PH.D. IN BIOLOGY

1. Credit hours: a total of 60 credit hours (including both course and research credit hours) beyond the Bachelor’s degree are required:
   - At least 18 course credit hours that are not from the independent study series, including the two semester departmental core courses for graduate students and at least one graduate course in statistics. The independent study series is:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIL 675</td>
<td>Advanced Study in Plant or Animal</td>
<td>1-6</td>
</tr>
<tr>
<td></td>
<td>Sciences</td>
<td></td>
</tr>
<tr>
<td>BIL 678</td>
<td>Current Topics in Biological Research</td>
<td>1</td>
</tr>
</tbody>
</table>

   At times these course numbers are used by professors to teach a new course or a special topics course, however, in which case the corresponding credit hours can be counted as a non-independent study credit hour. Course selection requires committee approval.
   - At least 12 research credit hours (BIL 830 and/or BIL 840). Once the overall number of required credit hours (see below #8) has been reached, there is no need to take additional research credit hours.
   - An additional 30 credit hours from any combination of graduate courses (600 level regular courses and independent study courses) and research credit hours (800 level) to bring the total number of credit hours beyond the Bachelor’s Degree to 60 credit hours. (One example: 18 required course credit hours + 12 required research credit hours + 15 additional course credit hours + 15 additional research credit hours = 60 total; another example would be 18 additional course credit hours and only 12 additional dissertation credit hours, etc.)
   - Students who already have a Master’s Degree in the same field may not need as many course credit hours (consult Graduate School rules on transfer credit hours), but at least 24 credit hours must be taken in residence at UM.
   - The committee may decide that students with previous graduate level courses may be exempt from some of the course requirements.
   - The minimum acceptable grade average in all coursework towards the degree is a “B (3.0)” and no grade may be below a “C.”
   - CONCEPTUAL AREAS: Students are encouraged to take courses and independent studies from at least 3 main conceptual areas, and are urged to take courses and independent studies that will prepare them for research and for the comprehensive qualifying exam. Students also are encouraged to participate in seminars and study groups and to take special courses in other departments of UM, at our Coalition for Excellence in Tropical Biology partner institutions, from the Organization for Tropical Studies, or other special interdisciplinary courses. Such courses should be appropriate to their course of study and research area as determined by their committee. Conceptual areas offered in our department include: EVOLUTION (graduate level evolution courses are in the 620’s series); ECOLOGY (graduate level ecology courses are in the 630’s series), BEHAVIOR (graduate level behavior courses are in the 640’s series); GENETICS AND MOLECULAR BIOLOGY (graduate level genetics and molecular biology courses are in the 650’s series); and PHYSIOLOGY AND CELL BIOLOGY (graduate level physiology courses are in the 660’s series). Special concentrations in our department and/or in collaboration with other departments include: Tropical Biology, Mathematical Ecology, Neuroscience, and Behavior.

2. Comprehensive qualifying exam should be passed by the end of the third semester.
   - A single committee (see number 9 below about committee membership) will advise the student on both comprehensive and research training. To fulfill the comprehensive function, the committee will be responsible for ensuring breadth, significant background and depth in at least 3 conceptual areas (examples include but are not limited to the areas listed above).
   - To establish intellectual communication between the committee members and students early on, the committee will begin to work with the student in the first semester. Faculty will suggest reading lists, courses and/or independent study, as needed, to prepare the student with sufficient background for the comprehensive examination which will include 3 areas, one of which is the research area. The committee and student will interactively define the scope of comprehensive training and thus of the comprehensive examination in these 3 areas.
   - The comprehensive examination will be held in the third semester. The committee will designate a chair to administer the examination. The chair of the comprehensive examination will not be the graduate advisor. The written part of the exam will not be open book and it will be administered on campus for a discrete period of time (up to 4 hours within each of two consecutive days) by the examination chair. All members of the committee will grade all the questions. With committee approval, an alternative is to present to the committee a first-authored, publishable, full-length article manuscript concerning research conducted since matriculation at UM. Before the end of the third semester, the manuscript must be submitted to a journal approved by the committee (refer to the Department of Biology Graduate Student Handbook for additional details concerning the alternative qualifying exam). After the committee has read the written answers or manuscript, about one week later there will be an oral exam for the purpose of further exploring the student’s grasp of the subject matter.
   - Each committee member will decide on a pass/fail grade based on the total performance (written plus oral). For the student to pass the examination, 3 of the 4 examiners must vote a grade of pass. An oral and written summary of the committee’s evaluation must be prepared by the chair of the examination committee and given to the student and to GAAC. If the student does not pass the examination, there will be a chance to retake it the following semester. In the case of failure a second time, he/she will be terminated from the program.
   - At time of completion of the oral examination the examination committee must provide the Graduate Director with a completed SACS evaluation form, the student is responsible for ensuring the Graduate Director receives this form.

3. Research proposal: public presentation of a research proposal and defense of a written research proposal to the complete research committee (see below) should be completed by the middle of the fourth semester. Students are encouraged to follow the format of a grant proposal to a major funding agency. At the proposal defense, the student will receive either a pass or a fail. A grade of pass will be recorded if no more than one member of the complete research committee (see below) votes to fail the student. If the student fails
the proposal defense, she/he will be given a second chance to defend no later than the sixth week of the fifth semester. If the defense is failed a second time, the student will be terminated from the program. At time of completion of the proposal defense the complete research committee must provide the Graduate Director with a completed SACS evaluation form, the student is responsible for ensuring the Graduate Director receives this form.

4. Admission to candidacy: (application is made on a form available in the grad school and in the department). This normally will occur at the end of the fourth semester. Requirements are to pass the comprehensive examination and to successfully defend a written research proposal and to have complete SACS evaluation forms from both the qualifying exam and the proposal defense on file.

