

BIOLOGICAL SCIENCE, B.S.

Mission

The mission of the Bachelor of Science in Biological Sciences is to provide an academically stimulating and challenging environment for intellectual and spiritual growth, preparing students to pursue careers in scientific research, industry, academia, and health care.

Degree Program

A Bachelor of Science degree in Biological Science is offered upon completion of the University baccalaureate and major requirements. The Bachelor of Science degree in Biological Science offers three different concentrations: Environmental Science, General Biology and Premed/Pre-Health Care Professional.

Learning Outcomes

Program Learning Outcomes

Upon completion of the Bachelor of Science in Biological Sciences, students will be able to:

1. Apply the scientific method in research (ULO 3).
2. Explain the biomolecular basis of life at the cellular level (ULO 1).
3. Describe and classify the diversity of organismal form, structure and function, and the relationship of the organisms to one another and the environment (ULO 1).
4. Integrate faith and scientific knowledge to practice science with integrity, steward creation, and articulate the merit of their worldview (ULO 2).

Each Program Learning Outcome (PLO) listed above references at least one of the University Learning Outcomes (ULO 1, 2, 3), which may be found in the General Information (<http://catalog.biola.edu/general-information>) section of this catalog.

Requirements

Admission Recommendations

Recommended high school courses are: one year of biology, one year of chemistry, three years of mathematics, and two years of foreign language. One year of physics is desirable. The student should be aware that Advanced Placement (AP) science courses may not be used to fulfill science requirements for this degree.

Graduate/Professional School Requirements

The student should be aware that most graduate programs and many professional schools require an overall minimum GPA of 3.0 and that a grade of "C" or better was earned for all science courses and they will not accept Advanced Placement science credit to fulfill the entrance requirements.

Curriculum Requirements Concentrations

General Biology (70+ Credits)

Code	Title	Credits
Program-Specific Core Curriculum (GE) Courses		
All Biological Science majors automatically meet the Core Curriculum requirement for science and mathematics. The foreign language requirement is met by two years in high school or the first 4 credits in college.		
PHIL 215 is strongly recommended for all biological science majors.		
Program Courses		
A minimum of 43 credits from the Department of Biological Sciences, including:		
BIOS 111	Fundamentals of Cellular and Molecular Biology	3
BIOS 113	Fundamentals of Cellular and Molecular Biology Laboratory	1
BIOS 112	Fundamentals of Organismal Biology	3
BIOS 114	Fundamentals of Organismal Biology Laboratory	1
BIOS 200	Sophomore Writing Seminar	1
BIOS 222	Botany	4
BIOS 312	Cell and Molecular Biology	3
BIOS 322	Laboratory in Cell and Molecular Biology	2
BIOS 332	Genetics	4
BIOS 401	General Ecology	4
BIOS 450	Directed Research	1
or BIOS 470	Seminar in Advanced Biology	
or BIOS 480	Internship	
Select one of the following:		4
BIOS 281	Physiology	
BIOS 282	Microbiology	
BIOS 380	Advanced Microbiology	
BIOS 381	Advanced Physiology	
BIOS 382	Vertebrate Physiology	
Select a minimum of 12 credits of upper-division biological sciences electives		12
The following minimum of 27 credits of supporting sciences from the Departments of Chemistry, Physics and Engineering and Mathematical Sciences are also required including:		
CHEM 105	General Chemistry I	4
CHEM 106	General Chemistry II	4
CHEM 301	Organic Chemistry I	3
CHEM 311	Laboratory in Organic Chemistry I	1
CHEM 302	Organic Chemistry II	3
CHEM 312	Laboratory in Organic Chemistry II	1
PHSC 111	Physics I	3
PHSC 117	Physics I Laboratory	1
PHSC 112	Physics II	3
PHSC 118	Physics II Laboratory	1
Select one of the following:		3-4
MATH 101	Precalculus Mathematics	

MATH 105	Calculus I	
MATH 210	Introduction to Probability and Statistics	
MATH 318	Biostatistics	
Total Credits		70-71

Environmental Science (64+ Credits)

Code	Title	Credits
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Program-Specific Core Curriculum (GE) Courses

All Biological Science majors automatically meet the Core Curriculum requirement for science and mathematics. The foreign language requirement is met by two years in high school or the first 4 credits in college.

PHIL 215 is strongly recommended for all biological science majors.

Program Courses

Select 37 credits from the Department of Biological Sciences, including:

BIOS 103	Introduction to Environmental Science	3
BIOS 112	Fundamentals of Organismal Biology	3
BIOS 114	Fundamentals of Organismal Biology Laboratory	1
BIOS 200	Sophomore Writing Seminar	1
BIOS 222	Botany	4
BIOS 332	Genetics	4
or BIOS 281	Physiology	
or BIOS 381	Advanced Physiology	
BIOS 401	General Ecology	4
BIOS 450	Directed Research	1
or BIOS 470	Seminar in Advanced Biology	
or BIOS 480	Internship	
Select a minimum of 8 credits in Organismal Biology Electives		8
BIOS 302	Vertebrate Biology	
BIOS 351	Invertebrate Biology	
BIOS 352	Marine Biology	
BIOS 402	Parasitology	
BIOS 446	Ornithology	
Select a minimum of 8 credits in Environmental Science Electives		8
BIOS 303	Ecological Agriculture	
BIOS 305	Global Development and Ecological Sustainability	
BIOS 306	Land Resources	
BIOS 307	Lake Ecology and Management	
BIOS 325	Environmental Microbiology	
BIOS 335	Field Biology	
BIOS 353	Environmental Ethics	
BIOS 354	Bioethics	
BIOS 355	Environmental Health: An Ecological Perspective	
BIOS 360	Principles of Geographic Information Systems	
BIOS 362	Natural History of Southern California	
BIOS 371	Conservation Biology	
BIOS 372	Restoration Ecology	

