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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 101</td>
<td>SINGLE VARIABLE CALCULUS I</td>
<td>3</td>
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<tr>
<td>MATH 102</td>
<td>SINGLE VARIABLE CALCULUS II</td>
<td>3</td>
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<tr>
<td>EBIO 338</td>
<td>DESIGN AND ANALYSIS OF BIOLOGICAL EXPERIMENTS</td>
<td>3-4</td>
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<tr>
<td>MATH 211</td>
<td>ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA</td>
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<tr>
<td>STAT 305</td>
<td>INTRODUCTION TO STATISTICS FOR BIOSCIENCES</td>
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<tr>
<td>CHEM 121 &amp; CHEM 123</td>
<td>GENERAL CHEMISTRY I and GENERAL CHEMISTRY LABORATORY I</td>
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<tr>
<td>CHEM 122 &amp; CHEM 124</td>
<td>GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY II</td>
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<tr>
<td>CHEM 211 &amp; CHEM 213</td>
<td>ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 212 &amp; CHEM 214</td>
<td>ORGANIC CHEMISTRY II and ORGANIC CHEM DISCUSSION II</td>
<td>3</td>
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<tr>
<td>CHEM 215</td>
<td>ORGANIC CHEMISTRY LAB</td>
<td>2</td>
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<tr>
<td>PHYS 125</td>
<td>GENERAL PHYSICS (WITH LAB)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 126</td>
<td>GENERAL PHYSICS II (WITH LAB)</td>
<td>4</td>
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<tr>
<td>BIOC 201</td>
<td>INTRODUCTORY BIOLOGY</td>
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<td>BIOC 211</td>
<td>INTERMEDIATE EXPERIMENTAL BIOSCIENCES</td>
<td>2</td>
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<tr>
<td>BIOC 213</td>
<td>INTRO EXPERIMENTAL ECOLOGY AND EVOLUTIONARY BIOLOGY</td>
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<td>BIOC 311</td>
<td>ADVANCED EXPERIMENTAL BIOSCIENCES</td>
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<tr>
<td>BIOC 313</td>
<td>INTRODUCTORY SYNTHETIC BIOLOGY</td>
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<tr>
<td>BIOC 318</td>
<td>MICROBIOLOGY LABORATORY</td>
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<tr>
<td>BIOC 320 / BIOE 342</td>
<td>LABORATORY IN TISSUE CULTURE</td>
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<tr>
<td>BIOC 413</td>
<td>EXPERIMENTAL MOLECULAR BIOLOGY</td>
<td></td>
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<td>BIOC 415</td>
<td>EXPERIMENTAL PHYSIOLOGY</td>
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<tr>
<td>BIOC 530</td>
<td>LAB MODULE IN NMR SPECTROSCOPY AND MOLECULAR MODELING</td>
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</tr>
<tr>
<td>BIOC 535</td>
<td>PRACTICAL X-RAY CRYSTALLOGRAPHY</td>
<td>2</td>
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<tr>
<td>EBIO 316</td>
<td>LAB MODULE IN ECOLOGY</td>
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</table>
EBIO 317  LAB MODULE IN BEHAVIOR
EBIO 319  TROPICAL FIELD BIOLOGY
EBIO 320  ECOLOGY 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
BIOC 301  BIOCHEMISTRY I  3

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

Lecture Courses
Students must complete 5 courses as listed in the EBIO and BIOC Lecture Course Requirements below:

Select 3-4 courses from the following:
- 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 / BIOC 331  BIOLOGY OF INFECTIOUS DISEASES
- EBIO 333 / COMP 370  EVOLUTIONARY BIOINFORMATICS
- EBIO 334 / BIOC 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

BIOC Lecture Courses
Select 1-2 courses from the following:
- BIOC 300  PARADIGMS IN BIOCHEMISTRY AND CELL BIOLOGY
- BIOC 301  BIOCHEMISTRY I
- BIOC 302  BIOCHEMISTRY II
- BIOC 331 / BIOL 331  BIOLOGY OF INFECTIOUS DISEASES
- BIOL 332 / BIOL 302  SYSTEMS PHYSIOLOGY
- BIOC 335  CELLULAR PHYSIOLOGY
- BIOL 334 / BIOL 302  SYSTEMS PHYSIOLOGY
- BIOL 335  CELLULAR AND MOLECULAR ANIMAL PHYSIOLOGY
- 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  IMUUNOLOGY
- BIOL 380 / NEUR 380 / PSYC 380  FUNDAMENTAL NEUROSCIENCE SYSTEMS
- BIOL 385 / NEUR 385  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) 60

Total Credit Hours: Minimum of 127
Footnotes and Additional Information

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 EBIO 306 if taken for at least 2 credit hours
   2. HONS 470 and HONS 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 EBIO 403 and EBIO 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 EBIO 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 EBIO 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 EBIO 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.

• Students pursuing the major in Biological Sciences may not additionally pursue the minor in Ecology and Evolutionary 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/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/.