, e.g., oxidative stress, radiation, cigarette smoking. Specifically, genes and proteins of the BER pathway are essential for the repair and resolution of approximately 20,000 base lesions per cell per day in both the nuclear and mitochondrial genomes and facilitates active gene demethylation that can impact transcription. The BER pathway, and in particular, the essential BER enzyme DNA Polymerase β (Polβ, Polb), has been shown to have an impact on several aging associated phenotypes using cell and transgenic mouse models, including a role in senescence, triplet repeat expansion, telomere loss or Alzheimer’s. Further, using human neuronal stem cells, it was shown that Polβ plays an essential role in active gene demethylation at neuronal enhancers, impacting gene transcription and neuronal stem cell differentiation. Missing from these studies is a robust mouse model of Polb deficiency that can be used to define a biologically relevant role for Polβ in a whole animal. To that end, we have recently developed a new Polb knockin mouse model that we will use to dissect the role of BER in neurodegeneration and senescence in the mouse and to evaluate how age-related neurodegeneration and senescence is regulated by BER pathway genes such as Polb. In this new mouse model, functional Polb protein is expressed, albeit at 10-15% the normal levels, rendering the BER pathway defective to as much as 85-90%. To aid in this project, the student will participate in mouse genotyping, tissue (liver, brain) isolation, DNA/RNA isolation, RNA analysis by qRT-PCR, analysis of BER and senescence-related protein expression by immunofluorescent staining and eventually by whole-body cellular mapping, all so as to help fully characterize this mouse model. https://sites.brown.edu/sobollab/

Required skills: Past coursework that includes an understanding of basic biology and of molecular biology.

Preferred skills: Experience in a cell biology lab setting and/or experience working with mice.

Is this project for more than one student: No

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**Maayan Leroy-Melamed**  
Department: Pediatrics  
Project Type: Research  
**Project Title:** Perspectives of Adolescents and Young Adults with Sickle Cell Disease and their Parents on Sexual and Reproductive Health (PEDIA-1)

**Project Description:**  
We will be conducting qualitative interviews of adolescents and young adults with sickle cell disease and their parents around topics of sexual and reproductive health such as menstrual concerns, penile dysfunction, and family planning. We expect to conduct interviews over the summer, and continue interviewing and transcribing recordings of the interviews in the fall. A student may be asked to help with recruitment, transcribing qualitative interviews, and other work around the project or other division projects in reproductive health.

Required skills: Non-judgmental approach to reproductive health, interest in social and reproductive justice

Preferred skills: Any experience with research studies
Is this project for more than one student: No

Jack Rusley
Department: Pediatrics, Adolescent Medicine
Project Type: Research
Project Title: Youth serving primary care provider toolkit for HIV pre-exposure prophylaxis (PrEP) (PEAM-1)

Project Description:
Despite being effective and safe for adolescents and young adults, HIV pre-exposure prophylaxis (PrEP) is rarely prescribed for this group in the US, despite their higher rates of HIV infection compared to adults. A key barrier is the lack of primary care providers (PCPs) who regularly prescribe PrEP to youth. Our project is funded by the NIH and Advance CTR to develop a youth-serving PCP PrEP Toolkit, pilot it with a small group of providers, and assess it's feasibility and acceptability. We are conducting focus groups of providers, and using this feedback to refine the toolkit. We will then train providers to use the toolkit, ask them to implement it in their clinical settings, and survey them to see if it was useful. Other related projects are potentially available, such as intervention study of PrEP uptake among LGBTQIA+ youth (see separate posting for details of that project).

Required skills: N/a

Preferred skills: Interest in working on projects related to relevant topics (e.g., LGBTQIA+ populations, youth, HIV, sexual health, etc.), social media content creation experience, graphic design experience (e.g., Canva, other platforms), data entry experience (e.g., Excel, REDCap, other database tools), customer service experience (e.g., in person and/or digital), research experience especially human subjects research, literature review and/or citation management experience (e.g., Mendeley, Endnote, etc).

Is this project for more than one student: Yes

Jack Rusley
Department: Pediatrics, Adolescent Medicine
Project Type: Research
Project Title: HIV prevention intervention for LGBTQIA+ youth in US (PEAM-2)

Project Description:
Youth make up a disproportionate number of new HIV infections in the US compared to adults, and the HIV incidence rates among LGBTQIA+ youth are far higher than cisgender and heterosexual youth. Among the key barriers to HIV prevention efforts in LGBTQIA+ youth is engagement in supportive and affirming health care (e.g., where they can access HIV testing and prevention medication such as pre-exposure prophylaxis or PrEP) as well as supportive and affirming relationships with parents, guardians,
and/or trusted adults. The Talk Study is an NIH funded project to develop a digital intervention for LGBTQIA+ assigned male youth ages 14-17 and parents/trusted adults to improve sexual health communication and PrEP uptake. This fall, our team will be in the process of conducting a trial to test the acceptability and feasibility of the intervention. Other related projects are potentially available, such as development of social-media based recruitment content and evaluation of the effectiveness of social-media recruitment, and development of a PrEP toolkit for youth-serving primary care providers (see separate posting for details of that project).

Required skills: N/a

Preferred skills: Interest in working on projects related to relevant topics (e.g., LGBTQIA+ populations, youth, HIV, sexual health, etc.), social media content creation experience, graphic design experience (e.g., Canva, other platforms), data entry experience (e.g., Excel, REDCap, other database tools), customer service experience (e.g., in person and/or digital), research experience especially human subjects research.

Is this project for more than one student: Yes

Mehtap Haktanir Abul
Department: Pediatrics, Pediatric Pulmonology
Project Type: Research
Project Title: Environmental factors affecting sleep and asthma in urban children (PEPP-1)

Project Description:
The Pediatric Health Disparities Research Program is directed by Drs. Daphne Koinis Mitchell, PhD and Elizabeth McQuaid, PhD, ABPP. The lab conducts research studies examining disparities in health outcomes and develops and evaluates interventions to improve health and sleep outcomes in youth. Studies investigate sleep, immune function, obesity, and asthma outcomes in children with asthma and allergy living in urban environments in greater Providence, RI.

Dr. Mehtap Haktanir Abul is a pediatric pulmonologist, her research focuses on environmental factors and air quality affecting sleep and asthma in urban children.

UTRA students will have the opportunity to shadow full-time research assistants, assist with data collection, and attend weekly research staff meetings as well as the monthly lab meetings, in which faculty and fellows affiliated with the group present ongoing research.

Specific tasks will include assistance with research participant recruitment and scheduling for studies, as well as assisting with a limited amount of data collection (e.g., administering questionnaires to child research participants and their caregivers) and with other tasks integral to research (e.g., preparing graphs and tables of results, preparing materials for research sessions, some clerical tasks, etc.).

This opportunity will provide excellent research training and public health experience for those considering pursuing graduate studies in psychology or public health, as well as those planning to apply to nursing or medical school.
Michelle Pievsky  
Department: Pediatrics, Psychiatry & Human Behavior  
Project Type: Research  
**Project Title:** From primary care to specialty care: helping children with developmental concerns get access to the care they need sooner (PEPHB-1)

**Project Description:**
We are seeking a student to join a research project that seeks to improve the connection from primary care to specialty developmental-behavioral pediatric care. Children with developmental concerns, including concerns for autism, benefit from specialty services, and those who receive early intervention have better outcomes. However, children wait over two years on average for an appointment with a diagnostic specialist, and there are known racial and ethnic disparities in age of diagnosis and access to resources. This research project is part of a larger project to create a more efficient screening and referral process to connect children with developmental concerns from Hasbro Children Hospital's pediatric primary care clinic to Children's Neurodevelopment Center (CNDC) for a specialty evaluation. The SPRINT|UTRA student would participate in a clinical chart review, collecting data from the charts of children ages 0-3 who were seen at Hasbro's primary care clinic over a 3-month period. The student would collect relevant data, including developmental screening scores, autism screening scores, specialty referrals placed, age at which referrals were placed, amount of time before their first appointment at CNDC, wait time until diagnostic appointment, and diagnostic outcomes. Information from this study will be used to inform the larger project. Please reach out to Dr. Pievsky (mpievsky@lifespan.org) if you have questions about the project. Students are encouraged to meet with Dr. Pievsky by Zoom or attend a lab meeting by Zoom to learn more about this and other research projects.

Required skills: Strong organizational skills, an interest in learning about the research process, credentialing as an intern at Lifespan OR the ability to begin the credentialing process remotely prior to the start of the fall semester

Preferred skills: Background knowledge of how to conduct research (either through past experience or coursework), interest in child development

Is this project for more than one student: No
Project Title: Reaching to the top: rare top quark decays at the LHC (PHYSI-11)

Project Description:
The project for the Fall UTRA will be to estimate the sensitivity of the LHC experiments to a rare top quark decay $t \rightarrow WZb$, which is very sensitive to the mass of the top quark and also potential new physics contributions. The project involves generating samples of these events with a modern Monte Carlo generator, processing them with a typical detector model simulation, and optimizing the selections to extract the signal against the standard model backgrounds. The ultimate goal is to project the sensitivity to this process as a function of the integrated luminosity (i.e., amount of data) collected by the LHC experiments.

Required skills: Basic knowledge of python and some familiarity with quantum mechanics in general and particle physics in particular

Preferred skills: Python, C++

Is this project for more than one student: No

Project Title: Understanding the impact of detector design on physics performance for the Future Circular Collider (FCC) (PHYSI-10)

Project Description:
High energy colliders, such as the Large Hadron Collider (LHC), provide a unique opportunity to answer big questions about the universe by studying the fundamental interactions between particles. This project is focused on understanding the impact of detector design on the physics program for future collider experiments, such as the Future Circular Collider (FCC). The student will begin by studying the impact of different detector designs on the reconstruction of different types of particles (hadrons, photons, electrons, etc). Characterization of this performance will inform the design of future collider experiments, giving us insight into how changes to different detector components will impact the physics that can be done at these experiments by directly showing the impact of these changes on the particles that are reconstructed. Following this, the student will study how machine learning (ML) can be used to improve the resolution and efficiency of the particles that are reconstructed, and to test how these improvements impact the physics potential of these experiments. The student will learn about reconstructing events at the FCC, and the same principles broadly apply to a range of experiments in nuclear and high energy physics, such as the CMS and ATLAS experiments. The student will also have the opportunity to improve their coding skills in C++ and/or python, and to learn or develop their skills in the fundamentals of ML.

Required skills: Some coding knowledge in C++ or python

Preferred skills: Experience with bash, git, basic experience with particle physics
**Project Title:** Exploring Higgs Boson Interactions with Quarks at the Future Circular Collider (PHYSI-7)

**Project Description:**
The primary objective of this project is to study the prospects of Higgs boson interactions with quarks within the context of the Future Circular Collider (FCC) initiative. Particular focus will be on interactions of the Higgs boson to strange quarks which is currently thought to be impossible to be observed even at future particle colliders. Confirming such interactions would represent a major advancement in particle physics, since it would allow establishing interactions of the Higgs boson with all second generation charged fermions and thereby providing key insights into New Physics phenomena. This research merges cutting-edge technology with particle physics to challenge our understanding of the Standard Model of particle physics. Students participating in this project will engage in a range of activities, including using advanced simulation software to model Higgs boson interactions and applying cutting-edge artificial intelligence (AI) techniques to identify and classify events. They will also work on studying the required specifications for vertex and timing detectors which are crucial to ensure precise measurements of these interactions. Additionally, students will review current literature to align their experimental design with the latest research and technological advancements in the field. Participants will have the unique opportunity to present their findings at FCC public meetings via Zoom at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland, and to the US community. Through their involvement in this project, students will develop proficiency in AI and machine learning as applied to data analysis in physics, gain a deep understanding of experimental physics through work with different detector technologies, and enhance their ability to document and present complex research findings. These skills will be particularly valuable as they prepare to present their research at international forums. This project is extremely well-timed to coincide with the upcoming mid-term review of the FCC Feasibility Study in Summer 2025, following a recent (i.e., April 2024) collaborative agreement between CERN and the U.S. to collaborate on the next Higgs factory. The insights from this study will significantly influence the decisions about the next particle collider.

**Required skills:** Good knowledge of Python and C++, basic knowledge of particle physics

**Preferred skills:** Excellent knowledge of Python and C++, Basic knowledge of AI/ML development, data analysis in physics

Is this project for more than one student: Yes
Project Type: Course Development
Project Title: Enhancing "Applied AI and ML in Physics" Course (PHYSI-8)

Project Description:
The primary objective of this project is to refine and enhance the "Applied AI and ML in Physics" course, which was initially designed and introduced at Brown University in the Spring 2024 semester. This revision seeks to deepen the integration of theoretical knowledge and practical applications of AI and ML techniques across various physics topics, thereby enhancing the educational outcomes for students. A key aspect of the project is to extend the hands-on components of the course to cover a variety of physics topics for each AI architecture discussed, making the learning experience more engaging and comprehensive. Additionally, the project involves transitioning the course materials from slides to comprehensive lecture notes. This will not only make the content more accessible but also pedagogically effective, allowing students to engage with the material in a more meaningful way. By doing so, the students attending the course, and clearly the student who chooses to work on this project, will gain advanced skills in developing and applying AI and ML techniques to real-world physics problems, learn to handle diverse datasets, implement various machine learning models in practical scenarios, and enhance their technical writing and pedagogical skills.

