BA 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 BA degree and the BS degree is that the BS degree requires more credit hours in biology, chemistry, physics, and math than the BA degree. 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). The BA 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

In addition to University (https://catalog.missouri.edu/academicdegreerequirements/universityrequirements/), general education (https://catalog.missouri.edu/academicdegreerequirements/generaleducationrequirements/), and College of Arts and Science (https://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

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.)

Major Core Requirements in Biology

BIO_SC 1500	Introduction to Biological Systems with Laboratory	5
or BIO_SC 1010 & BIO_SC 1020	General Principles and Concepts of Biology and General Biology Laboratory	
or BIO_SC 1030	General Principles and Concepts of Biology with Laboratory	
or BIO_SC 1200	General Botany with Laboratory (BIO_SC 1030 is not offered at MU and is for crediting transfer courses only. Grade of B- or higher required for BIO_SC 1010/ BIO_SC 1020 & BIO_SC 1030)	
BIO_SC 1550	Introduction to Life Science Research	
or GN_HON 2453H	Introduction to Research	
BIO_SC 2200	General Genetics	4
BIO_SC 2300	Introduction to Cell Biology	4
Evolutionary Biology (select from):		3
BIO_SC 3400	Evolution and Ecology	
BIO_SC 4600	Evolution	
Biological Diversity (select from):		3-5
MICROB 3200	Medical Microbiology and Immunology	
BIO_SC 3210	Plant Systematics	
BIO_SC 3240	Vertebrate Biology	
BIO_SC 3260	Invertebrate Zoology	
BIO_SC 3360	Herpetology	
BIO_SC 3510	Biology of Fungi	
BIO_SC 3710	Introductory Entomology	
BIO_SC 3750	General Microbiology	
F_W 2600	Ornithology	
F_W 2700	Ichthyology	
F_W 3660	Mammalogy	
Capstone course (select one) (complete in last 45 hours):		3-5
BIO_SC 4950 & BIO_SC 4952	Undergraduate Research in Biology and Undergraduate Research in Biology	
BIO_SC 4950H & BIO_SC 4952H	Honors Research in Biology and Honors Research in Biology	
BIO_SC 4972	Developmental Biology	
BIO_SC 4976	Molecular Biology	
BIO_SC 4978	Cancer Biology	
BIO_SC 4982	Human Inherited Diseases	
BIO_SC 4983	Molecular Ecology	
BIO_SC 4984	Mammalian Reproductive Biology	
BIO_SC 4988	Nerve Cells and Behavior	
BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	
BIO_SC 4994	Senior Seminar	

Related Science Requirements

CHEM 1400 & CHEM 1401	College Chemistry I and College Chemistry I Laboratory	4
CHEM 1410 & CHEM 1411	College Chemistry II and College Chemistry II Laboratory	4
CHEM 2100 & CHEM 2110	Organic Chemistry I and Organic Chemistry II	3-6
or CHEM 2030	Survey of Organic Chemistry	
Physical Sciences (select one)		4-5
PHYSCS 1210	College Physics I	
PHYSCS 2750	University Physics I	
GEOL 1100	Introduction to the Earth with Laboratory	
GEOL 1200	Environmental Geology with Laboratory	
ASTRON 1010	Introduction to Astronomy	
Mathematical Sciences (select one)		3-5
MATH 1400	Calculus for Social and Life Sciences I	
MATH 1500	Analytic Geometry and Calculus I	
STAT 1200	Introductory Statistical Reasoning	
STAT 2500	Introduction to Probability and Statistics I	

INFOTC 1040	Introduction to Problem Solving and Programming

No more than 5 credits of introductory biology coursework (BIO_SC 1010, BIO_SC 1020, BIO_SC 1030, BIO_SC 1100, BIO_SC 1200, 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 29 credits for the BA degree, of which at least 16 credits must be at the 3000 level or above.

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	Topics in Biological Sciences - Biological Sciences	1-3
BIO_SC 3040	Eugenics Past, Present and Future: An Ugly Partnership Between Science and Society	3
BIO_SC 3050	Genetics and Society	3
BIO_SC 3060	Science and Society: Past, Present and Future	3
BIO_SC 3075	The Human Microbiome	3
BIO_SC 3210	Plant Systematics	4
BIO_SC 3240	Vertebrate Biology	3
BIO_SC 3260	Invertebrate Zoology	4
BIO_SC 3360	Herpetology	3-4
BIO_SC 3400	Evolution and Ecology	3
BIO_SC 3510	Biology of Fungi	3
BIO_SC 3650	General Ecology	5
BIO_SC 3700	Human Physiology	5
BIO_SC 3710	Introductory Entomology	3
BIO_SC 3715	Insect Diversity	2
BIO_SC 3750	General Microbiology	3
BIO_SC 3760	Microbiology Laboratory	2
BIO_SC 3780	Genetics Laboratory	2
BIO_SC 4002	Topics in Biological Science - Biological Science	1-3
BIO_SC 4320	Molecular Plant Physiology	3
BIO_SC 4400	Plant Anatomy	4
BIO_SC 4500	Neurobiology	3
BIO_SC 4590	Computational Neuroscience	3
BIO_SC 4600	Evolution	3
BIO_SC 4640	Behavioral Biology	3-4
BIO_SC 4642	Animal Communication	3
BIO_SC 4950 & BIO_SC 4952	Undergraduate Research in Biology and Undergraduate Research in Biology	2-6
BIO_SC 4972	Developmental Biology	3
BIO_SC 4974	Molecular Biology Laboratory	3
BIO_SC 4976	Molecular Biology	3
BIO_SC 4978	Cancer Biology	3
BIO_SC 4982	Human Inherited Diseases	3
BIO_SC 4983	Molecular Ecology	4
BIO_SC 4984	Mammalian Reproductive Biology	3
BIO_SC 4988	Nerve Cells and Behavior	3
BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	5
BIO_SC 4994	Senior Seminar	3
BIOCHM 4270	Biochemistry	3
BIOCHM 4272	Biochemistry	3
F_W 2600	Ornithology	5
F_W 2700	Ichthyology	4
F_W 3660	Mammalogy	4
MICROB 3200	Medical Microbiology and Immunology	4

List of 3000/4000 level lab courses.

