Integrative Biology: Ecology, Evolutionary and Organismal Biology (IB).

The Integrative Biology Graduate Program was approved by the Faculty in May, 2006, replacing the previous EEOB program.. Below is a short (highlights) and detailed description of the program; hopefully clearer than that presented in the Graduate Handbook (which will soon be revised, hopefully for clarity).

Richard Vogt, Graduate Director of Biological Sciences
9/1/06

PROGRAM HIGHLIGHTS BELOW - FULL DETAILS ON PAGE 3-4

Ph.D. students.

Curriculum. There are no specific course requirements. You are expected to develop a curriculum that is appropriate to their research interests and academic development, in consultation with your professor (and committee). This can include courses offered at USC, other universities, workshops, or other creative venues. You are not hear to take courses per se, but to develop into a creative and independent scientist. Courses are intended to augment your already extensive education in a manner that empowers you towards your ultimate goals. You must submit a preliminary plan of your intended curriculum to me (the Graduate Director) in January of your first year. You will submit a formal plan, in the form of a "Program of Study" to the Graduate School at the end of your second year.

Committee. You are expected to establish a Provisional Committee (your professor, 3 additional members of the Dept. and 1 member outside the dept.) during your first semester. You will obviously need to do this with the help of your professor. Membership can change at any time at your request (in consultation with your professor). The title of this committee will change when you "advance to candidacy", but this committee will guide you throughout your graduate studies.

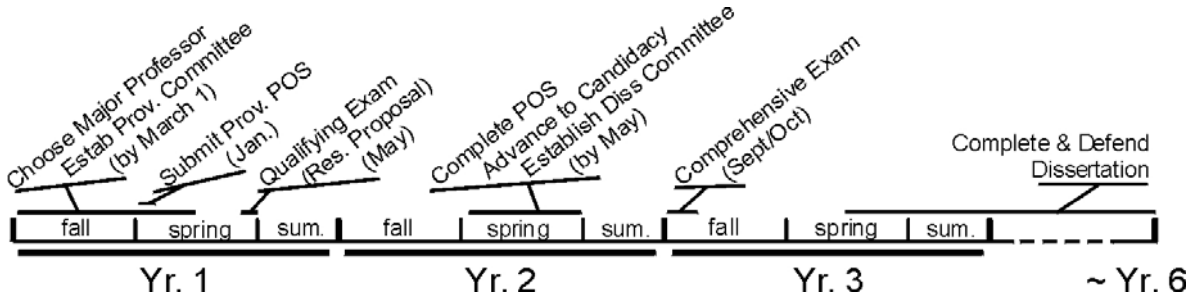
Qualifying Exam. You must write and present a research plan re. the work you plan on doing over the next few years in your professor's lab. This is due at the end of your first year, in May. This experience is not intended to be punitive; it is solely intended to help move you towards your goals. Through this process you should become familiar with the literature and research history of your professor and professor's lab, and establish a research plan that will empower you to move forward rapidly. Obviously plans and realty change; the proposal will not be binding. A course focusing on grant writing and other aspects of research will be offered in January to help guide you in this process. This course will likely be co-taught by Jim Morris and Richard Vogt (currently COSM 702) and will meet once a week, probably in the evening - details to follow).

Successful completion of your Qualifying Exam and completion of your curriculum plan (Program of Study) will advance you to candidacy.

Comprehensive Exam. This is the biggie... You must take a comprehensive exam during Fall term of your third year. In the current form, your committee will present you with a collection of questions; you will select several and write essays inspired by these questions over the course of one week. And you will orally defend your essays before your committee. The actual form of this exam will be determined by you and your committee.

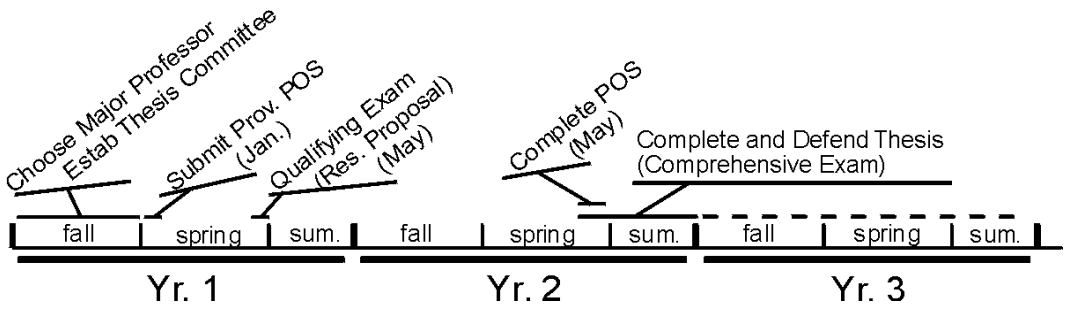
Dissertation. You must write and defend (orally) a research dissertation. Your professor will have specific expectations, but if a M.S. thesis consists of one publishable paper, a Dissertation might consist of at least three publishable papers, plus an introductory chapter that establishes a context for your work, and an final summary chapter that brings your work together. For guidance... look at dissertations that have already been produced by your professor's students. Attend Dissertation defenses and look at Dissertations of your fellow students. There is currently no requirement that your work be published, but it is strongly in your interest that you do publish your work, and that you publish some of it while a student. You should expect to complete your Ph.D. within 5-6 years.