Required skills: Good knowledge of Python and solid experience with AI and ML libraries like PyTorch, basic Physics knowledge

Preferred skills: Strong experience with AI/ML, ability to work independently on literature-based projects

Is this project for more than one student: No

Loukas Gouskos
Department: Physics
Project Type: Research
Project Title: Advancing Higgs Boson Self-Coupling Research through AI-Enhanced Detection of HH->4b decay at CERN's LHC (PHYSI-9)

Project Description:
The project is focused on the search for Higgs boson pair (HH) production at the Large Hadron Collider (LHC) located at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland. It specifically targets the dominant Higgs boson decay channel to two bottom quarks. The investigation of HH production provides the most direct method to probe the Higgs boson self-coupling, which is critical for understanding its role within the Standard Model of particle physics. This study is crucial as it aims to either confirm or refine our theoretical predictions concerning the Higgs field and its interactions, with a particular focus on how Higgs boson pair production influences our understanding of electroweak symmetry breaking and, consequently, the ultimate fate of our universe.

The project will employ state-of-the-art computational models and artificial intelligence (AI) techniques to enhance the detection of the HH->4b signal from the otherwise overwhelming background process. These methodologies, designed specifically for high-precision data analysis and event classification, are essential for isolating the extremely rare HH->4b process. The student will further refine these tools and apply them to data currently being collected at the LHC, thereby extending our understanding of the Higgs boson's nature. Participation in this project will enable the student to undertake comprehensive
data analysis, utilizing AI to sift through large datasets in search of evidence of HH production. They will gain hands-on experience in developing and deploying sophisticated AI tools and learn cutting-edge data analysis techniques applicable to highly complex and challenging datasets. This project not only enhances the student’s expertise in employing advanced technology in a high-stakes research environment but also holds the potential to make a significant contribution to the field by potentially providing the first indications of Higgs boson self-interaction.

Required skills: Basic knowledge of Python/C++, basic knowledge of particle physics

Preferred skills: Good knowledge of Python/C++, Good knowledge of AI/ML

Is this project for more than one student: No

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**Matt LeBlanc**  
Department: Physics  
Project Type: Course Development  
Project Title: Visualising Algorithms at the Large Hadron Collider (PHYSI-5)

**Project Description:**  
Data analysis at the Large Hadron Collider (LHC) often involves the use of complex recursive algorithms that cluster groups of particles into 'jets.' These algorithms are well-established and universally used: every researcher beginning to work on LHC physics will encounter them. The most commonly-used visualizations of these algorithms were produced nearly 15 years ago, and have become outdated. Modern versions would be extremely welcome by the LHC physics community for purposes of pedagogy and outreach.

This project aims to develop a series of visualizations (particularly animations) of common LHC physics algorithms. The initial focus of this project will be to prepare high-quality animations of the jet clustering algorithms that are typically used in LHC data analysis. Depending on the speed of progress, visualizations of other algorithms encountered in collider physics (e.g. jet substructure algorithms or event-shape calculations) can also be prepared. In addition to pre-made animations that illustrate these algorithms using publicly-available data, this project should also produce a well-documented open-source software package containing scripts that can easily produce visualizations of any LHC data provided by downstream users.

In addition to gaining experience with the relevant concepts in LHC physics, the undergraduate student will learn and use modern pythonic data analysis tools and visualization packages (e.g. matplotlib). They will also become acquainted with Unix-like operating systems and the git version control system: these skills are essential for careers in technical fields.

Required skills: N/A

Preferred skills: Python, Data Visualisation, Unix

Is this project for more than one student: No
**Matt LeBlanc**  
Department: Physics  
Project Type: Research  
**Project Title:** Constraining Anomalous Gluon Self-Interactions using Trijet Events and Machine Learning at the LHC (PHYSI-6)

**Project Description:**  
The Standard Model (SM) of particle physics has long been successful in describing the interactions between fundamental particles. Standard Model Effective Field Theory (SMEFT) offers a systematic approach to explore extensions of the SM, by introducing higher-dimension operators. Within the SMEFT framework, anomalous gluon self-interactions can be introduced by a dimension-six operator containing the product of three gluon field strengths (GGG). Constraining the allowed strength of this operator is interesting for several reasons. If larger than expected, it can introduce inconsistencies in higher-dimensional SMEFT analyses. Furthermore, studying the CP-odd variant of this operator offers a unique opportunity to search for signs of new physics: although current constraints on the CP-odd term exist from measurements of the neutron electric dipole moment (EDM), these constraints are indirect, making direct collider-based studies complementary.

This study will explore the prospects for constraining the GGG operator using 'trijet' events at the LHC, where three strongly-interacting particles produce collimated 'jets' of particles in the final state. By analyzing simulated events from Monte Carlo event generators, we can determine the sensitivity of LHC data to the anomalous gluon self-interactions described by the GGG SMEFT operator. In particular, this study will develop ML/AI algorithms to isolate the signal, which has not yet been attempted in studies of this operator. If time allows, the potential of jet substructure techniques in this context may also be explored.

In addition to gaining experience with the relevant concepts in LHC physics, the undergraduate student will learn and use modern pythonic data analysis tools (e.g. tensorflow, matplotlib) and high-energy physics event generators (i.e. MadGraph 5). They will also become acquainted with Unix-like operating systems and the git version control system.

Required skills: N/A  
Preferred skills: python, git  
Is this project for more than one student: No

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**Matthias Kuehne**  
Department: Physics  
Project Type: Research  
**Project Title:** Osmotic Energy Harvesting Using Hexagonal Boron Nitride Nanochannels (PHYSI-3)
Project Description:
Renewable blue energy can be generated from the flow of ions across salinity gradients. It is estimated that up to 2TW of electrical power can be harvested from existing estuaries where freshwater mixes with the sea. High electrical resistance values of currently existing semipermeable membranes make these materials impractical for the harvesting of osmotic energy. However, individual nanotubes have shown great promise in osmotic energy conversion if certain scalability challenges are able to be overcome. This project aims to create and study a multilayer boron nitride nanodevice in order to provide a direct experimental assessment of the boron nitride system, which has displayed great potential in the harvesting of osmotic energy at the single pore level. Components of this project include exfoliation of 2D materials, assembly of heterostructures, characterization of the device, and electrical measurement and analysis of individual nanopores and devices. This project is a great fit for students interested in nanofluidics, 2D materials, experimental physics, and chemistry.

Required skills: n/a

Preferred skills: A strong preference will be given to candidates with interest to engage in research activities in the lab for the longer term (on the order of 1 year). Besides, any of the following can be beneficial:
- some understanding of/previous experience with micro- or nanofluidics, electrophysiology, or electrochemistry
- some understanding of low-dimensional materials and/or 2d materials device fabrication
- some experience with finite element modeling, Python or equivalent programming languages

Is this project for more than one student: No

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Matthias Kuehne  
Department: Physics  
Project Type: Research  
Project Title: Fabrication of 2D Devices and SECCM Study for Electrochemical Properties (PHYSI-4)

Project Description:
Two-dimensional (2D) materials such as transition metal dichalcogenides (TMDC) preserve considerable promise for electrocatalytic applications. However, understanding the electrochemical processes remains a challenge. Scanning Electrochemical Cell Microscopy (SECCM) offers high spatial resolution, enabling us to map the electrochemical properties on the surface of our sample. This project aims to confirm the spatial heterogeneous intercalation of 2d material by in situ optical microscopy, and study the electron transfer kinetics of Co/Cu intercalated devices by SECCM. Tasks will include exfoliation of 2D materials, solvent-based intercalation, and SECCM measurement. This project is ideally suitable for students with an interest in experimental physics, low-dimensional materials, nano-fabrication and scanning probe measurements.

Required skills: n/a

Preferred skills: A strong preference will be given to candidates with interest to engage in research
activities in the lab for the longer term (on the order of 1 year). Besides, any of the following can be beneficial:
- some understanding of/previous experience with electrochemistry, scanning probe microscopy, or intercalation
- some understanding of low-dimensional materials and/or experience with 2d materials device fabrication

Is this project for more than one student: No

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**Richard Gaitskell**  
Department: Physics  
Project Type: Research  
Project Title: Machine Learning in Dark Matter Particle/Astrophysics Search (LZ Experiment) (PHYSI-2)

*Project Description:*  
The LUX-ZEPLIN (LZ) Experiment is a world-leading astrophysics detector designed to directly detect dark matter particles proposed as the solution to the invisible mass problem in cosmology. It is located at the Sanford Lab, a retasked gold mine 1 mile underground. The experiment can also detect other rare particle physics events such as double electron capture and double beta decay.

To help further improve our sensitivity to these rare particle interactions, we employ machine learning as a powerful tool to efficiently extract information from real and simulated data. In the race to identify these rare interactions, machine learning provides a significant advantage when combined with more traditional analytical methods.

A student would work developing new insights in machine learning applied to live data. This includes exploiting training data sets constructed from recent LZ calibrations. The student would gain experience working with a variety of machine learning techniques, from standard deep learning architectures such as Convolutional Neural Networks, to state-of-the-art networks for uncertainty classification and time-series analysis. A significant emphasis of this analysis will be improving the interpretability (or, minimizing the mystique) of deep learning networks used in physics. This work would assist in (1) improving our search identification of rare event signals, and (2) further reducing backgrounds from conventional sources in dark matter searches.

Required skills: Python Programming, Strong Interest in Machine Learning

Preferred skills: Machine Learning including Tensor Flow

Is this project for more than one student: Yes

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**Loukas Gouskos**  
Department: Physics
Project Type: Research

**Project Title:** Developing AI Algorithms on FPGA and ASIC Systems to Boost Particle Identification at the LHC at CERN (PHYSI-1)

**Project Description:**
The project focuses on the development of ultra-efficient AI algorithms for identifying particles responsible for jet formation at the Large Hadron Collider (LHC). This work is crucial for fully exploiting the potential of the LHC by enabling real-time selection and detailed analysis of particle collision data. By enhancing the LHC's capabilities, these developments could lead to groundbreaking results in particle physics. The project will explore various machine learning architectures, such as Fully Connected Neural Networks, Convolutional Neural Networks, and Graph Neural Networks, along with model compression techniques. These are vital for integrating advanced algorithms into FPGA (Field-Programmable Gate Array) and ASIC (Application-Specific Integrated Circuit) systems. FPGAs and ASICs are types of integrated circuits. An FPGA is a hardware circuit that a user can program to carry out one or more logical operations, providing flexibility and speed beneficial for real-time data processing. ASICs are custom-built for specific applications rather than intended for general-purpose use, offering high performance and efficiency in energy consumption. These technologies not only enhance the processing capabilities at the LHC but also find applications in other areas of physics, such as gravitational wave detection, and industries such as automotive for self-driving cars and mobile technology. By participating in this project, the student will work into the intersection of AI, machine learning, and hardware implementation, learning to develop solutions that are not only pivotal for particle physics but also transferable to various technological applications.

**Required skills:** Good knowledge of Python and experience in AI and ML algorithm development. Familiarity with hardware description languages like VHDL or Verilog

**Preferred skills:** Understanding of digital circuit design and implementation processes for FPGA and ASIC. Strong background in computer science or electrical engineering

Is this project for more than one student: No

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Richard Gaitskell
Department: Physics / Center for the Fundamental Physics of the Universe (CFPU)
Project Type: Course Development

**Project Title:** Development of AI Physics Game for Winter School on Reinforcement Machine Learning and Physics-Informed Neural Nets (PCFTF-1)

**Project Description:**
You would help develop a framework for testing a competitive algorithm capable of piloting a ship in the gravitational field of a black hole. This will be a Machine Learning Challenge For Students at a Brown Winter School 2024/25 hosted by the Center for the Fundamental Physics of the Universe / Student Machine Learning Initiative.

Our goal is to create a physics inspired machine learning challenge for students. The primary goal is for the event to serve as a fun and interactive introduction to machine learning for students. The goal of this game will be to control the thrust on a spacecraft that is orbiting a black hole in such a way that one does
not enter the black hole or leave the gamespace.

This task is made competitive by including additional spacecrafts in the environment that are being controlled by other groups. The idea is that one craft which is appropriately trained should be able to influence its dynamics and those of other craft such that it can cause the other craft to enter the black hole or be kicked from the system while staying within the game space itself.

The foundation of our game will be a code which simulates the physics dynamics for the system. We have already established n-body simulation code that will provide the appropriate environment. There are two important modifications that need to be made to this code. Firstly, we need to create an interface between this code and outside users - be it a neutral network (NN), more conventional algorithm or user keyboard input. Since reinforcement learning seems naturally suited to the NN problem (more on this later) we think it may be good to translate our code into the language (i.e. class structure) of OpenAI Gym.

