Graduate Research Prospectus
Dr. Ryan McEwan
ryan.mcewan@udayton.edu

McEwanlab.org

Overview

Graduate training is an essential part of the McEwan lab. Normally there are 2-3 graduate students in the lab at any given time. Graduate students in the lab have always been funded including both tuition remission and stipend. The mechanism of funding is normally a Teaching Assistantship through the University of Dayton, Department of Biology. Students have also been funded through Research Assistantships associated with grants and also through Graduate Assistantships through collaborative arrangements that I have worked out on campus.

I normally recruit graduate students in the lab through either a national search or some kind of collaborative communication with colleagues. Graduate students in the lab often are recruited from outside universities; however, some positive situations arise where a UD undergrad will complete a graduate degree in the lab.

Undergraduate research is an important component of the McEwan Lab and graduate students are often involved in mentoring undergraduates. Although, it is never a requirement for a graduate student to mentor a particular undergraduate, working with these students is an important part of our culture. If you do not wish to engage with undergraduates in your research program you should let Dr. McEwan know this during the recruitment process.

The goal of graduate training in the lab is to advance scientific understanding and provide a training platform for professional growth. As detailed below, we offer opportunities for both MS and PhD training. Those two degrees are very different from one another and both are very different from undergraduate training. See this blog series to learn more about my views on graduate training: LINK.

Advisor expectations

Being a mentor to graduate students is multi-faceted and complex. I take this task very seriously. Creating a platform for graduate student success is a fundamental career goal. Note that success in graduate school depends on the student's energy and drive, and my task is to create the conditions, the infrastructure, surrounding the student to support their professional development and scientific pursuit.

Some of my main responsibilities are:

(1) Respect each student as a whole, individual, unique, person deserving of support throughout whatever situations might arise during his or her time in the lab.

(2) Help each advisee seek out the best path for their career development. This is based on the ***student's vision*** for where they want to go with their career. This is my most important job, and I will take it very seriously.

(3) Push each student to extend the limits of their capability. Encourage professional and personal growth, academic excellence, and scientific achievement.

(4) Be regularly available for scientific and professional consultation, responsive to manuscripts, letter or recommendation requests or other writing help, and be willing to assist with field and lab projects.

(5) Provide the resources needed to accomplish the scientific projects, including gear, financial support, etc. This includes assisting with the search for grant funding and the application process and, where appropriate, support for technical training opportunities

(6) Support students after they have left the lab. I will write great letters for those who deserve it, and generally support your academic affairs as long as my help is needed and useful.

Master of Science
McEwan Lab Expectations

The Master's degree is a chance to build skills and competency, expand your professional network and do real science. There will be classes associate with the MS degree in the McEwan Lab but the fundamental goal of those two years is to complete a research-focused Thesis. This Master's Thesis should build on the published literature in a significant way and it should lead to meaningful publication(s) in scientific journals and presentations at regional or national meetings.

In particular, MS students working in my lab should:

(1) Exhibit positive and professional interactions with all members of our lab and departmental community. This includes interactions with me, with other students, and with other faculty members. Respect for all members of the lab community is required. Negative or harmful interactions are unacceptable.

(2) Strive constantly to become a better scientist.

(3) Become well versed in the literature and methodologies associated with their particular project.

(4) Be able to communicate effectively both in writing and in oral presentations.

Prior to graduation the student must:

- Present at least one abstracted, professional, scientific presentation at a national meeting.

General Approach to the Thesis in the McEwan Lab

The Thesis document is a vehicle for communicating the science you do during your MS in the McEwan Lab. It consists of at least one, preferably two, chapters that are individual manuscripts prepared for submission to peer-reviewed journals.

Doctor of Philosophy (PhD)
McEwan Lab Expectations

Caveat!

I urge careful consideration prior to starting a PhD program in Ecology. The work is arduous, the job market is roiling and shark-infested, and the many rewards are often difficult to quantify or even articulate. Unless you come from a background of high academic achievement, your family and friends might not even understand what you are doing with your life.

The PhD is dissimilar to the MS in fundamental ways. It is NOT more of the same. A much greater level of expertise is expected, and the quality and quantity of the research is not comparable. PhD students must dedicate themselves to the pursuit of scientific and academic excellence. Choosing the path toward a PhD is choosing a commitment to a life dedicated to asking scientific questions and the pursuit of professional excellence. Is this really what you want?

Overall, I would argue that, when making a life decision about whether or not to pursue a PhD, if you think that there are a number of career paths that could arrive at an equally happy existence, then remove "doing a PhD" from the list. There is no justification for going through the process unless you feel a passion for spending many years of your professional life on a scientific mission.

Ultimately, the pursuit of a PhD is setting course across the dunes toward a shimmering something, whether an Oasis or a Mirage will not be clear until you taste the water.

Death Valley Dunes at Dawn: photo by the author *ca*. 1994

Traits needed in order to be successful as a PhD student.

