OKLAHOMA EPSCoR UPDATE

Promoting Innovative Research
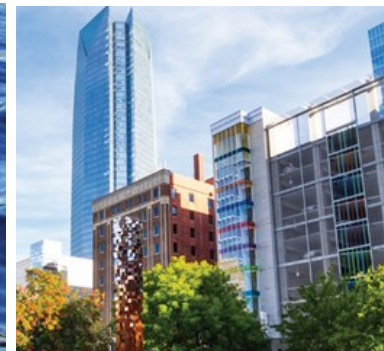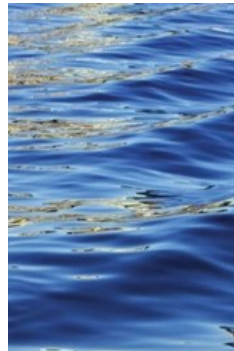
S³OK Project Awards Summer 2023 Intense Lab Experiences and Mentorship for Four Undergrads

The Oklahoma NSF EPSCoR program through the NSF EPSCoR Research Infrastructure Improvement Track-1 project "Socially Sustainable Solutions for Water, Carbon, and Infrastructure Resilience in Oklahoma (S³OK)" awarded Intense Laboratory Experiences and Mentorship (ILEM) to four undergraduates. The awards are designed to support S³OK theme-related research experiences for Oklahoma undergraduate students in researchers' labs during the summer of 2023. The awards also provide opportunities for undergraduate students from across the state to perform research at an Oklahoma higher education institution during the summer months. Students will gain improved science identity through faculty mentorship and will increase STEM skills and knowledge via hands-on research experiences. Each award will provide up to $5,000 that will be used for student stipend, laboratory supplies, or research-related travel.

The 2023 ILEM awardees are:

Student: *Damien Davis (Tulsa Community College)*
Faculty Mentor: *Dr. Mark Krzmarzick (Oklahoma State University, OSU)*

Mobile Deployable Membrane Distillation for Produced Water Reuse
The project's goal is to develop and test a mobile, rapidly deployable membrane distillation unit that can be used for water treatment and reuse. Specifically, Damien Davis (student) aims to a) develop a prototype for a mobile deployable membrane distillation unit that can process 15 gallons of water per day from oil and gas production water in environmental conditions, b) determine the membrane integrity and operational performance across 3 unique produced waters in Oklahoma, and c) gain understanding regarding the methods for water quality testing, membrane performance and design, water treatment, and research design.

Student: Kirsten Albert (OSU)
Faculty Mentor: Dr. Mary Foltz (OSU)

Quantifying Denitrification Within Agricultural Geographically Isolated Wetlands
The overall goal of this project is to study the nitrate removal and denitrification potential of geographically isolated wetlands. Kirsten Albert's (student) project aims to a) quantify denitrification rates within agricultural geographically isolated wetlands, and b) Determine the relationship between field conditions (i.e., temperature) and laboratory measured denitrification rates. Additionally, Kirsten will be trained in laboratory methods and approaches to data processing and visualization and will also be presenting research results via Foltz research group meetings or conference to improve her oral and written communication skills.

Student: Allison Bond (Southwestern Oklahoma State University (SWOSU))
Faculty Mentor: Dr. Kiranmayi Mangalgiri (OSU)

Catalytic Treatment for Enabling Reuse of Wastewater Containing Pharmaceuticals and Personal Care Products
The overall goal for this project is to establish the efficacy of novel tetraazomacrocycle catalysts (developed by Dr. Tim Hubin in SWOSU) to degrade pharmaceutically active CECs in municipal wastewater. Specifically, Allison Bond (student) will help determine the degradation kinetic rate constants for two pharmaceuticals with homogenous catalysts and identify the degradation mechanism by identifying byproducts formed and will study the impact of water and wastewater parameters (pH, alkalinity, dissolved organic matter, nitrate, sulfate, chloride) on degradation kinetics of pharmaceuticals using wastewater. By working in the lab, Allison will develop critical thinking skills and practice problem-solving and troubleshooting.

Student: Eddy Lyonsi (OSU)
Faculty Mentor: Dr. Yuting Zhou (OSU)

Facilitate Undergraduate's Engagement in S3OK Research Through Intense Laboratory Experiences and Mentorship
This project aims to use the weekly Google Trends data to study people's awareness of drought in the United States (US). Eddy Lyonsi (student) through Dr. Zhou's guidance will use a Google Trends API (Pytrends) to download daily Google data for the US and each state, aggregate the daily data to produce the weekly Google Trends data to reduce noises and match the temporal resolutions of other drought-related indices, and will use statistical models (e.g., vector autoregressive models) to analyze the relationships between the popularity of drought and other drought-related indices. Researchers seek to determine: a) how severe/long the drought must be before people start paying attention to it?; b) when will people stop paying attention to drought and why?; c) what are the spatial variations of people's attention to drought and the driving factors? Answering these questions can help in identifying the critical periods that could be most effective in educating people about drought and making drought-relevant policies.