Our initial intuition is that reinforcement learning may be the best suited approach for this problem. One could imagine that there is a landscape of decisions that one could make in terms of applied thrust where the reward is based on the survival of the craft. As a first step towards this, we have been experimenting with the idea of using RL to enter a stable orbit where rewards are based on final proximity to the desired orbit.

Longer term there will also be opportunities to change the physics model employed from the simple Newtonian mechanics currently employed to something more exotic. Participants can then investigate how their NN learn in a new environment and see what new insights they might gain.

Required skills: Python Programming, Machine Learning

Preferred skills: Detailed Machine Learning including Tensor Flow and Reinforcement Learning

Is this project for more than one student: Yes

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**Prerna Singh**  
Department: Political Science  
Project Type: Research  
**Project Title:** Measuring State Symbolic Power: The Cultural and Ideational Components of State Capacity (POLSC-2)

**Project Description:**  
Project description: Measuring State Symbolic Power: The Cultural and Ideational Components of State Capacity

How do states gain citizen cooperation with their agendas and programs? A vast scholarship across the social sciences has fixated on states’ use of ‘sticks’ (such as coercion, penalties for breaking the law, which include monetary fines and even imprisonment) and ‘carrots’ (for example, a range of incentives). This ‘rational’ repertoire of tactics is certainly important but also insufficient. States across the world and through time have relied equally and arguably, even more heavily, on a vast, relatively underemphasized
but potent reservoir of cultural and ideational power to persuade and gain the cooperation of their citizens. What exactly is this ‘symbolic power’? How can we operationalize it? These are the main tasks of this project.

Research assistants will work closely with me and a graduate student manager (Shreya Singh, Department of Political Science; Fellow in the Graduate Program of Development) in the planning and creating of a data base that seeks to capture the strength of symbolic power across different states over time. We will identify and draw on a diverse range of primary and secondary historical sources to develop a coding framework for state symbolic power.

Required skills: N/A

Preferred skills: Previous research work; Familiarity with use of data and statistical softwares such as R, State, Python; some prior Pol Sc work

Is this project for more than one student: Yes

Rebecca Weitz-Shapiro
Department: Political Science
Project Type: Research
Project Title: Accessing Social Welfare in Brazil and Argentina (POLSC-1)

Project Description:
Lower and middle-income democracies today promise more social welfare benefits to more citizens than they have at any time in the past. At the same time, however, effective access to these programs and benefits remains highly variable, even among those who are eligible. What explains why some citizens actually receive the social benefits and programs for which they are eligible while others do not? This project explores this question in Brazil and Argentina using original focus group and survey data from these countries.

The student working on this project will conduct research to support the Professor’s work on her book project, “Persistent Demands: Running After Social Welfare Benefits in Brazil and Argentina.” The student will support the project by finding and summarizing relevant literature, following policy updates through news reports and government documents, and by locating and summarizing data and policy reports from government agencies in each country and relevant international bodies, including the PAHO, ECLAC, the World Bank, and others. Where applicable, the student will also help the professor code some of the focus group transcripts for key themes.

The student will learn how to collect quantitative data and situate that data in the context of a larger research project, as well as how to integrate secondary and primary data into a literature review. The student will learn how to navigate and access major data repositories at international organizations. The student will learn best practices for searching for academic literature and for synthesizing and summarizing that literature. Where applicable, the student will learn best practices for coding and analyzing qualitative research material (i.e., focus group transcripts).

The student’s work will be crucial as the Professor prepares the book manuscript for submission to an academic press in December 2024.
Robert Blair  
Department: Political Science / Watson Institute of International and Public Affairs  
Project Type: Research  
**Project Title:** Understanding and Combatting Democratic Erosion in the US and Beyond (PSWII-1)  

**Project Description:**  
The Democratic Erosion Fellowship supports students from Brown to engage in cutting-edge and policy-relevant research on democratic erosion and resilience in comparative perspective. Fellows will contribute to the Democratic Erosion Consortium, a multi-university project that helps students and faculty evaluate threats to democracy both at home and abroad through the lens of theory, history, and social science. The Democratic Erosion Consortium aims to help understand and mitigate threats to democracy through a combination of research, teaching, and civic and policy engagement. Fellows may help with any or all of the following: 1) expand and improve the Democratic Erosion Event Dataset (DEED), an original dataset on the precursors and symptoms of, democratic backsliding around the world; 2) develop policy briefs on democratic backsliding and resilience in collaboration with the National Democratic Institute (NDI) and other policy partners; and 3) further our research on affective polarization in the United States. They will work individually and in teams under the direction of Robert Blair (Associate Professor of Political Science and International and Public Affairs) and the other Consortium directors and research associates. Students will build professional and research skills, learning how to code and analyze qualitative and quantitative data on democratic backsliding in countries across the world, produce independent policy analyses, and collaborate with non-academic clients. Please find more information about the Consortium here (https://www.democratic-erosion.com/).

**Required skills:** Self-starter, effective and reliable communicator, accountable team member, creative problem-solver  

**Preferred skills:** Experience with Stata or R; proficiency in Powerpoint and/or Overleaf/Beamer; courses in political science and other social sciences; experience developing educational materials  

Is this project for more than one student: Yes

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Gabriela Lopez
Department: Psychiatry and Human Behavior  
Project Type: Research  
**Project Title:** Event-level Antecedents of Heavy Drinking Among Bisexual and Heterosexual Women with and without Histories of Sexual Assault (PSHB-7)

*Project Description:*  
This study is focused on bisexual women's health and understanding the reasons why they might drink. The topics of interest include their psychological distress, experiences of microaggressions, and their reasons for drinking. The study is a small-scale ecological momentary assessment study. The protocol is already underway but it still needs to be refined. The goal will be to fully develop the protocol and recruit 16 participants so they can pilot the ecological momentary assessment study for 14 days.

Required skills: Great interpersonal communication skills, good time management, flexibility, prior research experience is a plus but not necessary; time management, flexibility, prior research experience is a plus. The position requires a commitment of 9-10 hours a week through the semester.

Preferred skills: If you have an interest in health disparities or bisexual+ women's health then that would be ideal. I am also looking for someone creative than can help me improve the current recruitment materials (i.e., flyers, ads etc).

*Is this project for more than one student:* Yes

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**Jennifer Barredo**  
Department: Psychiatry and Human Behavior  
Project Type: Research  
**Project Title:** Functional Magnetic Resonance Imaging at the Intersection of Personality, Social Functioning, and Mental Health. (PSHB-6)

*Project Description:*  
Our lab uses functional magnetic resonance imaging (fMRI) and other cognitive neuroscience approaches to study personality, the social brain, and mental health. Undergraduate researchers on our team have the opportunity to participate in all aspects of an fMRI research study. Activities include learning how to collect behavioral experimental data and images from the MRI scanner, basic MRI quality assurance, and MRI preprocessing. Students will also assist with recruitment and scheduling of participants over phone or email. Our studies primarily involve college-aged individuals and military veterans who are navigating the challenges of depression or anxiety symptoms, offering you insight into these life experiences, as well as mental health research experience.

During our fMRI research sessions, participants complete several brief experimental tasks designed to engage parts of the brain involved in self-reflection, learning, and emotion, while they are actively being scanned. Participants also complete electronic daily diaries at home, between scanning sessions. These diaries ask participants about daily social interactions, self-esteem, and stress; we integrate these data with fMRI to help us understand how brain functioning relates to the complexities of daily life.

By joining our lab, you'll not only gain invaluable experience in human subjects' research and research in clinical settings, but also enhance your tech skills with Python-based data analysis. This role requires a
commitment of at least 10 hours/week to the lab. Occasional evening hours are required to accommodate participants' work or school schedules.

Required skills: Participants are scanned multiple times over several weeks, so good interpersonal skills and the ability to build rapport with our study participants is essential. Because participants are scanned over 3-4 weeks, students must commit to keeping these weekly appointments, though actual session times and in-person days may vary. Due to the intensive nature of human subjects’ research training, we ask for a commitment to work in the lab for at least 2 semesters. Coursework in neuroscience or psychology is required.

Preferred skills: Previous experience working in a clinical or research setting is desirable, as is past customer service experience. Experience with statistics and/or computer programming is highly favorable. Students must have access to a computer and stable internet.

Is this project for more than one student: Yes

Laura Stroud  
Department: Psychiatry and Human Behavior  
Project Type: Research  
Project Title: Enriching the Rhode Island Child Health Study (PSHB-5)  
Project Description:  
The Rhode Island Child Health Study (RICHS) is led by Dr. Laura Stroud at the Center for Behavioral and Preventive Medicine (CBPM) at The Miriam Hospital and The Warren Alpert Medical School of Brown University. RICHS is a comprehensive, longitudinal research study involving maternal/child pairs from Rhode Island and Southern Massachusetts. Our current RICHS initiatives are centered around the exploration of how environmental factors (i.e., structural and individual racism and social determinants of health) impact the health and behavior of mothers and children. Undergraduate research assistants who become part of the RICHS team will engage in a diverse array of tasks. These responsibilities include reaching out to study participants, assisting in the enrollment process, aiding in the collection and processing various biospecimens, and supporting various other study-related activities. The research assistant will also work with clinical data from telephone interviews and electronic medical records, and assist in entry of various self-report measures and interview measures. This project offers students invaluable insights and hands-on experience in the realm of biobehavioral research, skills that can continue to benefit them throughout their undergraduate and postgraduate journeys.

We maintain rigorous training and supervision protocols to ensure that all tasks align with HIPAA and IRB guidelines, enabling us to fulfill our research objectives accurately and ethically. Throughout the semester, students will receive mentorship from our dedicated study staff to develop and execute an independent project within the RICHS cohort.

Required skills: N/A  
Preferred skills: N/A  
Is this project for more than one student: No
Sarah Thomas  
Department: Psychiatry and Human Behavior  
Project Type: Research  
Project Title: Adolescent Cannabis Use and Decision-Making: A brain/behavior investigation (PSHB-4)

*Project Description:*  
We are seeking a student with a dedicated interest in adolescent mental health to join our research project. This project investigates adolescent reward-related decision-making, how these processes may exhibit brain/behavior differences depending on adolescents' exposure to cannabis use, and whether these processes are altered when adolescents who use cannabis have moderate to severe depressive symptoms. Our mission is to identify bio-behavioral processes in the context of adolescent cannabis use that may give rise to later addiction.

The primary objective is to provide the student with comprehensive training and experience conducting human subjects research. Tasks include participant recruitment and enrollment, measurement and assessment during research study visits, data preprocessing and analysis, and the dissemination of research findings.

The student will gain hands-on participant experience by joining in-person research visits as part of the Teen Decision-Making Study. This involvement includes the administration of questionnaires to parents and adolescents. Furthermore, the student will play a role in the preprocessing, organization, management, and analysis of the resulting data. This experience will offer insights into the rigorous process of scientific data quality control, preprocessing, management, analysis, and interpretation, as well as ethics (e.g., working with minors). If interested, there are opportunities to learn programming languages relevant to the preparation and analysis of behavioral and neural data.

The student will engage in weekly journal club discussions of scientific articles. Depending on the student's interests and availability, there may be possibilities for them to explore available data within the lab.

The student is expected to dedicate approximately 10 hours per week, working under the mentorship of Dr. Sarah Thomas and a research assistant. Bi-weekly meetings with Dr. Thomas and research assistants will be held to facilitate discussions regarding progress, goal attainment, and project development.

Please visit our lab website: https://sites.brown.edu/teendecision-makingstudy/welcome/

Required skills:  
- Proficiency in Microsoft Suite applications such as Word and Excel, as well as familiarity with Google Suite tools like Google Calendar, Google Voice, and Google Drive.  
- Exceptional interpersonal skills, demonstrating the ability to engage effectively with families and individuals.  
- Strong time management and organizational abilities, characterized by meticulous attention to detail and the
capacity to prioritize tasks when faced with multiple responsibilities. -Availability for late afternoons and evenings to attend study visits as required.

Preferred skills: -Experience with data capture systems or programming, such as REDCap, and familiarity with statistical software like SPSS and R is preferred but not mandatory. -Prior experience interacting with adolescents and families in diverse settings is preferred but not obligatory. -Previous exposure to research in related fields is welcomed but not obligatory. -Knowledge of programming languages, computational modeling frameworks, or neuroimaging.

Is this project for more than one student: Yes

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**Virtue Sankoh**  
Department: Psychiatry and Human Behavior  
Project Type: Research  
**Project Title:** Perinatal Mental Health Curriculum for Patients and their Families (PSHB-2)  

**Project Description:**  
Women & Infants Hospital of Rhode Island is one of the nation’s leading specialty hospitals for women and newborns and the 9th largest stand-alone obstetrical service in the country with approximately 8,500 deliveries per year. In addition to providing extensive obstetrical, gynecological, and pediatric services, Women & Infants has an active Women’s Behavioral Health division which includes a specialized mother-baby psychiatric partial hospital called Day Hospital. As part of Day Hospital programming, patients engage in didactic and process-oriented group therapy on a range of relevant topics including adult and infant sleep hygiene, infant cues, attachment, mindfulness, anger management, and more.

