



Rensselaer

BIOCHEMISTRY/BIOPHYSICS (BCBP)

2017-2018

GRADUATE STUDENT HANDBOOK

BCBP Graduate Program

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Biochemistry/Biophysics (BCBP)

Graduate Education in Biochemistry/Biophysics at Rensselaer: Overview

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

The BCBP Program will help you obtain the tools necessary for a successful research or teaching career in the public or private sector. These include:

- A background in a variety of sub-disciplines within the broader field of biochemistry and/or biophysics.
- 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.
- Apprenticeship in a variety of biochemical and biophysical methodologies

Your graduate education will include:

- A core course covering the broad fields of modern biology, biochemistry, and biophysics. Depending on the needs and interests of individual students, other advanced courses are available as electives. RPI BCBP graduate students are also able 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.
- Practice in oral presentations through participation in 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 Biochemistry/Biophysics: The PhD is a scholarly degree requiring an original research contribution to a scientific field. Thus, the time to degree completion is determined by the research itself, and may be influenced by internal factors (e.g. student motivation and work ethic), and by external factors (e.g. standards in the research sub-discipline, luck with experiments). Although **a student may reasonably expect to spend approximately five years completing the requirements for a PhD**, there are many cases of both shorter and longer periods of study both at Rensselaer and across the broader disciplines of Biochemistry and Biophysics. A student wishing to register beyond the end of the fifth year must file a petition each semester with the Graduate Program Committee; this petition is normally granted. The Institute sets a **maximum time of seven years to degree completion for a PhD for students entering with a bachelor's degree**. For students entering with a master's degree, the maximum time to degree completion for a PhD is five years. For students pursuing a master of science degree there are alternate requirements, listed on page 7.

Requirements

First year students:

- Take the two-semester BCBP Core Course, one BCBP module course per semester and maintain a 3.0 GPA.
- Be a teaching assistant for an undergraduate section of a Biology course each semester.
- Attend weekly Seminar Series, with at least 6 Biology Seminars per semester and at least 4 seminars held outside the Department of Biological Sciences per semester.
- Rotate in three research laboratories of participating BCBP faculty. Following completion of the third rotation in the spring, students join a lab for their PhD research.
- *Note: Students who receive Rensselaer Graduate Fellowships will not TA during their first year, but instead take an additional elective in both the Fall and Spring semesters.*

Second year students:

- Continue dissertation research.
- Take one BCBP module course, typically in the first semester.
- Attend weekly Seminar Series, with at least 6 Biology Seminars per semester and at least 4 seminars held outside the Department of Biological Sciences per semester. Students will give their first seminar presentations to the department.
- May serve as a teaching assistant (at the discretion of their advisors).
- May take additional elective classes.
- Prepare for and pass their Candidacy examinations (by the end of the 2nd year).
- Form Doctoral Thesis Committee

Third year students and beyond:

- Continue performing dissertation research.
- Present department seminars (approximately once a year).
- Hold annual Thesis Committee meetings, preferably immediately after the department seminar
- Attend weekly Seminar Series, with at least 6 Biology Seminars per semester and at least 4 seminars held outside the Department of Biological Sciences per semester.

Key Points: (Year 1)

➤ **BCBP Core Course:**

To ensure that students gain a broad foundation in the diverse areas of modern biochemistry/biophysics inquiry, students are required to take the two-semester BCBP Core Course in their first year. The course is team-taught by faculty with expertise in each area and closely tracks the Core Course for graduate students in the Department of Biological Sciences. Each semester of the Core Course is divided into modules. The module grades are combined for the semester grade. The Core Course serves as the Qualifying Exam for Biology. Students must earn at least a B each semester to continue to the second year. If a student receives lower than a B for one module, but still receives a B for the semester, he/she may be required to repeat that module the following year (at the discretion of the GPC).

➤ **Seminar Attendance:**

An important aspect of graduate education is learning about a wide range of scientific topics, and learning to think critically about research in fields outside your own. To that end, all PhD students are required to attend weekly seminars. Students must attend at least six of the weekly Biology seminar series, which includes presentations from outside speakers, RPI speakers, and senior graduate students. Additionally, students must attend at least four seminars on topics relevant to their discipline held in departments outside of the Department of Biological Sciences.

➤ **Teaching requirements:**

An essential part of each student's professional training is experience as a teaching assistant. BCBP PhD students are required to TA at least two semesters, typically in the first year, although most will TA for four semesters (first two years). Note: as a teaching assistant, the graduate student is serving as an instructor for undergraduate students, and as such is expected to behave in a professional manner. All forms of harassment are prohibited.

