DOCTOR OF PHILOSOPHY (PHD) DEGREE IN THE FIELD OF BIOCHEMISTRY AND CELL BIOLOGY

Program Learning Outcomes for the PhD Degree in the field of Biochemistry and Cell Biology

Upon completing the PhD degree in the field of Biochemistry and Cell Biology, students will be able to:

1. Develop a comprehensive knowledge of current and past research accomplishments and techniques in biochemistry and cell biology.
2. Demonstrate independent problem solving and critical thinking skills.
3. Demonstrate effective written, oral, and visual communication skills required to articulate scientific findings and significance via a thesis describing independent research, publications, and seminars.

Requirements for the PhD Degree in the field of Biochemistry and Cell Biology

For general university requirements, please see Doctoral Degrees (ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-doctoral-degrees). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees). Students pursuing the PhD Degree in the field of Biochemistry and Cell Biology must complete the requirements as listed below.

Course Requirements

Most of the formal course studies will be completed in the first year of residence to allow the students to commence thesis research at the end of their second semester at Rice. During the first year, the BCB Graduate Advisory Committee will advise all graduate students. This committee will determine the formal course program to be taken during the first year in residence. Students are required to have training in biochemistry and cell biology; training in genetics and physical chemistry or biophysics is also beneficial. Students lacking formal training in biochemistry or cell biology are required to take the equivalent background courses during their first year.

The following Rice courses must be taken if students lack these prerequisites in their final undergraduate transcript:

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOC 301</td>
<td>BIOCHEMISTRY I</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 341</td>
<td>CELL BIOLOGY</td>
<td>3</td>
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</table>

Summary

Total Credit Hours Required for the PhD Degree in the field of Biochemistry and Cell Biology

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<tr>
<td></td>
<td>Total Credit Hours Required for the PhD Degree in the field of Biochemistry and Cell Biology</td>
<td>90</td>
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Degree Requirements

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Core Requirements

- BIOC 575  INTRODUCTION TO RESEARCH  1
- BIOC 581  GRADUATE SEMINAR IN BIOCHEMISTRY AND CELL BIOLOGY (required in all fall semesters of residency)  1 credit hour per year
- BIOC 582  GRADUATE SEMINAR IN BIOCHEMISTRY AND CELL BIOLOGY (required in all spring semesters of residency)  1 credit hour per year
- BIOC 583  MOLECULAR INTERACTIONS  4
- BIOC 587  RESEARCH DESIGN, PROPOSAL WRITING, AND PROFESSIONAL DEVELOPMENT  3
- BIOC 588  CELLULAR INTERACTIONS  4
- BIOC 599  GRADUATE TEACHING IN BIOCHEMISTRY AND CELL BIOLOGY (first semester, second year)  Minimum of 1 credit hour
- BIOC 599  GRADUATE TEACHING IN BIOCHEMISTRY AND CELL BIOLOGY (second semester, second year)  Minimum of 1 credit hour
- BIOC 701  GRADUATE LAB RESEARCH I (first year research course, fall semester)  2
- BIOC 701  GRADUATE LAB RESEARCH I (first year research course, spring semester)  2
- BIOC 702  GRADUATE LAB RESEARCH II (first year research course, fall semester)  2
- BIOC 702  GRADUATE LAB RESEARCH II (first year research course, spring semester)  2
- BIOC 800  BIOCHEMISTRY & CELL BIOLOGY GRADUATE RESEARCH (second year research and beyond)  1-15
- UNIV 594  RESPONSIBLE CONDUCT OF RESEARCH  1

Elective Requirements

Select at least 6 credit hours from BIOC course offerings at the 500-level:

- BIOC 523  EXTRACELLULAR MATRIX
- BIOC 524  MICROBIOLOGY & BIOTECHNOLOGY
- BIOC 525  PLANT MOLECULAR GENETICS AND DEVELOPMENT
- BIOC 530  LAB MODULE IN NMR SPECTROSCOPY AND MOLECULAR MODELING
- BIOC 535  PRACTICAL X-RAY CRYSTALLOGRAPHY
- BIOC 540  METABOLIC ENGINEERING
- BIOC 544  ADVANCED CONCEPTS AND CRITICAL ANALYSIS IN MODERN DEVELOPMENTAL BIOLOGY
- BIOC 545  ADVANCED MOLECULAR BIOLOGY AND GENETICS
Doctor of Philosophy (PhD) Degree in the field of Biochemistry and Cell Biology

