

UNIVERSITY OF ROCHESTER
DEPARTMENT OF BIOLOGY

HANDBOOK FOR
THE
Ph.D. PROGRAM

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by vote of the Faculty of the Department of Biology

University of Rochester
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These regulations are published for the guidance of candidates for the Ph.D. degree in Biology and their faculty advisors. They should be read in conjunction with the descriptions of the Department's graduate programs and the related University and College regulations printed in the Graduate Bulletin and in "Regulations Concerning Graduate Study." From time to time, changes in the timing or content of the program may be authorized by the Department in response to particular situations. Written requests for such changes should be directed to the Graduate Affairs/ Admissions Committee (GAAC).

I. COURSE WORK

A. Credit Hours

90 credit hours are required for completion of the Ph.D. degree. For students entering with an MS or MA, it is usually possible to transfer 30 credit hours toward this requirement. Credit hours include both coursework and research. The normal load is 16 credit hours in semesters in which no teaching is done, and 12 credit hours in semesters in which a teaching position is held.

Once a research advisor has been selected, students must register each semester for a sufficient number of credit hours in Biology 595 (Ph.D. Research in Biology) to bring the total to 12 credits. After a total of 90 credits has been achieved, the student should register for Biology 999 (Doctoral Dissertation). Students do not formally register for credit during the summer, but are required to do full-time research during this period.

During the first year, students are advised and their registration forms are signed by members of the GAAC. Students in the GEBS program will be advised by the graduate committee of the cluster in which they entered. In subsequent years, registration forms are signed by the student's advisor.

Dropping a course, or carrying a reduced credit load (fewer than 12 credit hours), is unusual and may only be done with the approval of the GAAC.

B. Course Requirements

Students whose interests are in cell, developmental or molecular biology must take a minimum of six courses during their graduate career, selected according to background and research interests. Courses required are Biochemistry (IND 408), Eukaryotic Gene Regulation (BIO 443), Cell Biology (BIO 420) and Topics in Cell, Development and Molecular Biology (BIO 581). In selecting other courses, those offered by the Biology faculty should be chosen first, as they are designed to provide adequate training for Biology students. Each course must be \geq three credits and one of them should be a Biology Department course. Students whose interests are in ecology and evolutionary biology are required to take Advanced Ecology and Evolutionary Biology A-D (BIO 471, 472, 473 and 474) and three additional lecture or reading courses (each of which must be \geq three credits). Courses will be selected, in consultation with a faculty advisor, to assure appropriate depth and breadth of preparation.

Students who have taken graduate courses prior to entering the Ph.D. program may petition the GAAC for a reduction in the number of required courses.

C. Laboratory Rotations

Incoming students are required to rotate through three research laboratories in the first year in order to become acquainted with faculty and to aid in selection of a research advisor. A student is allowed to do no more than one rotation outside of the Biology Department. Students who enter the Ph.D. program with at least two years of prior post-undergraduate training in biology may petition the GAAC to allow two rotations in the same laboratory. Each rotation is approximately 10 weeks long, and occupies an average of 12-15 hours/week.

Rotations are taken consecutively, and all three rotations are completed by the end of the Spring Semester. Students should sign up for BIO 480 (4 credit hours each semester). Actual time periods may vary because of holidays, but it is assumed that significant time will be spent in the laboratory during the long break between semesters.

In order to select laboratories for rotation, students need to become familiar with the research programs of the faculty. Faculty members who are accepting students into their laboratories will usually present a short, informal talk to all interested students. The secretary to the GAAC will schedule these talks during orientation week (the week prior to the start of classes).

During the first week of classes, each entering student should submit two choices for the first laboratory rotation, in order of preference. The GAAC will then make assignments, attempting to give students their first choice. The second and third laboratory rotations will be assigned in November. BIO 480 will be graded on a Satisfactory/Unsatisfactory basis. However, written evaluations of laboratory skill and effort will be solicited from the faculty for each rotation, and will become part of the student's permanent file. Choices of laboratories for rotation do not indicate a commitment to stay in any of the labs for the Ph.D. research and although infrequent, students sometimes change advisors even after they have selected them.

