BACHELOR OF ARTS (BA) DEGREE WITH A MAJOR IN BIOLOGICAL SCIENCES

Program Learning Outcomes for the BA Degree with a Major in Biological Sciences

Upon completing the BA degree with a major in Biological Sciences, students will be able to:

1. Demonstrate a comprehensive knowledge of the field of biology, illustrated by the ability to describe the breadth of the discipline and to synthesize a range of biological concepts and ideas.
2. Demonstrate an understanding of the modern scientific method, including a familiarity with current methods for designing experiments and/or mathematical models, and the ability to analyze and interpret data.
3. Demonstrate effective oral and written communication skills, including an ability to communicate effectively and work with diverse groups.
4. Locate primary scientific literature and demonstrate the ability to apply critical thinking and problem solving skills to evaluate published and proposed research in the biological sciences.
5. Demonstrate understanding of the practice and culture of science, scientific ethics, and the relationship between science and society.
6. Develop quantitative reasoning via the construction of models and/or the analysis of data.

Requirements for the BA Degree with a Major in Biological Sciences

For general university requirements, see Graduation Requirements (ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements). Students pursuing the BA degree with a major in Biological Sciences must complete:

- A minimum of 28 courses (67 credit hours) to satisfy major requirements. Additional credit hours may be required depending on course selection.
- A minimum of 127 credit hours to satisfy degree requirements. Additional credit hours may be required depending on course selection.
- A minimum of 60 credit hours outside of major requirements.
- A minimum of 10 courses (24 credit hours) taken at the 300-level or above.

The BA degree with a major in Biological Sciences incorporates elements from both the Biochemistry and Cell Biology and the Ecology and Evolutionary Biology programs.

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 official certifier). Students and their academic advisors should identify and clearly document the courses to be taken.

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### Summary

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Biological Sciences</td>
<td>Minimum of 67</td>
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<td>Total Credit Hours Required for the BA Degree with a Major in Biological Sciences</td>
<td>Minimum of 127</td>
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### Degree Requirements

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<tr>
<th>Code</th>
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<tr>
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<td>Core Requirements</td>
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<td>Non-Biology Courses</td>
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<td></td>
<td>MATH 101 SINGLE VARIABLE CALCULUS I</td>
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<td>MATH 102 SINGLE VARIABLE CALCULUS II</td>
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<td>Select 1 from the following:</td>
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<td>EBIO 338 DESIGN AND ANALYSIS OF BIOLOGICAL EXPERIMENTS</td>
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<td>MATH 211 ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA</td>
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<td>STAT 305 INTRODUCTION TO STATISTICS FOR BIO SCIENCES</td>
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<td>CHEM 121 GENERAL CHEMISTRY I &amp; CHEM 123 and GENERAL CHEMISTRY LABORATORY I</td>
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<td>CHEM 122 GENERAL CHEMISTRY II &amp; CHEM 124 and GENERAL CHEMISTRY LABORATORY II</td>
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<td>CHEM 212 ORGANIC CHEMISTRY II &amp; CHEM 214 and ORGANIC CHEM DISCUSSION II</td>
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<td>CHEM 215 ORGANIC CHEMISTRY LAB</td>
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<td>PHYS 125 GENERAL PHYSICS (WITH LAB)</td>
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<td>PHYS 126 GENERAL PHYSICS II (WITH LAB)</td>
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<td>Introductory Biology Labs</td>
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<td>EBIO 202 INTRODUCTORY BIOLOGY II</td>
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<td>Advanced Biology Labs</td>
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<td>BIOC 211 INTERMEDIATE EXPERIMENTAL BIO SCIENCES</td>
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<td>EBIO 213 INTRO EXPERIMENTAL ECOLOGY AND EVOLUTIONARY BIOLOGY</td>
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<td>BIOC 311 ADVANCED EXPERIMENTAL BIO SCIENCES</td>
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<td>BIOC 313 INTRODUCTORY SYNTHETIC BIOLOGY</td>
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<td>BIOC 318 LABORATORY STUDIES IN APPLIED MICROBIOLOGY</td>
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<td>BIOC 320 / BIOC 342 LABORATORY IN TISSUE CULTURE</td>
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<td>BIOC 413 EXPERIMENTAL MOLECULAR BIOLOGY</td>
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<td>BIOC 415 EXPERIMENTAL PHYSIOLOGY</td>
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<td>BIOC 530 LAB MODULE IN NMR SPECTROSCOPY AND MOLECULAR MODELING 2</td>
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<td>BIOC 535 PRACTICAL X-RAY CRYSTALLOGRAPHY 2</td>
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EBIO 316 LAB MODULE IN ECOLOGY
EBIO 317 LAB MODULE IN BEHAVIOR
EBIO 319 TROPICAL FIELD BIOLOGY
EBIO 320 ECOSYSTEM AND CONSERVATION OF BRAZILIAN WETLANDS LABORATORY
EBIO 324 CONSERVATION BIOLOGY LAB
EBIO 327 BIOLOGICAL DIVERSITY
EBIO 330 INSECT BIOLOGY LAB
EBIO 332 EVOLUTION OF GENES & GENOMES LAB
EBIO 335 EVOLUTIONARY BIOINFORMATICS LAB
EBIO 337 FIELD BIRD BIOLOGY LAB
EBIO 367 INTRODUCTION PHYCOLOGY LAB
EBIO 368 APPLIED PHYCOLOGY LAB
EBIO 379 LAB MODULE IN AQUATIC ECOLOGY WITH SCUBA