Day Hospital is seeking a student to join an ongoing patient- and family-centered curriculum development project that updates and digitizes relevant perinatal education literature for lay audiences. This is an exciting opportunity to support the work of behavioral health clinicians who deliver group therapy to a perinatal population experiencing acute mental health crises. Student will engage in literature reviews on perinatal topics, organize and review patient literature already available to Day Hospital patients, and support a digitization project using QR codes, under the mentorship of clinical director. Upon successful on-boarding as a volunteer at Women & Infants and at clinical director’s discretion, student may observe psychotherapy groups and attend peer supervision groups in order to support patient curriculum development. Student will meet with clinic director/mentor weekly to monitor progress. Required skills: Ability to zoom in private locations, knowledge of Microsoft Office (Word, Excel, PowerPoint) and Google Suite (gmail, google drive, etc.); strong communication and interpersonal skills, comfort with psychiatric and mental health topics. No patient health information (PHI) will be involved in this project. Preferred skills: Undergraduates with an interest in mental and behavioral health literacy, perinatal anxiety and mood disorders, infant development, and public health.

Required skills: Strong writing skills; strong organizational skills; eagerness to learn and grow

Preferred skills: Proficiency in Spanish language a plus; coursework in psychology and/or public health policy
**Virtue Sankoh**  
Department: Psychiatry and Human Behavior  
Project Type: Research  
**Project Title:** Perinatal Mental Health Curriculum for Patients and their Families (PSHB-3)

**Project Description:**
Women & Infants Hospital of Rhode Island is one of the nation’s leading specialty hospitals for women and newborns and the 9th largest stand-alone obstetrical service in the country with approximately 8,500 deliveries per year. In addition to providing extensive obstetrical, gynecological, and pediatric services, Women & Infants has an active Women’s Behavioral Health division which includes a specialized mother-baby psychiatric partial hospital called Day Hospital. As part of Day Hospital programming, patients engage in didactic and process-oriented group therapy on a range of relevant topics including adult and infant sleep hygiene, infant cues, attachment, mindfulness, anger management, and more.

Day Hospital is seeking a student to join an ongoing patient- and family-centered curriculum development project that updates and digitizes relevant perinatal education literature for lay audiences. This an exciting opportunity to support the work of behavioral health clinicians who deliver group therapy to perinatal populations experiencing acute mental health crises. Student will engage in literature reviews on perinatal topics, organize and review patient literature already available to Day Hospital patients, and support a digitization project using QR codes, under the mentorship of clinical director. Upon successful completion of onboarding as a volunteer at Women & Infants and at clinical director’s discretion, student may observe psychotherapy groups and attend peer supervision groups in order to support patient curriculum development. Student will meet with clinic director/mentor weekly to monitor progress.

**Required skills:** Ability to zoom in private locations, knowledge of Microsoft Office (Word, Excel, PowerPoint) and Google Suite (gmail, google drive, etc.); strong communication and interpersonal skills, comfort with psychiatric and mental health topics. No patient health information (PHI) will be involved in this project. **Preferred skills:** Undergraduates with an interest in mental and behavioral health literacy, perinatal anxiety and mood disorders, infant development, and public health.

**Required skills:** Strong writing skills; strong organizational skills; eagerness to learn and grow  
**Preferred skills:** Proficiency in Spanish language a plus; coursework in psychology and/or public health policy

Is this project for more than one student: Yes

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**Tosca Braun**  
Department: Psychiatry and Human Behavior (Primary); Religious Studies (Visiting)  
Project Type: Research  
**Project Title:** Mindful Yoga and Stigma Resistance in the Context of Incarceration – A Community-
Engaged Qualitative Inquiry (PHBPR-1)

Project Description:
Mass incarceration is both cause and result of structural health and other inequities, particularly among ethno-racially minoritized groups and women. The present qualitative study explored lifetime resiliency, stigma, and the tension between individual-level wellbeing benefits and resistance to inequity and stigma during participation in a 12-week mindful yoga-based intervention among people who were incarcerated in the Rhode Island jail/prisons. Preliminary qualitative coding has been conducted for this project, and findings presented at an international conference. The student working on this project will be trained and involved in formal qualitative coding and analysis, as well as conducting a structured literature review. They may be joined at times in the process by a community partner with lived experience in these intersections.

Required skills: Good time management, flexibility, and attention to detail, as well as cultural sensitivity

Preferred skills: If you have an interest in community-engaged research, public health, abolition, and/or health equity that would be ideal. Experience with qualitative research, structured literature reviews, and/or community engagement is a plus.

Is this project for more than one student: Yes

Tosca Braun
Department: Psychiatry and Human Behavior (Primary); Religious Studies (Visiting)
Project Type: Research
Project Title: Integrative Yoga and Self-Compassion for Survivors of Violence: A Community-Engaged Study (PHBPR-2)

Project Description:
This study uses community-engaged research to develop a culturally relevant 12-week healing and stigma resilience program for ethno-racially diverse survivors and victims of interpersonal (including domestic) violence. This program is being developed to build on women’s existing strengths and resilience while addressing concerns commonly cited in research with survivors and victims of violence, including stress, challenges with self-kindness or self-confidence, and/or being down or hard on themselves.

Phase of the study (nearing completion) involves developing a community action panel, conducting focus groups and interviews with women with lived experience, and integrating data with community feedback to draft the program manual. Phase 2 (Fall of 2024) involves pilot testing the intervention in a pre-post pilot, and Phase 3 involves running a randomized controlled trial, comparing the program to a women’s wellbeing education control group. The student research assistant working on this project will help develop the wellbeing program manual, based on prior community feedback; assist community workshops; and support other study activities, including team meetings. This internship will offer helpful insights and experience in conducting community-engaged research study.

Required skills: Good time management and strong attention to detail, as well as interpersonal skills including cultural humility and sensitivity. Reliable transportation will also be needed, as some activities
will occur at Butler Hospital and elsewhere in the Providence, RI area.

Preferred skills: If you have an interest or experience in community-engagement, public health, intersectionality, stigma, and/or health equity that would be ideal.

Is this project for more than one student: No

Elizabeth McQuaid
Department: Psychiatry and Human Behavior/Bradley Hasbro Children's Research Center
Project Type: Research
Project Title: Developing Prevention and Intervention Strategies to Improve Adolescent Health (PHBHC-1)

Project Description:
The student will have the opportunity to work on related projects within our lab. The student will be involved in studies investigating adolescents' and young adults' barriers and facilitators to food allergy management and developing a community-based intervention to improve diet quality and physical activity in youth. The studies take place at Hasbro Children's Hospital. Responsibilities include but are not limited to recruiting eligible families through phone, email, or on-site; collect data in the form of questionnaires and focus groups; data organization and entry; and assist with setup and maintenance of data management. Students will also have the opportunity to attend meetings with young community collaborators at the non-profit organization, Young Voices RI, and will assist in coordinating youth panel members. Some tasks can be conducted remotely while others will need to be completed on-site at Hasbro Children's Hospital, the Coro Building, or at the Young Voices location. This opportunity will provide excellent research training and public health experience for those considering pursuing graduate studies in psychology or public health, as well as those planning to apply to nursing or medical school.

Required skills: 1. Ability to function autonomously on a collaborative interdisciplinary team involving research, medical and mental health care 2. Excellent written and verbal communication and interpersonal skills 3. Strong administrative skills and a strong attention to detail 4. Strong computer skills 5. Ability to work harmoniously with diverse groups of individuals

Preferred skills: N/A

Is this project for more than one student: No

Brian Theyel
Department: Psychiatry and Human Behavior/Neuroscience
Project Type: Research
Project Title: Mechanism of ectopic action potential generation in neocortical regular spiking pyramidal cells. (PSHB-1)
Project Description:
My laboratory focuses on cells and circuits. We recently discovered that an important inhibitory brain cell fires on its own during periods of increased excitability. We record from these cells using glass electrodes, and sometimes light (using a voltage-sensitive imaging technique). We are currently performing experiments to determine the mechanisms underpinning a novel form of communication in neurons: ectopic action potentials (EAPs). EAPs are novel in that they ‘start’ far from the cell body, in a different (‘ectopic’) location from classic action potentials. Mechanistic experiments on inhibitory cells suggest that channels involved in epilepsy, schizophrenia, and autism spectrum disorders are involved in generating EAPs, but we do not yet know how EAPs are generated in a class of cells that our lab recently discovered is capable of firing them: regular-spiking pyramidal cells, which represent the most common cell type in the human cortex. In this project UTRA students will begin to learn how to obtain viable mouse brain slices, then record from neurons using glass electrodes while stimulating them to elicit EAPs. We will compare EAPs in the presence of various agonists and antagonists that will uncover how EAPs are generated in excitatory pyramidal cells, which will lay the groundwork for future, disease-relevant experiments.

Required skills: N/A

Preferred skills: Experience in lab settings, comfort with animal handling.

Is this project for more than one student: No

Sheryl Kopel
Department: Psychiatry, Pediatrics
Project Type: Research
Project Title: Pediatric Asthma and Health Disparities Research Program (PSYPE-1)

Project Description:
The Pediatric Health Disparities Research Program is directed by Drs. Daphne Koinis Mitchell, PhD and Elizabeth McQuaid, PhD, ABPP. The lab conducts research studies examining disparities in health outcomes and develops and evaluates interventions to improve health and sleep outcomes in youth. Studies investigate sleep, immune function, obesity, and asthma outcomes in children with asthma and allergy living in urban environments in greater Providence, RI.

UTRA students will have the opportunity to shadow full-time research assistants, assist with data collection, and attend weekly research staff meetings as well as the monthly lab meetings, in which faculty and fellows affiliated with the group present ongoing research.

Specific tasks will include assistance with research participant recruitment and scheduling for studies, as well as assisting with a limited amount of data collection (e.g., administering questionnaires to child research participants and their caregivers) and with other tasks integral to research (e.g., preparing graphs and tables of results, preparing materials for research sessions, some clerical tasks, etc.).

This opportunity will provide excellent research training and public health experience for those considering pursuing graduate studies in psychology or public health, as well as those planning to apply to nursing or medical school.
Required skills: Experience working with children; exceptional detail orientation and time management, some background knowledge/coursework in human participants research methods

Preferred skills: Spanish fluency, public health classes

Is this project for more than one student: Yes

Daniel Watkins
Department: School of Engineering
Project Type: Research
Project Title: Sea ice motion in a changing Arctic (SCHEN-19)

Project Description:
Sea ice is a key component of the Earth’s climate system. Sea ice is a dynamic material that cracks and deforms in response to stress from wind and ocean currents. The Arctic sea ice cover modulates the exchange of energy between atmosphere and ocean. Hence, understanding sea ice physics and correctly representing ice physics in models is a critical task for realistically simulating the future state of the climate. The Arctic is a harsh environment, and long-term measurements from weather stations are only available on land. Satellite observations, data from drifting buoys, and climate simulations all help us understand the long-term changes in the Arctic, including those due to anthropogenic climate change.

Our lab is developing a new sea ice drift product, Ice Floe Tracker, that retrieves trajectories and rotation rates of ice floes. This product allows us to measure the motion of individual sea ice floes (pieces of ice) in the highly dynamic transition regions between the open ocean and the central Arctic ice pack. In this project, we will be analyzing ice motion data derived from 20 years of satellite imagery to identify changes in sea ice dynamics and to understand the causes of year-to-year variability. The project has two objectives (one for each student researcher):

(1) Compare observations of sea ice motion from drifting buoys to satellite observations from the Ice Floe Tracker. How does ice motion change year-to-year? Why?

(2) Using a publicly available set of large-scale climate model experiments, examine differences in sea ice dynamics across the different models. Does observed sea ice variability fall within the range of simulations?

The results of the analysis will be suitable for presentation at research conferences and will be included in a scientific publication.

Required skills: Familiarity with basic statistics (APMA 0650 or similar). Some familiarity with programming language(s) for data processing and willingness to learn the basics of Python. Interest in climate and Earth observation. Students with backgrounds in applied mathematics or statistics are particularly encouraged to apply.

Preferred skills: Time series analysis, experience with big data projects.
Daniel Harris  
Department: School of Engineering  
Project Type: Course Development  
**Project Title:** Course-Based Undergraduate Research Experience in Design Engineering (SCHEN-20)  

**Project Description:**  
This project will be focused on revising the project-based learning experience in ENGN 0620: Design Brief to include Course-Based Undergraduate Research Experiences (CURE). The student will solicit and refine project topics based on the needs of research labs and other facilities at Brown (including the Brown Design Workshop) in collaboration with Profs. Harris and Manfredi. The outcome will be specific project problem statements and associated curricular material to be implemented and evaluated during ENGN 0620 in Spring 2025. The projects in past CURE Engineering courses at Brown have focused on low-cost or more accessible alternatives to scientific equipment and related methods to address new scientific challenges efficiently.

Prior study on CURE in Engineering at Brown:  

Examples of prior projects in other ENGN courses at Brown:  
https://www.instructables.com/member/BrownUniversityENGN/

More about the CURE Initiative at Brown:  
https://www.brown.edu/initiatives/stem-education/cure-initiative

Required skills: Successful completion of ENGN 0030 or 0032.

