BS in Biological Sciences

Degree Program Description

Biology is a broad field centered on the study of living organisms and processes. While the degree program requires general education courses in behavioral sciences, social sciences, and the humanities, students can specialize their curriculum through their course selections. The main difference between the BS degree and the BA degree is that the BS degree requires more credit hours in biology, chemistry, physics, and math than the BA degree. The curriculum for the BS degree currently has the option of completing a foreign language sequence or substituting one of two tracks for the foreign language requirement. Some of the knowledge that students acquire includes basic sciences necessary for upper-level biological science coursework (i.e., mathematics, statistics, physics, general and organic chemistry), how biologists use mathematical modeling and simulation to describe living systems, and arguments employed by scientists and others in key ethical controversies in biological science and research (for example, stem cell research). This degree is designed to prepare students for graduate study, professional schools, or direct entry into the workplace. Undergraduates majoring in biological sciences go on to careers in a wide range of fields, including medicine and other health professions, biotechnology, industry, government service, conservation and ecology, and secondary and higher education.

Major Program Requirements

The following degree requirements must be completed in addition to University (http://catalog.missouri.edu/academicdegreetrueqments/universityrequirements/), general education (http://catalog.missouri.edu/academicdegreetrueqments/generaleducationrequirements/), and College of Arts and Science (http://catalog.missouri.edu/collegeofartsandscience/#undergraduatetext) requirements, students must also meet the following major program requirements. All major requirements in the College of Arts and Science must be completed with grades of C- or higher unless otherwise indicated.

Requirements - Biological Sciences

Requirements for the BA and BS degrees with a major in Biological Sciences include course work in biology and related science departments (chemistry, physics and math). The BS degree program requires more extensive course work, with additional studies in biology and the related sciences. The BA degree program is more flexible and has fewer required courses to accommodate students with dual degrees or minors in other departments. Both degree programs can be used to prepare for graduate study or professional school. Students must also complete college and university graduation requirements, including university general education requirements.

All courses in the major (including related sciences) must be completed with a grade of C- or higher with a cumulative GPA of 2.0 or higher. (Satisfactory/Unsatisfactory grading is not acceptable for courses in the major.)

Second Language Alternative (SLA) for students pursuing a BS degree in biological sciences

Students who are pursuing a BS degree with a major in biological sciences may opt to satisfy the second language requirement through alternative coursework consisting of at least 12 credits in courses numbered 2000 or above. These courses may not be used to satisfy other degree requirements. Students should confer with the Biology Advising Office to ensure that alternative courses meet departmental requirements. All alternative courses must be approved by the Director of Undergraduate Studies.

All courses in the major (including related sciences) must be completed with a grade of C- or higher with a cumulative GPA of 2.0 or higher. (Satisfactory/Unsatisfactory grading is not acceptable for courses in the major.)

Major Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>BIO_SC 1010</td>
<td>General Principles and Concepts of Biology</td>
</tr>
<tr>
<td>BIO_SC 1020</td>
<td>General Biology Laboratory</td>
</tr>
</tbody>
</table>

(Grades of B- or higher required for BIO_SC 1010/BIO_SC 1020)

Evolutionary Biology (select from):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO_SC 3400</td>
<td>Evolution and Ecology</td>
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<tr>
<td>BIO_SC 4600</td>
<td>Evolution</td>
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Biological Diversity (select from):

<table>
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<th>Course Code</th>
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<tbody>
<tr>
<td>MICROB 3200</td>
<td>Medical Microbiology and Immunology</td>
</tr>
<tr>
<td>BIO_SC 3210</td>
<td>Plant Systematics</td>
</tr>
<tr>
<td>BIO_SC 3240</td>
<td>Vertebrate Biology</td>
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<tr>
<td>BIO_SC 3260</td>
<td>Invertebrate Zoology</td>
</tr>
<tr>
<td>BIO_SC 3360</td>
<td>Herpetology</td>
</tr>
<tr>
<td>BIO_SC 3510</td>
<td>Biology of Fungi</td>
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<tr>
<td>BIO_SC 3710</td>
<td>Introductory Entomology</td>
</tr>
<tr>
<td>BIO_SC 3750</td>
<td>General Microbiology</td>
</tr>
<tr>
<td>F_W 2600</td>
<td>Ornithology</td>
</tr>
<tr>
<td>F_W 2700</td>
<td>Ichthyology</td>
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<tr>
<td>F_W 3660</td>
<td>Mammalogy</td>
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Capstone course (select one) (complete in last 45 hours):

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>BIO_SC 4950</td>
<td>Undergraduate Research in Biology</td>
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<tr>
<td>BIO_SC 4952</td>
<td>Undergraduate Research in Biology</td>
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<tr>
<td>BIO_SC 4950H</td>
<td>Honors Research in Biology</td>
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<td>BIO_SC 4952H</td>
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<tr>
<td>BIO_SC 4972</td>
<td>Developmental Biology</td>
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<tr>
<td>BIO_SC 4976</td>
<td>Molecular Biology</td>
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<td>BIO_SC 4978</td>
<td>Cancer Biology</td>
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<td>BIO_SC 4982</td>
<td>Human Inherited Diseases</td>
</tr>
<tr>
<td>BIO_SC 4983</td>
<td>Molecular Ecology</td>
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<tr>
<td>BIO_SC 4984</td>
<td>Mammalian Reproductive Biology</td>
</tr>
<tr>
<td>BIO_SC 4988</td>
<td>Nerve Cells and Behavior</td>
</tr>
<tr>
<td>BIO_SC 4990</td>
<td>Vertebrate Histology and Microscopic Anatomy</td>
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<tr>
<td>BIO_SC 4994</td>
<td>Senior Seminar</td>
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Degree Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CHEM 1400</td>
<td>College Chemistry I</td>
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<tr>
<td>&amp; CHEM 1401</td>
<td>and College Chemistry I Laboratory</td>
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<tr>
<td>CHEM 1410</td>
<td>College Chemistry II</td>
</tr>
<tr>
<td>&amp; CHEM 1411</td>
<td>and College Chemistry II Laboratory</td>
</tr>
<tr>
<td>CHEM 2100</td>
<td>Organic Chemistry I</td>
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</table>
CHEM 2110  Organic Chemistry II  3
CHEM 2130  Organic Laboratory I  2
One of the following physics sequences  8-10