BIOS 390	Au Sable Institute of Environmental Studies	
BIOS 410	Topics in Environmental Science	
BIOS 430	Topics in Natural Resource Management	
BIOS 450	Directed Research	
BIOS 452	Directed Studies in Environmental Sciences	
BIOS 470	Seminar in Advanced Biology	
BIOS 480	Internship	
CHEM 332	Environmental Chemistry	

The following minimum of 27 credits of supporting sciences from the Departments of Chemistry, Physics and Engineering and Mathematical Sciences are also required including:

CHEM 105	General Chemistry I	4
CHEM 106	General Chemistry II	4
CHEM 301	Organic Chemistry I	4
& CHEM 311	and Laboratory in Organic Chemistry I	
or CHEM 321	Basic Organic and Biochemistry	
& CHEM 322	and Basic Organic and Biochemistry Lab	
MATH 210	Introduction to Probability and Statistics	3
or MATH 318	Biostatistics	
PHSC 103	Geology	3
PHSC 104	Geology Laboratory	1
PHSC 111	Physics I	3
PHSC 117	Physics I Laboratory	1
PHSC 112	Physics II	3
PHSC 118	Physics II Laboratory	1

Total Credits 64

Premed/Pre-Health Care Professional (70+ Credits)

Code	Title	Credits
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Program-Specific Core Curriculum (GE) Courses

All Biological Science majors automatically meet the Core Curriculum requirement for science and mathematics. The foreign language requirement is met by two years in high school or the first 4 credits in college.

PHIL 215 is strongly recommended for all biological science majors

Program Courses

Select 43 credits from the Department of Biological Sciences, including:

BIOS 111	Fundamentals of Cellular and Molecular Biology	3
BIOS 113	Fundamentals of Cellular and Molecular Biology Laboratory	1
BIOS 112	Fundamentals of Organismal Biology	3
BIOS 114	Fundamentals of Organismal Biology Laboratory	1
BIOS 200	Sophomore Writing Seminar	1
BIOS 312	Cell and Molecular Biology	3
BIOS 322	Laboratory in Cell and Molecular Biology	2
BIOS 332	Genetics	4
BIOS 401	General Ecology	4
BIOS 450	Directed Research	1
or BIOS 470	Seminar in Advanced Biology	
or BIOS 480	Internship	

Select one of the following:	4
BIOS 281 Physiology	
BIOS 282 Microbiology	
BIOS 380 Advanced Microbiology	
BIOS 381 Advanced Physiology	
BIOS 382 Vertebrate Physiology	

Please refer to the Education section of the catalog or meet with a credential analyst in the School of Education for program requirements.

Select a minimum of 16 credits of Biological Science electives ¹	16
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The following minimum of 27 credits of supporting sciences from the Departments of Chemistry, Physics, and Engineering and Mathematical Sciences are also required, including:

CHEM 105 General Chemistry I	4
CHEM 106 General Chemistry II	4
CHEM 301 Organic Chemistry I	3
CHEM 311 Laboratory in Organic Chemistry I	1
CHEM 302 Organic Chemistry II	3
CHEM 312 Laboratory in Organic Chemistry II	1
PHSC 111 Physics I	3
PHSC 117 Physics I Laboratory	1
PHSC 112 Physics II	3
PHSC 118 Physics II Laboratory	1

Select one of the following:	3-4
MATH 101 Precalculus Mathematics	
MATH 105 Calculus I	
MATH 210 Introduction to Probability and Statistics	
MATH 318 Biostatistics	

Total Credits	70-71
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¹ 12 credits must be upper-division.

Secondary Education Minor

For those interested in teaching Biology at the high school level, this concentration provides coursework that, combined with successfully passing the California Subject Examinations for Teachers (CSET), leads to a California Single Subject Teaching Credential in Biology. The Professional Teacher Preparation Program leading to a California Teaching Credential at Biola University is subject to change in response to new legislation. See a credential analyst in the School of Education for current information on completing the requirements for a teaching credential. Students must consult with both their major advisor and a School of Education advisor. Candidates who take the following 18 credits qualify for a Secondary Education Minor:

Code	Title	Credits
LEDU 301	Introduction to Teaching	3
LEDU 330	Psychological Foundations of Education	3
LEDU 341	Methods of Teaching Linguistically Diverse Students	3
LEDU 425	Secondary Content Area Reading	3
LEDU 433	Single Subject Pedagogy	2
LEDU 438	Secondary Curriculum, Differentiation, and Assessment	3
Select 1 credit of approved electives		1
Total Credits		18