D. Seminar Requirements

All students are required to participate in a minimum of four seminar courses in which they make oral presentations. EEB students will meet this requirement in BIO 584 and CDM students will meet this requirement by taking three BIO 516 seminars and presenting in BIO 517 every Spring semester. First year students and advanced students who will defend their dissertation by the end of the following Fall semester are not required to present in BIO 517. Both EEB and CDM students may petition the GAAC to have one oral presentation at a national or international meeting count towards the seminar requirement. Students must complete the seminar requirement by the end of their fourth year in order to avoid tuition charges.

E. Foreign Language

The Department has no formal language requirement. However, individual faculty mentors have the option of requiring their students to demonstrate competence in a language.

F. Grades in Graduate Courses

Grades for graduate courses (and research) are reported using the following notations. Courses are either graded as **Satisfactory/Unsatisfactory**, or using letter grades.

A	(Excellent)	E	(Failure)
A-		I	(Incomplete)
B+		IE	(Incomplete & Failure)
B	(Good)	W	(Withdrawn)
B-		N	(No Report)
C	(Poor)	S	(Satisfactory)

Students are expected to maintain at least a B average. Minimum passing grades for courses and research carrying credit are C or S. However, a student can get credit for only one C during the course of their graduate studies. A student who receives the grade of C in one or more courses or the grade of E in one or more courses will be considered to have an unsatisfactory record and will be automatically placed on academic probation. A student on academic probation may not be awarded a graduate degree. A student will be removed from academic probation if he/she completes 12 semester hours of graduate credit with no grade lower than B-. If the student receives a grade below B-, the student is subject to removal from the program.

II. TEACHING

Teaching is valuable for training students in the process of organizing and presenting material, and for expanding their background in various instructional methods. Candidates for the Ph.D. degree are required to serve as teaching assistants for a minimum of two semesters. Students must teach during any semester in which they are supported with University teaching funds. (MD/Ph.D. candidates who are supported by fellowships are exempt from teaching.)

TA assignments are made by the GAAC in late summer. Every attempt will be made to assign students to the courses of their choice, while still providing appropriate coverage of courses. Students gain experience in various kinds of teaching situations (labs, recitations, introductory, and advanced courses). They may also be assigned to TA in courses in which they wish to review material.

The instructors for courses to which a graduate student is assigned are asked to submit a written evaluation of teaching performance. Questionnaires are also completed by students in the courses. These are returned to the Department office and become part of the graduate student's permanent record. TAs are encouraged to examine the completed questionnaires.

Monitoring TA performance

- a. At the beginning of the semester, the instructor will provide the TA with a written description of specific duties, time commitment (hours/week), etc. and meet with him/her to discuss these duties and how performance will be evaluated.
- b. Faculty will monitor TA performance throughout the semester. A formal, mid-course evaluation by the students may be appropriate.
- c. If, at any time during the semester, the instructor thinks that a TA is doing an unsatisfactory job, (s)he will meet with the TA to discuss the problems and indicate actions that should be taken to improve performance. If adequate improvement is not made, the instructor will send a formal letter to the GAAC. The GAAC will solicit a response from the student. A GAAC member will check on the TA's performance, for instance by dropping in unannounced during recitation or lab sections.
- d. If the TA's performance does not improve sufficiently in the judgment of the GAAC, the student will not be granted credit for having taught the course.
- e. If a TA does an unsatisfactory job in one course, then the student will teach an additional course. If one does an unsatisfactory job in two courses, this will be grounds for disciplinary review by the GAAC.

III. QUALIFYING EXAMINATION

The Ph.D. Qualifying Examination consists of a written thesis proposal and an oral examination. The oral exam is intended to determine whether a student is prepared to pursue a professional career in science, as demonstrated by successful defense of the proposal. The exam also will test general knowledge of biology and, in greater depth, knowledge within the students' field of interest. The Qualifying Exam is given in June of the second year.

Preparation of the thesis proposal for the Qualifying Examination should be a realistic training experience that involves developing a feasible research project and presenting it in concise and cogent prose. It is impossible to regulate uniformity in this process such that all students receive equal input from their faculty and graduate student colleagues, nor would any member of the faculty attempt to prepare a proposal without using all available resources. Therefore, students should feel free to use any kind of information available to them. These may include recent grant proposals, review articles, conversations with faculty and other students, previous thesis proposals and, of course, the original literature. The student should indicate clearly in the proposal the resources

used in its preparation and the origins of major experimental approaches. For example, a major question or approach incorporated directly from a review or grant proposal should be identified as such by citing it. Any aspect that has been discussed extensively with others should be footnoted. It is not necessary to identify resources for standard methodologies although unusual procedures should be referenced appropriately in the text.

