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Biology & Biomedical Sciences

ACADEMIC PROGRAM GUIDELINES

**Program in
Evolution, Ecology and
Population Biology**

Guidelines for Graduate Students Entering the Evolution, Ecology and Population Biology Graduate Program

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The transition from being a student concerned primarily with learning in a classroom setting to a scientist designing and implementing his or her own research program generally occurs in the first years of graduate school. To help in this transition, we have provided some guidelines concerning goals and expectations for graduate students in the Evolution, Ecology and Population Biology Program.

The overriding goal of this program is to produce Ph.D.s who have the experience, knowledge, and qualifications to succeed in whatever career path they choose. The following is a schedule to which students should attempt to adhere during their graduate careers:

Year 1 Classes and rotations. Ideally, rotations should involve a self-contained project, which can be completed during the course of the rotation, permitting students the opportunity to analyze data and write up results, perhaps even leading to a publication. Students should always consider the possibility of extending a rotation into a thesis project.

Year 2 End of classes, orals exam (perhaps combined with thesis proposal), choose lab, settle on thesis project, begin collecting preliminary data.

Year 3 Thesis Proposal. At the time of the thesis proposal, the student should have enough preliminary data to demonstrate that the project is feasible and also to illustrate that the student knows how to analyze the data.

Year 4 Thesis Research.

Year 5 Thesis Research, Thesis Defense.

Although the length of the Ph.D. will vary on a case-by-case basis depending on the subject matter, the student's preparation, and other factors, five years is a reasonable goal to set for the duration of one's graduate training; only under the most extreme circumstances should a Ph.D. require more than six years. The Graduate School of Arts & Sciences does not permit graduate students to remain at Washington University for more than seven years unless a petition is received from the student's graduate program and approved by the Dean. The Graduate Program in Evolution, Ecology and Population Biology will only write such petitions under the most unusual and exceptional circumstances. To receive guidance and advice, students should meet with their Thesis Committees no less than once per year. It is the role of the Thesis Committee to carefully oversee students' progress and to provide necessary advice, guidance, and encouragement. Thesis Committees also have the responsibility to inform students when their progress is not satisfactory and to take such steps as are necessary to rectify such situations. The standard that

committees should employ is to ask whether students are being productive and continuing to make reasonable progress toward the completion of their thesis research.

Graduate school is a full time job meant to prepare students for a career in academia or some other career that will use the skills and knowledge obtained. One of the benefits of being an academic is the freedom to determine one's own work hours. Along with this freedom, however, comes responsibility. Most academics work 60+ hours a week; students should expect to work similar hours. Consequently, students should expect to work on occasions at night and during weekends. Moreover, students should expect to work even when school is not in session. Students planning to be absent from campus for more than a week for whatever reason (e.g., vacation, field research) should request permission from their advisor (either rotation or thesis) and from the Director of the Graduate Program, either of whom may seek advice from the student's Thesis Committee or the Program's Steering Committee.

1. Faculty Advisor

Graduate students are admitted to the Evolution, Ecology and Population Biology Program as students-at-large for the first year of their training. During that year, faculty advisors are assigned to assist students in selecting courses of study and to acquaint them with available research opportunities. Faculty advisors for the first year are assigned by the program director. If the assignment seems inappropriate, a new advisor may be selected in consultation with the program director.

2. Prerequisites

Our program has no formal prerequisites except an up-to-date course in basic genetics. Students lacking this background will be advised to remedy it by auditing the spring undergraduate course, Bio 3051.

3. Course Work

The course work in the program is centered around four core courses: Population Genetics (Bio 4181), Macroevolution (Bio 4182), Community Ecology (Bio 419), and Population Ecology (Bio 4170). All students are expected to take 3 of the 4 core courses, although prior coursework at the student's undergraduate institution may exempt the student from one or more of these courses. In addition, students are expected to enroll in the Population Biology Seminar (Bio 580) each semester for the first two years of the program. Besides these courses, a number of specialty courses in population biology are available. Students are also required to take the course, Ethics in Research Science (Bio 5011), which is a Division requirement for all graduate students. The course is most often taken in the spring semester of the second year.

