

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

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: April 29, 2024

**PROJECT TITLE: Per- and polyfluoroalkyl substances (PFAS) removal by activated charcoal and ion exchange****Physical Requirement : Need to move subjects of up to 20 pounds****Project's Technical Skills Requirement : Courses in water treatment****Project's Available Positions : Undergraduate RA****Xi-Zhi Niu, Ph.D., Assistant Professor of  
Environmental Engineering****Project Description**

Poly- and perfluoroalkyl substances (PFAS) are widely referred to as "forever" chemicals and are conceivably the most challenging emerging contaminants threatening drinking water quality nowadays. PFAS molecules have a chain of linked carbon and fluorine atoms. Because the carbon-fluorine bond is one of the strongest, these chemicals do not degrade easily in the environment. Consuming potable water contaminated with PFAS is a primary exposure pathway for the community. To reduce or eliminate PFAS from entering tap water, the efficacies of different drinking water treatment technologies have been carefully examined by the scientific community.

The current project aims to provide the student with an opportunity to investigate the removal of PFAS by conventional drinking water treatment technologies, in particular activated carbon, ion exchange, and biochar. The student will be involved in one or more of the following tasks: PFAS treatment under environmentally relevant conditions, enrichment of PFAS from ultra-low concentration (ng/L and sub-ng/L) water (e.g., Ohio River water or groundwater from the Great Miami Buried Valley Aquifer), and analysis by advanced mass spectrometry instruments. The undergraduate student will be working in Dr. Niu's Emerging Contaminants Lab and be jointly supervised by a doctoral student and the PI. The project represents an opportunity to learn the fate and exposure of emerging contaminants, to familiarize with the principles of water treatment, to operate drinking water treatment units on the laboratory scale, and to gain experience with advanced analytical instrumentation. The outcomes of the project could guide more efficient and systematic management of PFAS from the sources to tap.

Preferred skills include:

- Having taken one or more of the following water treatment courses with B+ and higher grades: Water & Wastewater Treatment, Environmental Measurements, Physical Chemical treatment, Chemical Principles in Environmental Systems.

- 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:

- Emerging contaminants treatment under environmentally relevant conditions
- Enrichment of trace contaminants from ultra-low concentration (ng/L and sub-ng/L) water
- Knowledge of fate and exposure of emerging contaminants
- Familiarize with the principles of water treatment
- Potential for research publications in peer-reviewed scientific journals and presentations at local and national conferences