The suggested format for the thesis proposal is that used for a research grant. It should include an introduction providing a brief background to the research, a list of specific aims, a description of experimental procedures, and presentation of preliminary data that have been obtained by the student to demonstrate the feasibility of the approach. The advisor must sign the thesis proposal, indicating that (s)he is willing to allow the research to be carried out in her/his laboratory. The advisor should also indicate his/her level of input into the proposal. This might include, for example: provision of a recently submitted proposal or one in preparation; suggestions to expand and/or clarify specific parts of the proposal; discussions on the preliminary data to be included, and its interpretation; identification of missing background information; and text editing for grammar, syntax or clarity.

A copy of the thesis proposal must be distributed to the examining committee and filed with the secretary of the GAAC at least one week prior to the oral exam. The proposal should be less than or equal to 10 pages, single spaced, excluding figures and references.

The examining committee is selected by the GAAC and approved by the Associate Dean of Graduate Studies of the College. It will consist of four members one of whom may be from outside the Department. The student's advisor will not be present. The committee will be chaired by the most appropriate faculty member.

After the questioning is concluded, the candidate will be asked to leave the room and each committee member in turn will discuss the strengths and weaknesses of responses to his/her questions. The committee will also list major strengths and weaknesses of the research proposal. When discussion has been completed to everyone's satisfaction, an anonymous written, pass/fail vote will be taken.

Within one week of the exam, each member of the committee will provide the committee chair with a summary of his/her questions and evaluation of the responses. The chair will use these to prepare a summary for transmission to the student. Comments of individual faculty will be retained in the student's file, and treated as confidential.

Results of the Qualifying Examination are reported in writing to the GAAC by the examining committee. The committee may:

- a. Declare that the student has passed the examination. (The University regulation states that a vote to pass the candidate must be approved by at least three-fourths of the examining committee.)
- b. Declare that the student has not passed the examination. In this case, the GAAC, in consultation with the student's advisor and other faculty, will recommend to the Department whether the student should be terminated from the program or allowed to retake the exam. The student may be terminated from the program with or

without a master's degree. If terminated without a masters degree, the student may petition the GAAC to take a written master's exam.

After successful completion of the Qualifying Examination, the Chairman of the GAAC informs the Associate Dean of the College for Graduate Studies. On the recommendation of the Associate Dean, the student will be advanced by the University Dean of Graduate Studies to the status of Candidate for the Degree, Doctor of Philosophy. Successful completion of the Qualifying Examination and a total of 30 credit hours also entitles the Ph.D. student to a Master of Science Degree under Plan B (see Graduate Bulletin).

IV. RESEARCH

The most important part of the work leading to the Ph.D. degree is the independent research that leads to the preparation of a thesis. The following sections outline the formal mechanisms for guiding thesis research and monitoring its progress.

A. Selection of a Research Sponsor

During the first year, students become familiar with the research of faculty through lab rotations, seminars, reading published work, and conversations with individuals. By the announced deadline (usually the end of April), first year students submit their first and second choices for a research sponsor to the secretary of the GAAC. The involved faculty will then be notified, and the students informed promptly as to whether or not they can be accepted into the lab of their first choice. Students will be matched with their highest possible choice. The research sponsor becomes the student's academic advisor, and recommends courses that should be taken or audited.

The time of selection of a research sponsor usually falls in the middle of the third lab rotation period. Students must complete this rotation with maximum effort, regardless of whether or not they are in their future research lab.

In general, students should choose Biology faculty members as their research sponsors. If a mutually satisfactory match between a student and a Biology faculty member cannot be found, the student is allowed to choose a faculty member outside of the Biology Department, but he/she will remain in the Biology graduate program, and be subject to all of its requirements including the teaching requirement. However, if the outside PI's research field does not overlap with the collective expertise of the Biology faculty, then the student is allowed to transfer to the PI's resident department.