➤ **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. To enable students to choose the laboratory best suited for their individual needs, students are required to rotate in three different laboratories that are associated with the BCBP program during their first year, and may not join a lab for their dissertation research until all three rotations have been completed. The rotation system also allows prospective advisors to judge if the student is a good fit for their laboratories. If three rotations are not sufficient to select an advisor, the student, in consultation with GPC, may be allowed a fourth rotation laboratory. Requests for exemptions to the "three rotations" rule will be considered by the GPC on a case-by-case basis. **The student must join a lab by the end of the first year in order to progress to the second year.**

Each rotation will last for approximately eight weeks. At the end of each rotation, students will present a short talk on their rotation research to BCBP faculty and staff.

(Year 2 and beyond)

➤ **Graduate Student Seminar:**

Beginning in the second year, each student is required to give an annual presentation in the departmental seminar series. From the third year on, it is advisable that these seminars are coordinated with the annual meeting of the Doctoral Thesis Committee (see below). It is preferable, although not always possible, to schedule the Committee meeting immediately after the seminar.

➤ **Other Courses and Credits:**

The Institute requires a total of seventy-two credits for the PhD. After the first year, most of these credits will come from Dissertation Research; courses are generally only taken during the first two years while students are beginning their research. This allows students to focus on their dissertation research in subsequent years. BCBP students are required to take three (3) courses from among the BCBP modules, listed below. Students whose needs are not met by more conventional departmental offerings can enroll in directed reading courses with their thesis advisors or other faculty members. Students entering the program with an MS degree may receive credit for earlier work (although work outside RPI cannot be counted toward the Core Course requirement) – this will be evaluated by the GPC on a case-by-case basis.

➤ **Doctoral Thesis Committee:**

The Doctoral Thesis Committee will consist of four members: the advisor (who chairs the committee), two members of the department and one external member (from outside of the department and/or the Institute). If the external member is outside RPI, a CV and letter of justification must be submitted to the GPC (and then subsequently to the Office of Graduate Education) and the appointment to the committee must be approved. The graduate student selects the thesis committee in consultation with the faculty advisor during the spring of the second year. The thesis committee is responsible for supervising the student's academic studies and monitoring the student's progress towards the degree. The thesis committee also oversees the student's candidacy examination (although for the candidacy, a committee member other than the advisor must serve as the chair). Once the thesis committee is selected, the GPC must approve any changes in its composition.

Students must convene at least one thesis committee meeting per year – generally in coordination with the student's presentation in the seminar series. A week before each committee meeting, the student should provide the committee members with a written progress report, consisting of background (brief), specific aims, results since the last committee meeting, and future plans. A report of the outcome of the meeting signed by the majority of the members of the Doctoral Thesis Committee and by the Graduate Program Director must be filed with Graduate Program Administrator.

➤ **Candidacy Examination:**

The candidacy exam is designed to evaluate the student's ability to perform independent scientific research, and to present and analyze data at an appropriate level for a doctoral student. The exam must take place **by the end of the second year** (i.e. May 31st), and passing this exam is mandatory for continuation in the Ph.D. program.

The candidacy exam is a thesis proposal, and therefore should be based on the student's research. The exam consists of three parts – a written document, an oral presentation, and an oral defense. The written document should be in the style of a fellowship proposal (i.e. NIH). Several examples of

styles are available with the BCBP Graduate Program Administrator. The proposal should be a maximum of ten pages (not including references), single spaced, 1 inch margins on all sides, font size 12 point. The oral presentation should be 30-40 minutes, followed directly by the defense of the research plan to the candidacy examination committee. The proposal and presentation must be prepared by the student without any help or editing by his/her advisor.

The doctoral thesis committee serves as the candidacy examination committee, but a member of the committee other than the thesis advisor serves as the committee chair. The student's advisor is present during the examination but the student must answer the questions alone.

The student must give the written candidacy proposal to the members of his/her committee at least 2 weeks prior to the exam. If the student fails, the committee will decide whether the student should be allowed to retake the exam by a specified date or be asked to leave the program. A thorough evaluation of the student by the advisor is essential for this decision.

To receive a PhD, a student must:

- Write a doctoral dissertation and prepare it with appropriate formatting and references (for guidance on this topic, see the Office of Graduate Education website).
- Present the dissertation research in a public seminar.
- Defend the dissertation in an oral examination.
- Publications – an essential aspect of research is publication of peer-reviewed research articles, and students are expected and encouraged to publish peer-reviewed journal articles. It is expected (but not absolutely required) that students will have at least one paper published or accepted for publication at the time of graduation.

Additional Information:

Deviations from the typical course of study must be approved (in advance) by the Graduate Program Committee. Failure to receive prior approval may result in the loss of financial aid.

Graduate School is a full-time job. Working an additional job (or moonlighting) is not permitted. Infractions of this policy may result in the termination of all financial aid.

