Application Accepted!

The following application was submitted to the undergraduate research administrator via the Engineering.Cornell.edu web site.

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To contact our office email us at oie-research@cornell.edu

Application ID: 5025

Name: Claire Yuewei Wang
Year/Term: Fall 2025
E-Mail Address: cyw34
Phone: 5714746180
Citizenship: USA
Permanent Right To Work: --Please select--
Student has Federal Work Study: No
Highest Level of Parental Education: Graduate/Professional Degree
Expected Graduation Date: May 2027
Major Field of Study: Environmental Engineering
Overall GPA: 4.16
Major GPA:

Reporting Agreement Accepted - Student ID Number: 5486949

Faculty Application Info:
Faculty Application ID: 3943
Faculty Name: Cowen, Edwin A
Overall Project Title: An experimental scale-model study of a flow control structure that impounded an estuary in the Cape Cod National Seashore

Reference:
Professor Todd Cowen 119 Hollister Hall 607-379-9224

Research Proposal Essay:
The Herring River Estuary at Cape Cod National Seashore historically contained extensive salt marshes. After the Chequessat Neck Road dike was constructed in 1909 for flood control, tidal flow into and out of the estuary was severely restricted – there was only one small culvert that allowed tidal saltwater to travel upstream of the dike. The ecology of the estuary suffered as invasive freshwater grasses overtook the salt marshes and water quality declined. The National Park Service is leading a $50 million restoration project installing a larger and adjustable tide control structure. Our project supports this work by developing an understanding of the tidal flow conditions through the existing culvert, providing critical data for the safe and controlled reintroduction of tides to the estuary. The graduate student working on this project has performed field measurements of the water velocity as it enters the culverts. He found that these measurements did not agree with previously developed computational models of the culverts. To help explain the discrepancies between the measurements and computational models, I will construct scale models of the culvert in the lab and perform controlled experiments to observe the flow dynamics inside the culvert. I will be learning about and using a flume in the laboratory to simulate tidal flow through the model, sensors to measure water height, and instruments to measure water velocity. Throughout the project, I will work closely with and receive guidance from my faculty mentor and the aforementioned graduate student. The data our project will provide

will significantly improve the chances of a successful estuary restoration, which will increase the resilience of the coastline and ecosystem to sea level rise. Additionally, salt marshes act as carbon sinks, and restoring the Herring River Estuary to its original salt marshes could sequester hundreds of thousands of tons of carbon dioxide. The coastal restoration model we are contributing to, if scaled, can become a global strategy for reducing atmospheric greenhouse gases and contribute to the mitigation of climate change.

Has Federal Workstudy: No

Support Essay:
I intend to spend 8 hours per week on this project for 14 weeks, a significant time commitment essential for me to get the most out of this experience, but I do not have enough academic credits available in my schedule to allocate this time. Financial assistance for my wages will allow me to fully focus on this project, which provides direct experience for my academic and professional goals, instead of seeking other employment. Although I am not eligible for Federal Work Study, I still look towards these employment opportunities to support my cost of living on campus and to save funds for my graduate studies, which I hope to pursue immediately after finishing my undergraduate degree.

Personal Information Essay:
During my sophomore year, I joined a research project in the DeFrees Hydraulics Laboratory, one of my first research experiences. I worked closely with and sought mentorship from the graduate student that led the project, gaining experience in the research process and experimental design, literature review and writing, and data analysis and organization. The sensors and data acquisition techniques I helped set up and operate for the previous project I will also use for this research experience, and the familiarity I have will serve as a springboard for the new project. Although some of the lab work I'll be doing for this project will be familiar, I am excited to expand my skillsets with many new research techniques in environmental fluid mechanics – for example, using an open-channel flow flume to model environmental systems, and measuring water velocities using quantitative measurement techniques. The context of this project is also new to me, and I hope to deepen my understanding of coastal resilience and restoration, which I have been eager to explore throughout my undergraduate career. I will be working closely with Professor Todd Cowen and his graduate student Evan Heberlein, and hope that their mentorship and feedback will help me continue to grow as an engineer and researcher. I look forward to presenting my work during the Environmental Fluid Mechanics and Hydrology seminar and pursuing publication, both experiences that will challenge me and strengthen my science communication skills. In my future career, I hope to apply my engineering expertise to water-related climate resilience projects, especially those grounded in ecological solutions. This project is the perfect opportunity to dive into these interests and discover future opportunities and connections within the field, all while making impactful contributions to a critical restoration project.

-- end of application received --