PHYSICS 1210  College Physics I  5-8
& PHYSICS 1220  and College Physics II  4-5
or PHYSICS 2750/2760  University Physics I  3

One semester of calculus and one semester of statistics, selected from the following:

MATH 1400  Calculus for Social and Life Sciences I  3-5
or MATH 1500  Analytic Geometry and Calculus I  4

STAT 1200  Introductory Statistical Reasoning  3
or STAT 2500  Introduction to Probability and Statistics I  3

No more than 5 credits of introductory coursework (BIO_SC 1010, BIO_SC 1020, BIO_SC 1100, BIO_SC 1200, and BIO_SC 1500) may be included in the major. At least 12 hours of biology coursework must be taken in residence at MU.

Electives

All biology majors must take additional biology courses to total at least 33 credits for the BS degree, of which at least 16 credits must be at the 3000 level or higher.

Elective credits must be in formal courses numbered above 2000 and must include at least one 3000- or 4000-level laboratory course, one 4000-level course, and one WI course at the 3000- or 4000-level in a natural science. In addition to the biological diversity and capstone courses listed above, the following courses may be used as elective credit: BIO_SC 3002, BIO_SC 3040, BIO_SC 3050, BIO_SC 3060, BIO_SC 3075, BIO_SC 3650, BIO_SC 3700, BIO_SC 3715, BIO_SC 3760, BIO_SC 3780, BIO_SC 4002, BIO_SC 4320, BIO_SC 4400, BIO_SC 4500, BIO_SC 4590, BIO_SC 4642, BIOCHM 4270, and BIOCHM 4272. MICROB 3200 may not be used to satisfy the laboratory course requirement.

Students completing research courses (BIO_SC 2950, BIO_SC 4950, BIO_SC 4950H, BIO_SC 4952, or BIO_SC 4952H) for 6 credits may apply 3 credits toward fulfillment of capstone or biology elective hours for the BS degree.

Students may repeat readings, internships, problems, or research courses for a total of 18 hours. Any credits remaining after 3 hours are used as a capstone or an elective in biology will be applied toward total hours to graduate. A maximum of 18 credit hours from the following courses (BIO_SC 2940, BIO_SC 2950, BIO_SC 2960, BIO_SC 2965H, BIO_SC 4085, BIO_SC 4950, BIO_SC 4950H, BIO_SC 4952 and BIO_SC 4952H) can be counted toward graduation.

Semester Plan

NOTE: These plans are intended only as general guides. Courses outside Biology and Chemistry are provided only for illustrative purposes. Advanced credit or exemption from the Foreign Language requirement and/or advanced credit in non-science courses, along with the interests of each individual student will determine a final combination of courses in each semester that is unique for each student. Note also that the sample schedules in Semester 5 and beyond are left incomplete on purpose because each schedule should be highly individualized at that point.

Plan 1

A student that is exempt from MATH 1100

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall</th>
<th>CR</th>
<th>Spring</th>
<th>CR</th>
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<tbody>
<tr>
<td>CHEM 1400</td>
<td>4 CHEM 1410 &amp; CHEM 1411</td>
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<td>ENGLISH 1000</td>
<td>3 BIO_SC 1500</td>
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<td>Social Sciences Course (MO State Law)</td>
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** See Grad Plan for Mathematical Sciences Option

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<td>CHEM 2100</td>
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<td>STAT 1200</td>
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<td>1-2 Second language II or Second Language Alternative</td>
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<td>PHYSICS 1210</td>
<td>4 Biology Elective</td>
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<td>Second language III or Second Language Alternative</td>
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<tr>
<td>Elective</td>
<td>3 Humanities (2000 Level)</td>
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<table>
<thead>
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<th>Spring</th>
<th>CR</th>
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<td>Biology Diversity</td>
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Total Credits: 117-122

** Could meet A&S Diversity Intensive Requirement (3 hrs).

Plan 2

A student that needs MATH 1100

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<tr>
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<tbody>
<tr>
<td>BIO_SC 1500</td>
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** Elective 1 Elective 1-2

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### Second Year

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<td>BIO_SC 2300</td>
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<td>STAT 1200</td>
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<td>MATH 1400</td>
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<td>Second Language or Second Language Alternative</td>
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### Third Year

<table>
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<th>Spring</th>
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<tbody>
<tr>
<td>Biology Elective Lab (3000 level)</td>
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<td>CHEM 2110</td>
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<td>Biology Elective</td>
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<td>CHEM 2130</td>
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<td>Behavioral Science</td>
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<td>Second Language or Second Language Alternative</td>
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### Fourth Year

<table>
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<th>Fall</th>
<th>CR</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Biology Capstone</td>
<td>3</td>
<td>Biology Elective- Writing Intensive</td>
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<tr>
<td>PHYSCS 1220</td>
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<td>Evolutionary Biology</td>
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<td>Social Science (2000 level)</td>
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<td>Biology Diversity</td>
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<tr>
<td>Writing Intensive Elective</td>
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** Total Credits: 120-124**

** Could meet A&S Diversity Intensive Requirement (3 hrs).