Requirements for an M.S. In Biochemistry & Biophysics

(applies to both co-terminal* and regular M.S. degrees)

The Master's Degree in BCBP consists of 30 credits. Students can pursue either (A) a dissertation-based Masters (B) a course-based Masters with a Professional Project with the following requirements:

A. Dissertation based Master's degree

- Thesis required¹
- 21-26 Credits of Coursework²⁻⁵
- 4-9 Credit MS thesis¹
- TOTAL: 30 Credits²⁻⁵

B. Professional Project-based Masters (30 credits)

- Professional project required⁶
- 21-26 Credits of Coursework²⁻⁵
- 4-9 Credit MS professional project
- TOTAL: 30 Credits^{3, 4}
- TOTAL of 30 credits of coursework, with the following requirements:

NOTES:

1. The MS thesis is typically a laboratory research project undertaken with a faculty mentor. An MS thesis must be approved by an MS thesis committee and must be submitted to the Office of Graduate Education for binding.
2. Students cannot repeat a course at the graduate level that was already taken at undergraduate level.
3. Of the 30 credits, 15 or more (including the thesis) must be at the 6000 level, with the rest at 4000 or above.
4. Of the 30 credits, 15 or more must have the BIOL or BCBP, CHEM OR PHYS prefix.
5. Of the 30 credits, 8 or more must come from BCBP modules
6. A professional project consists of a written document such as a report of research outcomes, a review of relevant literature or a proposal for future work, and should be approved by the BCBP graduate program director.

Important Information from the Office of Graduate Education:

Current Requirements for Graduation can be found on the Office of Graduate Education website (<http://gradoffice.rpi.edu/>).

The items listed below should be completed by the beginning of the semester you intend to graduate:

- Registration for the semester in which the degree will be conferred is required.
- A Degree Application Form must be on file with the Registrar's Office-refer to the academic calendar for due dates applicable to the semester you intend to graduate.

Part I: Prior to submission of the dissertation, the items below must already be on file in the Office of Graduate Education.

- An approved [Plan of Study](#) must be on file with the Registrar's Office and a copy on file with the Office of Graduate Education (courses listed on the Plan of Study must agree with courses shown on your transcript).
- An approved [Doctoral Committee Nomination Form](#) must be on file with the Office of Graduate Education.
- A record of successful completion of the Candidacy Examination must be on file with the Office of Graduate Education.

Part II: The items listed below must be submitted to the Office of Graduate Education before a formal review of the dissertation will be conducted. In order to complete the review process and notify the Registrar's Office that your dissertation requirement has been met, it is highly recommended that your submission is completed before the dissertation submission deadline (but no later than the published deadline).

- A [Record of Dissertation Exam Form](#) with the original signatures of your Examining Committee must be provided to the Office of Graduate Education. Once your dissertation has been reviewed and officially approved, this form is signed by the Dean of Graduate Education and sent to the Registrar's Office.
- A completed [Survey of Earned Doctorates](#) form must be submitted with the dissertation.
- A completed [Graduate Student Exit Survey](#) form when you submit your dissertation.
- We ask that you please take a moment to complete the [First Destination Survey](#). We have many employers who request compensation guidelines for PhD graduates, this data can help strengthen salary offers for our students.

Typical Course of Study for BCBP Graduate Students

Academic load: To be considered full time you must carry 12 credit hours per semester. (exception: If you are a TA, you may carry 9 credits hours for full-time status)

1st semester:

BCBP module course	4 credits
Research Rotation I	4 credits
Core course	4 credits
Seminar	1 credit
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Total	13 credits

2nd semester:

BCBP module course	4 credits
Research Rotation II	2 credits
Research Rotation III	2 credits
Core course	4 credits
Seminar	1 credit
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Total	13 credits

3rd semester:

BCBP module course	4 credits
Elective	4 credits
Dissertation	5 credits
Seminar	1 credit
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Total	13 credits

4th semester:

Readings Course	4 credits
Dissertation	5 credits
Seminar	1 credit
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Total	9 credits

5th semester:

Dissertation	11 credits
Seminar	1 credit
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Total	12 credits

6th semester:

Dissertation	11 credits
Seminar	1 credit
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Total	12 credits

7th semester:

Dissertation	11 credits
Seminar	1 credit
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Total	12 credits

8th semester:

Dissertation	11 credits
Seminar	1 credit
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Total	12 credits

Alternate First Year Plan for students with Rensselaer Graduate Fellowships:

1st semester:

Research Rotation I	4 credits
Core course	4 credits
Elective Course	4 credits
Seminar	1 credit
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Total	13 credits

2nd semester:

Research Rotation II	2 credits
Research Rotation III	2 credits
Core course	4 credits
Elective Course	4 credits
Seminar	1 credit
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Total	13 credits

BCBP modules

BCBP-6870 Protein Structure Determination
BCBP-6800 Methods in Biophysics
BCBP-6310 Genetic Engineering
BCBP-6420 Molecular Modeling
BCBP-6965 Systems Biology