

BIOLOGY DEPARTMENT

2008

***GRADUATE STUDENT
HANDBOOK***

Department of Biology
Rensselaer Polytechnic Institute
Jonsson-Rowland Science Center, 1W14
Telephone: (518) 276-6446
Fax: (518) 276-2344

Susan P. Gilbert, Ph.D. – Department Head

Dear Biology Graduate Students:

Graduate Education in Biology at Rensselaer: Overview

The Biology Graduate Program at Rensselaer is designed to help you to become an active participant in modern biological research and to provide you with unique opportunities to develop as a scientist.

The Biology Program will help you obtain the tools necessary for a successful biology research career. These include:

- A background in a variety of sub-disciplines within the broader field of biology.
- Critical thinking skills.
- The ability to plan, execute, and interpret experiments, and experience in the necessary research techniques.
- Skills in analyzing the scientific literature.
- Oral communication skills.
- Experience in scientific writing, including manuscript and grant proposal preparation.

Your graduate education will include:

- A core course covering the broad field of modern biology. Other advanced courses are available as electives depending on the needs and interests of individual students. Opportunities are also available for Rensselaer Biology graduate students to enroll in courses at nearby institutions, including SUNY-Albany and Albany Medical College.
- Working closely with a research advisor who will serve as your scientific mentor.
- Participation in journal clubs on a variety of topics.
- Practice in oral presentations through participation in group meetings, journal clubs, and departmental seminars. This is essential for learning to present your work at research conferences and seminars, and will help you to become an effective communicator for research and education.
- Teaching experience. Many scientists choose careers that involve teaching, and our program provides this valuable experience.
- Opportunities to mentor undergraduates and/or junior graduate students.
- Opportunities for interdisciplinary collaborations.

We hope this will be a rewarding experience!

The Graduate Curriculum in Biology: The Ph.D. is a scholarly degree requiring an original research contribution to a field of knowledge. Thus, the time to degree completion is determined by the research itself, and this may be influenced by internal factors, such as student motivation and work ethic, and by external factors, such as standards in the research sub-discipline and/or luck with experiments. Although **a student may reasonably expect to spend approximately five years completing the requirements for a Ph.D.**, there are many cases of both shorter and longer periods of study both at Rensselaer and across the discipline of Biology. After five years have been completed, a student must file a petition with the Graduate Program Oversight Committee in order to register each semester; this petition is normally granted. Rensselaer sets a **maximum time of seven years to degree completion for a Ph.D. for students entering with a bachelor's degree.** For students entering with a master's degree, the maximum time to degree completion for a Ph.D. is five years. The basic rules for graduate degrees are given in the Rensselaer Course Catalog effective on the date of the student's entry into graduate study.

Requirements

First year students:

- Take the two-semester Biology Core Course and maintain a 3.0 GPA.
- Teach an undergraduate section both semesters.
- Attend the weekly Biology Seminar Series.
- Rotate in three research laboratories. Following completion of the third rotation in the spring, students identify a research advisor in whose lab they will pursue their Ph.D.

Second year students:

- Continue dissertation research.
- Attend the weekly Biology Seminar Series and give their first seminar presentations to the Department (repeated every third semester).
- May teach undergraduate sections (at the discretion of their advisors).
- May take additional classes.
- Prepare for and pass their Candidacy examinations.

Third year students and beyond:

- Continue performing dissertation research.
- Present department seminars every third semester.
- Attend the weekly Biology Seminar Series.
- Hold annual Thesis Committee meetings.

To receive the Ph.D., a student must:

- Write a doctoral dissertation.
- Present the dissertation research in a public seminar.
- Defend the dissertation in an oral examination.

The expectation of the Department and Faculty is that our graduate students will publish their research in peer-reviewed journals.

1. Biology Core Course: To provide students with a broad foundation in the diverse areas of modern biological inquiry, students are required to take the two-semester Biology Core Course in their first year. The core course is subdivided into the following modules: 1) ethics, writing, and basic biology research tools; 2) structural and computational biology; 3) protein and carbohydrate structure and function; 4) microbiology, ecology and evolution; 5) genetics; 6) cell and developmental biology; and 7) neurobiology. The course is team-taught by faculty with expertise in each area. At the end of each module, students will take an examination. The mean of the module examination grades will determine the course grade for each semester. Completion of the Core Course with a minimum grade of B each semester will fulfill the qualifying examination requirement. Students who fail one or more module exams will retake the corresponding modules the following year, but the Institute requires a 3.0 to remain in good standing.

