

Advising Prospectus

Mike Ryan

(with many thanks to Dan Binkley (<http://lamar.colostate.edu/~binkley/prospectus.htm>) for many of the ideas here)

This prospectus gives my view of graduate education, and is intended to articulate expectations: what students are expected to accomplish, and what students should expect from me. Each student is different and will have different goals and an individual program. Despite differences in individual programs, my expectations for students and what students should expect from me will be fairly constant. Probably the most important thing to know and remember often is that you are in charge of your program of graduate studies. I can help in many ways, from advice to resources, but it's your program—self-discipline and self-initiative are critical to your success.

Graduate Education: Graduate education in science differs from undergraduate education in many ways. Probably the most important distinction is that an undergraduate education teaches what is known, and a graduate education teaches to identify the unknown and make it known. Science's fundamental role is to develop new insights and knowledge, and the goal of a graduate education in science is to teach the student how to be a scientist. A MS program is an introduction and should provide the student with the tools to understand the scientific method and an experience in applying the scientific method to a particular problem. Because identification of an important, solvable problem often requires some experience in a field, the MS often receives much guidance in problem selection. A PhD program aims to produce scientists, and is both qualitatively and quantitatively more involved than an MS program. A PhD is expected to make an important, original contribution to the field.

Advising: The advisor serves a double role in graduate programs. As a mentor, the advisor supports, encourages and nurtures each student's development, and provides resources. As a professor, the advisor also judges the accomplishment and potential of each student. Students should expect support from advisors, but this support may sometimes include challenges and uncomfortable criticism. The advisor is responsible for helping students develop their visions and accomplishments to meet the demands of the program. I have high expectations for my students and work very hard to provide them the advice, resources, and experience they need to succeed.

Expectations for beginning students:

Beginning MS and PhD students should:

- Have personal motivation, curiosity, and enthusiasm for learning how the world works.
- Have a good, general background in biology or environmental sciences and good communication, quantitative, and analytical skills.

Expectations for MS level students:

A student completing an MS program should:

- Have a general, working knowledge of science, including its philosophy, methods, and current state.
- Have a solid understanding of the background, theory, problems, and impediments within the area of his or her interest.
- Be able to understand and use sampling procedures, basic statistics, analytical methods, and computer data analysis.
- Be familiar with and able to communicate clearly and effectively, in written and oral presentations.
- Begin to critically read the literature.
- Have accomplished the planning and execution of a substantial research project.

Milestones expected:

1. Coursework plan developed by end of first semester.
2. Research plan developed by middle of second semester; file GS-6 form.
3. Steady progress on research.
4. Submission of at least one substantial paper for publication by the time of graduation.

Expectations for PhD level students:

A student completing a PhD program should:

- Have a broad knowledge of the philosophy, history, and current state of science.
- Be competent in major techniques used in ecophysiological and ecological research, including field, laboratory, statistical, and computer methods.
- Be an expert in the state of science within his or her specialty – knowing more about the subject than I or the committee knows.
- Be able to think clearly, critically, and creatively – your PhD program should give you the skills to independently develop important ideas and comfortably criticize the work of others.
- Routinely read the literature.
- Be able to communicate clearly and effectively, in written and oral presentations.
- Have accomplished the inception, planning and execution of a substantial research project.

Milestones expected:

1. Coursework plan developed by end of first semester;
2. Research plan developed by middle of second semester; file GS-6 form;
3. Steady progress on research.

4. Submission of one original research paper or one research paper before the end of your 2nd year; at least 2 more papers ready to submit near the time of graduation. One original-data paper should deal with a topic not prescribed in the grant funding the research. The number of papers would of course be flexible in cases where large (monograph) papers are produced.
5. Additional papers, such as a review paper or papers as lead or co-author with fellow students and mentors, will immensely improve your marketability after graduation.

Expectations for advising:

The graduate advisor should:

- Take a personal interest in each student's education, including goals, areas of interest, and abilities.
- Challenge each student to achieve.
- Encourage independent thought and action and provide space for the student to make mistakes.
- Provide feedback on progress, and critique written and oral presentations. Feedback on proposals and ideas should be less than one week; turnaround on review of student paper should be less than two weeks.
- Provide critical and constructive reviews of student outputs and ideas.
- Provide insights on the inner workings of science – funding, personalities, publications, manuscript review and publication.
- Provide financial support, including tuition, stipend, research funds and travel to a variety of ecosystems and scientific meetings.

Workload:

If a student uses graduate school to advance toward career goals, it's important to develop a clear idea of the professional playing field. Good job openings have many well-qualified competitors; a graduate program needs to produce graduates who are well positioned to win the competition. Four points of successful preparation for the job arena are:

1. Quality of publications and presentations. This includes style -- but also pizzazz of the topic (hypothesis, question examined, context of the question, etc.)
2. Number of publications.
3. Successful participation in grant-writing activities.
4. Presentations at meetings, and other direct ways of developing personal contacts with peers.
5. Breadth and depth of experience, including multiple ecological questions and ecosystems.

Resources

These are great references for understanding the process of getting into graduate school, thriving while there, and some career advice for after graduation.

Bloom, Dale F. et al. 1998. *The Ph.D. Process: A student's guide to graduate school in the sciences*. Oxford University Press, New York. Excellent book on getting a degree—less cynical than Peters.

Ford, E.D. 2000. *Scientific method for Ecological Research*. Cambridge University Press.

Medawar, P.B. 1981. *Advice to a young scientist*. Basic Books. Very good, simple advice about starting to do science.

Oliver, J.E. 1991. *The incomplete guide to the art of discovery*. Columbia University Press.

Peters, RL. 1997. *Getting what you came for- the smart student's guide to earning a Masters or PhD*. Farrar, Straus and Giroux. Excellent book on getting a degree. More on school and less on career than Reis' book.

Reis, Richard M. 1997. *Tomorrow's Professor – Preparing for academic careers in science and engineering*. IEEE Press. – If I had to have only one book on getting a PhD and an academic position, this would be it.