In rare cases, a faculty member or a student may decide that continuation in the chosen research laboratory is undesirable. Current University policy allows a faculty member to resign as an advisor if the student is making unsatisfactory research progress. In the Department of Biology, the reasons for requesting a student to leave a laboratory must be thoroughly documented by the research sponsor, in writing, to the GAAC, and a copy of the letter must be supplied to the student. Such action is to be taken only after the research advisor has warned the student, over the course of several months, that continuation in the laboratory is in jeopardy and that this

warning has been communicated to the GAAC. After receiving such a letter, the student will have 60 days to find a new research advisor. If unable to do so, the student must leave the Department.

A student who is contemplating changing research laboratories must first discuss such a move with the current research sponsor or the Chairman of the GAAC. If it appears that no mutually agreeable resolution can be reached, the student must write a letter to the GAAC indicating the intention to leave the laboratory and describing how the student plans to complete his/her thesis research. It is the mutual obligation of the student and the sponsor to go over research materials and to attempt to conclude any short-term projects before departure. Any disputes will be resolved by the GAAC. The student and sponsor must inform the GAAC of the date the student will be leaving the lab (regardless of whether the student is staying in the Department or leaving the University).

If a research sponsor leaves the University, a student in good standing has several options. Students who have just started research may choose to remain in the Department with a different sponsor and project. For students who are at a more advanced stage in their Ph.D. research (e.g., have completed the Qualifying Exam, and/or have made substantial progress on a project), continuation may either be in residence or *in absentia*. Students remaining in residence must have a sponsoring laboratory in which their research can be completed. Written notification of this arrangement must be sent to the GAAC and must be approved by the sponsor, the head of the sponsoring laboratory, and the members of the Thesis Advisory Committee. Students who move with their advisor and complete work *in absentia* retain their Thesis Advisory Committee, one member of which is appointed to obtain progress reports from the student. In either case, the thesis is registered and defended at the University of Rochester. University rules regarding the completion of a degree *in absentia* are contained in the Graduate Bulletin. Finally, a student may leave the program and obtain a degree at a different institution.

B. Thesis Advisory Committee and Progress Reports

Following completion of the Qualifying Exam, the student will meet with his or her Thesis Advisory Committee (TAC), which need not include the same members as the Qualifying Examination Committee. The first meeting should be held by the end of the fifth semester. Subsequently, the Thesis Advisory Committee must meet at least once a year to review the candidate's progress. More frequent meetings may be held at the request of the student or any member of the Thesis Advisory Committee.

The Thesis Advisory Committee is normally selected by the student and the research advisor to include faculty members especially knowledgeable in the research area. The committee is formally appointed by the Associate Dean of Graduate Studies. It must include at least three faculty members from the Department (one of whom is the research advisor) and a faculty member from outside the Department. The outside member is usually from another department at the University of Rochester but may be from another institution, if sufficient expertise is not available at the University.

At least one week before each meeting, the candidate will provide TAC members with a written report of work completed since the previous meeting. This report should be no more than five pages long (double-spaced, typed). A copy of the report should be filed with the secretary of the GAAC for retention in the student's record. Written assessments of the candidate's progress will be submitted to the GAAC by members of the Thesis Advisory Committee after every meeting. These reports will form the basis for the Department's recommendation regarding continuation in the Ph.D. Program. If more than two semesters and one summer elapse without a progress meeting, the student will not be allowed to register for the next semester.

TAC meetings are intended to be a constructive mechanism to assist the student in his/her progress toward an outstanding thesis. They should be used as opportunities to review results and focus research plans. However, they are not the only mechanism. Students are encouraged to consult with their sponsor, with members of the TAC, and with any faculty member or student whose expertise is of use.

C. Preparation and Defense of the Thesis

Once a student has completed the work agreed upon by the advisor and TAC, he/she writes a thesis. The format required by the Graduate School is described in a pamphlet available from the secretary to the GAAC or the Office of the University Dean for Graduate Studies. Note that a number of specific regulations dealing with the preparation and presentation of a dissertation are described in "Regulations Concerning Graduate Study." A "Ph.D. Calendar," which includes time requirements regarding thesis registration and defense, is issued each year by the University Dean's office.

Students are strongly encouraged to begin writing sections of their theses dealing with completed work, even while final research projects are being carried out. The style of the thesis (e.g., chapters based on papers, or a continuous results narrative) should be agreed upon by the student and the TAC at least six months prior to the intended submission date.

