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 (https://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 (minimum of 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 (minimum of 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 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/).

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 Biological Sciences</td>
<td>Minimum of 67</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours Required for the BA Degree with a Major in Biological Sciences</td>
<td>Minimum of 127</td>
</tr>
</tbody>
</table>

### Degree Requirements

#### Core Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MATH 101</td>
<td>SINGLE VARIABLE CALCULUS I</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 105</td>
<td>AP/OTH CREDIT IN CALCULUS I</td>
<td></td>
</tr>
<tr>
<td>MATH 102</td>
<td>SINGLE VARIABLE CALCULUS II</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 106</td>
<td>AP/OTH CREDIT IN CALCULUS II</td>
<td></td>
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</tbody>
</table>

Select 1 course from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>EBIO 338</td>
<td>ANALYSIS AND VISUALIZATION OF BIOLOGICAL DATA</td>
</tr>
<tr>
<td>MATH 211</td>
<td>ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA</td>
</tr>
<tr>
<td>STAT 305</td>
<td>INTRODUCTION TO STATISTICS FOR BIOSCIENCES</td>
</tr>
<tr>
<td>CHEM 121</td>
<td>GENERAL CHEMISTRY I</td>
</tr>
<tr>
<td>or CHEM 111</td>
<td>AP/OTH CREDIT IN GENERAL CHEMISTRY I</td>
</tr>
<tr>
<td>CHEM 123</td>
<td>GENERAL CHEMISTRY LABORATORY I</td>
</tr>
<tr>
<td>or CHEM 113</td>
<td>AP/OTH CREDIT IN GENERAL CHEMISTRY LAB I</td>
</tr>
<tr>
<td>CHEM 122</td>
<td>GENERAL CHEMISTRY II</td>
</tr>
<tr>
<td>or CHEM 112</td>
<td>AP/OTH CREDIT IN GENERAL CHEMISTRY II</td>
</tr>
<tr>
<td>CHEM 124</td>
<td>GENERAL CHEMISTRY LABORATORY II</td>
</tr>
<tr>
<td>or CHEM 114</td>
<td>AP/OTH CREDIT IN GENERAL CHEMISTRY LAB II</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>CHEM 212</td>
<td>ORGANIC CHEMISTRY II</td>
</tr>
<tr>
<td>&amp; CHEM 214</td>
<td>and ORGANIC CHEM DISCUSSION II</td>
</tr>
<tr>
<td>CHEM 215</td>
<td>ORGANIC CHEMISTRY LAB</td>
</tr>
<tr>
<td>or CHEM 365</td>
<td>ORGANIC CHEMISTRY LAB</td>
</tr>
<tr>
<td>PHYS 125</td>
<td>GENERAL PHYSICS (WITH LAB)</td>
</tr>
<tr>
<td>PHYS 126</td>
<td>GENERAL PHYSICS II (WITH LAB)</td>
</tr>
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#### Introductory Biology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>BIOC 201</td>
<td>INTRODUCTORY BIOLOGY I</td>
</tr>
<tr>
<td>EBIO 202</td>
<td>INTRODUCTORY BIOLOGY II</td>
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</tbody>
</table>

#### Introductory Biology Labs

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 211</td>
<td>INTERMEDIATE EXPERIMENTAL BIOSCIENCES 2</td>
<td>2</td>
</tr>
<tr>
<td>EBIO 213</td>
<td>INTRO EXPERIMENTAL ECOLOGY AND EVOLUTIONARY BIOLOGY</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Advanced Biology Labs

Select 3 courses from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>BIOC 311</td>
<td>ADVANCED EXPERIMENTAL BIOSCIENCES</td>
</tr>
</tbody>
</table>
### Bachelor of Arts (BA) Degree with a Major in Biological Sciences

- **BIOC 313**  
  EXPERIMENTAL SYNTHETIC BIOLOGY

- **BIOC 318**  
  MICROBIOLOGY LABORATORY

- **BIOC 320 / BIOE 342**  
  LABORATORY IN TISSUE CULTURE

- **BIOC 333**  
  BIONNOVATION STUDIO: FROM BASIC RESEARCH AND IDEATION TO TECHNOLOGY DEVELOPMENT

- **BIOC 415**  
  EXPERIMENTAL PHYSIOLOGY

- **BIOC 417**  
  EXPERIMENTAL CELL AND MOLECULAR NEUROSCIENCE

- **BIOC 530**  
  LAB MODULE IN NMR SPECTROSCOPY AND MOLECULAR MODELING

- **BIOC 535**  
  PRACTICAL X-RAY CRYSTALLOGRAPHY

- **EBIO 316**  
  LAB MODULE IN ECOLOGY

- **EBIO 317**  
  LAB MODULE IN BEHAVIOR

- **EBIO 320**  
  TROPICAL FIELD BIOLOGY

- **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 / ENST 379**  
  LAB MODULE IN AQUATIC ECOLOGY WITH SCUBA

- **1 independent research experience**

### Upper-Level Biology Course Requirements:
- **BIOC 301**  
  BIOCHEMISTRY I

### Elective Requirements

#### Upper-Level Biology Courses:
Select 1 course from the following:

- **BIOC 302**  
  BIOCHEMISTRY II

- **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 15 Lecture Course Requirements below:

**EBIO Lecture Courses**

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 / BIOC 329**  
  ANIMAL BIOLOGY AND PHYSIOLOGY

- **EBIO 331 / BIOC 331**  
  BIOLOGY OF INFECTIOUS DISEASES

**BIOC Lecture Courses**

Select 1-2 courses from the following:

- **BIOC 300**  
  PARADIGMS IN BIOCHEMISTRY AND CELL BIOLOGY

- **BIOC 302**  
  BIOCHEMISTRY II

- **BIOC 331 / EBO 331**  
  BIOLOGY OF INFECTIOUS DISEASES

- **BIOC 332 / BIOE 302**  
  SYSTEMS PHYSIOLOGY

- **BIOC 335**  
  CELLULAR AND MOLECULAR ANIMAL PHYSIOLOGY

- **BIOC 341**  
  CELL BIOLOGY

- **BIOC 344**  
  MOLECULAR BIOLOGY AND GENETICS

- **BIOC 352**  
  PHYSICAL CHEMISTRY FOR THE BIOSCIENCES

- **BIOC 361 / BIOE 361 / GLHT 361**  
  METABOLIC ENGINEERING FOR GLOBAL HEALTH ENVIRONMENTS

- **BIOC 368 / HUMA 368**  
  CONCEIVING AND MISCONCEIVING THE MONSTROUS IN FICTION AND IN ART, IN MEDICINE AND IN BIOSCIENCE

- **BIOC 371**  
  SEMINAR IN CONTEMPORARY BIOLOGICAL AND BIOMEDICAL RESEARCH

- **BIOC 372**  
  IMMUNOLOGY

- **BIOC 380 / NEUR 380 / PSYC 380**  
  FUNDAMENTAL NEUROSCIENCE SYSTEMS

- **BIOC 385 / NEUR 385**  
  FUNDAMENTALS OF CELLULAR AND MOLECULAR NEUROSCIENCE

- **BIOC 390**  
  TRANSFER CREDIT IN BIOCHEMISTRY AND CELL BIOLOGY

- **BIOC 424**  
  MICROBIOLOGY AND BIOTECHNOLOGY

- **BIOC 425**  
  PLANT MOLECULAR GENETICS AND DEVELOPMENT

- **BIOC 442**  
  MOLECULES, MEMORY AND MODEL ANIMALS: METHODS IN BEHAVIORAL NEUROSCIENCE

- **BIOC 443**  
  DEVELOPMENTAL NEUROBIOLOGY

- **BIOC 445**  
  ADVANCED MOLECULAR BIOLOGY AND GENETICS

- **BIOC 447**  
  EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE
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 105 or MATH 111 and MATH 112 may be substituted for MATH 101; MATH 106 may be substituted for MATH 102; CHEM 151 may be substituted for CHEM 121 or CHEM 111; CHEM 153 may be substituted for CHEM 123 or CHEM 113; CHEM 152 may be substituted for CHEM 122 or CHEM 112, and CHEM 154 may be substituted for CHEM 124 or CHEM 114; 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 BIOC 212 may be substituted for BIOC 211

3 These advanced labs (BIOC 530 and BIOC 535) must be taken concurrently with or after BIOC 482.

4 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.

5 CHEM 301 and CHEM 302 (both courses for 6 credit hours total) may substitute for BIOC 352.

6 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 a BIOC elective lecture course requirement when it is taken prior to BIOC 301 and BIOC 341, or their equivalent transfer course. A maximum of 3 credits of EBIO 391 can apply to this major.

7 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 a BIOC elective lecture course requirement when it is taken prior to BIOC 301 and BIOC 341, or their equivalent transfer course. A maximum of 3 credit hours of BIOC 390 can apply to this major.

**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: [https://biosciences.rice.edu/](https://biosciences.rice.edu/).

**Program Restrictions and Exclusions**

Students pursuing the major in Biological Sciences should be aware of the following program restrictions:

- Students pursuing the major in Biological Sciences may not additionally pursue the major or minor in Biochemistry and Cell Biology.
- Students pursuing the major in Biological Sciences may not additionally pursue the major or minor in Ecology and Evolutionary 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](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 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.

**Additional Information**

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

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