

APPROVED

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The Population Biology Graduate Group

The Curriculum

Overview

The curriculum for the Population Biology Graduate Group consists of:

PBG 200

A one-year, five- to six-units per quarter core course taken by all first-year students. The course includes lectures and discussions.

Supporting courses

All first-year students, except those explicitly exempted by their Guidance Committee because of their previous mathematical training, must take PBG/Ecology 231 *Quantitative Methods in Population Biology* in their first quarter. Students will normally be required to take three additional course as determined by their Guidance Committees.

Monte Carlos and other seminars

Student must participate in at least two Monte Carlo seminars (described below) during their first year and at least one each subsequent year. Students are also expected to attend (and enroll for) the Tuesday Population Biology seminars (PBG 290) and the Thursday Ecology and Evolution seminars (PBG 292) every quarter that they are on campus.

First-year exam

A written exam is taken at the end of the first year to test mastery of the material presented in PBG 200 and to assess the student's suitability to continue in the program.

Teaching experience

Each student is encouraged to have at least two quarters of experience as a TA, normally before the qualifying exam.

Qualifying exam

The qualifying exam is taken at the end of the second year (or the Fall Quarter of the third year, at the latest) and is based on a written research proposal.

Dissertation seminar

After presentation of the dissertation, all students are required to present a seminar based on the contents of their dissertation to the graduate group.

Units

A typical program will involve 50-70 units of course work, including seminars (e.g., 18 for the first-year core, 12-20 for additional courses and 20-30 seminar units).

The Guidance Committee and the first-year mentor

Each new student will be assigned a three-person Guidance Committee when they arrive on campus. This committee is made up of the student's first-year mentor (see below), a Population Biology Graduate Group advisor, and a third person with interests close to those of the student. The committee will meet with new students within the first week of the Fall quarter and together will agree on the courses that will be required for graduation. These requirements will be recorded on the *Guidance Committee Report* form, which serves as a contract between the Group and the student. This contract may be changed at any time by mutual consent of the student and the Guidance Committee.

The Guidance Committee is also charged with overseeing all aspects of a student's academic life in the Group and should meet as often as is useful, but at least once every year in the Spring quarter.

Every student who is accepted into the program is assigned a first-year mentor who is typically the person with whom the student intends to work. However, an official Graduate Adviser is not assigned until the beginning of the second year. Students are encouraged to shop around for a different advisor if, for any reason, they feel that they will be more successful with someone other than their first-year mentor. In order to effect a change, a student need only meet with the Graduate Group Chair, who will then implement the change.

In the beginning of the second year, the first-year mentor on the Guidance Committee is replaced by the student's Graduate Advisor, who may or may not be the same person. During the second year, the Guidance Committee, in addition to its role in academic advising, has the additional responsibility to recommend a committee for the Qualifying Examination, which should be scheduled for the Spring Quarter of the second year or the Fall Quarter of the third year. Ordinarily, the choosing of this committee will occur when the student meets to fill out the progress report.

Remedial courses

Students entering the graduate group are expected to have completed a set of courses that are typical in undergraduate biology majors. Certain courses are viewed as sufficiently important that entering students who have not taken them will be required to do so. These courses are:

1. a one-year course in introductory biology for biology majors.
2. a one-year course in calculus.
3. a course in statistics.
4. an upper-division course in general ecology or population biology.
5. an upper-division course in genetics.
6. an upper-division course in evolution.

The requirements for evolution and ecology/population-biology may be met by demonstrating proficiency in these courses while working as a teaching assistant. The guiding committee is charged with the assignment of courses that will fulfill these requirements.

PBG 200

The core course for the graduate group, PBG 200ABC, is a one-year, five-unit per quarter course. The course consists of formal lectures and discussion sessions. It is comprised of six five-week modules covering topics that include population genetics, population dynamics, community ecology, quantitative genetics, macroevolution and systematics. This course will be supplemented in the Fall by PBG/Ecology 231, *Quantitative Methods in Population Biology*.

Supporting courses

Students are normally expected to take three additional courses as determined by their Guidance Committee. These courses may consist of formal lecture courses, laboratory and field courses, or graduate seminars (excluding one-unit seminars such as PBG 270, PBG 290 and PBG 292), as appropriate to achieve a balance between training in organismal biology and quantitative methods. Generally, these will include at least two 100/200 level courses in mathematics and/or statistics. More or fewer courses may be required by the Guidance Committee depending on the student's background and interests.

Monte-Carlo seminars

Each student is expected to participate in the Monte-Carlo seminars sponsored by the Center for Population Biology. All of the graduate students and Center for Population Biology postdocs participating each quarter are assigned at random to the participating faculty. A topic of mutual interest to the participants is chosen at the first meeting. First year students must participate in at least two Monte Carlo seminars. After that, students must participate in at least one Monte Carlo per year.