1 independent research experience

Upper-Level Biology Course
BIOL 301 BIOCHEMISTRY I 3

Elective Requirements
Upper-Level Biology Courses
Select 1 from the following: 3
BIOL 302 BIOCHEMISTRY II
BIOL 341 CELL BIOLOGY
BIOL 344 MOLECULAR BIOLOGY AND GENETICS
BIOL 352 PHYSICAL CHEMISTRY FOR THE BIOSCIENCES

Lecture Courses
Students must complete 5 courses as listed in the EBIO and BIOL Lecture Course Requirements below:
EBIO Lecture Courses
Select 3-4 courses from the following: 5
EBIO 321 ANIMAL BEHAVIOR
EBIO 323 / ENST 323 CONSERVATION BIOLOGY
EBIO 325 ECOLOGY
EBIO 326 INSECT BIOLOGY
EBIO 328 EVOLUTION OF GENES & GENOMES
EBIO 329 ANIMAL BIOLOGY AND PHYSIOLOGY
EBIO 331 / BIOL 331 BIOLOGY OF INFECTIOUS DISEASES
EBIO 333 / COMP 370 EVOLUTIONARY BIOINFORMATICS
EBIO 334 / BIOL 334 EVOLUTION
EBIO 336 PLANT DIVERSITY
EBIO 340 / ENST 340 / ESCI 340 GLOBAL BIOGEOCHEMICAL CYCLES
EBIO 365 INTRODUCTORY PHYCOLOGY
EBIO 366 APPLIED PHYCOLOGY
EBIO 372 CORAL REEF ECOSYSTEMS
EBIO 391 TRANSFER CREDIT IN ECOLOGY AND EVOLUTIONARY BIOLOGY
EBIO 433 ADVANCED ECOLOGY

BIOL Lecture Courses
Select 1-2 courses from the following: 6
BIOL 300 PARADIGMS IN BIOCHEMISTRY AND CELL BIOLOGY
BIOL 301 BIOCHEMISTRY I
BIOL 302 BIOCHEMISTRY II
BIOL 331 / BIOL 331 BIOLOGY OF INFECTIOUS DISEASES
BIOL 332 / BIOL 302 SYSTEMS PHYSIOLOGY
BIOL 335 CELLULAR AND MOLECULAR ANIMAL PHYSIOLOGY
BIOL 341 CELL BIOLOGY
BIOL 344 MOLECULAR BIOLOGY AND GENETICS
BIOL 352 PHYSICAL CHEMISTRY FOR THE BIOSCIENCES
BIOL 361 / BIOL 361 / GLHT 361 METABOLIC ENGINEERING FOR GLOBAL HEALTH ENVIRONMENTS
BIOL 368 / HUMA 368 CONCEIVING AND MISCONCEIVING THE MONSTROUS IN FICTION AND IN ART, IN MEDICINE AND IN BIOSCIENCE
BIOL 371 SEMINAR IN CONTEMPORARY BIOLOGICAL AND BIOMEDICAL RESEARCH
BIOL 372 IMMUNOLOGY
BIOL 380 / NEUR 380 / PSYC 380 FUNDAMENTAL NEUROSCIENCE SYSTEMS
BIOL 385 / NEUR 385 / PSYC 380 FUNDAMENTALS OF CELLULAR AND MOLECULAR NEUROSCIENCE
BIOL 390 TRANSFER CREDIT IN BIOCHEMISTRY AND CELL BIOLOGY
BIOL 424 MICROBIOLOGY AND BIOTECHNOLOGY
BIOL 425 PLANT MOLECULAR GENETICS AND DEVELOPMENT
BIOL 443 ADVANCED CONCEPTS AND CRITICAL ANALYSIS IN MODERN DEVELOPMENTAL BIOLOGY
BIOL 445 ADVANCED MOLECULAR BIOLOGY AND GENETICS
BIOL 447 EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE
BIOL 450 VIRUSES AND INFECTIOUS DISEASES
BIOL 455 COMPUTATIONAL SYNTHETIC BIOLOGY
BIOL 460 CANCER BIOLOGY
BIOL 470 COMPUTATION WITH BIOLOGICAL DATA
BIOL 481 MOLECULAR BIOPHYSICS I
BIOL 482 STRUCTURAL BIOLOGY