Ph.D. Timeline



M.S. students.
If you are a M.S. student, you will follow the same path as the Ph.D. student, except that for your Comprehensive Exam you will write a thesis and orally defend it before their committee. A M.S. committee consists of only three faculty members, including your professor. Your professor will have specific expectations, but your thesis should consist in scope of at least one publishable research project. Though there is currently no requirement that your work be published, it is strongly in your interest that you do publish your work. For guidance... look at theses that have already been produced by your professor's students. Attend Thesis and Dissertation defenses and look at Theses of your fellow students, past and current. You should be able to complete your M.S. degree within 2 years, or at most three years.

M.S. Timeline



NUMBERS:

1. **Number of credits to register.** Students must register for at least 6 credits for each of Fall and Spring terms and 1 credit for one summer term if they are supported by a TA or RA (you may find yourself registering for more than 6, especially if you are taking several classes - fees are per credit).

2. **Number of credits to graduate (Ph.D.).** Ph.D. students must accumulate 60 credits in order to graduate, 12 of these (no more, no less) must be Biol 899. Ph.D. students entering with a M.S. need only complete 30 credits, but 12 of these (no more, no less) must be Biol 899. The majority of credits will likely be 798 and 899 (Research and Dissertation Prep.). [@ 13 credits per year, a Ph.D. degree can take a minimum of 5 years]

3. **Number of credits to graduate (M.S.).** M.S. students must accumulate 30 credits in order to graduate, 6 of these (no more, no less) must be Biol 799. The majority of credits may be 798 and 799. [@ 13 credits per year, a M.S. degree can take a minimum of 2.5 years]

4. **798, 799, 899 Research Credits.** These course numbers apply to Research Credit. If you are not taking 6 credits of actual lecture courses (which is usually the case), you should register for Research Credits (798, 799, or 899) using a section number designated for your Professor. Technically 798 is called "Research in Biology" and is the generally appropriate course number. However, the University has the above requirements for 799 and 899 for M.S. students and Ph.D. students, respectively ("Thesis Preparation" and "Dissertation Preparation"). In the culture of our discipline, you will be doing almost the exact same things under either designation. However, the University has imposed this requirement and attention must be paid to these details.

   My recommendation is...
   - **M.S. students:** register for 799 as soon as you can, and once 6 credits are earned, register for 798 until you graduate.
   - **Ph.D. students:** register for 798 until you are Advanced to Candidacy (by end of year 2). Then register for 899 until 12 credits are earned, and then register for 798 until you graduate.

   Almost all problems can be fixed (e.g. students hoping to graduate without having taken the requisite number of 899 and 799 credits), but it is helpful not to have to fix to many. We will monitor your progress, etc., but you should not trust us and should rather be proactive in ensuring that you are following these imposed rules.

Details: Integrative Biology: Ecology, Evolutionary and Organismal Biology (IB).

This path is well suited for students with diverse interests, that may well include molecular biology and genetics and/or biomedical research, developmental biology or physiology as well as ecology and evolutionary biology. Students following this path are presumably interested in the interrelations and interactions of systems.

Students develop a curriculum that is suited to and tailored to their interests and goals, with the assistance of their Major Professor and Provisional Committee. The same plan is appropriate for both M.S. and Ph.D. students, with the exception that M.S. students are not required to take a Comprehensive Exam.

In brief, each student will ...

1. form a Committee which, with their Major Professor, will steward each through his or her degree;
2. develop a Curriculum that is tailored to his or her goals and interests;
3. take a Qualifying Exam in the form of writing and presenting a proposal of his or her planned thesis or dissertation research;
4. take a Comprehensive Exam (Ph.D. only) that explores the breadth of his or her knowledge within and around the chosen discipline;
5. write and defend a thesis (M.S.) or dissertation (Ph.D.).

1. Committees (Year 1) (M.S. and Ph.D. Students).

Ph.D. Students should form a Provisional Committee as early as possible, but no later than March of their first year, in consultation with his or her Major Professor (5 members, one of whom is outside the Dept.). A Dissertation Committee with the same make up must be formed upon Advancing to Candidacy (both committees can have the same membership). Students can change committee membership at any time (consult with Major Professor and notify the Graduate Director). Each student must meet with his or her Committee at least once a year. The Dissertation Committee will conduct the Comprehensive Exam and oversee the successful completion of the Dissertation, and will exam the student over his or her Dissertation. The student must present a public seminar on the subject of his or her Dissertation.