Preferred skills: Familiarity and some training with the Brown Design Workshop (BDW). Interest in Design Engineering.

Is this project for more than one student: No

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David Borton  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Continuous imaging of cell morphology, function, and cell-to-cell interactions. (SCHEN-18)  

**Project Description:**  
Currently, there are no autonomously imaging microscopes that have been designed to continuously
image neural cell tissue for multiple weeks within an incubator environment. We are specifically interested in understanding how specific cells related to Alzheimer’s Disease respond to inflammatory stimuli and the time evolving dynamics of these cell states. The goal of this research project is thus to perform continuous video-capture within the interior space of an incubator with minimal error in position and focus when imaging cell cultures in each well of a plate.

The student researcher will program an Arduino (or similar) and Python scripts to perform image alignment, auto-focusing, and build a user interface for ease of control. Live video feedback will be provided to the user from the microscope for sample verification. The researcher will be tasked with evaluating the materials used on the platform to make compatible with long-term imaging in the environmental conditions of the incubator necessary for cell development. Additionally, the student will prepare neural cell cultures and obtain fluorescence data from captured video over a ~two-month period to study the progression of microglia inflammation in vitro.

Required skills: N/A

Preferred skills: Working knowledge of Arduino (or similar), Python, cell culture

Is this project for more than one student: No

Ian Wong
Department: School of Engineering
Project Type: Research
Project Title: Profiling Circulating Tumor Cell Heterogeneity using Computer Vision and Machine Learning (SCHEN-17)

Project Description:
Cancer cells exhibit profound heterogeneity in shape and biomarker expression, which remains challenging to profile using computer vision and machine learning. In particular, primary tumors release heterogeneous circulating tumor cells (CTC) into the bloodstream, which then encounter hostile microenvironments en route to forming a metastatic colony in a distant tissue. This project will investigate how cellular behavior and gene expression change based on the tumor microenvironment, by analyzing morphological changes, proliferation rates, and RNA sequencing data. In order to properly evaluate cell behavior, a trained computational pipeline is needed to correctly identify CTCs, their shape, nuclei, etc, during live cell imaging as well as stained samples. We are recruiting an undergraduate student for the Wong Lab in the School of Engineering to continue a computational project to analyze cell shape and classify heterogeneous phenotypes.

Required skills: Past coursework and experience with image processing is needed

Preferred skills: High proficiency with computer programming is required (e.g. MATLAB, Python, R), and the position requires a commitment of 5-10 hours a week through the academic year

Is this project for more than one student: No
**Kurt Pennell**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Abiotic and Biotic Transformation of Perfluoroalkyl Acid (PFAA) Precursors at AFFF-impacted Sites (SCHEN-16)  

**Project Description:**  
The use of aqueous film-forming foam (AFFF) to extinguish fuel-based fires at military, industrial, and municipal sites since the 1970's has resulted in widespread contamination of per- and polyfluoroalkyl substances (PFAS), including a wide variety of environmentally persistent perfluoroalkyl acids (PFAAs). Field observations of prolonged PFAA persistence may result in part from abiotic and biotic transformations of PFAA precursors introduced during AFFF applications. However, the mechanisms of these processes and their potential contribution as long-term sources of PFAS contamination are largely unknown, especially in surface soils and heterogenous aquifers subject to multiple environmental factors. The goal of this project is to advance our fundamental understanding of abiotic and biotic processes that can transform PFAA precursors under dynamic conditions that are representative of AFFF-impacted sites.

Required skills: Wet laboratory experience, analytical experience  

Preferred skills: ENGN 490, CHEM 100 and/or CHEM 330  

Is this project for more than one student: Yes

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**Louise Rosanna Manfredi**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Data-driven sustainability in fabrication: Reframing the industrial ecology of the Brown Design Workshop (SCHEN-15)  

**Project Description:**  
In response to the growing urgency to address climate change and foster sustainability literacy, the integration of circular economy principles within educational settings has become paramount. This study delves into the significance of informal sustainability education as testbed for knowledge dissemination and solution co-development. The research centers around the Brown Design Workshop (BDW).  

Through initial assessments and surveys, it was revealed that there exists a substantial interest in understanding the environmental impacts of making among BDW members. In response, the research proposes a multifaceted approach focusing on two key areas: 3D printing and material recycling and design for non-destructive disassembly in woodworking.  

By leveraging smart systems and IoT technologies and rethinking practicing to make objects, the research aims to gather data for long-term sustainability tracking and life cycle assessment reporting.
These efforts are expected to contribute to clearer and meaningful understanding of material flows and environmental impacts within the BDW. The UTRA recipients will work closely with BDW faculty and staff to co-develop a sustainability dashboard, showing our metrics and targets for a healthier creative process in the BDW.

Required skills: The only requirement is that you have taken at least 2 workshops in the BDW and are to some extent, active in the space. 3D printing or intro to wood are vital.

Preferred skills: Some knowledge and/or passion of sustainable design, has worked in an interdisciplinary team (in a course or extra curricular), some experience with programming or analytical software (we will be using LCA software to model environmental impact). Experience in woodworking or 3D printing.

Is this project for more than one student: Yes

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**Lucas Caretta**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Probing Thin Film Structures and Surfaces with Angstrom Precision (SCHEN-14)  
**Project Description:**  
Structure-property relationships are critical in the design of new functional materials. Nanoscale distortions of the positions of atoms within a material’s crystal can cause colossal changes in macroscopic, measurable properties. A famous example of this is carbon. Virtually, the only difference between soft, black graphite and hard, transparent diamond is the atomic structure of carbon in each system! Thus, the ability to accurately probe crystal structure is essential in discovering new properties and functionalities. This project will give you the opportunity to probe both the surface and bulk structural properties of a wide variety of thin films materials and help relate this to materials properties. You will use and learn scanning probe techniques (such as atomic force microscopy) and high-resolution x-ray diffraction, and apply these state-of-the-art techniques to epitaxial, single crystal thin film materials. The materials we are most interested in are magnetic and ferroelectric films, whose structure-property relationships are extremely sensitive and are useful for memory, logic, data storage, and quantum sensing applications.

Practically, you will obtain experimental skills with x-ray optics and scanning probe techniques. You will also develop skills which enable the delicate handling of thin film materials, critical thinking, and numerical analysis. This project will develop your teamwork skills by giving you the opportunity to work with graduate students and postdoctoral scholars and disseminate your work to the group through oral presentations. You will also learn the basics of how magnetic and ferroelectric materials work and how we make thin films. Additionally, if interested, driven, and dedicated, you may have the opportunity to formulate your own research questions and pursue your own project, which could result in conference presentations or paper co-authorship.

Required skills: A desire to learn about thin film materials, a willingness to work hands-on, concurrent or previous completion in an introductory materials science course (e.g., ENGN 41), attention to detail, previous lab or research experience.
Preferred skills: Experience in thin film characterization, scanning probe techniques, x-ray diffraction

Is this project for more than one student: Yes

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**Mauro Rodriguez**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Numerical simulations of acoustic wave-soft tissue interface interaction (SCHEN-12)

**Project Description:**  
In ultrasound imaging of soft tissues (e.g., lungs), bubbles are used to create a higher contrast in the imaging. The small bubble nuclei respond to the ultrasound by inertial growing and increasing contrast in the images. However, the ultrasound grows bubbles that oscillate violently leading to adverse bioeffects (e.g., bleeding) in the soft tissue. The aim of this project is to study the wave-induced vorticity-related mechanisms that lead to adverse bioeffects. The problem of interest involves the following. An acoustic wave travels in a viscoelastic liquid towards a liquid-air interface. The interface is initially perturbed (typically with a sine wave profile) and stationary. The acoustic wave interacts with the interface. The wave is partially transmitted and reflected. The density and pressure gradients from the interaction deposit baroclinic vorticity along the interface. Vorticity distorts the interface and could be a mechanism for the adverse bioeffects. Earlier water-air numerical simulations have enabled the prediction how much the perturbation can grow depending on the initial acoustic wave parameters and interface shape. However, these simulations typically involve a water-air system, water representing the soft tissue. The lung soft tissue has elastic characteristics pertinent to the acoustic wave interface interactions. The student shall use an in-house code to run numerical simulations of this problem with a viscoelastic liquid. The in-house code has an existing viscoelastic model, the student shall run a 2D version of the code to compare the differences between viscoelastic-air and water-air simulations. The numerical simulations shall be run on Brown’s Oscar supercomputer.

Required skills: Written and ran ODE numerical solvers, knowledge of the Rayleigh-Plesset-type equations, some working knowledge of viscoelasticity

Preferred skills: Fascination with fluid mechanics, some knowledge of fundamental fluid mechanics, understanding of how to solve a system of ordinary differential equations (ODEs), some working knowledge of C++ or Matlab

Is this project for more than one student: No

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**Mauro Rodriguez**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Bubbles in trees: Fully confined microbubble oscillations in soft materials (SCHEN-13)
Project Description:
The aim of this project is to investigate microbubbles oscillating in a liquid that is fully confined by a hyperelastic solid. This configuration is found in various biological (e.g., trees, plant cells, geological fluid inclusions) and technological applications (e.g., cavitation erosion, peeling of adhesives). Microbubbles respond to environmental pressure forcing by oscillating in volume. The governing equation that describes oscillations of a bubble in a liquid are Rayleigh-Plesset-type equations. State-of-the-art approaches have a Rayleigh-Plesset-type equation to account for the three-component configuration: bubble, liquid, and solid. However, the solid is treated as a linear elastic solid. The research objective is to extend current theory to account for hyperelastic solids (e.g., materials that are soft and can undergo large deformations). This research-based project is a combination of theoretical (analytical) and computational work. The scholar shall write and run a numerical simulation code that solves non-linear ordinary differential equations that are an initial-valued problem. The ideal candidate for this project has some working knowledge of numerically solving ODEs via Matlab or a similar tool (e.g., Python and/or C) and some knowledge of fluid mechanics. Additional knowledge of the numerical techniques and physics shall be provided by the faculty member. The scholar shall be provided computational resources (e.g., CCV’s Oscar) to conduct the work.

Required skills: Fascination with fluid mechanics and/or bubbles, some knowledge of fundamental fluid mechanics, understanding of how to solve a system of ordinary differential equations (ODEs), some working knowledge of Matlab, C, C++, Python, or similar

Preferred skills: Written and ran ODE numerical solvers, knowledge of the Rayleigh-Plesset-type equations, some working knowledge of viscoelasticity, knowledge of machine learning algorithms

Is this project for more than one student: No

Minki Kim
Department: School of Engineering
Project Type: Research
Project Title: Detecting Small-Scale Structures in the Arctic Ocean through Biological Signatures in Satellite Imagery (SCHEN-10)

Project Description:
In the Arctic Ocean, the annual summer melting of sea ice creates conditions favorable for phytoplankton blooms. These microscopic organisms, reliant on sunlight and nutrients, thrive in response to increased sunlight penetration resulting from recent global warming trends. Studying the distribution and motion patterns of phytoplankton provides insights into underlying ocean structures.

The proposed project aims to identify small-scale rotating structures in the Arctic Ocean by analyzing signatures of phytoplankton observed in satellite Imagery. Meso- and submeso-scale ocean eddies, ranging from 200 m to 100 km in size, play crucial roles in heat, freshwater, and sea ice transport, yet their distributions and characteristics remain incompletely understood. Phytoplankton distribution is influenced by these eddies, providing a proxy for identifying eddy characteristics.
The UTRA scholar will analyze optical satellite imagery (e.g., Moderate Resolution Imaging Spectroradiometer imagery) to extract phytoplankton data products from available datasets in the Arctic Ocean (e.g., Beaufort Gyre and Fram Strait). The UTRA scholar will then manually identify small-scale rotating structures in the images. The UTRA scholar will explore methodologies to enhance the accuracy of measuring rotating features, drawing from previous approaches used for other satellite datasets, such as altimetry data. Finally, the UTRA scholar is expected to develop an algorithm using data-driven or machine-learning approaches for the automatic detection of ocean features. The ideal candidate for this project has a strong interest in one of these fields: ocean and atmospheric science, fluid dynamics, applied mathematics, data processing, and coding software (e.g., MATLAB, Python, Julia).

Required skills: Some experience with MATLAB, Python, Julia, or other similar-level coding software

Preferred skills: Introductory material in computer science, earth sciences, or engineering

Is this project for more than one student: No

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Minki Kim
Department: School of Engineering
Project Type: Research
Project Title: Classification of Sea Ice Motion for Detecting Small-Scale Ocean Features (SCHEN-11)

Project Description:
Small-scale swirling motion in the Arctic Ocean play a critical role in the freshwater budget and heat transport of the Arctic Ocean. However, quantifying eddy properties poses significant challenges due to sparse in-situ measurements and the presence of sea ice cover. As an alternative approach, Lagrangian observations of individual pieces of sea ice (ice floes) were employed to characterize swirling motion in the upper ocean affecting ice floe dynamics and thermodynamics.