BIO_SC 3210	Plant Systematics	4
BIO_SC 3360	Herpetology	3-4
BIO_SC 3510	Biology of Fungi	3
BIO_SC 3650	General Ecology	5
BIO_SC 3700	Human Physiology	5
BIO_SC 3710 & BIO_SC 3715	Introductory Entomology and Insect Diversity	5
BIO_SC 3760	Microbiology Laboratory	2
BIO_SC 3780	Genetics Laboratory	2
BIO_SC 4400	Plant Anatomy	4
BIO_SC 4950	Undergraduate Research in Biology	1-3
or BIO_SC 4950H	Honors Research in Biology	
BIO_SC 4974	Molecular Biology Laboratory	3
BIO_SC 4983	Molecular Ecology	4
BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	5
F_W 3660	Mammalogy	4
The following two courses satisfy the lab requirement if taken for 4 credit hours.		
BIO_SC 3260	Invertebrate Zoology	4
BIO_SC 4640	Behavioral Biology	4

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 BA 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, Chemistry, MATH 1100, and ENGLSH 1000 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. Students who are pursuing the BA will not need to complete CHEM 2130.

Plan 1

A student that is exempt from MATH 1100

First Year				
Fall	**CR**	**Spring**	**CR**	
BIO_SC 1550	2	BIO_SC 1500	5	
CHEM 1400	3	CHEM 1410	3	
CHEM 1401	1	CHEM 1411	1	
Behavioral Science	3	ENGLSH 1000	3	
Mathematical Science: Related Science Requirements	3	Humanities from Arts and Science	3	
Int Disc 1001, SSC 1150, or elective	2			
	14		**15**	
Second Year				
Fall	**CR**	**Spring**	**CR**	
CHEM 2030	3	BIO_SC 2300	4	
BIO_SC 2200	4	Missouri State Law Requirement: Social Science from Arts an Science	3	
Second Language Requirement	4	Second Language Requirement	4	
Behavioral Science, 2000+ level from Arts and Science	3	Humanities, 2000+ level	3	
Undergraduate research, second major, minor, certificate, or elective	1	Undergraduate research, second major, minor, certificate, or elective	1	
	15		**15**	
Third Year				
Fall	**CR**	**Spring**	**CR**	
Biology Lab Requirement, 3000+ level	5	undefined	4	
Second Language Requirement	4	Physical Science: Related Science Requirements	4	
Social Science, 2000+ level	3	First Writing Intensive	3	
Undergraduate research, second major, minor, certificate, or elective	4	Undergraduate research, second major, minor, certificate, or elective	4	
	16		**15**	
Fourth Year				
Fall	**CR**	**Spring**	**CR**	
Biology Capstone, Second Writing Intensive	3	Bio 3400 or Bio 4600, Evolutionary Biology Requirement	3	
Humanities	3	Humanities	3	
Social Sciences, Arts and Science Diversity Requirement	3	Undergraduate research, second major, minor, certificate, or elective	3	
Undergraduate research, second major, minor, certificate, or elective	3	Second major, minor, certificate, or elective	3	
Second major, minor, certificate, or elective	3	Second major, minor, certificate, or elective	3	
	15		**15**	

Total Credits: 120

Plan 2

A student that needs MATH 1100

First Year				
Fall	**CR**	**Spring**	**CR**	
BIO_SC 1500	5	CHEM 1400	3	
Math 1100: Math and Quantitative Reasoning	3	CHEM 1401	1	
Behavioral Sciences	3	Bio 1550 or Gn Hon 2453H	2	
Missouri State Law Requirement: Social Science from Arts and Science	3	Mathematical Science: Related Science Requirements	3	
Int Disc 1001, SSC 1150, or elective	2	ENGLSH 1000	3	
		Humanities from Arts and Science	3	
	16		**15**	
Second Year				
Fall	**CR**	**Spring**	**CR**	
BIO_SC 2200	4	BIO_SC 2300	4	
CHEM 1410	3	Second Language Requirement	4	
CHEM 1411	1	Social Science, 2000+ level	3	
Second Language Requirement	4	Undergraduate research, second major, minor, certificate, or elective	3	
Behavioral Science, 2000+ level from Arts and Science	3			
	15		**14**	
Third Year				
Fall	**CR**	**Spring**	**CR**	
CHEM 2030	3	Biological Diversity Requirement	4	
Second Language Requirement	4	Humanities, 2000+ level	3	
Biology Lab Requirement, 3000+ level	5	Physical Science: Related Science Requirements	4	
Social Science, Arts and Science Diversity Requirement	3	Undergraduate research, second major, minor, certificate, or elective	4	
	15		**15**	
Fourth Year				
Fall	**CR**	**Spring**	**CR**	
Biology Capstone, Second Writing Intensive	3	Bio 3400 or 4600, Evolutionary Biology Requirement	3	
Humanities	3	Humanities	3	
Undergraduate research, second major, minor, certificate, or elective	3	First Writing Intensive	3	
Second major, minor, certificate, or elective	3	Undergraduate research, second major, minor, certificate, or elective	3	
Second major, minor, certificate, or elective	3	Second major, minor, certificate, or elective	3	
	15		**15**	

Total Credits: 120