2025 SARE Project Descriptions

SARE Project Title	University/ College	Faculty/ Email	Full-time/ Part-time	In-person/ Virtual	SARE Opportunity Description	Will student be driving vehicle?
Application of GPS and Photo-grammetric Methods for Stream Flow Monitoring (in the Rock Creek and Salmon Falls Creek Drainages tributary to the Snake River Basin)	College of Southern Idaho (CSI)	**Jeffrey Cooper** jcooper@csi.edu	Full-time	In-person or hybrid	Research will focus on novel methods for monitoring open-channel stream flow utilizing photogrammetry techniques and GPS, evaluating techniques for accuracy and efficiency. Student(s) will participate in field data collection, data processing, and/or protocol development. Individuals will be responsible for a significant portion of the research and play a crucial role in the research's success.	Yes
Application of Cold Atmospheric Pressure Plasma to Sanitization of Foodstuffs and Spacecraft Environments	Boise State University (BSU)	**Ken Cornell** kencornell@boisestate.edu	Full-time (part-time if needed)	In-person	The research project that the student will work on involves the analysis of antimicrobial activity produced by two configurations of cold atmospheric pressure plasma devices (10x10 array, radial inward array) that we have developed in our lab. These devices ionize ambient air or other gasses to create reactive oxygen and nitrogen species that can inactivate planktonic and biofilm associated pathogens to reduce the spread of foodborne or surface-borne disease. The SARE student will work on testing two of our devices for: 1) antimicrobial activity against Pseudomonas aeruginosa, E. coli, and Staph. aureus planktonic cells and biofilms on steel and plastic surfaces, and 2) reactive oxygen species production (ozone, peroxide, hydroxyl radicals, and superoxide). Pseudomonas is a common cause of food spoilage, and E. coli and Staph. can cause of foodborne illness. Both organisms are also capable of causing a variety of other serious infections in humans. All the protocols are established in the lab for assessing antimicrobial activity and detecting reactive oxygen species. The desired knowledge and skills involve standard laboratory techniques (making solutions/media, autoclaving, etc), performing microbiology experiments to grow biofilms and planktonic cells and test plasma activity in a BSL-2 environment, and performing analytical chemistry experiments of reactive oxygen species using spectrophotometric and spectrofluorometric techniques.	No (other than personal car)

					The proposed students are current undergraduate researchers in the lab and have the training and experience to complete the proposed research.	
Understanding the degradation behavior of microplastics in the environment	Idaho State University	**Joshua Pak** pakjosh@isu.edu	Full-time	In-person	Student will work on simulating how polymers degrade in the environment and will monitor molecular species coming from degradation sources. Particularly, student will prepare and characterize several condensation polymers (polyesters, nylon, polyureas, polyurethanes, etc.) and shorter molecules. These polymers and molecules will be prepared as microplastic samples and exposed to accelerated decomposition conditions simulating natural degradation of polymers in various environmental conditions (i.e. pH, UV exposure, temperatures, etc.). Student will monitor the degradation behavior to understand the amounts and types of potential toxic materials originating from polymer degradation. The knowledge gained from this project can lay a foundation for the detailed understanding of how different polymer-related environmental contaminants are introduced to our water. Student will learn typical synthesis and characterization techniques for organic chemistry. In addition, Student will be introduced to several analytical instrumental techniques such as NMR, IR, MS, DSC, and TGA. He will also be trained in written and oral communication skills.	no
Differentiating Groundwater Recharge Zones through Traditional and New Age Dating Techniques	University of Idaho	**Jeff Langman** jlangman@uidaho.edu	Full-time or Part-time	In-person	Develop a monitoring well program to test a new age-dating technique for discriminating primary recharge zones in a basalt aquifer system. Results of the study will be used by local/regional entities for water resource protection, enhanced recharge, and ensuring climate resiliency of the regional water supply. Project will include identification of appropriate wells for inclusion in the study through web-based, GIS, and in-person evaluation of existing wells in the basin. Sampling of wells and collection of field parameters through use of a multi-parameter probe and collection and preservation of groundwater samples for submission to multiple analytical laboratories. The student should be familiar with basic stratigraphic principles and comfortable interacting with landowners.	Yes – department truck
Co-Creating Resilient Water Futures: Integrating Indigenous Knowledge and AI with Snake River Water Systems	Idaho State University	**Jose Luis Benavides** josebenavides@isu.edu	Full-time	Virtual	As an assistant professor of digital media at Idaho State University, I will mentor my former digital media and 3D modeling students about water and energy system resilience in Idaho, focusing on the Snake River Basin. By learning about Indigenous governance and traditional knowledge systems alongside advanced AI and 3D modeling technology, the project aims to imagine sustainable water management strategies and foster workforce development between the digital arts and environmental sciences. Our main objectives include two research questions guiding this student investigation of local Indigenous knowledge toward Energy-water system sustainability: • What role could adopting Indigenous knowledge and governance dynamics of water systems, especially considering water protection, play in determining resilience strategies or options to climate-driven technological changes with new technologies such as artificial intelligence? • How could incorporating diverse ways of knowing by means of artistic interpretation with 3D modeling software and AI create viable pathways for more equitable and resilient futures for our water systems?	No