

Three undergraduate internships in water quality

The Montana Consortium for Research on Environmental Water Systems (CREWS) seeks three undergraduate interns for summer 2022 on projects in agricultural and reclaimed stream systems in Montana. The CREWS project combines approaches in biogeochemistry and hydrology to better understand the fate and transport of nitrate and sulfate through soils, groundwater, and streams. This summer, we will conduct one to two weeklong field campaigns to collect data to support this work. Undergraduate interns will support field work, data analysis, and have opportunities to conduct guided research projects, while focusing on different research areas within the project.

All positions are based in Bozeman and will include field work. The interns will generally have mentorship via regular meetings with the collaborative field team. The student will collaborate on a research plan and will be expected to report on their research to the larger CREWS team in informal meetings, at the annual all hands meeting, and at the fall Montana American Water Resources Association meeting.

Applicants should have introductory coursework in environmental science, environmental engineering, or chemistry and enthusiasm for summer field work. These are full time positions and will be paid hourly, at a minimum rate of \$16/h but potentially higher based on experience.

Please submit a statement of interest and resume or CV to stephanie.ewing@montana.edu and rpayn@montana.edu, with subject line "CREWS internship application". We welcome applicants to multiple positions.

Theme 1: Transformations of metabolite signals along stream corridors

This intern will collaborate on collection of continuous stream sensor water quality data in agricultural streams of the Judith River Watershed. The student will assist CREWS graduate students in collecting the data, and will be expected to design and perform their own research on a component of data analysis. Examples of relevant areas of research include: (1) Exploring links between carbon and nitrogen dynamics in streams; (2) Analysis of methods used to generate high-quality water quality monitoring data; and (3) Analysis of inverse modeling techniques for extracting information from automated monitoring data. The student will generally have mentorship via regular meetings with the JRW team. Rob Payn will provide specific faculty guidance through the experience, and graduate student Madison Foster will provide direct mentorship and guidance.

Theme 2: Spatial and temporal patterns in riparian hydrosystems

This intern will monitor solutes in riparian groundwater wells side channels, and soils of select reaches of small agricultural streams in central Montana, where continuous stream channel and adjacent surface water observations are underway. The student will assist in sampling shallow groundwater wells, sensor calibration and deployment, and sample collection and analysis. The student will work under the direct guidance and mentorship of faculty member Stephanie Ewing, and graduate student Caitlin Mayernik, and interact with the broader collaborative field team. In addition, based on prior experience, the student will have the opportunity to gain skills (a) in the Environmental Analytical Laboratory with Dr. Toby Koffman on measures of nitrate, ammonium and other solutes; (b) in techniques for subsurface water level and solute observations in the riparian zone, including resistivity surveys and direct observation using sensors in wells depending on experience; and (c) plant community assessment in conjunction with drone-based imaging of the riparian corridor.

Theme 3: Groundwater-surface water interactions in Rosebud Creek

This intern will support evaluation of groundwater-surface water interactions in reclaimed and undisturbed coulees supplying groundwater to Rosebud Creek, just south of Colstrip, Montana. The

student will assist in sampling groundwater wells, sensor calibration and deployment, and sample collection and analysis, in conjunction with extensive groundwater assessment associated with reclamation following strip mining for coal. The student will work under the direct guidance and mentorship of faculty member Stephanie Ewing, and graduate student Skye Keeshin. The student will have the opportunity to interact with the broader collaborative field team including Dr. Liddi Meredith, Dr. Rob Payn, and Dr. Payton Gardner. In addition, based on prior experience, the student will have the opportunity to gain skills (a) in ^{222}Rn surveys of stream waters as a measure of groundwater connection; (b) in techniques for subsurface water level and streamflow observations; and (c) in the Environmental Analytical Laboratory with Dr. Toby Koffman on measures of sulfate, strontium, dissolved organic carbon and other solutes.