M.S. Students must form a Thesis Committee as early as possible, but no later than March of their first year, in consultation with his or her Major Professor (3 members, all can be within the Dept., in consultation with your Major Professor). Students can change committee membership at any time (consult with Major Professor and notify the Graduate Director) The Thesis Committee will oversee the successful completion of the Thesis, and will exam the student over his or her Thesis. The student is encouraged but not required to present a public seminar on the subject of his or her Dissertation.

2. Curriculum (Year 1) (M.S. and Ph.D. Students).

Each students must develop a curriculum plan in consultation with their Major Professor and Provisional Committee. Students must present a Provisional Program of Study to the Graduate Director by January of their first year. This can consist of courses offered at USC in any Department, or courses or educational experiences offered outside USC (e.g. special courses in Europe or at Biological Field Stations). This curriculum plan should be designed to (1) empower students to be successful in their chosen area of research and (2) to prepare students for their Comprehensive Exam. There are no specific course requirements, though students in certain disciplines may be encouraged to participate in specific courses.

A formal Program of Study (POS) must be submitted to the Graduate School at the end of the second year, detailing the actual course of study taken and approved by the Committee, the Head of Integrative Biology and the Graduate Director; this POS is revised at the time of degree completion.

Discipline Specific courses being offered Fall 2006 include...

Advanced Undergrads and Graduate Students	Graduate Students Only
Biol 523, Plant Development	Biol 711, Structure and Function of Nucleic Acids
Biol 530, Histology	Biol 717, Biological Chemistry
Biol 541, Principles of Biochemistry	Biol 750, Advances in Biological Oceanography
Biol 543, Comparative Physiology	Biol 752, Marine Biogeochemistry
Biol 552, Biochemistry/Molecular Biology I	Biol 764, Advances in Plant Physiology
Biol 575, Marine Ecology	Biol 765, Theoretical Ecology
Biol 640, Microbial Ecology	Biol 766, Evolutionary Biology
Biol 641, Biophysical Ecology	
Biol 653, Bioinformatics	
Biol 655, Biotechnology	
Biol 671, Plant Responses to the Environment	

Note... Students should consider 500 and 600 level courses to meet specific but significant deficits they might have from their undergraduate studies. The above list only includes courses in Biological Sciences; other Departments have courses that may also be of interest (Marine Science, Public Health, Chemistry, Psychology, Medical School, etc.)

3. Qualifying Exam and Grant Writing Course (Spring Term, Year 1) (M.S. and Ph.D. Students). Each student must develop, write and present a research proposal, in the style of an NSF grant, at the end of their first year. This should be a plan of research to be pursued as his or her thesis or dissertation, and should be developed with consultation of his or her Major Professor. The goal is to help the student move forward rapidly with his or her research program, becoming familiar with the literature and issues relevant to their chosen area of study. To support this effort, a **Grant Writing Course** will be offered Spring term, meeting one evening a week, with the goals to (1) understand the structure of a grant proposal, (2) develop appropriate questions and focus, (3) develop a literature based background, and (4) develop of a research plan. It is expected that several faculty will participate in this course and that the course will be highly interactive. Students will present their plans orally in a seminar format at the end of Spring term. A successfully written and orally presented proposal will be construed as passing the Qualifying Exam.

4. Advancement to Candidacy (Ph.D. students). Advancement to Candidacy will occur with the successful completion of the Qualifying Exam and the submission of / completion of the Program of Study.

5. Comprehensive Exam (Fall Term, Year 3) (Ph.D. Students). Each Ph.D. student will take a Comprehensive Exam, during the early part of Fall Term of Year 3, and administered by his or her Dissertation committee. The exam may take any form the student and committee determine, but is recommended to be in the form of questions submitted by committee members that explore diverse topics within and surrounding the interests of the student. The student will select a specified number of questions and have one week to write appropriate responses. The students will both submit written responses and will be orally examined by their committee in which discussion is guided by the questions and student responses. Students will be evaluated on the quality of these essays and oral responses to questions. Committees should prepare students in advance through curriculum and intellectual guidance.

6. Thesis or Dissertation. The degree is culminated by the writing and oral defense of a Thesis (M.S. students) or Dissertation (Ph.D. students). The difference (thesis v. dissertation) is primarily one of scope: a thesis might include one publication worth of research while a Dissertation might include several publications worth. At the current time there is no requirement for actual publication, but students are strongly encouraged to publish early and often. The Thesis or Dissertation is developed with strong early and ongoing input from the Major Professor and oversight of the Committee. Ph.D. students must present a public seminar on their Dissertation, and will defend their Dissertation orally with their committee. M.S. students must also defend their Thesis orally with their committee; M.S. students are not required to present a public seminar, but are nevertheless encouraged to do so.