

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 \(https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/\)](https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BS degree with a major 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 34 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*

- **Integrative Biology** (<https://ga.rice.edu/programs-study/departments-programs/natural-sciences/biosciences/integrative-biology-bs/#requirementstext>).

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 applied 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

Code	Title	Credit Hours
Total Credit Hours Required for the Major in Biosciences and a Major Concentration in Biochemistry		Minimum of 70
Total Credit Hours Required for the BS Degree with a Major in Biosciences and a Major Concentration in Biochemistry		120

Degree Requirements

Code	Title	Credit Hours
Core Requirements		
Non-Biology Courses		
CHEM 121	GENERAL CHEMISTRY I ¹	3
	or CHEM 111 AP/OTH CREDIT IN GENERAL CHEMISTRY I	
CHEM 123	GENERAL CHEMISTRY LABORATORY I ¹	1
	or CHEM 113 AP/OTH CREDIT IN GENERAL CHEMISTRY LAB I	
MATH 101	SINGLE VARIABLE CALCULUS I	3
	or MATH 105 AP/OTH CREDIT IN CALCULUS I	
MATH 102	SINGLE VARIABLE CALCULUS II	3
	or MATH 106 AP/OTH CREDIT IN CALCULUS II	
PHYS 125	GENERAL PHYSICS (WITH LAB) ²	4
STAT 305	INTRODUCTION TO STATISTICS FOR BIOSCIENCES ³	4
Core Lecture Courses		
BIOS 201	INTRODUCTORY BIOLOGY I	3
BIOS 202	INTRODUCTORY BIOLOGY II	3
Elective Lecture Course		
	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 ⁴	3
Code	Title	Credit Hours
Major Concentration in Biochemistry		
Core Requirements		

Non-Biology Courses

CHEM 122	GENERAL CHEMISTRY II ⁵	3
CHEM 124	GENERAL CHEMISTRY LABORATORY II ⁵	1
CHEM 211 & CHEM 213	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION	3
PHYS 126	GENERAL PHYSICS II (WITH LAB) ⁶	4

Lecture Courses

BIOS 301	BIOCHEMISTRY I	3
BIOS 302	BIOCHEMISTRY II	3
BIOS 352	PHYSICAL CHEMISTRY FOR THE BIOSCIENCES	3

Elective Lecture Courses in Biochemistry

Select 2 courses from the following: 6

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	

Core Laboratory Courses

BIOS 211	INTERMEDIATE EXPERIMENTAL BIOSCIENCES	2
BIOS 311	ADVANCED EXPERIMENTAL BIOSCIENCES	2

Elective Laboratory Course

Select 1 course from the following: 1-2

BIOS 342	LABORATORY IN TISSUE CULTURE	
BIOS 313	EXPERIMENTAL SYNTHETIC BIOLOGY	
BIOS 318	MICROBIOLOGY LABORATORY	

BIOS 333	BIONNOVATION STUDIO: FROM BASIC RESEARCH AND IDEATION TO TECHNOLOGY DEVELOPMENT	
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BIOS 393	LABORATORY TRANSFER CREDIT IN BIOSCIENCES	
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BIOS 415	EXPERIMENTAL PHYSIOLOGY	
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Independent Research

Select 1 from the following: 9-10

BIOS 310	INDEPENDENT RESEARCH FOR BIOSCIENCES UNDERGRADUATES ⁷	
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BIOS 401 & BIOS 402	UNDERGRADUATE HONORS RESEARCH and UNDERGRADUATE HONORS RESEARCH	
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Capstone Requirement ⁸

Select 1 course from the following: 3

BIOS 405	PHYSICAL BIOLOGY	
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BIOS 420	MOLECULAR BASIS OF DISEASES	
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BIOS 424	MICROBIOLOGY AND BIOTECHNOLOGY	
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BIOS 425	PLANT MOLECULAR GENETICS AND DEVELOPMENT	
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BIOS 447	EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE	
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BIOS 449	ADVANCED CELL AND MOLECULAR NEUROSCIENCE	
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BIOS 450	VIRUSES AND INFECTIOUS DISEASES	
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BIOS 460	CANCER BIOLOGY	
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BIOS 470	COMPUTATION WITH BIOLOGICAL DATA	
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BIOS 481	MOLECULAR BIOPHYSICS I	
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BIOS 482	STRUCTURAL BIOLOGY	
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Total Credit Hours Required for the Major in Biosciences and Major Concentration in Biochemistry Minimum of 70

Additional Credit Hours to Complete Degree Requirements * 19

University Graduation Requirements (<https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/>) * 31

Total Credit Hours 120

Footnotes and Additional Information

* **Note:** University Graduation Requirements include 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.

- ⁴ Students must select 1 elective course (3 credit hours) from courses offered by the Wiess School of Natural Sciences or the George R. Brown School of Engineering at the 200-level or above, designated as a lecture course. Courses offered by the Wiess School of Natural Sciences or the George R. Brown School of Engineering include the following subject codes: ASTR, BIOE, BIOS, CAAM, CEVE, CHBE, CHEM, COMP, DSCI, ELEC, ENGI, ESCI, GLHT, HEAL, KINE, MATH, MECH, MSNE, NEUR, NSCI, PHYS, RCEL, and STAT.
- ⁵ CHEM 152 may be substituted for CHEM 122 or CHEM 112; CHEM 154 may be substituted for CHEM 124 or CHEM 114.
- ⁶ PHYS 102 **and** PHYS 104 **or** PHYS 112 may be substituted for PHYS 126.
- ⁷ BIOS 310 must be taken for at least 3 credit hours per semester for a minimum of 3 semesters in order to fulfill the Independent Research.
- ⁸ The Capstone Requirement is **in addition** to the other lecture course requirements. The same course may not be used to satisfy more than one requirement for this major and/or major concentration.

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 tab for Undergraduate Studies: <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:

- 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 \(https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/\)](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.

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 \(https://ga.rice.edu/undergraduate-students/honors-distinctions/university/\)](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 \(https://ga.rice.edu/undergraduate-students/honors-distinctions/university/\)](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 Studies](https://biosciences.rice.edu/), 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 [Undergraduate Studies](https://biosciences.rice.edu/), at: <https://biosciences.rice.edu/>.

Additional Information

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