4. Laboratory Rotations

Rotations serve to broaden the research experience of the student and provide them with an opportunity to explore several possibilities before a thesis problem is selected. During these periods, students are likely to be involved in both laboratory and literature research. It is usually expected that students will undertake three rotations. Students are encouraged to do at least one lab rotation in an area outside that of their primary interest: a student in plant systematics might spend a semester studying lizard behavior; a theoretician might spend a semester in a DNA sequencing laboratory. Rotations should be discussed with the student's advisor and planned according to the student's interests. Each lab rotation should last no longer than three-six months.

5. Preliminary Examination

Successful completion of the three core courses mentioned in section three is required as a demonstration of mastery of the basics of the field rather than a written exam. An oral preliminary examination is required of all students, and is to be taken sometime between March-May of the second year of graduate study. The examination committee will consist of 3 EEPB faculty members, with the stipulation that the primary advisor cannot serve on the committee. Two of those examiners will come from a standing committee (that rotates every year) in order to ensure consistency among exams; one of these will be an evolutionary biologist and one an ecologist. The student, in consultation with the advisor, will choose a third examiner from the EEPB program, but not on the standing committee. The preliminary exam may not be combined with the thesis proposal defense, which comes at a later date.

The purpose of the EEPB preliminary exam is to test a student's knowledge in the two core areas of the program: ecology and evolutionary biology. To focus the discussion/examination, the student will choose 3-4 papers that share a central theme, and which will serve as the core of the examination. One possible set of papers would include a theoretical paper, a review paper and a paper illustrating empirical research on the topic. However, through the course of the examination, the discussions/questions will broaden to relate the topics of the papers to general principles of ecology and evolutionary biology. Students should prepare by reviewing their knowledge in these fields, using coursework in these areas as a guide. The exam committee will provide a study guide including several general questions that would be appropriate in the oral examination. To avoid situations in which students do not choose an appropriate topic or papers, students must fill out a preliminary exam form. The form includes a short description of the topic, the papers, and how they fit together. The form must be submitted to your Student Coordinator **no later than February 1 of the second year (May 31 of first graduate year for MSTP)**. The Student Coordinator will send your topic to the Exam Chairperson for approval.

Preliminary Exam: Key Deadlines

	Ph.D. students	MSTP students
Submit Exam form to Coordinator	February 1 of second year	May 31 of first graduate year
Oral examination	by April 30 of second year	by September 1 of second year

It is important to remember that although this is not a comprehensive exam, in that students are not expected to have specific knowledge of the entire field of biology, or even all of evolutionary biology and ecology. The goal of the preliminary exam is to test the student's ability to gain depth and breadth of knowledge in the field. Exam questions will center on the material chosen by the student, but students should expect questions that extend beyond the specific material covered. Students thus should prepare broadly.

The exam begins with a short (15-20 minute) presentation by the student about his or her chosen topic. Questions by each examiner will follow, starting with questions related to the material chosen by the student, and then getting more general. Possible outcomes of the exam include: pass; conditional pass, in which case the student will be considered to pass the exam once some further condition is met, such as writing a paper or successfully completing a course; retake, in which case the student's knowledge is not considered adequate and the student is allowed to retake the exam by the end of the following fall

semester (the exam committee will devise the new exam tailored to the student's deficiencies). If the exam is failed the second time, the student would be asked to leave the program.