2. Rotations and choosing an advisor: Because the dissertation advisor will serve as the primary mentor for a student, the selection of the advisor is one of the most important decisions that a graduate student will make. With the guidance of the advisor, the student will develop critical thinking, independence, and laboratory skills, and set goals for completion of the dissertation project. Students are required to rotate through three different laboratories during their first year, and may not formally join a laboratory to begin thesis work until they have completed three rotations. This enables a student to choose the right laboratory for him or her. The rotation system also allows prospective advisors to determine if the student is a good fit for their laboratories. If three rotations are not sufficient to select an advisor, the student in agreement, with the advisory committee, may choose a new lab for a fourth rotation. The Graduate Program Oversight Committee will consider any requests for exemptions to the "three rotations" rule on a case-by-case basis.

Each rotation will last for approximately eight weeks. At the beginning of each rotation, students submit a one-page document of their specific aims for their project, and at the end of each rotation, the results of the rotation projects are presented as short talks to the Department.

3. Seminar Reading Course: Graduate students progressing toward a Ph.D. are required to take two semesters of "Seminar Reading", generally in the fall of the second and third years. The class consists of reading a journal article from the recent work of the Department's weekly seminar speaker, and then discussing the work with the speaker, generally over lunch. Class is scheduled for Monday 1:15-2:15, Fall semester only.

4. Other Courses and Credits: The Institute requires a total of seventy-two course credits. Courses are generally taken during the first two years while students are beginning their dissertation research. This allows students to focus solely on their dissertation research in subsequent years. Students whose needs are not met by the more conventional course offerings may enroll in directed reading courses. Students entering the program with a master's degree will be evaluated by the Graduate Program Oversight Committee to determine if credit can be given for previous courses. Rensselaer requires a 3.0 grade point average for a student to remain in good standing.

5. Teaching requirements: An essential part of each student's professional training required by the Department is one year of experience as a teaching assistant. This takes place during the first

year unless a student has an external fellowship. Most Ph.D. students teach for another year, usually the second, at the discretion of their Ph.D. advisor. No student may teach more than a total of four semesters during the course of their Ph.D. studies.

6. Candidacy Examination: As stated in the Rensselaer catalog, the Candidacy Exam is used “to formally determine a student’s ability to pursue research leading to a doctoral degree, and must be taken within the first two years of the date of the earliest course listed on the student’s Plan of Doctoral Study.” The candidacy examination in Biology must take place by the end of the fourth semester of full time study. It will be based on the student’s thesis project, and will consist of **a written proposal of the planned thesis research** in the style of an NIH or NSF fellowship application, **(ten pages, single spaced, not including references)** and **an oral presentation** with a defense of the research plan to the candidacy examination committee. **Passing this examination is mandatory for continuation in the Ph.D. program.**

The candidacy examination committee will consist of at least four members: the advisor, two members of the Department, and one Rensselaer member external to the Department or a fourth member of the Department and one non-Rensselaer member. The chair of the committee should be a member of the Department but not the student’s advisor. The student will give the candidacy proposal to the members of his or her committee 2 weeks before the exam. If the student fails, the committee will decide whether the student should be given additional time and a new exam date or be asked to leave the program. If a student is unable to pass this examination, this is an appropriate time for a student to leave the program with an M.S. degree. The participation of the advisor is essential at this point because he or she can more thoroughly evaluate the progress of the student.

7. Thesis Committee: After passing the candidacy examination, each student selects a thesis committee, chaired by the advisor. The thesis committee is often (but not always) the same as the candidacy committee. Once the student has selected a thesis committee, the Graduate Program Oversight Committee must approve subsequent changes in its composition.

At least one thesis committee meeting per year is required for continued enrollment in the graduate program. This enables the student and committee to interact productively, so that the student may benefit from the committee’s advice and expertise, and will also be valuable for letters of recommendation. Additionally, meetings with the thesis committee may facilitate resolution of any problems prior to the defense.

A week before each committee meeting, the student will present the committee members with a written progress report, consisting of background (brief), specific aims, current results (since the last committee meeting), and future plans.

8. Publication: Students are expected to publish their research in peer-reviewed journals(s) appropriate to the area of research.

Typical Course of Study for Biology Graduate Students

Academic load: 12 credits/semester.

Elective courses may be added.

1st semester:

Research Rotation I	8credits
Core course	3 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits

2nd semester:

Research Rotation II	4 credits
Research Rotation III	4 credits
Core course	3 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits

3rd semester:

Reading Course	3 credits
Dissertation	8 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits

4th semester:

Reading Course	3 credits
Dissertation	8 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits

5th semester:

Dissertation	11 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits

6th semester:

Dissertation	11 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits

7th semester:

Dissertation	11 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits

8th semester:

Dissertation	11 credits
<u>Seminar</u>	<u>1 credit</u>
Total	12 credits