The PhD is a highly misunderstood credential. Many associate it with intellect and technical acumen. While those things might come along during the process, the words that are actually most associated with the PhD success are things like gumption, fortitude, sweat equity, stick-to-itiveness, clear mindedness, and dedication. Here is a run-down of traits that I feel are important to completing the PhD and launching a research career:

(A) You have to enjoy (at least to some degree) doing all aspects of science.
These include:
- Reading the literature
- Designing experiments
- Collecting data
- Analyzing data
- Writing manuscripts
- Publishing
- Presenting research
- Networking
- Grant writing

If you absolutely hate any step of the process you will exhaust yourself trying to make it…don't start the journey. Of all things that you must be able to do, and preferably enjoy, WRITING is the most important. If you hate to write, then you probably will not succeed as an academic scientist.

(B) Ambition/Drive to become highly successful at all levels of the academic process.
In the best case, this is driven by a love for the system you are working in, and a desire to learn more about that system. You need something burning inside to keep you warm on the cold nights of the Dissertation process.

(C) Stamina & grit.
The dissertation will become a grind. You will need to dig deeply, put your head down and keep moving forward.

(D) Capacity to multi-task, or (at least) stay focused on a task in the midst of chaos.

(E) Kindness and Equanimity under stress.
At times you will be interacting with stressed people and you may experience stress and frustration. This is natural; however, a critical trait for you to be successful is the capacity to remain kind and team-oriented when things go wrong. Keeping a positive demeanor and engaging the broader community of your workplace are critically important to your long-term success and are necessary for being a student in the McEwan lab.

Particular expectations of PhD Students working in the McEwan lab

I require that PhD students working in my lab....

(1) Exhibit positive and professional interactions with all members of our lab and departmental community. This includes interactions with me, with other students, and with other faculty members. Respect for all members of the lab community is required. Negative or harmful interactions are unacceptable. PhD students ultimately become leaders in the lab community and are expected to behave accordingly.

(2) Develop an expert understanding of the scientific method, and a broad understanding of where science stands on the most important issues of the our time. Being a PhD in Science means understanding how to apply the scientific method broadly and what makes for good science, in general.

(3) Develop an expert understanding of their study organism or system. This includes a deep understanding of the literature. They should have a ready, and sharp, knowledge of the current state of the science in their field of study including prominent scientists working in the field, and their work.

(4) Develop an expert competency in the practice of science in their area of specialization. This could include plant taxonomy, lab methods, or statistical techniques. *The student should eventually significantly surpass my understanding of their system.*

(5) Become a voracious consumer of scientific literature.

(6) Become an outstanding public speaker and an excellent writer.

Prior to graduation, the student must:
- Present at least 4 abstracted scientific presentations at regional or national meetings. One per year after the 1st year is a minimum expectation.

- Have a peer-reviewed journal article from the dissertation data (not a review) in print (not *accepted*, not "*in review*", actually in print). This is required by the Biology Department and is a hard rule with no exceptions. Note that a single journal article from the dissertation does NOT reflect competition in the job market. The McEwan Lab recommendation is for PhD students to have at least 4 peer-reviewed journal articles *in print*, *in press*, or *in review* at the time of graduation with others in the "pipeline." The diversity and breadth of publications should be outstanding, and they should be published in international journals. The best students enter the PhD

program with publications already in the works from a prior MS experience or from undergraduate research.

- Have developed a record of grant seeking to support their work including grant submissions outside the University of Dayton. Students must write a fellowship for each summer of their time at the University of Dayton to provide additional support beyond the 9-month stipend and tuition waiver that we offer. Thus, grant writing is already embedded in the process. In addition to this annual activity, I require students to look for outside support including local, regional or state small grants. Competing for national awards is also encouraged. Ultimately, students must develop a habit of thinking about funding for their work.

General Approach to the Dissertation in the McEwan Lab

The Dissertation is a vehicle for communicating the science you do during your PhD in the McEwan Lab. It consists of chapters that are individual manuscripts prepared for submission to peer-reviewed journals. As a physical document, the Dissertation is just a conglomeration of individual research articles. A normal Dissertation in the McEwan Lab will consist of four or five science chapters, each of which will be submitted, individually, to a scientific journal for publication. As noted above, at least one of these chapters must be *in print* to schedule your defense in the Department of Biology.

The scientific articles that make up a Dissertation in the McEwan lab typically hold together to create a broader scientific vision and developmental arch. Generally, the first science chapter of the dissertation should start very soon after arriving at UD and should be relatively straightforward. I will work with the student to set them up with a project that is publishable and can launch quickly. I prefer the PhD student have the first chapter published and "in hand" as a printed final document by the end of the 2nd year in the program. The subsequent chapters can be increasingly "risky" and a product of the student's developing scientific vision. The final science chapter should be the most daring, and student-driven.

When preparing for the defense, the student may choose to write a short first chapter that outlines the broader vision of the science chapters; this is not a requirement for defending. There is no requirement for a "literature review" for the Dissertation and such a task will only be undertaken if the goal is submitting that review for publication and it is clear that it will add to the scientific literature in an important way.

Near the end of the PhD process, the student must have developed a systematic approach to article development, submission, revision and publication that is sustainable and professionally fulfilling. Developing the capacity to have many projects in various phases of development is a crucial goal of the Dissertation process and will be a focus of my mentoring efforts.