

Biology (BA/BS)

Thank you sincerely for your interest in studying Biology at the University of Oregon, a member of the Association of American Universities, that includes 71 Universities (69 in the US and 2 in Canada) recognized throughout the world for their leading research and teaching. We have developed an outstanding major that will prepare you for a multitude of options including graduate schools and careers in biomedicine and research, allied health, private industry and education. Our nationally and internationally recognized graduates have completed top MD, PhD, MD-PhD, MS programs and internships all over the world. Emphasis Areas for the Biology major include Ecology & Evolution, Human Biology, Marine Biology, Molecular Cellular & Developmental Biology and Neuroscience & Behavior.

Biology faculty who conduct research and teach specialize in cellular and molecular biology, developmental biology, ecology and evolution, human biology, marine biology, neuroscience and behavior, and bioinformatics. Our students learn and work alongside scientists making important contributions in their field of expertise. We foster collaboration among students, staff and faculty across Biology, Chemistry and Biochemistry, Human Physiology, Physics and Psychology Departments. The first ever Institute of Molecular Biology including research faculty from multiple departments was established at Oregon in 1959. So, the rich history and interdisciplinary nature of our department creates many opportunities for students after they graduate. Our graduates have secured a variety of jobs working with:

- Biomedical research groups
- Biotechnology companies
- Clinics and hospitals
- Industry and laboratories
- Inspection agencies and control boards
- Pharmaceutical companies
- Private research institutions
- Public health departments
- State and federal government agencies
- Universities and Colleges
- Zoos and aquariums

We are excited that you have considered Biology as a major and look forward to meeting with you soon here on campus in Eugene.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- An understanding of the process and application of scientific inquiry; the ability to develop well-reasoned hypotheses and to design experiments by which to test them.
- An ability to apply mathematical and statistical approaches to understanding biological information; an ability to interpret graphical representations of biological information.
- A broad-based knowledge of biology at multiple levels and in interdisciplinary contexts; competency in reading, understanding, and critically evaluating scientific information across major areas of the curriculum, from molecules to ecosystems.
- An ability to communicate scientific ideas clearly, both orally and in writing to both general and professional audiences.

- An ability to understand the relationship between science and modern society as well as the potential impact of scientific discovery on the future.
- An ability to use modeling and simulation to study biological systems.

Fundamental Concepts:

- Evolution and biological diversity: all living organisms are genetically related; the diversity of life evolved over time by processes of mutation and selection.
- Structure and function: Basic units of structure give rise to the function of all living things.
- Information flow, exchange, and storage: Properties of organisms emerge from the flow, exchange, expression, and storage of genetic information.
- Pathways and transformations of energy and matter: Biological systems grow and change by processes based on chemical transformation pathways and are governed by the laws of thermodynamics.
- Systems: Living systems are interconnected and interacting.

Biology Major Requirements

Courses used to fulfill the major requirements must be taken for a letter grade of C- or better or a mark of Pass (P or P*).

Code	Title	Credits
Core Courses		
Math ¹		8
MATH 246	Calculus for the Biological Sciences I or MATH 251 Calculus I	
MATH 247	Calculus for the Biological Sciences II or MATH 252 Calculus II	
General Chemistry		18
CH 221	General Chemistry I or CH 224H Advanced General Chemistry I	
CH 222	General Chemistry II or CH 225H Advanced General Chemistry II	
CH 223	General Chemistry III or CH 226H Advanced General Chemistry III	
CH 227	General Chemistry Laboratory or CH 237	
CH 228	General Chemistry Laboratory or CH 238	
CH 229	General Chemistry Laboratory or CH 239	
Organic Chemistry ²		4
CH 331	Organic Chemistry I	
Physics ³		12
PHYS 201 & PHYS 202 & PHYS 203	General Physics and General Physics and General Physics	

or PHYS 251 Foundations of Physics I
and Foundations of Physics I
& PHYS 252 and Foundations of Physics I

& PHYS 253

Lower-Division Biology 15-20

BI 211	General Biology I: Cells
& BI 212	and General Biology II: Organisms
& BI 213	and General Biology III: Ecology and
& BI 214	Evolution
	and General Biology IV: Biochemistry and
	Genetics
or BI 281H	Accelerated Biology I: Cells, Biochemistry and
& BI 282H	Physiology
& BI 283H	and Accelerated Biology II: Genetics and Molecular
	Biology
	and Accelerated Biology III: Evolution, Diversity and
	Ecology

Upper-Division Biology ⁴ 44

At least one course needs to be completed from each area (I, II, and III):

Area I: 300-level molecular, cellular, and developmental biology course

Area II: 300-level systems and organisms course

Area III: 300-level ecology and evolution course

At least one 300- or 400-level course with significant laboratory or fieldwork

12 credits of courses numbered BI 410, 420–499

At least one course in modeling, analysis, programming, and statistics (MAPS) ⁵

One course from the following: an additional Lab/Field course
OR an additional MAPS course OR 4 credits of BI 401 Research

Total Credits 101-106

¹ A course in statistics is required if an ecology and evolution or neuroscience and behavior emphasis area is selected.

