



McEwanlab.org

Undergraduate Research Prospectus

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Undergraduate research is a key component in the McEwan Lab. The work environment in the Lab is supportive of the development of intellectual and practical capabilities for students. Although students often begin by assisting with general lab tasks, the goal is to provide a pathway for the individual toward *assuming a leadership role in every piece of the scientific process*- experimental design, grant writing, data collection, data analysis, manuscript writing, and presenting.

Those who join the lab must be willing to commit themselves to the Lab community. In particular, I have these expectations for every Lab member:

- 1) Attend ~weekly lab meetings during the academic year. We usually meet once a week to discuss our ongoing projects, to read & critique each other's work, to talk about professional development, etc. We sometimes read from the primary literature together. We can also problem solve as a group, and take trips to field sites.
- 2) Everyone in the Lab should attend pertinent campus events. In particular lab members should attend lectures on campus that are ecological/environmental in nature. I prefer if students in the lab attend **all** of the Biology seminars, and this is required for graduate students.
- 3) As a lab, we usually host 1 invited speaker/semester who is a scientist from outside UD. I **expect** lab members to interact with that person in some regard.
- 4) I expect students conducting research in the Lab to do **high quality work** that is worthy of professional presentations and, ultimately, publication. This means careful and diligent data collection. The DETAILS all matter! Where viable, I expect the student to help me pursue the project through to publication. I also strongly encourage

professional presentation. Each year I expect most everyone in the lab who has usable data to present at the Stander Symposium. If the data warrant it, some students may be able to present work at the Ecological Society of America conference. and we may also attend other regional conferences as a group. I view communicating our research to be a crucial step in the scientific method, and a critical developmental opportunity for students.

5) I commit myself to professional development for folks in the lab, and I want to be involved in this process. Although I totally understand and support a student who might change their minds about career options- I do not work with students who *a priori* simply want "a lab experience." I want students in the lab to be involved in this work because it is a life passion. I view student experience in my lab as just the first step down the path toward a career. To be honest, I do not accept everyone who applies to work with me, and the selection process has a whole lot to do with whether I think the person is serious about moving beyond UD toward an impactful life in Environmental Ecology (broadly construed).

6) The challenge for me as your research advisor is to help you carve a piece of research/scholarship out of your interests that also fits within the broader lab mission of the Lab. This will involve helping you put together the skill set, and connections, needed for you to accomplish the research, while also keeping an eye on the long-term, where do you want to go after UD, and what steps do you need to take now to get you there.

Undergraduates in my Lab generally move through a systematic progression as described below- although each case is unique and exceptions are common. Over the course of their time at UD, undergraduates in my lab have the opportunity to work through the following four employment categories. These are divided up roughly in association with the categories of undergraduate development (Freshman-Senior) although **there are many ways in which this system might not match individual circumstances.**

Support Technician (entry-level, often Freshman or Sophmores)

These are volunteer positions, usually ~3-5 hrs/week. The work associated with this position is generally basic- sampling processing, data entry, some microscope work, etc. In this position you are expected to meet whatever need we might have in the lab.

You must be flexible and not only willing, but eager to learn.

Undergraduates who are serving as a technician in my lab must:

- 1) Be punctual and responsible about appointments and work hours.
- 2) Be extremely diligent about data collection and following procedures.
- 3) Be responsible and respectful with lab gear and facilities.
- 4) Have a positive attitude. Negativity or disrespect toward lab members will not be tolerated.

Technicians

These are paid positions, (minimum wage per BIO Department Policy); 5-10 hrs/week. There are more interested students than positions, so getting into these slots is seniority based and competitive. This is step up in responsibility from the Support Tech position. Students in this position will be trusted with more complex tasks and analyses. When appropriate, these positions could include full-time employment during the summer break. Students in these positions generally are poised to start thinking about research projects that they could participate in more of a leadership role. Students in these positions are expected to comply with 1-4 above, and:

- 5) Be willing (and able) to take on more complex scientific tasks.
- 6) Begin familiarizing themselves with both the operational aspects of field/lab tasks, but also the *reasons* for using them.
- 7) Work independently, without supervision, effectively.
- 8) Instruct students with less experience

Undergraduate Researchers

These are more advanced position. Often >10 hrs/week. Students may be paid in these positions, may use these activities for independent study credits, or both. They are a step up in responsibility from the Technician position. In these positions, students are taking on large sub-sections of research projects. They are seeing field/lab tasks through to completion, collecting AND beginning to analyze data. These students should begin reading scientific literature. A student in this position will begin writing small grants and may present research at the Stander Symposium or other local meetings. These students may also begin engaging with regional natural areas managers. In addition to 1-8 above, these students will:

- 9) Take a leadership role with their research.
- 10) Be willing to problem solve.
- 11) Work all the way through the scientific method, including preparing a final report of their findings and presenting at Stander.

Project Leader (Mostly Seniors)

These are the most advanced position in the lab. Usually > 10 hrs/ week. The student is expected to meet most of the tasks associated with being a graduate student. A Project Leader takes the initiative with a project, helps develop a research vision and pursues that vision. A Project Leader develops timelines, collects data, processes data, analyzes data, and vigorously pursues presenting a regional or national meetings and publishing in a peer-reviewed journal. Very often a Project Leader will have undergraduates (e.g., Support Technicians) who they direct on their project. Students in this position are expected to interact at the level of a dedicated scientist, and may be invited (by the PI) to functions usually reserved for only Graduate Students. In fact, this position in the lab is only slightly removed from the level of expectation I have for a Master's Degree student. Ascension to such a position will usually involve working through the various other levels successfully (a multi-year process). A student in this position will be perfectly position to move into graduate school or become a professional ecologist. *It is quite rare for a student to arrive at this level of excellence.*

Norris Guidelines for Undergraduate Research Projects

One of the biggest challenges of completing a research project in Environmental Ecology is properly budgeting time for analysis and writing. These come at the end of the process and the time commitment needed to bring the project to completion properly is often **vastly** underestimated. Here are guidelines for research projects in my lab:

During the final year of the project I expect:

- All initial data analysis to be completed, and turned in, by **November 1st**. This includes the creation of maps, graphs, and statistical analyses.
- A completed draft of the final manuscript must be turned in, by **March 1st** of the final year. The remainder of the semester will be spent editing and sharpening the manuscript.
- Allocation of Thesis/Research credits should emphasize or match, the writing process. Thus, should be heaviest in the spring semester. It is best to minimize other courses in the spring so that focused attention can be given to completing the project.

Data Ownership, Sharing and Publishing

At the time of graduation, or the ending of any particular project, all data and other information associated with the project must be transferred to Dr. McEwan for curation, storage, publication or sharing. Students may be entitled to authorship on subsequent publications; however, that is determined on an individual basis depending on the efforts of the students within the context of the overall project. As Principle Investigator in the lab, and the person responsible to funding agencies, etc, Dr. McEwan is the ultimate owner of all data collected in the lab and reserves the right to move forward with publishing or other uses pursuant to the [code of ethics](#) surrounding scientific information put forward by the Ecological Society of America.