**Coastal Critical Zone Summer Undergraduate Internship**

Dates of internship: June 3 – August 9, 2024

Location: Seyfferth Lab, University of Delaware, Newark, DE 19716

Number of positions available: 1

Faculty Mentor: Angelia Seyfferth, angelias@udel.edu

Graduate Student Mentor: Ashleigh Montgomery, amontg@udel.edu

**Overview:** The Coastal Critical Zone Network is an interdisciplinary team project researching the effects of changing climate and sea level rise on the Delmarva Peninsula, which includes Delaware and parts of Maryland and Virginia. The project is funded by the National Science Foundation, a prestigious, taxpayer-supported federal science agency. The Critical Zone team is inviting applications for paid undergraduate research internships for summer 2024; interns will be part of sub-teams in hydrology, biogeochemistry or ecosystem research. 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: Coastal Critical Zone: Effect of Sea-level rise on Soil Biogeochemistry**

**Project Sub-team:** Biogeochemistry

**Research Description:**

Coastal ecosystems are vulnerable to the effects of sea level rise (SLR), with increased flooding resulting in increased soil salinity and water saturation. Both changes in soil salinity and saturation level can lead to plant stress and the die-off of coastal forests, as well as significant changes in soil biogeochemistry. While salt marshes are typically considered a carbon sink, the ability of salt marshes to sequester carbon is uncertain with sea level rise. One pool of carbon whose stability is uncertain is mineral associated carbon, which may be released when soil minerals are reductively dissolved. Thus, it is critical to understand changes in soil chemistry as a result of sea level rise and how they may alter carbon storage in coastal soils. As part of this project, the student will investigate changes in soil chemistry to determine how they may alter carbon storage in coastal ecosystems. The particular soil chemical properties measured will be tailored to the interests of the students, but will likely involve the field collection of soil and/or porewater samples for analysis. The student will be trained in various laboratory analysis, field work, sample collection techniques, and data processing.

**Research Questions:**

1. How does sea-level rise alter soil biogeochemistry and carbon stability?
2. What soil chemistry parameters impact carbon stability in coastal ecosystems?

**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 | Communicate with diverse audiences - Development of impactful poster and oral presentations. Honing ability to deliver scientific results/impacts to people of multidisciplinary backgrounds. |
| Broad Scientific Research Skills | **Specific Skills** |
| Understand relationships between environmental responses | Make connections between soil biogeochemical processes with larger scale ecosystem implications. |
| Recognize simple patterns in research data | Connect trends in data to understand biogeochemical processes. |
| Build skills in field research | Learn how to design a successful field sampling campaign. |
| Understand, apply, and explain scientific concepts and theories | Express questions and plan methods for answering them. Learning to communicate results through oral presentations and posters. |

**Prerequisites:**

A background in soil or environmental science, chemistry, or related fields is preferred. Fieldwork outdoors during summer will be required, and therefore, prior outdoors experience (scientific or professional) is preferred.

**Work Environment and Expectations:**

Laboratory environment: Worrilow Hall, University of Delaware, Newark, DE

Field work environment: Delmarva Peninsula salt marsh sites, 1-3 hour drive from University of Delaware (transportation provided). Light-colored, long sleeve field shirts are recommended. Waders will be provided.

Computational environment:

The internship is full-time, with exact hours and expectations determined between student and mentor. Students will also participate in a June 2024 Critical Zone group orientation in person, weekly Zoom team meetings, and end of internship poster session.

**Stipend:**

$6,000 - Direct deposit is required. In addition, for undergraduate researchers who do not live locally, up to $2,000 per research intern may be available in housing assistance.

**Funding Source:**

National Science Foundation Coastal Critical Zone Network

**Application deadline:**

Friday, March 15, 2024

**How to apply:** <https://forms.gle/a8M3VWXntmNWxLCU9>