BACHELOR OF SCIENCE (BS) DEGREE WITH A MAJOR IN BIOSCIENCES AND A MAJOR CONCENTRATION IN BIOCHEMISTRY

Program Learning Outcomes for the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry

Upon completing the BS degree with a major in Biosciences and a major concentration in Biochemistry, students will be able to:

1. Demonstrate a broad knowledge of core concepts in biology.
2. Demonstrate an advanced understanding of biochemistry.
3. Demonstrate the ability to access scientific literature in the biological sciences and to use critical thinking skills to evaluate primary and secondary sources of biological research.
4. Demonstrate the ability to apply the process of science through original research, including designing experiments and/or building mathematical models, and collecting, analyzing, and interpreting data.
5. Demonstrate effective oral, written, and visual communication skills, including communicating science to diverse audiences.

Requirements for the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry

For general university requirements, see Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BS degree in Biosciences and a major concentration in Biochemistry must complete:

- A minimum of 70 credit hours to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 30 credit hours taken at the 300-level or above.
- Core courses common to all major concentrations.
- The requirements for the major concentration in Biochemistry. When students declare the major (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/#text) in Biosciences, students must additionally identify and declare one of the four major concentrations, either in:
  - Biochemistry (p. 1), or
  - Cell Biology and Genetics (https://ga.rice.edu/programs-study/departments-programs/natural-sciences/biosciences/cell-biology-and-genetics-bs/requirementstext), or
  - Ecology and Evolutionary Biology (https://ga.rice.edu/programs-study/departments-programs/natural-sciences/biosciences/ecology-and-evolutionary-biology-bs/requirementstext), or

Because of the common core requirements, it is possible for students to change their major concentration at any time, even after initially declaring the major. To do so, please contact the Office of the Registrar (registrar@rice.edu).

The BS degree emphasizes broad foundational knowledge of biology with in-depth exposure to the subfield of biochemistry that includes independent research.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major’s academic advisor, or where applicable, the department’s Director of Undergraduate Studies. (Course substitutions must be formally approved and entered into Degree Works by the major’s Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Biosciences and a Major Concentration in Biochemistry</td>
<td>Minimum of 70</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours Required for the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry</td>
<td>120</td>
</tr>
</tbody>
</table>

Degree Requirements

<table>
<thead>
<tr>
<th>Core Requirements</th>
<th>Non-Biology Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Code</td>
</tr>
<tr>
<td></td>
<td>CHEM 121</td>
</tr>
<tr>
<td>or CHEM 111</td>
<td></td>
</tr>
<tr>
<td>CHEM 123</td>
<td></td>
</tr>
<tr>
<td>or CHEM 113</td>
<td></td>
</tr>
<tr>
<td>MATH 101</td>
<td></td>
</tr>
<tr>
<td>or MATH 105</td>
<td></td>
</tr>
<tr>
<td>MATH 102</td>
<td></td>
</tr>
<tr>
<td>or MATH 106</td>
<td></td>
</tr>
<tr>
<td>PHYS 125</td>
<td></td>
</tr>
<tr>
<td>or STAT 305</td>
<td></td>
</tr>
<tr>
<td>or STAT 315 / DSCI 301</td>
<td></td>
</tr>
<tr>
<td>Core Lecture Courses</td>
<td>BIOS 201</td>
</tr>
<tr>
<td>BIOS 202</td>
<td></td>
</tr>
<tr>
<td>Elective Lecture Course</td>
<td>Select 1 elective course from lecture courses offered by the Wiess School of Natural Sciences or the George R. Brown School of Engineering at the 200-level or above</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>CHEM 122</td>
<td>GENERAL CHEMISTRY II 5</td>
</tr>
<tr>
<td>CHEM 124</td>
<td>GENERAL CHEMISTRY LABORATORY II 5</td>
</tr>
<tr>
<td>CHEM 211</td>
<td>ORGANIC CHEMISTRY I</td>
</tr>
<tr>
<td>&amp; CHEM 213</td>
<td>and ORGANIC CHEMISTRY DISCUSSION</td>
</tr>
<tr>
<td>PHYS 126</td>
<td>GENERAL PHYSICS II (WITH LAB) 6</td>
</tr>
<tr>
<td>BIOS 301</td>
<td>BIOCHEMISTRY I</td>
</tr>
<tr>
<td>BIOS 302</td>
<td>BIOCHEMISTRY II</td>
</tr>
<tr>
<td>BIOS 352</td>
<td>PHYSICAL CHEMISTRY FOR THE BIOSCIENCES</td>
</tr>
</tbody>
</table>

**Elective Lecture Courses in Biochemistry**

Select 2 courses from the following:

- BIOE 464  EXTRACELLULAR MATRIX
- BIOS 300  PARADIGMS IN BIOCHEMISTRY AND CELL BIOLOGY
- BIOS 334  EVOLUTION
- BIOS 340  INTEGRATIVE ANIMAL PHYSIOLOGY
- BIOS 341  CELL BIOLOGY
- BIOS 344  MOLECULAR BIOLOGY AND GENETICS
- BIOS 368  CONCEIVING AND MISCONCEIVING THE MONSTROUS IN FICTION AND IN ART, IN MEDICINE AND IN BIOSCIENCE
- BIOS 372  IMMUNOLOGY
- BIOS 385  FUNDAMENTALS OF CELLULAR AND MOLECULAR NEUROSCIENCE
- BIOS 390  TRANSFER CREDIT IN BIOCHEMISTRY AND CELL BIOLOGY
- BIOS 405  PHYSICAL BIOLOGY
- BIOS 410  STEM CELL BIOLOGY
- BIOS 420  MOLECULAR BASIS OF DISEASES
- BIOS 424  MICROBIOLOGY AND BIOTECHNOLOGY
- BIOS 425  PLANT MOLECULAR GENETICS AND DEVELOPMENT
- BIOS 447  EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE
- BIOS 449  ADVANCED CELL AND MOLECULAR NEUROSCIENCE
- BIOS 450  VIRUSES AND INFECTIOUS DISEASES
- BIOS 460  CANCER BIOLOGY
- BIOS 470  COMPUTATION WITH BIOLOGICAL DATA
- BIOS 481  MOLECULAR BIOPHYSICS I
- BIOS 482  STRUCTURAL BIOLOGY

**Capstone Requirement**

Select 1 course from the following:

- BIOS 313  EXPERIMENTAL SYNTHETIC BIOLOGY
- BIOS 318  MICROBIOLOGY LABORATORY
- BIOS 333  BIONNOVATION STUDIO: FROM BASIC RESEARCH AND IDEATION TO TECHNOLOGY DEVELOPMENT
- BIOS 393  LABORATORY TRANSFER CREDIT IN BIOSCIENCES
- BIOS 415  EXPERIMENTAL PHYSIOLOGY

**Independent Research**

Select 1 from the following:

- BIOS 310  INDEPENDENT RESEARCH FOR BIOSCIENCES UNDERGRADUATES 7
- BIOS 401  UNDERGRADUATE HONORS RESEARCH
- BIOS 402  and UNDERGRADUATE HONORS RESEARCH

**Core Laboratory Courses**

- BIOS 211  INTERMEDIATE EXPERIMENTAL BIOSCIENCES
- BIOS 311  ADVANCED EXPERIMENTAL BIOSCIENCES

**Elective Laboratory Course**

Select 1 course from the following:

- BIO 342  LABORATORY IN TISSUE CULTURE

**Total Credit Hours Required for the Major in Biosciences and Major Concentration in Biochemistry**

<table>
<thead>
<tr>
<th>Minimum</th>
<th>of 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Credit Hours to Complete Degree Requirements</td>
<td>19</td>
</tr>
</tbody>
</table>

**University Graduation Requirements**

- 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying major requirements may additionally meet distribution requirements.

**Additional Credit Hours to Complete Degree Requirements**

- Include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

1. CHEM 151 may be substituted for CHEM 121 or CHEM 111; CHEM 153 may be substituted for CHEM 123 or CHEM 113.
2. PHYS 101 and PHYS 103 or PHYS 111 may be substituted for PHYS 125.
3. STAT 280 may be substituted for STAT 305.
Policies for the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry

Advising

Rice University policies are governed primarily by the General Announcements; students are encouraged to look there first for academic policies. Advising information specific to the Department of Biosciences can be found at the department website by clicking on the link for Undergraduate Program: https://biosciences.rice.edu/.

Program Restrictions and Exclusions

Students pursuing the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry should be aware of the following program restrictions:

- As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), under Declaring Majors, Minors and Certificates, students may not obtain both a BA and a BS in the same major. Students pursuing the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry may not additionally pursue the BA Degree with a Major in Biosciences.
- Students pursuing the major in Biosciences may pursue only one major concentration within the major.
- Students pursuing the major in Biosciences and a major concentration in Biochemistry may not additionally declare the minor in Biochemistry and Cell Biology.

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of transfer credit advisors on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines

Students pursuing the major in Biosciences should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program's official transfer credit advisor) on an individual case-by-case basis.

Additional Information

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

Opportunities for the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry

Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

Departmental Honors

Instructions on applying for the Distinction in Research and Creative Work award from the Department of BioSciences can be found at the department website, by clicking on the link for Undergraduate Program, at: https://biosciences.rice.edu/.

Research in the Biosciences

Research is highly encouraged for all biosciences majors, and there are many opportunities for independent research at Rice. Information about research for credit and research internships specific to the Department of BioSciences can be found at the department website, by clicking on the link for Research, at: https://biosciences.rice.edu/.

Additional Information

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