The final version of the thesis (as approved by the research advisor), must be registered with the Associate Dean for Graduate Studies of the College of Arts and Science, via the secretary for GAAC, at least twenty full working days prior to the date of the final oral examination. The Dissertation Examining Committee will normally consist of the members of the student's Thesis Advisory Committee and a chairman to be appointed by the University Dean of Graduate Studies. If the Thesis Advisory Committee did not include an outside member of the Department, the student and advisor must select a faculty member from outside the Department to sit on the Dissertation Advisory Committee.

The final oral examination will consist of a one-hour public seminar, followed by an open question and answer period. The candidate and the examining committee will then meet in private for additional discussion and the formal defense. A variety of outcomes of the defense are possible ranging from passing with no suggestions for revising the thesis, through requiring major revisions and possibly additional experiments or data analysis, to failing. Note that if the TAC has done its job and the

student has been receptive to its suggestions, there is little chance of failure. Also, it is rare that a thesis is accepted without some requirement for revision. After meeting the committee's requirements for acceptance, the student should provide one corrected copy of the thesis for the research sponsor, and must file two corrected copies with the Graduate Dean.

Note that University regulations state that no thesis defense may be scheduled during the month of August. While petitions to defend during this time can be forwarded to the University Dean of Graduate Studies, exceptions are rarely made by the Dean's office. Other deadlines regarding the Ph.D. thesis are published regularly by the University Dean of Graduate Studies.

University Regulations state that all work for the Ph.D., including final thesis defense, must be completed within seven years of the initial date of registration (six years if a Master's has already been awarded before matriculation at UR). This time limit can be waived only by action of the Graduate Dean on a request from the student that has been approved by the sponsor and the GAAC.

V. REQUIREMENTS FOR STUDENTS IN THE M.D./Ph.D. PROGRAM

M.D./Ph.D. candidates:

- A. are exempt from teaching.
- B. are not required to do laboratory rotations.
- C. will have the same overall coursework and exam requirements as Ph.D. students.

VI. EVALUATION OF STUDENT PERFORMANCE

The GAAC reviews the progress of students on a regular basis. First-year students are evaluated at the end of each semester. After that time, students are evaluated at least once a year based on the written reports of the TAC that are submitted after each committee meeting. In addition to indicating whether or not students are progressing satisfactorily, these reviews are used to identify potential candidates for departmental or University awards and fellowships. Documents used in assessing progress include grade reports, qualifying exam performance, written evaluations of lab rotations and teaching, and thesis committee reports.

Students will be notified by the GAAC in writing if there is a concern about performance. A decision to terminate a student from the program will only be made following detailed discussion by the GAAC in consultation with the student's advisor. The faculty of the Biology Department must approve such action by majority vote before any recommendation for academic termination is sent to the Dean.

VII. PROFESSIONAL CONDUCT

A. Ethics and Disciplinary Procedures

Graduate students are expected to maintain standards of the highest integrity in course work, in the conduct of research, and in the performance of teaching duties. As outlined in The University Regulations on Graduate Study (section on Disciplinary Procedures for Graduate Students), charges indicating that these standards have been violated will be reviewed by the appropriate departmental and University committees, and may lead to expulsion from the Ph.D. Program.

B. Vacation Policy

The department recognizes that vacations are important, both to enjoy the non-scientific aspects of life and to recharge your batteries. However, it is important that vacations be taken at opportune times so that they do not interfere with students' research progress and responsibilities as teaching assistants. Therefore students should be aware of the following vacation policies:

- Graduate students are entitled to official University holidays (New Year's Day, Memorial Day, 4th of July, Labor Day, Thanksgiving Day and the Friday following Thanksgiving Day, Christmas Day). In addition, reasonable accommodation will be made for students needing to observe religious holidays.
- All other absences must be approved in advance by the advisor.
- For first year students, absences must be approved in advance by the GAAC, to ensure that they do not interfere with completion of rotations.
- Semester breaks are not automatic holidays.
- Vacations **must not** interfere with teaching assistant duties, including meetings prior to the start of classes.
- International students should follow procedures set by the International Services Office.
- Unauthorized absences may result in a prorated withholding of a student's stipend.