6. Thesis Proposal

After successfully passing the qualifying exam, students will begin developing their thesis committee and proposals. At the time of the thesis proposal, a minimum of three division members (approved by the program director) are required to evaluate and advise on the student's proposed thesis. The thesis proposal shall follow the general outline required in an NIH or an NSF grant application (available in the Division Office). The description of the research plan should include a brief statement of the specific aims of the project and the hypotheses to be tested. The following section is a review of the literature giving the context in which the hypotheses were generated and the potential significance of the proposed work for population and evolutionary biology. The third section describes the research design and methods. This section should include a description of the measurements to be taken and the analytical methods used to test the hypotheses presented in the first section. The final section should provide any preliminary results bearing on the project. The proposal will be judged primarily with regard to the significance of the hypotheses presented and whether the samples, measurements, and analytical methods are sufficient to test the hypotheses proposed.

All students must propose their thesis within six months after passing the preliminary exam. However, if a student feels a coherent proposal cannot be presented by that time, he or she may request permission from the Program Director to schedule a pre-proposal meeting to discuss informally the current project and likely future directions and defer the formal proposal by no more than six months. **A student must propose their thesis proposal no later than June 1 of their third year.** If the proposal is not complete within 6 months of this deadline, the student will lose their good academic standing status and could be dismissed.

7. Thesis Research

Once approved and convened, the student will meet with this committee at least once each year to keep the members informed of research progress. Students are required to hold meetings as prescribed by their thesis committee; failure to do so will lead to action by the program steering committee; if the meeting is long-overdue, students may be placed on academic probation. In order for thesis committee meetings to be as beneficial as possible for students and as informative as possible for committee members, students may choose to submit an outline of their progress to their committee prior to the meeting. This may include a summary of their work since the last committee meeting, a summary of planned work in the future, a proposed timeline for future work and/or thesis completion, and specific questions or concerns related to their thesis work that they would like to discuss with their committee. This outline will generally be no longer than 1-2 pages, except in extraordinary circumstances. It should be submitted to committee members at least 1-2 weeks prior to the committee meeting in order to give them adequate time to consider any questions to be discussed. Students are not required to submit an outline prior to their committee meeting; however, doing so will allow committee members to be more prepared to address problems and concerns the student has, and he or she should be as specific as possible in describing these concerns in the outline. Committee members should then give this outline consideration prior to the meeting and use it, along with the presentation made by the student during the meeting itself, to help the student address his or her thesis concerns. A report of such meetings should be sent by the committee chairman to the Division Office. The committee chairman should be any member of the committee other than the thesis preceptor. Students should consider thesis committee meetings as an opportunity to get feedback and advice. For this reason, the program strongly recommends that students consider adding additional members beyond the initial three to the committee at an early date so

as to maximize the input and advice that they may receive. Eventually, thesis defense committees must be enlarged to six members, but members added to the committee shortly before the defense have little opportunity to provide useful input to many aspects of the thesis; consequently, adding these members to the committee at an earlier date can prove very useful.

The student must gain approval of his/her thesis committee to prepare the thesis for circulation to the committee. The thesis advisor should learn whether the committee wishes to meet to discuss whether the thesis is ready to be written up, or whether a decision can be reached without a meeting. The advisor must approve of circulating the thesis before it is circulated; such approval constitutes endorsement that the thesis is substantially ready to be defended. In the rare case that the student and the advisor disagree about contacting the committee and are having difficulty resolving this issue, the question is to be put to the whole thesis committee.

Students in their third year and beyond are expected to regularly present research talks in the programs seminar series, or in other appropriate settings such as Herpetology Group, Plant Lunch, or other topical gatherings. At minimum, students should make at least three presentations during their graduate career, and one per year is encouraged.

8. Thesis Defense

For the thesis defense, the dissertation committee will be enlarged to include at least six full-time faculty members of the University (unless the thesis committee already has six members). Four of these members should be from the student's program or department and two should be from a program or department other than the student's own. The research for the thesis is expected to be of a sufficiently high quality that it will be accepted for publication in a reputable, refereed journal. The preparation and defense of the thesis will follow guidelines set by the University Graduate School of Arts and Sciences (available in the Division Office), with one exception. Students may find it useful to go over matters of organization and analysis with members of their committee so that, hopefully, committee members will not have major criticisms when they read the thesis. The thesis, or at least a reasonable draft of the thesis, shall be in the hands of the dissertation committee one month before the defense. If this requirement is not met, the defense will be rescheduled at the committee's convenience. Students should be prepared to spend time revising the thesis after the defense before it is finally signed. Allowing 4-6 weeks for such revisions would be prudent.

