MASTER OF SCIENCE (MS) DEGREE IN THE FIELD OF BIOCHEMISTRY AND CELL BIOLOGY

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

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

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

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

Course Requirements

The MS degree is a thesis master’s degree. For general university requirements, please see Thesis Master's Degrees (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-thesis-masters-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/). 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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>

Summary

Total Credit Hours Required for the MS Degree in the field of Biochemistry and Cell Biology 30

Degree Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Core Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>BIOC 575</td>
<td>INTRODUCTION TO RESEARCH</td>
<td>1</td>
</tr>
<tr>
<td>BIOC 581</td>
<td>GRADUATE SEMINAR IN BIOCHEMISTRY AND CELL BIOLOGY (required in all semesters of residency, fall semester)</td>
<td>1 credit hour per year</td>
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<tr>
<td>BIOC 582</td>
<td>GRADUATE SEMINAR IN BIOCHEMISTRY AND CELL BIOLOGY (required in all semesters of residency, spring semester)</td>
<td>1 credit hour per year</td>
</tr>
<tr>
<td>BIOC 583</td>
<td>MOLECULAR INTERACTIONS 1</td>
<td>4</td>
</tr>
<tr>
<td>BIOC 587</td>
<td>RESEARCH DESIGN, PROPOSAL WRITING, AND PROFESSIONAL DEVELOPMENT 1</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 588</td>
<td>CELLULAR INTERACTIONS 1</td>
<td>4</td>
</tr>
<tr>
<td>BIOC 701</td>
<td>GRADUATE LAB RESEARCH I (first year research course, fall semester)</td>
<td>2</td>
</tr>
<tr>
<td>BIOC 701</td>
<td>GRADUATE LAB RESEARCH I (first year research course, spring semester)</td>
<td>2</td>
</tr>
<tr>
<td>BIOC 702</td>
<td>GRADUATE LAB RESEARCH II (first year research course, fall semester)</td>
<td>2</td>
</tr>
<tr>
<td>BIOC 702</td>
<td>GRADUATE LAB RESEARCH II (first year research course, spring semester)</td>
<td>2</td>
</tr>
<tr>
<td>BIOC 800</td>
<td>BIOCHEMISTRY &amp; CELL BIOLOGY GRADUATE RESEARCH 2</td>
<td>1-15</td>
</tr>
<tr>
<td>UNIV 594</td>
<td>RESPONSIBLE CONDUCT OF RESEARCH</td>
<td>1</td>
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</table>

Elective Requirements

Select at least 6 credit hours from the set of 500-level advanced BIOC electives listed below:

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>BIOC 523</td>
<td>EXTRACELLULAR MATRIX</td>
</tr>
<tr>
<td>BIOC 524</td>
<td>MICROBIOLOGY &amp; BIOTECHNOLOGY</td>
</tr>
<tr>
<td>BIOC 525</td>
<td>PLANT MOLECULAR GENETICS AND DEVELOPMENT</td>
</tr>
<tr>
<td>BIOC 530</td>
<td>LAB MODULE IN NMR SPECTROSCOPY AND MOLECULAR MODELING</td>
</tr>
<tr>
<td>BIOC 535</td>
<td>PRACTICAL X-RAY CRYSTALLOGRAPHY</td>
</tr>
<tr>
<td>BIOC 540</td>
<td>METABOLIC ENGINEERING</td>
</tr>
<tr>
<td>BIOC 544</td>
<td>DEVELOPMENTAL NEUROBIOLOGY</td>
</tr>
<tr>
<td>BIOC 545</td>
<td>ADVANCED MOLECULAR BIOLOGY AND GENETICS</td>
</tr>
<tr>
<td>BIOC 547</td>
<td>EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE</td>
</tr>
<tr>
<td>BIOC 550</td>
<td>VIRUSES AND INFECTIOUS DISEASES</td>
</tr>
<tr>
<td>BIOC 551</td>
<td>MOLECULAR BIOPHYSICS</td>
</tr>
<tr>
<td>BIOC 552</td>
<td>STRUCTURAL BIOLOGY</td>
</tr>
<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>
</tr>
<tr>
<td>BIOC 572</td>
<td>BIOINFORMATICS: NETWORK ANALYSIS</td>
</tr>
<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
Footnotes and Additional Information

1 Students generally complete BIOC 583, BIOC 587, and BIOC 588 in their first year.
2 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. MS candidates must maintain a GPA ≥ 2.67, complete a thesis, and successfully complete a public oral defense of their research work to their Thesis Committee and other interested parties.

Evaluation after the first year includes:

• The research progress review examination held during the MS student’s second year replaces the admission to candidacy examination; no other preliminary examination is required before the final oral defense of the master’s thesis; satisfactory research progress will be indicated by a grade of ‘S’ in BIOC 800 each semester
• 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
• Defense of the MS thesis research and text in a final public seminar presentation and oral examination attended by the student’s Thesis Committee

Opportunities for the MS 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.

Additional Information
For additional information, please see the BioSciences website: https://biosciences.rice.edu/