First Year Examination

In June, during the period of Spring Quarter finals, all first-year students will take a written examination based on the contents of the six modules that make up the core curriculum. The faculty in charge of the lecture modules will supply questions and evaluate the answers. The questions may include material from the discussion groups as well as the formal lectures. This written exam takes the place of questions on general Population Biology during the qualifying examination. The exam is meant to identify weaknesses in a student's understanding of population biology and to help determine what additional course work or study might be appropriate. On occasion, the exam may be used to dismiss a student from the program who, by failing to exhibit a mastery of the material, is judged to unsuitable for continuation in the graduate group.

When the examination is completed, the examining committee (the six module instructors) will reach one of three decisions for each student: pass, conditional pass with a requirement of further study and examination on some aspect of the material, or fail. In case of failure, the student must retake a written exam in September. Failing the second exam will result in dismissal from the graduate group.

Qualifying Examination

Qualifying examinations will normally be taken in the sixth quarter and absolutely no later than the seventh quarter, according to the regulations of Graduate Studies. A four-person committee will examine the student in four designated areas. At least two of the examiners, including the chair, must be members of the Population Biology Graduate Group. The examination will focus on a written research proposal submitted by the student at least one month prior to the exam. The proposal should demonstrate the student's ability to design and execute a research project leading to publishable results. The proposal should follow the guidelines for an NSF research grant (maximum of 15 pages, single spaced - guidelines available from the Graduate Program Staff).

Before taking the qualifying examination, the student must complete all course requirements set by Graduate Studies, the graduate group, and the student's Guidance Committee. Students will be examined in four subject areas chosen in consultation with the Guidance Committee, and representing distinct but broad research specializations. Representative choices include: population ecology, population genetics, molecular genetics, evolution, community ecology, systematics, conservation biology, environmental physiology, mathematical theory in population biology, statistical and experimental methods in

population biology, resource economics and management, paleontology, and biology of a particular taxon (e.g., mammalogy, ornithology, entomology, invertebrate zoology). For all students, one of the four designated areas will be some aspect of quantitative methods (statistical or other mathematical techniques). The student, in consultation with the Guidance Committee, will propose examination areas and a faculty member to act as examiner for each area, and will designate one of these faculty members to chair the qualifying exam. The graduate adviser and master adviser will review the recommendations and, on approval, will have the Graduate Program Staff forward them to the Dean of Graduate Studies, who appoints the committee.

In accordance with University policy, there are three outcomes for the qualifying examination: pass, not pass, or fail. A failure will mean dismissal from the Graduate Group. In case of a not pass, the student will be allowed to retake the exam a second time and/or will be required to meet specific course work requirements. A fail on the second exam will mean dismissal from the Graduate Group. A student subject to dismissal from the Graduate Group may be awarded an M.S. degree.

Schedule of the examination

1. The Qualifying Exam is taken after the introductory core sequence, PBG 200ABC & PBG 231, and the First Year Exam, which thoroughly test the students' knowledge in areas of ecology and evolution.
2. Qualifying examinations will normally be taken in the sixth quarter and absolutely no later than the seventh quarter, in accord with the regulations of Graduate Studies.
3. Before taking the qualifying examination, the student is expected to complete all course requirements set by Graduate Studies, the Population Biology Graduate Group, and the student's Guidance Committee.

Faculty membership on the examination committee

1. A five-person committee will examine the student in Population Biology and three other designated areas.
2. At least three of the examiners, including the chair, must be members of the Population Biology Graduate Group. The student's major professor is not eligible to serve on the examination committee.
3. The student, in consultation with the Guidance Committee, will propose three examination areas in addition to Population Biology and a faculty member to act as examiner for each area. A fifth faculty member will be designated to chair the qualifying exam.
4. The graduate adviser and master adviser will review the recommendations and, on approval, will have the Graduate Program Staff forward them to the Dean of Graduate Studies, who appoints the

committee.

5. Given that the general area of Population Biology will have already been extensively covered in the First Year Exam, the faculty member assigned the area of "Population Biology" will be expected to examine the student in only those areas of Population Biology that relate directly to the proposed dissertation research.
6. The primary role of the Chair, who is not assigned a specific area for questions, is to oversee the examination.

Topics and focus for the examination

1. The exam will focus upon the student's ability to design and execute a research project leading to publishable results.
2. It will address the formation of general scientific questions, building and testing hypotheses, and reformulation of both general questions and hypotheses as a result of evidence, analysis, and interaction with committee members.
3. The examination will be initiated by a written proposal describing the student's planned dissertation research.
4. The research proposal and exam will emphasize three subject areas chosen in consultation with the Guidance Committee, and representing subdisciplines of population biology such as population genetics, molecular genetics, evolution, community ecology, systematics, conservation biology, environmental physiology, mathematical theory in population biology, statistical and experimental methods in population biology, resource economics and management, paleontology, or the biology of a particular taxon (e.g., mammalogy, ornithology, entomology, invertebrate zoology).
5. All proposals will include some treatment of the essential quantitative methods to be integrated into the research. These include statistical analysis or other mathematical techniques.

