**Project WiCCED Undergraduate Internships**

Dates of internship: Fall 2023 – May 2024

Location: 102A Pearson Hall, Newark, DE 19716

Number of positions available: 1

Faculty Mentor: Drs. Kevin Brinson and Richard Martin

Professional Staff Mentor: David Huntley

**Overview:** Project WiCCED is a multi-institutional project in partnership with National Science Foundation and the State of Delaware aimed at assessing major threats to Delaware’s water quality, and developing viable technological and policy solutions for meeting the challenges imposed by them. Research will involve a combination of laboratory, outdoor field work and/or computational environments. We seek a diverse group of undergraduate students to join our team in a welcoming, collaborative environment.

**Project Title: Development of a Low-cost Flood Sensor for Transportation in Delaware**

**Research Description:**

Throughout Delaware, numerous roadways and transportation structures are adversely affected by significant flooding. This has led to extensive damage to critical infrastructure, altered transportation routes, and restricted access for emergency responders. In addition, the Delaware State Hazard Mitigation Plan, lists flooding, both coastal and stream, as the number one risk hazard, natural or man-made, with other weather-related hazards rounding out the top three. Typical flood operational flood monitoring stations cost upwards of $10,000 to $15,000 to install and thousands of dollar per year to operate. On a small scale, this level of expense is affordable for most transportation departments, but on a larger scale it is cost prohibitive. Previous studies have identified 120-150 flood concern locations in Delaware. Thus, in order to monitor road flooding at most, if not all of these locations, alternative, low-cost flood sensing solutions are needed.

**Research Questions:**

1. What is the optimum housing material and design for a low-cost flood sensor used in brackish water in Delaware?
2. Can an affordable sensor housing be design that optimizes the assembly process while also minimizing cost?

**Student Learning Objectives: Professional and Research Skills**

This internship focuses on the development of the following professional and scientific skills.

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| Broad Professional Skills | Specific Skills |
| Planning and time management | Ability to set and complete specific goals of varying scope |
| Work independently | Independent work ethic - work independently to problem-solve |
| Collaborative skills | Learning to complete tasks efficiently and effectively with others |
| Express ideas in writing and verbally | Create engineering diagrams and drawings using CAD and other software. Honing ability to deliver scientific results/impacts to people of multidisciplinary backgrounds. |
| Broad Scientific Research Skills | **Specific Skills** |
| Material Research | Review sensor components and materials optimal for deployment in harsh environmental conditions |
| Use scientific tools | Use engineering design software and 3D printing technology to design and build sensor components. |
| Apply research tools and techniques in research experiments | Deploy and test sensor designs into real-world enviornments to study their usability, durability, and assess their performance. |
| Understand, apply, and explain scientific concepts and theories | Freedom to form questions and plan methods for addressing challenges. Learning to communicate results through oral presentations and posters. |

**Prerequisites:**

Prior experience using CAD and other related software to design and build engineered solutions. Previous experience prototyping with 3-D printers is a plus.

**Work Environment and Expectations:**

Laboratory environment: Primarily working in CEMA’s Delaware Environmental Observing System (DEOS) shop to develop the design.

Field work environment: Occassional field visits to deploy sensor designs for testing and evaluation with project staff members.

Computational environment:

The internship is part time during the academic year. The exact hours and expectations are established between the student researcher and mentor.

**Stipend:**

$5,000 - Direct deposit is required.

**Funding Source:**

National Science Foundation EPSCoR Project WiCCED

**Application deadline:**

September 15, 2023

**How to apply:** [https://ugresearch.udel.edu/PUB\_Program.aspx](about:blank)