**DENIN Environmental Scholars Internships**

Dates of internship: November 1, 2021 – May 13, 2022

Location: Harker ISE Lab, University of Delaware, Newark, DE 19711

Number of positions available: 1-2

Faculty Mentor: Donald L. Sparks

Professional Staff Mentor: Chunhao Gu

**Project Title:** The impacts of increasing seawater level rise on phosphorus biogeochemistry in coastal soils

**Research Description:**

Coastal soils are being salinized at an increasing rate due to climate-driven sea level rise. The increasing salinization may impact phosphorus (P) dynamics in coastal soils and further affect water quality. The impacts of varying degrees of salinization on P dynamics have been evaluated mostly using microcosm and other macroscopic batch experiments. However, P speciation, that largely determines the bioavailability, transformation, and environmental risk in coastal soils, remains poorly understood, limiting our understandings of how increasing sea level rise may affect soil P biogeochemistry. Thus, we aim to evaluate the impacts of sea level rise on soil P transformation using a set of techniques including wet chemistry technique, enzymatic assays and X-ray absorption spectroscopy. Students working on this project would be a component of a multi-institutional project and specific project goals will be formed to cater to students’ interests.

**Research Questions:**How does increasing seawater level rise influences P speciation and transformation in coastal soils?

1. What’s the P speciation in soils impacted by varying seawater level rise?
2. How do soil minerology and enzyme activities impact P speciation and transformation in these soils?

**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 interdisciplinary background. |
| Broad Scientific Research Skills | **Specific Skills** |
| Understand scientific terms  | Mechanistic and applied concepts regarding soil P cycling |
| Literature analysis | Ability to effectively find and utilize scientific manuscripts related to soil biogeochemistry |
| Use scientific tools | X-ray absorption spectroscopy, enzymatic assays, wet chemistry techniques |
| Recognize simple patterns in research data | Applying soil chemistry concepts to qualitatively and quantitatively understand data. |
| Apply research tools and techniques in research experiments  | Selective extractions, microcosm experiments, enzymatic assays etc. to investigate How soil P responses to increasing salinization. |
| Analyze research data  | Excel, Origin, and instrument-specific software utilization to form effective figures and tables. |
| Understand, apply, and explain scientific concepts and theories | Freedom to form questions and plan methods for addressing challenges. Learning to effectively communicate results through oral presentations and manuscript writing. |

**Prerequisites:**

Introductory knowledge and experience with chemistry.

**Work Environment and Expectations:**

Laboratory environment: Harker ISE Lab 4th floor. Hours are flexibly determined between student and mentor. Students will work part time during the fall and spring semesters, and full time during UD Winter Session, January 7-February 8, 2022. Students will also participate in a retreat, communications workshop and end of internship spring symposium.

**Stipend:**

$3,500 Direct deposit is required.

**Funding Source:**

National Science Foundation, Delaware EPSCoR

**How to apply:** <https://ugresearch.udel.edu/PUB_Program.aspx>