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<tr>
<td>BIOC 547</td>
<td>EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE</td>
</tr>
<tr>
<td>BIOC 550</td>
<td>VIRUSES AND INFECTIOUS DISEASE</td>
</tr>
<tr>
<td>BIOC 551</td>
<td>MOLECULAR BIOPHYSICS</td>
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<tr>
<td>BIOC 552</td>
<td>STRUCTURAL BIOLOGY</td>
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<tr>
<td>BIOC 555</td>
<td>COMPUTATIONAL SYNTHETIC BIOLOGY</td>
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<tr>
<td>BIOC 560</td>
<td>CANCER BIOLOGY</td>
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<tr>
<td>BIOC 570</td>
<td>COMPUTATION WITH BIOLOGICAL DATA</td>
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<tr>
<td>BIOC 571</td>
<td>BIOINFORMATICS: SEQUENCE ANALYSIS</td>
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<tr>
<td>BIOC 572</td>
<td>BIOINFORMATICS: NETWORK ANALYSIS</td>
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<tr>
<td>BIOC 580</td>
<td>PROTEIN ENGINEERING</td>
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Thesis Requirement

Completion and public defense of a thesis

Additional Coursework as Approved by Department

Total Credit Hours  Minimum of 90

Footnotes and Additional Information

1. Students generally complete BIOC 583, BIOC 587, and BIOC 588 in their first year, and will be responsible for the content of these courses in their admission to candidacy examination.

2. Students gain teaching experience by serving as discussion leaders and graders in two undergraduate courses during their second year (BIOC 599); additional teaching experiences are available on an individual basis.

3. Students are required to enroll in at least 9 hours of BIOC 800 during all semesters of residency after the first 2 semesters.

Evaluation of Progress in Graduate Study

The BCB Graduate Advising Committee evaluates each student’s undergraduate record and recommends course work based on the requirements. Thesis advisors may require additional courses.

At the end of each semester, the department chair, in consultation with the faculty, reviews student performance in the formal course work. Students must maintain at least a B average (GPA ≥ 3.00), perform satisfactorily in BIOC 701/BIOC 702, and demonstrate outstanding motivation and potential for research. Thesis lab assignments are made based on student and faculty preferences following research rotations.

Evaluation after the first year includes:

- Ongoing review of research progress by the thesis advisor; satisfactory research progress will be indicated by a grade of “S” in BIOC 800 each semester.
- A yearly research progress assessment by the student’s Research Progress Review Committee.
- Presentation of research progress at least once a year in seminar format (BIOC 581/BIOC 582) starting in the fourth semester and continuing until submission of the thesis.
- Completion of a written and oral admission to candidacy examination before the start of the fifth semester.
- Defense of the PhD thesis research and text in a final public seminar presentation and oral examination attended by the student’s Thesis Committee.

Policies for the PhD Degree in the field of Biochemistry and Cell Biology

Biochemistry and Cell Biology Graduate Program Handbook

The General Announcements (GA) is the official Rice curriculum. As an additional resource for students, Biochemistry and Cell Biology publishes a graduate program handbook, which can be found here: [http://gradhandbooks.rice.edu/2018_19/Biochemistry_Cell_Biology_Graduate_Handbook.pdf](http://gradhandbooks.rice.edu/2018_19/Biochemistry_Cell_Biology_Graduate_Handbook.pdf).

Admission

Applicants for graduate study in the Biochemistry and Cell Biology must have:

- BA or BS degree in biochemistry, biology, chemistry, chemical engineering, physics, or some equivalent
- High levels of intellectual strength and motivation, as indicated by academic record, Graduate Record Examination (GRE) scores, and recommendations

Although the department offers an MA degree in Biochemistry and Cell Biology, the department admits students who intend to pursue the PhD program. For general university requirements, see Graduate Degrees ([ga.rice.edu/graduate-students/academic-opportunities/degrees](ga.rice.edu/graduate-students/academic-opportunities/degrees)).

Additional Information

For additional information, please see the BioSciences website: [https://biosciences.rice.edu/](https://biosciences.rice.edu/)

Opportunities for the PhD Degree in the field of Biochemistry and Cell Biology

All full-time Biochemistry and Cell Biology graduate students receive funding and full tuition waivers as specified in their offer letters. Information about Student Resources, Attendance at Scientific Conferences, Internships, Graduate Students Awards, the Graduate Student Association, etc. can be found in the Biochemistry and Cell Biology Graduate Program Handbook online at the department website: [http://gradhandbooks.rice.edu/2018_19/Biochemistry_Cell_Biology_Graduate_Handbook.pdf](http://gradhandbooks.rice.edu/2018_19/Biochemistry_Cell_Biology_Graduate_Handbook.pdf)

Additional Information

For additional information, please see the BioSciences website: [https://biosciences.rice.edu/](https://biosciences.rice.edu/)