² Graduate programs in medicine and allied health typically require additional organic chemistry lectures, Organic Chemistry II (CH 335), Organic Chemistry III (CH 336), and laboratories (CH 337, 338) beyond that required by the biology major. Often, course work in biochemistry and genetics as well as other additional courses are typically required or preferred. Please consult the Health Professions Program (<https://healthprofessions.uoregon.edu/>) for further details.

³ Graduate programs in medicine and allied health typically require additional laboratories (PHYS 204, 205, 206) or three terms of Foundations of Physics Laboratory (PHYS 290) beyond that required by the biology major. Please consult the Health Professions Program (<https://healthprofessions.uoregon.edu/>) for further details.

⁴ Students must complete a minimum of 44 upper-division biology credits. A maximum of 20 credits may be from other departments. For a complete list of approved courses and other details about upper-division requirements, see the online requirements for the biology major (<https://biology.uoregon.edu/undergraduate-program/requirements/>).

⁵ Visit the Biology Advising Center for a list of approved courses.

Area I Courses

Code	Title	Credits
BI 320	Molecular Genetics	4
BI 322	Cell Biology	4
BI 326	Immunology and Infectious Disease	4
BI 328	Developmental Biology	4
BI 360	Neurobiology	4

Area II Courses

Code	Title	Credits
BI 330	Microbiology	6
& BI 331	and Microbiology Laboratory ¹	
BI 353	Sensory Physiology	4
BI 356	Animal Physiology	5
BI 358	Investigations in Medical Physiology	4
BI 359	Plant Biology	4
BI 451	Invertebrate Zoology	1-8

¹ Both BI 330 and BI 331 must be taken to satisfy the Area II requirement.

Area III Courses

Code	Title	Credits
BI 307	Forest Biology	4
BI 357	Marine Biology	4
BI 370	Ecology	5
BI 374	Conservation Biology	4
BI 380	Evolution	4
BI 390	Animal Behavior	4
BI 395	Tropical Ecology	4
BI 474	Marine Ecology	1-8

Laboratory or Fieldwork Courses

Code	Title	Credits
BI 307	Forest Biology	4
BI 328	Developmental Biology	4
BI 330	Microbiology	6
& BI 331	and Microbiology Laboratory ¹	
BI 356	Animal Physiology	5
BI 357	Marine Biology	4
BI 370	Ecology	5
BI 432	Mycology	5
BI 442	Systematic Botany	5
BI 448	Field Botany	4
BI 452		4
BI 454	Estuarine Biology	5
BI 455	Marine Birds and Mammals	1-6
BI 457	Marine Biology: [Topic]	1-8
BI 458	Biological Oceanography	5
BI 468	Amphibians and Reptiles of Oregon	4
BI 474	Marine Ecology	1-8

¹ Both BI 330 and BI 331 must be taken.

Modeling, Analysis, Programming, and Statistics (MAPS) Courses

Code	Title	Credits
BI 471	Population Ecology	4
ANTH 470	Statistical Analysis of Biological Anthropology	4
ERTH 418	Earth and Environmental Data Analysis	4
MATH 425	Statistical Methods I	4

Approved Courses from Other Departments

Code	Title	Credits
Anthropology		
ANTH 376	Decoding Your Genome	4
ANTH 459	Advanced Evolutionary Medicine	4
ANTH 462		4
ANTH 463	Primate Behavior	4
ANTH 467	Paleoecology and Human Evolution	4
ANTH 468		4
ANTH 470	Statistical Analysis of Biological Anthropology	4
ANTH 472	Primate Conservation Biology	4
ANTH 487	Bioanthropology Methods	4
Computer Science		
CS 445	Modeling and Simulation	4
CS 471	Introduction to Artificial Intelligence	4
Chemistry		
CH 360	Physiological Biochemistry	4
CH 461	Biochemistry	4
CH 462	Biochemistry	4
CH 463	Biochemistry	4
CH 467	Biochemistry Laboratory	4
Earth Sciences		
ERTH 418	Earth and Environmental Data Analysis	4
ERTH 433		4
ERTH 434	Vertebrate Paleontology	4
Environmental Studies		
ENVS 427	Environmental and Ecological Monitoring	4
ENVS 465	Wetland Ecology and Management	4
ENVS 477	Soil Science	4
Geography		
GEOG 323	Biogeography	4
GEOG 423	Advanced Biogeography: [Topic]	4
Human Physiology		
HPHY 321	Human Anatomy I	5
HPHY 322	Human Physiology I	5
HPHY 323	Human Anatomy II	5
HPHY 324	Human Physiology II	5
Landscape Architecture		
LA 441	Principles of Applied Ecology	2-6
Mathematics		