The proposed project aims to use machine learning techniques to classify sea ice motion for the detection of small-scale ocean features. Leveraging our recently developed Ice Floe Tracker (IFT) algorithm, the UTRA scholar will employ IFT data to interpolate sea ice trajectories and assess the performance of interpolation methods. Next, sea ice trajectories will be categorized based on collision events, allowing for the identification of non-colliding trajectories. These non-colliding trajectories will be analyzed using classification algorithms to identify sea ice trajectories influenced by swirling ocean motion, facilitating the detection of small-scale ocean features. Finally, the UTRA scholar is expected to apply the selected algorithms to IFT data products for automated and comprehensive detection of ocean rotating features. The ideal candidate for this project has a strong interest in one of these fields: computer science, ocean and atmospheric science, applied mathematics, data processing, and coding software.

Required skills: Some experience with MATLAB, Python, Julia, or other similar-level coding software

Preferred skills: Introductory material in computer science, earth sciences, or engineering

Is this project for more than one student: No
Minki Kim  
Department: School of Engineering  
Project Type: Research  
Project Title: Revealing Arctic Sea Ice Dynamics via Simulation: Impacts of Sea Ice Conditions Due to Global Warming (SCHEN-8)

Project Description:  
The Arctic is entering a new era with thinner ice, decreased ice extent, and changing weather. These changes, driven by global warming, introduce substantial variability in sea ice conditions, which in turn affect sea ice motion. Surface conditions of sea ice play a crucial role in determining drag forces, influenced by ocean currents and winds. These interactions lead to significant changes in sea ice dynamics, including motion, transport, and distribution, ultimately impacting trends in sea ice melting. However, traditional approaches for studying sea ice-ocean-wind interactions are often insufficient in capturing the complexity of ice floe motions.

The proposed project aims to conduct numerical simulations to investigate the dynamics of Arctic sea ice, ranging from 1 to 100 km in size, under various surface conditions such as thickness and roughness. These simulations will utilize simplified models for ocean, sea ice, and wind interactions. The UTRA scholar will observe the transport of sea ice released randomly initially. Sea ice translation and rotation will result from the competing influences of the ocean and wind, causing distinct sea ice motion. The UTRA scholar will explore broad parameter space, including distribution of sea ice thickness, and shape of surface roughness, to understand the interactions among ocean, sea ice, and wind. The simulation results will be compared to the observational data to reveal key mechanisms inducing sea ice rotation. The ideal candidate for this project has a strong interest in one of these fields: fluid dynamics, applied mathematics, ocean and atmospheric science, data processing, and coding software (e.g., MATLAB).

Required skills: Some experience with MATLAB, Python, or other similar-level coding software

Preferred skills: Introductory material in engineering, computer science, or earth sciences

Is this project for more than one student: No

Minki Kim  
Department: School of Engineering  
Project Type: Research  
Project Title: Producing Novel Arctic Ocean Data Products via Machine Learning: Retrieval of Small-Scale Ocean Properties from Satellite Imagery (SCHEN-9)

Project Description:  
The Arctic is transitioning into a new era characterized by thinner ice, decreased ice extent, and changing weather. The changed state of sea ice in this era not only undermines the accuracy of predictions in existing climate models but also brings about a different ocean status compared to historical trends.
Among various scales of rotating features in the ocean, meso- and submeso-scale ocean eddies (ranging from 200 m to 100 km in size), critical for the transport of heat, freshwater, and sea ice, exhibit different distributions and characteristics that are not yet fully understood.

The proposed project aims to detect and identify rotating structures in the Arctic Ocean using machine learning approaches applied to Synthetic Aperture Radar (SAR) data. The SAR data are capable of capturing ocean eddy signatures comprehensively in both open water and ice-covered regions. The UTRA scholar will gain proficiency in processing SAR imagery and explore machine learning algorithms, such as YOLO, for object detection of eddy signatures. The UTRA scholar will evaluate algorithm performance to determine optimal methods for eddy detection, and subsequently apply selected algorithms to a broad range of SAR data for automatic and comprehensive detection of ocean rotating features. The ideal candidate for this project has a strong interest in one of these fields: computer science, ocean and atmospheric science, applied mathematics, data processing, and software coding.

Required skills: Some experience with MATLAB, Python, Julia, or other similar-level coding software

Preferred skills: Introductory material in computer science, earth sciences, or engineering.

Is this project for more than one student: No

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**Nora Ayanian**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Exploiting Ground Effect for Motion Planning and Control of Quadrotors (SCHEN-7)

**Project Description:**
This project entails performing experiments and developing algorithms to leverage aerodynamics for longer flight endurance. The overarching goal is to explore combinations of different configurations of aerial robots. Ground effects can be exploited to develop new planning and control algorithms for quadrotor flights near the ground, leveraging energy efficiency. The control approach would require adaptive time-stepping to account for the sudden change in state and orientation of the quadrotor as it moves closer to the ground to leverage the effect.

Required skills: Data collection, teamwork, problem-solving, and creativity. CS or Engineering majors preferred.

Preferred skills: Some background in programming using MATLAB/Python; Previous exposure to RRT* and Dijkstra’s algorithms. Basic understanding of ROS environments/RViz. Skills in capturing pictures from these experiments and video editing are a plus.

Is this project for more than one student: Yes
**Project Title:** Swimming in Space (SCHEN-4)

**Project Description:**
The US is pursuing two major initiatives in human space flight, the Artemis program for staying on the moon and on a lunar orbiting space station, and eventual human exploration of Mars. Private companies are also pursuing space tourism at those two destinations. We have so far pursued space as a mission and living there as a heroic challenge. There are many needed improvements to the experience: larger and better living spaces, improved food and nutrition in general including fresh foods, and opportunities to move and to relax.

Currently astronauts walk a treadmill one hour per day to maintain conditioning - imagine that regimen for a two and a half year Mars round trip as your only activity besides sitting in a cramped and noisy capsule. 2700 meals squeezed out of plastic pouches. Gradually receiving and exceeding the OSHA limit for lifetime radiation dose. Sounds like a luxury vacation?

Students in ENGN 1760 have studied a zero gravity swimming pool for exercise, relaxation and meditation in space. Apparently no other group has studied this possibility - it is easy to dismiss. Water is difficult to manage in 0-gravity. It is heavy and mass is critical in space missions. We reason that while heavy, the water needs to be on board anyway, why not make use of it? Water is one of the best known radiation shields.

The challenges include entrance and exit without losing water, recovery of water from the swimmer and their clothes on exit, how to dry off and life support inside the pool. While the pool might be decades to realization, we can be solving the design riddles here and now. We might be able to see the human space programs of NASA and ESA seriously working on space swimming facilities.

The UTRA proposes to analyze, design and build at smaller scale an entrance and exit mechanism including drying and water recovery, the key design challenges identified in the ENGN 1760 study. We will try to show the functionality of the pool plus entrance / exit facility here on the ground as a first step to demonstrating the ultimate practicality of a swimming pool on the moon or on board a ship headed to Mars.

**Required skills:** design and build experience in an engineering or pure design environment

**Preferred skills:** mechanical / fluids engineering or biomedical / biological / bioengineering for humans or human centric design or space engineering (any one these skills or experiences would be helpful)

Is this project for more than one student: Yes
**Project Description:**

Human space exploration historically were sorties of short duration, a few days. Now as we plan for lunar habitation and travel to Mars, astronauts will be months to years in the space environment. Longer missions will be less structured and Astronauts will have leisure time. In this UTRA we want to imagine and prototype games that will draw individuals away from their computer screens and technologies, relax and restore their sense of play and of well being, and help to maintain hand eye coordination, fine motion precision and speed and mental alertness.

These games might be adapted from classics such as marble in maze and pocket pinball. They will not be electronic. They will be adapted for use in micro and zero gravity environments, of space compatible materials, and of minimum size and mass, while maintaining the fun and spirit of gaming.

**Required skills:** there is no required coursework for this project

**Preferred skills:** It is preferred the student would have previous design and fabrication experience either from coursework or extra-curricular activity. An interest in non-electronic games would be helpful.

**Is this project for more than one student:** No

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**Rick Fleeter**

Department: School of Engineering  
Project Type: Research  
**Project Title:** Realizable enhancements to the NASA Space Suit. (SCHEN-6)

**Project Description:**

As Biomedical Engineering has become such an important part of the School of Engineering, the UTRA we carried out this Spring semester has generated a lot of interest among students. This interest has been further augmented by the promising results of that UTRA. A passive approach to energy storage and release around the space suit knee joint we showed considerably decreases the effort required to walk, for instance on the lunar surface, with that suit whose heritage now dates to the Apollo program.

This UTRA is in two parts:

1) We propose to refine the technology of the original utra into a finished prototype which we could propose to NASA to test at the human space flight facility in Houston. We would both be refining the original cut and test engineering we did and using that refined product to transition the suit enhancement to be carried forward beyond this proposed utra by NASA. The excitement is in part seeing this invention go forward, and also that the student team would be potentially beginning an interaction with the human space flight center. That is a major step which very few innovations achieve.

2) We had originally planned several other improvements based on interviews we did with astronauts who have used the original “bubble” suit. These include enhanced heating of the gloves, particularly the fingertip areas, and providing haptic feedback - that is, feedback to the astronaut of for example how tightly they are holding onto an object. That natural feedback we are accustomed to in bare hands is currently quite vague to nil. This would be a new effort undertaken by different students under the same utra.

**Required skills:** Students should have experience in design and build whether of mechanical, electrical or textile projects, in class, on the job or as a hobby
Preferred skills: Experience in human / bio engineering, in human anatomy and biomechanics, in human centric engineering or in instrumentation and testing would be desirable

Is this project for more than one student: Yes

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**Rick Fleeter**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Virtual Astroaut (SCHEN-2)

**Project Description:**  
Human history is often described according to exploration and migration. In exploring beyond Earth, this paradigm collides with the realities of space. Missions can be extremely long in duration, a significant fraction of or even longer than the human life span, space does not have oxygen nor external air pressure, there is no naturally occurring food and at best very scarcely water. Every kg of mass launched can cost tens of thousands or for lunar and extra-planetary travel, millions or tens of millions of dollars, Astronauts require food, water, oxygen a heated illuminated and pressurized environment, their stability on a long duration or even multigenerational mission is hard to predict, Astronauts require sanitary and medical services and sometimes urgent and complex medical care. Human contact becomes less effective as round trip radio message times stretch to days or weeks. Space flight is risky and the need to return the astronaut to earth further doubles mission time and risk.  
The virtual astronaut aims to satisfy the human drive to explore by extending our physicality through robotics. Telepresence allows an astronaut on the ground to experience the exploration without physical travel, while still able to apply human judgement, perception and collaboration to the exploratory process. Under the UTRA we propose to design a space fairing robot and its telepresence realization on earth to demonstrate the feasibility and explore the advantages and disadvantages of a human guided tele robotic virtual astronaut.

Required skills: general experience in robotics or space systems design or telepresence

Preferred skills: robotics and programming robots, space systems design and engineering

Is this project for more than one student: No

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**Rick Fleeter**  
Department: School of Engineering  
Project Type: Research  
**Project Title:** Combating detraining, bone loss and loss of fine motor dexterity in space using Neuromuscular electrical Stimulation (NMES) (SCHEN-3)

**Project Description:**
As we transition to a phase of longer duration space missions, living on a lunar base or in lunar orbit, or making the over two year round trip to Mars, the well established decline in human conditioning and performance in space must be overcome. Right now astronauts spend one hour per day in training, generally on a tread mill, which is marginally effective and unpleasant. We propose to modify an exercise garment suitable for astronaut use integrating Neuromuscular Electrical Stimulation (NMES) combined with fine dexterity simulators to provide better, quicker and more whole body strength, cardiovascular and fine motion/dexterity conditioning. The project is a complete design of that NMES / fine motion training suit and to build a working prototype of at least some of the system's capabilities.

Required skills: at least one student must fully understand NMES theory and implementation

Preferred skills: distributed among the team members the following skills and experience would be desirable;
- biomedical engineering and NMES
- electrical circuits and instrumentation
- human centric design, clothing and textile design

Is this project for more than one student: Yes

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**Roberto Zenit**
Department: School of Engineering
Project Type: Research
**Project Title:** The mechanics of painting brushes (SCHEN-1)

*Project Description:*
The project is aimed at understanding the physical principles behind brush painting. A brush is the most widely used instrument for artistic painting and calligraphy. It holds paint or ink in its bristles, due to the action of capillarity; when artists push a loaded brush against a canvas or surface, the mean spacing between bristles increases, therefore the ink is released at controlled rate. This fluid flow is then deposited on the substrate to create images and textures. We will investigate the relationships among bristle flexibility, packing, diameter, and length, with the fluid viscosity and surface tension for brushes moving at different speeds. We will observe painters in action and conduct controlled laboratory experiments to document and understand the process. The amount of paint released, and its texture, will be quantified for many conditions.

Required skills: Laboratory experience, ENGN0040.