Total Credit Hours Required for the Major in Biological Sciences
Minimum of 67

University Graduation Requirements (ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements) *

Total Credit Hours
Minimum of 127
Footnotes and Additional Information
* Includes coursework completed as distribution credit, FWIS, LPAP, upper-level, residency (hours taken at Rice), 60 hours outside of the major (if applicable), and any additional academic program requirements. The "hours outside of the major" requirement may include all of the above university requirements.

1 Permissible substitutions: MATH 111 and MATH 112 may be substituted for MATH 101; CHEM 151 and CHEM 153 may be substituted for CHEM 121 and CHEM 123; CHEM 152 and CHEM 154 may be substituted for CHEM 122 and CHEM 124; CHEM 320 may be substituted for CHEM 212; CHEM 365 may be substituted for CHEM 215; PHYS 101 and PHYS 103 or PHYS 111 may be substituted for PHYS 125; PHYS 102 and PHYS 104 or PHYS 112 may be substituted for PHYS 126.

2 These advanced labs must be taken concurrently with or after BIOC 482.

3 Only one of the advanced laboratory course requirements can be satisfied by taking any of the following:
   1. BIOC 310 if taken for at least 3 credit hours or EBI0 306 if taken for at least 2 credit hours
   2. CONS 470 and CONS 471, if the research supervisor is from the BioSciences department or if the research is biological in nature and pre-approved by the student’s major advisor
   3. BIOC 401 and BIOC 402 and BIOC 412 or EBI0 403 and EBI0 404
   4. BIOC 393/EBIO 393

This substitution may be used only once regardless of the number of semesters of independent research or transfer credit.

4 A maximum of 3 credits of BIOC 390 and 3 credits of EBI0 391 can apply to this major. CHEM 311 and CHEM 312 may substitute for BIOC 352.

5 If students choose to complete 3 courses (9 credit hours) from the EBI0 Lecture Courses requirement, students will be required to complete 2 courses (6 credit hours) from the BIOC Lecture Courses requirement. BIOC 300 is only allowed to fulfill this elective requirement when it is taken prior to BIOC 301 and BIOC 341, or their equivalent transfer course.

6 If students choose to complete 1 course (3 credit hours) from the BIOC Lecture Courses requirement, students will be required to complete 4 courses (12 credit hours) from the EBI0 Lecture Courses requirement. BIOC 300 is only allowed to fulfill this elective requirement when it is taken prior to BIOC 301 and BIOC 341, or their equivalent transfer course.

Policies for the BA Degree with a Major in Biological Sciences

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: http://biosciences.rice.edu/.

Program Restrictions and Exclusions
Students pursuing the major in Biological Sciences should be aware of the following program restriction:

* Students pursuing the major in Biological Sciences may not additionally pursue the minor in Biochemistry and Cell Biology.

Transfer Credit
For Rice University's policy regarding transfer credit, see Transfer Credit (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: http://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 Biological Sciences should be aware of the following 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.

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

Opportunities for the BA Degree with a Major in Biological Sciences

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 (ga.rice.edu/undergraduate-students/academic-policies-procedures/latin-honors) and Distinction in Research and Creative Work (ga.rice.edu/undergraduate-students/honors-distinctions/university) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work (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, at: http://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, at: http://biosciences.rice.edu/.

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