MATH 425	Statistical Methods I	4
Psychology		
PSY 302	Statistical Methods in Psychology	4
PSY 304	Biopsychology	4
PSY 438	Perception	4
PSY 445	Brain Mechanisms of Behavior	4
PSY 449	Cognitive Neuroscience	4

Emphasis Areas for the Biology Major

Fulfilling the requirements for an undergraduate degree in biology provides a solid, general foundation in the discipline. Some biology majors choose to concentrate their upper-division course work in one of five emphasis areas:

- ecology and evolution
- human biology
- marine biology
- molecular, cellular, and developmental biology
- neuroscience and behavior

The requirements listed for each emphasis may be fulfilled as the student completes the upper-division course work for the biology major. Though not required, emphasis areas are designed to guide students, based on their specific interests, through upper-division course work. Upon graduation, students who complete the requirements for an emphasis area receive a written recognition from the department.

Visit biology.uoregon.edu/undergraduate-program/requirements (<http://biology.uoregon.edu/undergraduate-program/requirements/>) for the current requirements for each emphasis area, or contact the Biology Advising Center at 541-346-4525 for more information.

Honors Program in Biology

The honors program requires substantial laboratory or field research supervised by a faculty member. Biology majors who satisfy the following requirements are eligible to graduate with honors:

1. Registration for the honors program through the Biology Advising Center, which includes obtaining an acceptance signature from the faculty research advisor, *before* beginning research
2. Completion of all requirements for the major in biology
3. Attainment of a minimum 3.30 GPA in all upper-division biology courses (including 300- and 400-level approved courses outside the department; see a biology advisor for a list). The GPA will be calculated for **all** courses in this category, regardless of the total number of credits.
4. Completion of a minimum of three terms of intensive research (summer session counts as a term); at least four terms and summer research experience are strongly encouraged
5. Completion of a minimum of 4 credits in Research: [Topic] (BI 401) under the supervision of a single faculty advisor. Up to 4 credits may be applied towards the 44 upper-division elective Biology credits. (*See #7 for Honors College students.*)
6. Completion of a thesis, with the following requirements:
 - a. Oversight by a thesis committee comprising two faculty members—a primary advisor and one faculty member on the Biology Undergraduate Affairs Committee
 - b. A final version of the thesis must be provided to the committee one week prior to the thesis defense

- c. Both committee members must sign the thesis within one week of the thesis defense, and a final signed copy must be submitted to the Biology Advising Center
7. Thesis defense
- a. Thesis committee must attend the thesis defense.
 - b. Defense must happen at least one week prior to the end of the term in which the student is graduating.
 - c. The thesis defense will be an open seminar. Other faculty, students, and staff will be encouraged to attend.

The chair of the Biology Undergraduate Affairs Committee will notify students during their senior year with the name of the committee member who will serve as their second thesis committee member. Students should contact both committee members via email sometime during the term before the defense to start working on a range of possible defense dates. For more information, contact the committee chair.

Four-Year Degree Plan

The degree plan shown is only a sample of how students may complete their degrees in four years. There are alternative ways. Students should consult their advisor to determine the best path for them.

Bachelor of Arts in Biology

Course	Title	Credits	Milestones
First Year			
Fall			
CH 111	Introduction to Chemical Principles	4	
MATH 111Z	Precalculus I: Functions	4	
WR 121Z	Composition I	4	
Arts and letters or social science course		4	
Credits		16	
Winter			
CH 221	General Chemistry I	4	
CH 227	General Chemistry Laboratory	2	
MATH 112Z	Precalculus II: Trigonometry	4	
WR 123	College Composition III (WR 123	4	
or	Recommended)		
WR 122Z	or Composition II		
PE or seminar elective		1	
Credits		15	
Spring			
CH 222	General Chemistry II	4	
CH 228	General Chemistry Laboratory	2	
MATH 246	Calculus for the Biological Sciences I	4	
or	(Math 246 recommended)		
MATH 251	or Calculus I		
General education course in Social Science or Arts & Letter		4	
PE or seminar elective		1	
Credits		15	
Total Credits		46	

Course	Title	Credits	Milestones
Second Year			
Fall			
BI 211	General Biology I: Cells	5	

CH 223	General Chemistry III	4
CH 229	General Chemistry Laboratory	2
General education course in arts and letters or social science		4
PE or seminar elective		1
Credits		16
Winter		
BI 212	General Biology II: Organisms	5
MATH 247	Calculus for the Biological Sciences II	4
or	(Math 247 recommended)	
MATH 252	or Calculus II	
Elective or general education course that also satisfies a multicultural requirement		8
Credits		17
Spring		
BI 213	General Biology III: Ecology and	5
or BI 214	Evolution	
	or General Biology IV: Biochemistry and Genetics	
General education course in arts and letters or social science		8
Elective or multicultural requirement or Minor course		4
Credits		17
Total Credits		50

