

RII Track-1: Consortium for Research on Environmental Water Systems

Undergraduate Student Mentoring Plan

Summary: This plan provides guidance on mentoring undergraduate students supported on the CREWS RII Track-1 project. For this plan, mentoring is a collaborative and reciprocal relationship between a faculty member and an undergraduate student focused on advancing learning and career development for the student. Developing a meaningful and effective mentor-mentee relationship requires time. Thus, our plan pertains to undergraduate students who are engaged in CREWS research and intend to be participants on the CREWS project for a minimum of an academic year, or students who are participating in the CREWS Summer Undergraduate Internship Program. Our goal is to provide interdisciplinary research and career development mentoring that matches the needs of our students.

Undergraduate students are critical to the CREWS project. The goal of the Undergraduate Student Mentoring Plan is to provide a framework for constructive mentor-mentee relationships. Undergraduate student mentoring requires transparency, support and candor. *Transparency* means that an advisor sets clear and reasonable expectations and works with the student to develop critical thinking skills. *Support* underscores the need for advisors to be affirming in their interactions with their students. *Candor* is constructive criticism and honest assessment of a student's progress.

Context: Undergraduate participation ranges from volunteer contributions to driving hypothesis-driven original research. This range requires careful attention from supervisors, and open communication between advisors and students. *Most importantly, the diverse ways in which undergrads engage in research requires that advisors and students agree on very clear expectations.*

Plan: the CREWS Mentoring Plan provides structure and guidance for mentors through three broadly applicable guidelines:

1. CREWS requires a minimum of two meetings each academic semester between each undergraduate student and their Faculty Advisor. Mentoring meetings differ from operational research and academic meetings in that the professional goals of the students are on the agenda.

Suggested Meeting Topics:

- a. long-term student career goals
- b. quality of peer-to-peer interactions
- c. conference, workshop, etc. opportunities
- d. networking opportunities beyond the lab
- e. reading the literature
- f. how to work autonomously and with teams

- g. how to prepare for grad school or the workforce
- h. fostering independence and resilience
- i. the nuts and bolts of hypothesis-driven science
- j. issues of concern to students; i.e., the agenda provided by student

2. Participation in undergraduate research training seminars and other project-related learning opportunities as available: Two formal training efforts will be provided, annually, for CREWS undergraduate participants to address 1) Inquiry and the scientific method, and 2) Navigating a mentoring relationship in scientific research. All CREWS undergraduate mentees are encouraged to participate.

A seminar on Inquiry and the scientific method developed by a senior UM project faculty member will be presented to CREWS undergraduate students in Years 3, 4, and 5. This will address observations and question generation as the basis of scientific inquiry. Results from the workshop will develop individual student research programs and an understanding of science.

The seminar on mentoring relationships in scientific research will discuss power structures, performance evaluations and unspoken agendas and expectations. We will address challenges and expectations associated with engaging in academic mentor-mentee efforts. This seminar will be in Year 3 and repeated in Years 4 and 5.

3. Though not required, CREWS recommends that students be encouraged to publish their work in peer-reviewed journals. If the work does not meet these standards, we support considerations of ScholarWorks or a report on the CREWS website. CREWS also encourages advisors to help undergraduates identify workshops or other venues for presentations. Of particular interest are those symposia supported by the MUS that focus on undergraduate research, including but not limited to the [University of Montana's Conference on Undergraduate Research \(UMCUR\)](#) and the Montana State University Student Research Celebration.