5. Teaching: All students on the Ph.D. track in Biology are required to serve satisfactorily at least one semester as a teaching assistant in one of the courses offered as part of the Department’s training program.

6. Grants: Submission of a grant proposal to a major funding agency (e.g., NSF, NIH, National Geographic, World Wildlife Fund, etc.) is required. All students are required to seek outside funding for their research. This must be a research project proposal. Application for an NSF pre-doctoral fellowship does not meet this requirement, but application for an NSF dissertation improvement grant does qualify.

7. Ph.D. Dissertation: A well-written and successfully defended dissertation containing an original contribution to the field and of quality appropriate for publication in a scientific journal; a defense is successful if all members of the committee sign the grad school form and the signature page of the dissertation. A public dissertation seminar also is presented at the time of the defense. Following the defense the committee is required to provide the Graduate Director with a completed SACS evaluation form.

8. Other requirements described under “Doctor of Philosophy,” including but not limited to:
   • a total of at least 60 credit hours (course credit hours plus research credit hours).
   • once a student has completed all required credit hours, she/he must enroll in “Research in Residence” (BIL 850) status until the degree is granted. This course carries 0 credit hours, but is considered full-time enrollment. Even though no credit is earned, a tuition charge equivalent to 1 course credit hours normally applies to this course.

9. A single committee will advise the student on both comprehensive and research training. The committee will be responsible for ensuring breadth, significant background and depth in at least 3 conceptual areas (examples include but are not limited to the areas listed above). The research function of the committee is to advise the student on research, including preparation, training, project choice, project design, implementation and evaluation of the research. The committee will go through several phases and its membership will be determined by the advisor and student together, contingent upon approval of GAAC and/or the Graduate School, as appropriate at each phase:
   • The initial committee will consist of at least 4 faculty, 2 appointed to ensure breadth of training (from two areas outside the research area) and 2 from the research area. It will be formed to help the student choose courses during the first few weeks of the first semester. This committee will decide whether students having a M.S. in biology (botany, zoology, etc.) from another institution can substitute a graduate level course taken elsewhere for a departmental course requirement; it also will decide which additional courses should be taken for both research and breadth. The choice of areas briefly will be outlined in a memo to GAAC.
   • The initial committee of at least 4 faculty will be responsible for preparing and administering the comprehensive examination.
   • The complete committee of at least 4 faculty including one from outside the department, should be formed by the end of the third semester; all four members should participate in the proposal evaluation which will take place in the fourth semester. The committee will consist of a minimum of four faculty, which includes the committee chair, who must be a member of the Graduate Faculty. Of the remaining members, it is also required that two shall be from the Graduate Faculty.
   • The dissertation committee (of four) is formed officially when the student is admitted to candidacy. It usually will comprise the same individuals as the complete research committee, or it may be formed anew. The student and advisor consult on the membership of the committee, and the department nominates the committee to the graduate school. The committee will consist of a minimum of four faculty, which includes the committee chair who is the advisor, who must be a member of the Graduate Faculty. Of the remaining members, it also is required that two shall be from the Graduate Faculty and one from outside the department of concentration. The dissertation committee is nominated by the department, but it must be approved and appointed by the Dean of the Graduate School. There is a special form that must be filed with the graduate school.
   • Committee meetings are required at least once a year (recommended at least once a semester in the early phases). The student is responsible for arranging meetings; the student should consult with the committee about any major changes in research goals and any problems; memos summarizing each meeting should be in the student’s file.

10. About the time table:
   • The written comprehensive qualifying examination must be passed by the end of the third semester.
   • A polished, written dissertation proposal must be defended to the committee in the fourth semester together with a public presentation of the proposal. This must take place by mid-April of the spring semester or mid-November of the fall semester.
   • Admission to candidacy normally occurs after the comprehensive qualifying exam and proposal defense are passed upon the recommendation of the committee and the approval of the Graduate School. Application for admission to candidacy is made to the graduate school on a special form.
   • Analysis of data and a polished draft of the dissertation should be completed and in the hands of the dissertation committee no later than the middle of the tenth semester.
   • Defense of the dissertation and its submission to the Graduate School must meet or precede the deadline for graduation immediately following the tenth semester unless an extension has been approved by GAAC upon recommendation of the dissertation committee. Notice of the defense and of the public seminar must be submitted on a special form to the graduate school in advance of the defense and must be posted publicly in the department.
• The oral defense of the dissertation must be given during regular sessions of the Fall or Spring semesters, not during summer sessions, intersessions, reading days or finals weeks.

• No student may receive the degree in the same semester in which she/he is admitted to candidacy.

• The indicated dates form firm deadlines. A student’s committee, however, may submit a written petition to GAAC for an extension of time detailing reasons for the request. An extension will be granted only under extraordinary circumstances and will be effective upon written approval by GAAC.

• Proposals to change the schedule for any reason should be preceded by a study of the graduate bulletin sections on leaves of absence, full time student status and recency of credit hour, and explicitly should address how the proposed change of schedule relates to these matters. The memo requesting the change also should address the proposed financial support of the student beyond the 10 semesters of normal departmental support.

11. Public presentations must be during regular semesters. The public presentation associated with the defense of the proposal and the public seminar associated with the defense of the dissertation must be given during regular sessions of Fall or Spring semesters, not during summer sessions, inter-sessions, reading days, or finals weeks.

12. Completed SACS evaluation forms are required at three points during the course of study. One following the qualifying exam, one following the proposal defense and the final following defense of the dissertation. The student is responsible for providing blank forms to the committee at each milestone. The graduate advisor is responsible for forwarding completed forms to the Graduate Director. The student is responsible for ensuring the Graduate Director receives these forms.