**DENIN Environmental Scholars Internships**

Dates of internship: Academic Year 2022-23

Location: Delaware Environmental Monitoring and Analysis Center, University of Delaware, Newark, DE 19713

Number of positions available: 1

Faculty Mentor: Thomas Hanson

Graduate Student Mentor: Alexa Bennett

Professional Staff Mentor: Tina Callahan, Matt Shatley

**Project Title:** Visualizing and Analyzing Microbiome Data in Regional Context and Scale

**Research Description:**

Next generation sequencing technologies produce large scale data sets containing millions of DNA sequencing reads that come from samples collected at different sites and the same site at different times. These data are processed to understand what microbes and genes were present in the sample at the time it was taken. Translating these data into meaningful visualizations and analyzing them in the context of existing environmental and climate data is a significant challenge. This project seeks to produce tools to visualize microbial community structure data, collect relevant environmental/climate data, and analyze these data sets in concert with one another.

**Research Questions:**Given a set of site locations, what environmental/climate data can be automatically collected?

How can collected data be utilized to provide context for microbiome data?

How can microbiome data and correlations between environment, climate, and microbiome be meaningfully communicated to users?

**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  | Correctly use terms and concepts from the fields of GIS and computer programming |
| Literature analysis | Ability to effectively find and utilize scientific manuscripts related to GIS and visualization of GIS data |
| Use scientific tools | Database access and data download, programming for data transformation, programming for visualization |
| Recognize simple patterns in research data | Identify qualitative and quantitative trends in data |
| Analyze research data  | R, python, and ArcGIS to form effective figures, tables, and web sites. |
| 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:**

Ideally, introductory course based familiarity with GIS or programming (e.g. R or python). Strong interest in GIS and environmental science.

**Work Environment and Expectations:**

Laboratory environment: Primarily Project WiCCED Data Core with significant interaction the Microbiome Core.

**Stipend:**

$4500

**Funding Source:**

National Science Foundation, Delaware EPSCoR Track I

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