Structure of the research proposal

1. The proposal will be a written document that follows the style of an NSF research proposal. The proposal will be a maximum of 15 single-spaced pages.
2. After a one-page summary, the proposal should present a rationale for the proposed research. The body of the proposal should focus upon a few important, related ideas that lead to a small number of coherent objectives. The objectives should be possible to accomplish within the student's graduate career.
3. A final section of the proposal should address the broader scientific significance of the objectives, and future directions that could be taken from different possible outcomes of the proposed research.

The "future directions" portion of the proposal should be brief, outlining some courses of investigation that could follow from possible outcomes of the research in the body of the proposal.

Preparation for the exam: Student and faculty responsibilities

1. The student will give the proposal to each member of the committee no later than six weeks prior to the examination.
2. No later than two weeks prior to the exam, the student will discuss the proposal with each faculty member. The faculty members should have read the proposal carefully before this meeting and should be prepared to offer substantive feedback, if necessary, to the student.
3. A "perfect" draft of the proposal is not an objective of the examination process, and the student should not revise the written document before the examination.
4. Instead, the proposal is seen as a focal point for discussions about carrying out science in the areas chosen by the student. The examination will proceed by working outward from the proposed research, into related areas and ideas.

Conduct of the examination

1. A typical exam will begin with a 20-minute oral presentation by the student of the research proposal. The next component of the exam will be faculty questions pertaining to the proposal and the broader scientific issues of the student's three specialty areas.
2. In these discussions, the student should be able to respond to faculty perceptions, reactions, and criticisms of the proposal in some detail.
3. It is the student's responsibility to place the proposed research within the broader context of science, and it is the responsibility of the examining committee to explore the student's science, and it is the responsibility of the examining committee to explore the student's understanding of scientific concepts, issues, and techniques that relate to the research.

Results of the examination

1. In accordance with University policy, there are three outcomes for the qualifying examination: *Pass*, *Not Pass*, or *Fail*.
2. A failure will mean dismissal from the Graduate Group. In case of a *Not Pass*, the student will be allowed to retake the exam a second time.
3. In the case of either a "not pass" or a "fail", the committee will provide a written explanation of its decision.

4. If a second examination is necessary, the possible outcomes are pass and fail. A "fail on the second exam will mean dismissal from the Graduate Group.
5. A student dismissed from the Graduate Group may be awarded an M.S. degree, if all other course requirements have been successfully fulfilled.

Dissertation Committee

When a student is advanced to candidacy, the student's Guiding Committee will propose a Dissertation Committee with at least three members. At least two members, including the chair, must be members of the Graduate Group. The committee will be appointed by the Dean of Graduate Studies.

The student will meet with the committee at least once a year to guide the research and review the student's progress. Contents of the thesis must be approved by the committee at least six months before the submission of the dissertation. In cases where a committee member is not in residence, suitable alternative arrangements may be made.

Insofar as it is consistent with the regulations of Graduate Studies, the dissertation will normally be presented in a form suitable for publication with minimal modifications. Students will be encouraged to present their theses in the form of several manuscripts suitable for publication in major peer-reviewed journals.

Dissertation Seminar and Defense

After presentation of the dissertation, all students are required to present a seminar based on the contents of their dissertation. Normally, the seminar will be given in the Tuesday Population Biology Seminar series. If this is not possible, the seminar may be scheduled for any convenient time. A announcement of the seminar to the entire Population Biology Graduate Group membership must be circulated at least one week prior to the seminar.

Units

A typical program will involve 50-70 units of course work, including seminars (e.g., 18 for the first-year core, 12-20 for additional courses and 20-30 seminar units).

University requirements for units for full-time students are:

You are expected to enroll in 12 units each quarter (this includes 299 units) until advanced to candidacy for the doctoral degree. Units of 299 are to be assigned when doing supervised preparation for comprehensive or qualifying exams.

You should not enroll for more than 16 units of 100 and 200 level courses combined, or for more than 12 units of 200 level course work. But basically, **FULL TIME ENROLLMENT** is 12 units.

If you are a TA you are not expected to enroll in more than 9 units of seminars or graded course work, but should try to attain the expected 12 unit load with appropriate 299 units and credit for courses in technique of teaching and laboratory supervision.

Research Assistants. RA's should enroll in 12 units. This load should include the appropriate number of 299 research courses.

Exceptions to the 12 unit rule are: part-time students, first quarter international students, and other students with special circumstances. If you have special circumstances which make a 12 unit load difficult, please have your graduate adviser contact Graduate Studies.