Preferred skills: ENGN0810

Is this project for more than one student: Yes

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**Nils Tack**
Project Title: Exploring what makes metachronal swimming highly maneuverable using a bioinspired shrimp robot. (SEFTS-1)

Project Description:
Evolution has produced and refined marine animal morphology for efficient swimming, inspiring bioinspired engineering in underwater robotics. Our lab focuses on metachronal propulsion, a swimming mode commonly favored by many oceanic invertebrates like shrimp for maneuverability. Current underwater robots used for exploration are invaluable in our quest to study our oceans but often struggle to navigate in complex environments due to restricted maneuverability. In our lab, we leverage our engineering, biomechanics, and fluid dynamics expertise to develop a novel type of underwater robot based on metachronal propulsion to overcome these challenges. We recently developed a shrimp-inspired robot to study propulsion parameters and answer the question: how do metachronal organisms like shrimp modulate yaw, pitch, and roll to perform intricate turning maneuvers in their three-dimensional underwater environment?

Our interdisciplinary undergraduate research project aims to integrate biological data with bio-inspired robotics to elucidate metachronal swimming's biomechanics. Using our advanced test platform, we will measure forces and torque during metachronal swimming to quantify their role in yaw, pitch, and roll. Ultimately, we will perform untethered swimming trials to analyze the resulting maneuvers.

The student will work with a team of undergraduate and graduate students and postdocs to conduct simultaneous fluid flow and force experimental measurements to evaluate how the appendages interact with water for propulsion. Motion tracking during trials will quantify turning rates, which we will compare against other swimming modes to determine the benefits of metachronal swimming. The findings from this collaborative effort will be presented at conferences and published in the scientific literature, providing an immersive learning experience in fast prototyping, fluid dynamics, programming, and scientific communication to the candidate.

This project is crucial to illuminate essential aspects of the biomechanics of metachronal organisms. It will advance our mission to develop innovative bioinspired underwater robots for ocean exploration.

Check out our current test platform: https://www.youtube.com/watch?v=YsL8qMkySyU

Required skills: Basic knowledge of CAD (Fusion 360, Solidworks…); Basic programming skills (Matlab, Arduino) for data analysis, statistics, and to run the robot.

Preferred skills: Skills in experimental fluid dynamics (i.e., Particle image velocimetry, particle tracking); Coursework in fluid dynamics and biostatistics; 3D printing (resin and/or FDM)

Is this project for more than one student: No

Nils Tack
Department: School of Engineering - Fluids and Thermal Sciences
Project Type: Research
**Project Title:** Building a new generation of bioinspired underwater vehicles employing metachronal propulsion. (SEFTS-2)

**Project Description:**
Marine animal evolution has inspired the development of highly efficient designs, leading to the emerging field of bioinspired engineering for underwater robotics. Our lab focuses on metachronal swimming, a strategy used by many oceanic invertebrates like shrimp for its efficiency and maneuverability. We've created a shrimp-inspired robot to study the underlying mechanisms of metachronal propulsion and are now refining it towards autonomy and miniaturization for ocean exploration. See our current robot: https://www.youtube.com/watch?v=YsL8qMkySyU

Currently, our robot is tethered with one row of appendages. Breakthroughs in 3D-printed compliant joint mechanisms have simplified leg actuation, paving the way for a ten-legged, free-swimming version. This undergraduate research project aims to fabricate and integrate the ten appendages, thus enhancing the robot's agility and autonomy.

The selected undergraduate student will explore and fabricate alternative appendage designs using various techniques, including computer-aided design (CAD) and 3D printing. Upon validation of a suitable design, the ten appendages will be integrated into a self-contained system. With guidance from graduate students and postdocs, the candidate will contribute to programming and testing the robot to perform the first untethered swimming trials that will form the backbone of future studies and developments. Finally, the student will present the findings at conferences and symposia and contribute to the publication of the results in a scientific journal.

Throughout the project, the candidate will gain expertise in domains such as fast prototyping, experimental fluid flow visualization, programming, and effective communication (e.g., scientific paper, and poster presentations). This project is pivotal in our mission to advance bioinspired underwater robotics for ocean exploration, offering an immersive learning opportunity for the student while pushing the boundaries of marine-inspired technology.

Required skills: Good knowledge of CAD (Fusion 360, Solidworks…); Basic knowledge about fast prototyping via 3D printing (resin and/or FDM); Basic programming skills (Matlab, Arduino) for data analysis, statistics, and to run the robot.

Preferred skills: Coursework in mechanical engineering.

Is this project for more than one student: No

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**Ananda Martin-Caughey**
Department: Sociology
Project Type: Research
**Project Title:** Job Titles and Tasks: Uncovering New Sites of Stratification within Occupations and Organizations (SOCIO-4)

**Project Description:**
How is working changing, and what are the implications for inequality, in general, and gender/racial
stratification in particular? This is the overarching question guiding a series of projects on job titles and
tasks in the new economy. The projects use a variety of data sources, including a large dataset of job
advertisements, to shed light on job titles and tasks as sites of stratification in the evolving labor market.
Typically, the inequality literature in sociology focuses on income or occupational attainment. However, a
growing body of research has demonstrated that even detailed occupational categories contain a wide
variety of job titles and tasks. This heterogeneity can result in hidden gender and racial segregation, and
other forms of inequality, within occupations. The student will work on several interrelated tasks. Tasks
may include literature reviews and background research, qualitative data review, editing, and, if the
student is interested, quantitative data cleaning and analysis. The student will be trained and supervised
by myself and a doctoral student.

Required skills: Strong writing and editing skills. Attention to detail and organizational skills. Research
methods class in sociology or related field. Interest in inequality/stratification and work/organizations.

Preferred skills: Coding or quantitative analysis skills.

Is this project for more than one student: No

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**David Lindstrom**  
Department: Sociology  
Project Type: Course Development  
**Project Title:** Developing a New Course in the Use of R for Data Management and Analysis (SOCIO-3)

*Project Description:*  
I am looking for a student to assist me in developing a new, graduate level course in the use of the R
language for social science data management and analysis. The course will be designed for advanced
undergraduates in the Social Analysis and Research concentration, students in the Social Data Analytics
masters program, and PhD students in Sociology who have little or no prior experience in R. The course
will be structured around the use of R for common data management tasks, a broad range of descriptive
and multivariate statistical analyses, and data visualization. The emphasis in the course will be on
practical applications using hands-on exercises.

Required skills: Students should have prior experience in the use of a statistical software package, with a
high priority given to students who have some knowledge of R or a strong interest in learning R.

Preferred skills: Past coursework in introductory statistics or econometrics, and prior experience in the
use of R is preferred but not absolutely necessary.

Is this project for more than one student: No

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**John Logan**
Project Title: Mapping segregation and neighborhood inequality (SOCIO-2)

Project Description:
This is a set of related projects using historical data and GIS maps for 1880-1980 to study issues of segregation and inequality across neighborhoods in U.S. Cities. The UTRA student will join a team of undergraduate RAs who have been working on various aspects of this research for several years, especially to develop the historical street and census block maps that allow us to define the neighborhoods where people lived. One project will look across the whole century to document the trajectory of segregation of Blacks and Hispanics from whites across neighborhoods, between cities and suburbs, and within suburbia. Another focuses on redlining and discrimination in mortgage availability in the 1930s and beyond, documenting which neighborhoods were underserved and how that affected their development. Another analyzes deaths from the Spanish flu in 1917-1918 in Philadelphia and New York, identifying which people and which neighborhoods were most vulnerable to that pandemic.

Required skills: We will train students who can work carefully, regardless of prior skills.

Preferred skills: Students from different backgrounds have worked successfully on this project. Some background or interest in urban issues, urban history, racial segregation and neighborhood inequality would be of value. Some GIS or computing background would be a plus.

Is this project for more than one student: Yes

Nicole Gonzalez Van Cleve
Department: Sociology
Project Type: Research
Project Title: Race and Wrongful Conviction in the United States (SOCIO-1)

Project Description:
Wrongful conviction is defined by racial disparity. However, we know little about how racial stigma creates egregious miscarriages of justice. This study offers a novel intervention in the field of wrongful convictions by examining how racial stigma embeds in the seemingly race-blind, fact-finding stage of criminal investigations. Specifically, I focus on false confessions because they are the most common type of evidence used in serious cases like murder but also because they are important indicators of how police and prosecutors craft criminal cases with “contaminating narratives” used to incite racial animus with juries.
I rely on data from the National Registry of Exonerations and from the Center for Science and Justice at Duke University. I code false confessions in 98 exoneration cases from Chicago, IL, and look at “narrative contamination” or extra-legal narratives that leverage racial tropes and transform an innocent person into a criminal “monster” through their confession.

Students will code/analyze false confessions authored by police. They will also work with university librarians to pull media coverage of these high-profile wrongful conviction case. In all instances, students will examine how racial tropes are used in confessions and amplified in the media. They will also research key court decisions related to legal protections afford to juvenile suspects in criminal cases.
Required skills: Strong writing and editing skills. Research methods class in the sociology or related field. Coursework in the area of race/racism and ethnicity or Black Studies. Familiarity with navigating university libraries and archives.

Preferred skills: Ability to fact-check citations. Meticulous attention to detail. At-ease with co-writing via google doc.

Is this project for more than one student: Yes

Mary C. Wright
Department: Sociology & Sheridan Center
Project Type: Research
Project Title: How do we support university teaching and learning? (SOSC-1)

Project Description:
This project is mentored by Dr. Mary Wright, who directs the Sheridan Center for Teaching and Learning and has a faculty appointment in sociology. The research project focuses on a large nationwide survey of people who work in centers like the Sheridan Center. The survey will eventually be a book project that will focus on key national trends in higher education, teaching and learning innovation, and improvement. Students will participate in meetings with a cross-institutional team and help with preliminary analysis of survey data, e.g., visualizations and coding of open-ended responses. Students will learn collaborative research skills, qualitative and quantitative methodologies, and be introduced to a national network of higher education researchers. For students who wish to continue the work through multiple terms (e.g., continuing through Spring 2025), there will likely be opportunities for publication.

Required skills: Facility with Qualtrics and Excel will be very helpful. Participants should have a basic knowledge of descriptive statistics (e.g., frequencies and means).

Preferred skills: Interest in teaching, learning, and professional development

Is this project for more than one student: No

Mary C. Wright
Department: Sociology & Sheridan Center
Project Type: Research
Project Title: Faculty Development in an Age of Change (SOSC-2)

Project Description:
This project is mentored by Dr. Mary Wright, who directs the Sheridan Center for Teaching and Learning and has a faculty appointment in sociology. The research project focuses on a large nationwide survey of people who work in centers like the Sheridan Center. The survey will eventually be a book project that will
focus on key national trends in teaching and learning innovation and improvement. Students will participate in meetings with a cross-institutional team and help with preliminary analysis of survey data, e.g., visualizations and coding of open-ended responses. Students will learn collaborative research skills, qualitative and quantitative methodologies, and be introduced to a national network of higher education researchers. For students who wish to continue the work through multiple terms (e.g., continuing through Fall 2024 and/or Spring 2025), there will likely be opportunities for publication.

Required skills: Facility with Qualtrics and Excel will be very helpful. Participants should have a basic knowledge of descriptive statistics (e.g., frequencies and means).

Preferred skills: Interest in teaching, learning, and professional development

Is this project for more than one student: No

Thomas Sgouros
Department: Swearer Center
Project Type: Research
Project Title: Rhode Island education funding policy research (SWECE-1)

Project Description:
Project is researching state and municipal tax policy about education funding in Rhode Island. Education funding here continues to be linked tightly to property tax revenue, creating tremendous levels of inequality among RI school districts. On behalf of the Providence City council research staff, we are looking for assistance updating the state’s 2007 education funding adequacy study, and also for research into the history of education funding in the state. The project will involve basic statistical analysis of community wealth vs. education funding, as well as public finance questions related to tax incidence and capacity.

Required skills: Decent writing essential. No fear of statistics or economics, though no coursework required. Enthusiasm also required.

Preferred skills: Some familiarity with statistics, or data analysis with something besides Excel would be good. Data analysis with Excel isn't bad to have.

Is this project for more than one student: Yes

Hilary Silver
Department: Urban Studies
Project Type: Research
Project Title: Spatial and Social Variation in Homelessness (URBST-2)

Project Description:
Homelessness afflicts many different kinds of people in a variety of ways, and it is greater in some places than in others. This research aims to understand why some areas have more homelessness – unsheltered, youth, family, chronic, veteran, and so on – than elsewhere. The UTRA will assist in analyzing a dataset compiled from multiple sources, including HUD’s annual Point-in-Time estimates and the US Census. The UTRA will gain an understanding of the complexity of homelessness and why it looks so different for different people in different parts of the US, while acquiring valuable experience with data management and statistical analysis.

Required skills: At least one course in statistics, econometrics, or social research methods.