9. Teaching Requirements

Each student is required by the Division to act as a teaching assistant for one semester, usually in the second year of study. However, most students in the Evolution, Ecology and Population Biology Program assume positions at academic institutions, where teaching skill and experience are essential. Moreover, many institutions now consider teaching qualifications when deciding whom to hire. Thus, a single teaching experience is inadequate for preparing students for the future. For these reasons, it is the expectation of the Evolution, Ecology and Population Biology program that students serve as teaching assistants for 2-3 semesters during their graduate tenure. Assignments are made after considering the educational background and interests of the student, and often present an opportunity to brush up on a specific area or to gain knowledge of new areas, as well as representing a diversity of teaching experiences.

10. Support

Every student is guaranteed support as long as progress is satisfactory. As of 7/1/08, a stipend of \$28,000 will be paid in monthly installments at the end of each month.

11. Student Travel

Students may travel with Division support after the thesis proposal has been approved by the Thesis Advisory Committee. Exceptions to these eligibility requirements are permitted only in unusual circumstances as determined by the Program Director. The Division provides up to \$600 toward travel expenses for all students during their graduate training; this money may be used to help pay for field trip expenses or to help pay for attendance at a meeting. Money will only be provided for the latter if the student is presenting a talk or a poster at the meeting. To request travel support, the student will submit a letter to the Program Director asking for use of the funds and stating the purpose of the trip.

12. Students' Responsibility to Meet Program Requirements

Graduate students in the Program in Evolution, Ecology and Population Biology are responsible for completing the requirements of the program in a timely fashion. In particular, the requirements for courses, preliminary examinations, thesis proposals, and thesis committee meetings are important components of graduate training and should be regarded seriously. In the event that a student has trouble meeting any requirement, he or she should request consideration of the situation by the Steering Committee, which may agree to waive or delay the requirement.

13. Transfer From and To Outside Programs

Students are free to transfer to the Program in Evolution, Ecology and Population Biology from any other program in the Division of Biology and Biomedical Sciences provided they are "in good academic standing". Students who transfer will be expected to meet all of the normal requirements of the programs, although special exceptions may be granted in rare cases by the Steering Committee. Students in the Program in Evolution, Ecology and Population Biology also are free to transfer from the program to another program, with the approval of both program directors and provided a qualifying examination committee or program steering committee has not recommended against the student continuing in the Ph.D. program. Transfer is accomplished most easily during the first year, but can be done at later times if necessary.

14. Publications

There is no specific requirement for publication to receive the Ph.D. However, high quality, peer-reviewed publications are an important determinant for a student's career. Similarly, the process of writing and submitting a manuscript and responding to reviewer critiques is an essential part of a student's training. Therefore, the publication record is one of several important and appropriate measures to be used by a thesis committee in evaluating a Ph.D. candidate. It is generally expected that students will have submitted and/or published one or more first author manuscripts in peer-reviewed journals at the time of the defense.

Evolution, Ecology and Population Biology Program

Steering Committee

Dr. Barbara Schaal, Program Director, Department of Biology

Dr. Jon Chase, Department of Biology

Dr. James Cheverud, Department of Anatomy & Neurobiology
Dr. Ellen Damschen, Department of Biology
Dr. Tiffany Knight, Department of Biology
Dr. Allan Larson, Department of Biology
Dr. Ken Olsen, Department of Biology
Dr. John Orrock, Department of Biology
Dr. Mick Richardson, Missouri Botanical Gardens
and Department of Biology
Dr. Alan R. Templeton, Department of Biology

Graduate Student Representatives: Steve Kroiss and Guoqin Yu

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