**DENIN Environmental Scholars Internships**

Dates of internship: June 1, 2020 to August 7, 2020

Location: Wesley College, Dover, DE 19901

Number of positions available: 1

Faculty Mentor: Dr. Kevin E. Shuman

**Project Title:** Identification of Potential Metabolic Pathways in Environmental Isolates

**Research Description:**

This project will train Summer Scholars in basic bioinformatics techniques to help identify potential metabolic pathways in bacteria that have been isolated from the St. Jones river and characterized using the Biolog Microbial Identification System. Bioinformatics techniques will include BLAST, multiple-sequence alignments, and phylogenetics. Scholars will also learn how to design primers for specific genes for later PCR analysis.

**Research Objectives:**

1. Analyze sequenced genomes of bacterial species isolated for potential metabolic pathways as suggested by the Biolog data.
2. Determine how conserved these metabolic pathways are in the genomes of closely related species.
3. Design PCR primers that can be used to validate the presence of the identified metabolic pathways in the bacterial isolate.

**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 |
| Express ideas in writing | Write descriptions of research procedures, create a poster of your research, communicate via email professionally and in a timely and consistent fashion |
| Express ideas verbally | Discuss research activity in lab meetings, present poster at symposium |
| Work independently | Independent work ethic – work independently or with peers to problem solve  |
| Develop professional network | Work with lab team to develop professional network and utilize peer-groups to problem solve. |
| Maintain professional attitude and work principles (i.e. integrity, responsibility, diligence, following ethical standards) | Be on time, learn procedures, ask questions if unsure, and respect everyone you work with. |

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| Broad Scientific Research Skills | Specific Skills |
| Understand scientific terms  | BLAST, Multiple-sequence alignments, PCR |
| Locate scientific articles and resources | Conduct searches for literature on environmental valuation |
| Understand research questions | Develop questions based on preliminary data. |
| Read and understand research articles | Research metabolic pathways |
| Apply research tools and techniques in research experiments  | Use bioinformatics techniques to analyze metabolic pathways  |
| Understand, apply, and explain scientific concepts and theories | In lab meetings, with lab personnel, and during research symposium |

**Prerequisites:**

Basic understanding of microbiology and genetics.

**Work Environment and Expectations:**

Scholars will complete their research virtually from home. Scholars are expected to meet with Dr. Shuman weekly to review progress and next steps.

**Stipend:** $5,000 Direct deposit is required.

**Funding Source:** National Science Foundation EPSCoR RII-IV Grant No. 1757353 and the State of Delaware.

**How to apply:** https://ugresearch.udel.edu/PUB\_Program.aspx