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

APPLICATION DEADLINE: April 27, 2025

PROJECT TITLE: Fate and Transport of PFAS and Microplastics in Water

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 challenging emerging contaminants currently threatening drinking water quality. These compounds consist of carbon-fluorine chains, where the carbon-fluorine bond is one of the strongest in chemistry—making PFAS highly resistant to environmental degradation. Drinking water contaminated with PFAS is considered a major exposure pathway for communities. Similarly, microplastics (MPs), primarily resulting from the widespread use of disposable plastics, are an emerging pollutant class with significant implications for ecological health and water systems. Understanding how PFAS and MPs behave in natural and engineered environments is essential for developing effective treatment strategies.

This project offers undergraduate students an opportunity to explore the fate of PFAS and/or MPs in surface waters and throughout water treatment processes. Students will participate in one or more research tasks, such as studying PFAS removal from water, their accumulation in organic and solid phases or in biota, and the environmental transport of MPs. Research will take place in Dr. Niu’s Emerging Contaminants Lab under the joint supervision of a Ph.D. student or postdoctoral researcher and the principal investigator.

Through this project, students will gain hands-on experience in environmental fate and exposure studies, learn key water treatment concepts, investigate contaminant transport mechanisms, and work with advanced analytical tools. The results of this research aim to inform more effective and systematic strategies for managing PFAS and MPs, ultimately helping to reduce community exposure to these pollutants.

Preferred skills include:
• Having taken one or more of the following ENVE courses with at least B+ grades: Water & Wastewater Treatment, Environmental Measurements, Physical Chemical treatment, Chemical Principles in Environmental Systems.
• Interest in chemistry and performance in General Chemistry and/or Organic Chemistry are desired but optional.
• Interested in wet chemistry, e.g., solution preparation, characterization, and instrumentation.
• Familiar with Office and able to analyze experimental data, interpret results, prepare, and present lab reports.
Training provided:
• Fate and transport of emerging contaminants
• Knowledge of exposure of emerging contaminants
• Familiarize with the principles of water treatment and environmental chemistry
• Potential for research publications in peer-reviewed scientific journals and attendance to local and national conferences