DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING
COLLEGE OF ENGINEERING AND APPLIED SCIENCES

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: February 8, 2026

PROJECT TITLE: Analysis and fate of PFAS at the water-solid interface

Physical Requirement :
Need to move subjects of up to 20 pounds

Project's Technical Skills Requirement :
Courses in water treatment and environmental analysis

Project's Available Positions : Undergraduate RA/co-op

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Project Description

Poly- and perfluoroalkyl substances (PFAS), often referred to as “forever chemicals”, are among the most pressing emerging contaminants impacting drinking water quality and ecological health today. PFAS are composed of chains of carbon and fluorine atoms, and because the carbon–fluorine bond is exceptionally strong, these compounds resist natural degradation. For many communities, including Greater Cincinnati that rely on the Ohio River for more than 80% of their drinking water, contaminated water is a major exposure pathway. Understanding the occurrence and fate of PFAS in the Ohio River is therefore critical for both utilities and the public.

This project provides undergraduate students with the opportunity to investigate the fate of PFAS in Ohio River water and sediments, with a particular focus on partitioning at the water–solid interfaces. Students may participate in the following activities:

- Sampling of water, sediment, wastewater, and biosolids
- Sample preparation and PFAS analysis using advanced mass spectrometry
- Partitioning experiments at interfaces
- Data analysis, interpretation, and visualization
- Preparation of reports, manuscripts, and/or conference presentations

The work will be conducted in Dr. Niu’s Emerging Contaminants Lab, with supervision provided jointly by a doctoral student and the principal investigator (PI). The project offers students hands-on research experience in environmental chemistry, exposure to advanced analytical instrumentation, and opportunities to contribute to publications or conference presentations.

Ultimately, the findings could inform more effective PFAS management strategies and help reduce community exposure.

Preferred Qualifications
• Completion of the following courses with a grade of B+ or higher:
o ENVE 4020 Water & Wastewater Treatment (required)
o ENVE 4010L Environmental Measurements (required)
o ENVE 5147 Chemical Principles of Environmental Systems (desired)
• Interest and experience in wet chemistry, including solution preparation, characterization, and use of instrumentation
• Proficiency with Microsoft Office; ability to analyze data, interpret results, and prepare written and oral reports

Training Provided
• Hands-on training with advanced water analysis instrumentation
• Methods for enrichment and quantification of trace contaminants in water and sediment at ultra-low concentrations (ng/L and sub-ng/L)
• Knowledge of the fate and exposure pathways of emerging contaminants
• Fundamental principles of water chemistry
• Opportunities for research dissemination through peer-reviewed publications and local/national conferences