Preferred skills: Experience with data management, statistical analysis, and literature searches; knowledge about or experience with homelessness

Is this project for more than one student: No

Lauren Yapp
Department: Urban Studies
Project Type: Course Development
Project Title: Our Providence: Documenting and Preserving Urban Heritage (URBST-1)

Project Description:
Urban heritage – from archaeological sites and historic architecture to longstanding cultural practices – is increasingly under threat in cities today. Most critically, the complex histories and lived experiences of the diverse communities who have shaped cities are often in danger of being erased and forgotten. URBN 1871A: Heritage in the Metropolis is a seminar that examines how we might remember and preserve this urban past – and the sites and stories that attest to it – in light of the social and political dynamics of cities in the present. A key component of this seminar is the “Our Providence” project, where students conduct original research on an aspect of Providence’s own history and then develop a compelling and creative way to tell this story to a broader audience. This upcoming Fall, the students will work together on a group “Our Providence” project throughout the semester, which will focus on a specific event that has had a profound impact on the city’s communities, to be determined in collaboration with our community partners. Working together with the Providence Preservation Society, the class will conduct oral histories, archival research, and mapping exercises to document this history, and then present this research to the public, possibly in the form of an exhibition, website, or another creative format, to be decided.

For this UTRA, Professor Yapp is seeking an enthusiastic, organized, and dedicated student to provide logistical and research support for the “Our Providence” project throughout the Fall semester. The duties of this student may include: liaising with the Providence Preservation Society and other relevant community organizations over email and phone, scheduling meetings and organizing site visits, conducting supplementary library research, collectively organizing the original research conducted by individual students, keeping track of the overall project’s progress, and assisting with any other logistical or research tasks needed by Professor Yapp throughout the course. The UTRA recipient should expect to dedicate an average of 3-4 hours to this position per week; however, there will be less hours than this at the start of the semester and more towards the end, as the “Our Providence” project develops. Some of this work can be done remotely, but the student should be available to meet with the class and Professor Yapp in person each week as well, at a time to be determined. While the student will not be required to
attend the regular class meeting (Wednesday 3-5:30), it would be an advantage to be regularly available for some portion of this time slot, if needed.

Required skills: * Genuine interest in public history, heritage preservation, and memory studies * Experience with community-engaged research, either through prior coursework, internships, students organizations, and/or projects within or outside of Brown * Able to communicate and collaborate with faculty, students, and community members in a professional, conscientious, and organized manner

Preferred skills: * Knowledge of Providence’s history and/or familiarity with urban studies * Some experience working or volunteering with Providence-based organizations or public institutions (such as libraries and archives, community groups, arts and music organizations, schools and other educational programs, etc.) * Has a class schedule that allows for the student to be regularly available for some portion of the Wednesday 3-5:30 time slot, if needed

Is this project for more than one student: No

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**David Polatty**  
Department: Watson Institute of International and Public Affairs  
Project Type: Research  
**Project Title:** Humanitarian Research Analyst (WIIPA-8)

*Project Description:* Students will conduct research with Professor Polatty that focuses on at least one of the following areas in current active conflicts (wars) : 1) protection of civilians (PoC) and civilian harm mitigation challenges; 2) humanitarian aid worker security challenges; 3) humanitarian access constraints. Students may also engage in research on two other key areas not necessarily related to conflict: 4) localization of humanitarian aid; or 5) climate adaptation and its intersection with humanitarian response. These research efforts will be completed in coordination with several United Nations agencies as well as other humanitarian NGOs that Professor Polatty is working with, and offers an exceptional opportunity for students to engage with experts across the humanitarian sector.

Required skills: At least one course that has explored humanitarian or human rights issues globally.

Preferred skills: Preference will be given to students who have completed more than one course exploring humanitarian or human rights issues, as well as students who have previously conducted research in these areas.

Is this project for more than one student: Yes

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**Geri Augusto**  
Department: Watson Institute of International and Public Affairs
Project Type: Course Development
Project Title: Juxtaposing Manifest Destiny and Development Policies in Brazil and USA Using Visual Thinking (WIIPA-7)

Project Description:
This project is to update for Spring 2025 my junior seminar "Development's Visual Imaginaries: Still and Moving Images That Shaped the Field." We use primarily paintings, broadsides, sketches, engravings, maps, etc. and a few early films, to explore the visual imaginaries created and circulated between 17th and early 20th centuries, especially in the Americas but also in Europe, which came to underpin prominent mid- to late-19th century and early 20th-century development theories in the USA, with impact on legislation and public policies. The course argues that development policies domestically and abroad have often drawn from the same set of ideas and imaginaries about categories of humans, land, nature, work, gender, race, capacity for self-definition and political self-representation, and sovereignty across various dimensions of political, economic and symbolic life. The student researcher will help me introduce a new module which compares similar types of visual imaginaries which helped to foment public policies in Brazil, given the commonalities of initial colonization and westward continental "spread," in which Native dispossession and Native and African slavery were foundational. The new module will explore both convergences and divergences in the largest two American polities, and ideally will include 3 remote, cross-border exchange sessions with invited Brazilian counterparts. To better the module's design, both the student researcher and myself will consult virtually, as needed, with Brazilian professors who are colleagues with whom I have worked closely on other projects involving culture, history and social policies in that country.

Required skills: Past coursework (or work experience) in development studies, public policy and/or international affairs--in any combination. Interest in how public policies may impact the citizens of diverse, pluralistic countries grappling with inequality and striving for greater democratization. Familiarity and dexterity with Brown teaching tools, including Canvas and Google Classrooms. Capacity for visual thinking. Capacity to work independently and give critical observations on professor's ideas. Some experience researching in Brown's libraries (John Hay, JCB, etc.), or at least a strong desire to do so.

Preferred skills: Ability to read Portuguese or Spanish preferred, though not required for the diligent and self-motivated. Experience in creating digital art exhibits and other visual creative research products would be useful. Transcultural competence needed to deal equitably with international partners and counterparts preferred, but may also be an outcome of working on this project!

Is this project for more than one student: No

Nick Ziegler
Department: Watson Institute of International and Public Affairs
Project Type: Research
Project Title: Policy and Moral Contestation in Derivatives Regulation (WIIPA-5)

Project Description:
Derivatives have emerged as a powerful, but contested set of financial instruments. This research project examines how federal regulators formulate the rules for trading derivatives, both for agricultural commodities and financial swaps. One Sprint-Ultra research assistant will examine debates about how
the key federal agency, the CFTC (Commodity Futures Trading Commission) finalizes regulations in this area. The work requires searching press sources, Congressional hearings as well as speeches and press releases by the CFTC Commissioners. The output forms part of the empirical foundation for a series of published papers that I am writing on finance and inequality in the United States.

Required skills: Background in American politics and the equivalent of at least one or more course(s) on public policy, the Congress, the legislative process, courts, or the Presidency

Preferred skills: Experience organizing research notes and substantial amounts of qualitative or historical or other qualitative material generated from different sources.

Is this project for more than one student: No

Nick Ziegler
Department: Watson Institute of International and Public Affairs
Project Type: Research
Project Title: Financial Regulation, Politics, and the Moral Economy of Derivatives (WIIPA-6)

Project Description:
Derivatives have emerged as a powerful, but controversial group of financial instruments. This research project investigates how industry interest groups (banks and other financial institutions) contend with non-profit advocacy groups trying to shape how government agencies regulate derivatives markets. One Sprint-Utra research assistant will classify and analyze the public comments submitted by the banking interest groups and advocacy organizations to two federal regulatory agencies: the CFTC (Commodity Futures Trading Commission) and the SEC (Securities and Exchange Commission). The work involves learning about the regulatory process, collecting data from government websites and analyzing how interest groups shape financial-market regulations in the United States. The work forms part of the empirical foundation for a series of published papers that I am writing on finance and inequality in the United States.

Required skills: Some experience in constructing a database from public web sources and facility with Excel, Python, and R.

Preferred skills: A basic interest and some background in the political system of the United States, roughly equivalent to a course on Congress, the legislative process, courts, or the Presidency.

Is this project for more than one student: No

Tyler Jost
Department: Watson Institute of International and Public Affairs
Project Type: Research
Project Title: Domestic Origins of International Rivalry (WIIPA-4)
**Project Description:**
How do international rivalries form? How did the Cold War between the United States and the Soviet Union begin? How did the competition between the United States and the People’s Republic of China come about? This project seeks to answer these questions by analyzing a new set of archival documents collected from the United States, Russia, and China. Researchers will assist in organizing, processing, and analyzing these documents. In so doing, researchers will learn about the history of US-Soviet and US-China relations – and receive training in contemporary text-based research methods in the social sciences. All work can be done remotely.

Required skills: N/A

Preferred skills: Language abilities in Russian, French, or Japanese

Is this project for more than one student: Yes

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**Yan Xu**  
Department: Watson Institute of International and Public Affairs  
Project Type: Research  
**Project Title:** US-China “Tech War” and Reorganization of the Semiconductor Industry (WIIPA-3)  

**Project Description:**
How do geopolitics and high-tech industries relate to each other? The “tech war” between the US and China has become a flashpoint in the most important bilateral relations in the world. How did this conflict break out and escalate? While research has mostly attributed the conflict to a changing power structure, it was in fact not widely anticipated that tech would become a focal point in US-China tensions. In addition, how has the rise of geopolitics affected the contours of the global supply chains? Is there evidence for “deglobalization” or the bifurcation of supply chains? This project seeks to answer these questions by focusing on the semiconductor industry, a major battlefield in the “tech war.” Researchers will collect and examine statements made by US political and industrial leaders regarding China’s efforts in semiconductors. They will also examine the changing configurations of the global semiconductor industry by collecting and analyzing data from the public filings of major semiconductor companies.

Required skills: Coursework in political economy

Preferred skills: Knowledge of the semiconductor industry

Is this project for more than one student: Yes

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**John Eason**  
Department: Watson Institute of International and Public Affairs / Sociology  
Project Type: Research
**Project Title:** Punishment Beyond Mass Incarceration: Immigrant Detention, Jails, and Prison (WIIPA-2)

**Project Description:**
We have three central projects to reframe the national narrative surrounding prison abolition to focus on policy solutions targeting health/wealth initiatives in rural communities of color. These criminal legal system policy reforms will be focused on how to best repurpose prisons, jails, and immigrant detention centers once these facilities are shuttered. We are looking for two-three research assistants: one to help with quantitative data analysis and one to assist with qualitative data analysis for our studies.

Students will contribute to data analyses and strengthen skills such as coding, cleaning of data, interviewing, and memo writing. They will also have space to discuss their interpretations of the findings with the PI and will have a chance to guide the study towards new research questions.

For the Prison Bust Project, one central question of our investigation asks: how do prison closures directly and indirectly impact local prison town communities? How can impacted stakeholders and communities be involved in the creation of viable, safe, and ethical policies (and practices) for closing prisons in ways that mitigate potential or unintended harms?

Another project we have is Health, Violence, in Immigrant Detention which seeks to understand how race and punishment intersect to produce health disparities in immigrant detention centers.

Lastly, we have an emerging project called the Jail Justice Initiative where we are mapping the growth of the jail population and location of facilities over the last 50 years.

**Required skills:** Interest and passion around the criminal legal system.

**Preferred skills:**
- Experience working with quantitative data analysis tools such as STATA or commitment to learning
- Experience working with spatial analysis tools such as ArcGIS or commitment to learning
- Interest in the US prison system, inequality, and sociological research

**Qualitative research assistants preferred skills:**
- Experience working with qualitative data analysis tools such as MAXQDA or commitment to learning
- Experience or interest in conducting qualitative research interviews
- Interest in the US prison system, inequality, and sociological research

Is this project for more than one student: Yes

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**Project Title:** Fetal Personhood & the Criminalization of Pregnancy (WIIPA-1)

**Project Description:**
The 2022 Supreme Court ruling in Dobbs v. Jackson Women’s Health did not simply end federal
protections for abortion, it also opened the door to an expanded vision of fetal personhood that pro-life advocates have promoted for decades. Fetal personhood is the idea that a fetus has the same legal and constitutional status - the same rights and entitlements - as a person. When fetuses gain personhood, they acquire a legal "self-interest" that is distinct from, and potentially in conflict with, pregnant people. Additionally, they also acquire the ability to be "harmed" by the actions of those who carry them. How do fetal personhood statutes impact when, under what circumstances, and with what level of frequency pregnant people are criminalized?

This UTRA project will pair an undergraduate student with a team of researchers working at the Watson Institute, including the PI Poulami Roychowdhury, Alexandria Nylen (Research Associate, Center for Human Rights and Humanitarian Studies) and a graduate student. The team will work together to create and analyze a pregnancy criminalization database, matching instances of pregnancy criminalization with fetal personhood laws. By collecting this information, we hope to better understand:

- Trends in the gross number of arrests since the Dobbs decision and proportion of arrests by state
- Factors that may explain geographical clustering – including existence of fetal personhood statutes, and the incidence of neonatal abstinence syndrome (NAS)
- Demographic characteristics (gender, race, income, citizenship status) of those who are arrested and charged
- Specific laws used by prosecutors
- Nature of judicial orders (where they exist) and level of punitiveness

Required skills: N/A

Preferred skills: Preference for students with exposure to law, gender studies, politics and who have experience with excel.

Is this project for more than one student: No