Course	Title	Credits	Milestones
Third Year			
Fall			
BI 214	General Biology IV: Biochemistry and	5	
or BI 213	Genetics		
	or General Biology III: Ecology and Evolution		
CH 331	Organic Chemistry I	4	
Upper-division biology course, or MAPS		4	
General education course in arts and letters or social studies		4	
Credits		17	
Winter			
CH 335	Organic Chemistry II	4	
Upper-division biology courses, MAPS requirement		8	
General education course in arts and letters or social studies		4	
Credits		16	
Spring			
Upper-division biology courses		8	
General education course in arts and letters or social studies		4	
Elective or course for minor		4	
Credits		16	
Total Credits		49	

Course	Title	Credits	Milestones
Fourth Year			
Fall			
PHYS 201	General Physics	4	

Upper-division biology course, MAPS course if still need it	4
Upper-division biology course or elective	4
Elective courses - consider BI 401, BI 402, or BI 406	4

Credits 16

Winter

PHYS 202 General Physics	4
Upper-division biology course or elective	4
Elective course or MAPS if still need it. - Consider BI 401, BI 402, or BI 406, depending on career plans	4

Credits 12

Spring

PHYS 203 General Physics	4
Upper-division biology course	4
Upper-division biology course or elective- Consider BI 401, BI 402, or BI 406	4

Credits 12

Total Credits 40

Bachelor of Science in Biology

Course Title Credits Milestones

First Year

Fall

CH 221 General Chemistry I	4
CH 227 General Chemistry Laboratory	2
MATH 112Z Precalculus II: Trigonometry	4
WR 121Z Composition I	4
PE or seminar elective	1

Credits 15

Winter

CH 222 General Chemistry II	4
CH 228 General Chemistry Laboratory	2
MATH 246 Calculus for the Biological Sciences I (MATH 246 recommended) or MATH 251 or Calculus I	4

WR 123 College Composition III (WR 123 recommended) or WR 122Z or Composition II	4
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PE or seminar elective	1
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Credits 15

Spring

CH 223 General Chemistry III	4
CH 229 General Chemistry Laboratory	2
MATH 247 Calculus for the Biological Sciences II (Math 247 recommended) or MATH 252 or Calculus II	4

General-education course that also satisfies multicultural requirement	4
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PE or seminar elective	1
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Credits 15

Total Credits 45

Course Title Credits Milestones

Second Year

Fall

BI 211 General Biology I: Cells or BI 281H or Accelerated Biology I: Cells, Biochemistry and Physiology	5
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CH 331 Organic Chemistry I	4
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General-education course that also satisfies multicultural requirement	4
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General education or minor requirement	4
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Credits 17

Winter

BI 212 General Biology II: Organisms or BI 282H or Accelerated Biology II: Genetics and Molecular Biology	5
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CH 335 Organic Chemistry II	4
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Elective or general education course that also satisfy a multicultural requirement	4
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General education course in arts and letters or social science	4
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Credits 17

Spring

BI 213 General Biology III: Ecology and or BI 214 Evolution	5
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or or General Biology IV: Biochemistry and Genetics or Accelerated Biology III: Evolution, Diversity and Ecology	
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General-education courses	8
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General education or minor requirement	4
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Credits 17

Total Credits 51

Course Title Credits Milestones

Third Year

Fall

BI 214 General Biology IV: Biochemistry and or BI 213 Genetics	5
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or General Biology III: Ecology and Evolution	
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PHYS 201 General Physics	4
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Upper-division biology course, MAPS	4
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Elective course - Consider BI 401, BI 402, or BI 406	4
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Credits 17

Winter

PHYS 202 General Physics	4
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Upper-division biology courses, MAPS	8
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Elective course - Consider BI 401, BI 402, or BI 406	4
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Credits 16

Spring

PHYS 203 General Physics	4
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Upper-division biology courses	8
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Upper-division elective course	4
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All students are required to take 62 upper-division
(300- or 400-level) credits

Credits	16
Total Credits	49

Course	Title	Credits	Milestones
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Fourth Year

Fall

Upper-division biology courses, MAPS if still need it	8
Upper-division elective course - Pre-med students will need biochemistry (CH 360 or CH 461)	4
Minor requirement or upper-division biology course	4
Credits	16

Winter

Upper-division biology courses, MAPS if still need it.	8
Elective course - Consider BI 401, BI 402, or BI 406	4
Credits	12

Spring

Upper-division biology courses	8
Upper-division elective course - Consider BI 401, BI 402, or BI 406	4
Credits	12
Total Credits	40