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 25	1Calculus I	
MATH 247	Calculus for the Biological Sciences II	
or MATH 25	Calculus II	
General Chemist	ry	18
CH 221 & CH 222 & CH 223	General Chemistry I and General Chemistry II and General Chemistry III	
CH 227 & CH 228 & CH 229	General Chemistry Laboratory and General Chemistry Laboratory and General Chemistry Laboratory	
Organic Chemist	ry 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 25	Foundations of Physics I and Foundations of Physics I	
& PHYS 252	2 and Foundations of Physics I	
& PHYS 253	3	

Lower-Division Biology

15-20

Total Credits	· · · ·	101-106
or a lab/field cour	se	
One course from	the following: 4cr BI 401, or a MAPS course,	
At least one cours statistics (MAPS)	se in modeling, analysis, programming, and ⁵	
12 credits of cour	ses numbered BI 410, 420–499	
At least one 300- laboratory or field	or 400-level course with significant work	
Area III: 300-le	evel ecology and evolution course	
Area II: 300-le	vel systems and organisms course	
Area I: 300-lev biology course	rel molecular, cellular, and developmental	
At least one cours II, and III):	se needs to be completed from each area (I,	
Upper-Division I	Biology ⁴	44
or BI 281H & BI 282H & BI 283H	Honors Biology I: Cells, Biochemistry and Phys and Honors Biology II: Genetics and Molecular Biology and Honors Biology III: Evolution, Diversity and Ecology	iology
	and General Biology IV: Biochemistry and Genetics	
& BI 213 & BI 214	and General Biology III: Ecology and Evolution	
& BI 212	and General Biology II: Organisms	
BI 211	General Biology I: Cells	

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 form 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 & BI 331	Microbiology and Microbiology Laboratory ¹	6
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 & BI 331	Microbiology and Microbiology Laboratory ¹	6
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	Insect Biology	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	Primate Evolution	4
ANTH 463	Primate Behavior	4
ANTH 467	Paleoecology and Human Evolution	4
ANTH 468	Evolutionary Theory	4
ANTH 470	Statistical Analysis of Biological Anthropology	4
ANTH 472	Primate Conservation Biology	4
ANTH 487	Bioanthropology Methods	4
Computer Scien	ce	
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	Paleobotany	4
ERTH 434	Vertebrate Paleontology	4
Environmental S	tudies	
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 Physiolo	ду	
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 Arch	itecture	
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
- 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.
- 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
- 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 Milestor
First Year		
Fall		
CH 111	Introduction to Chemical Principles	4
MATH 111Z	Precalculus I: Functions	4
WR 121Z	Composition I	4
Arts and letter	s 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 seminal	r 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 educa Letter	ation course in Social Science or Arts &	4
PE or seminal	relective	1
	Credits	15
	Total Credits	46

Winter

	BI 212	General Biology II: Organisms	5
	MATH 247 or MATH 252	Calculus for the Biological Sciences II (Math 247 recommended) or Calculus II	4
	Elective or ger a multicultural	neral education course that also satisfies requirement	8
		Credits	17
	Spring		
	BI 213 or BI 214	General Biology III: Ecology and Evolution or General Biology IV: Biochemistry and Genetics	5
	General educa science	ation course in arts and letters or social	8
nes	Elective or mu	Iticultural requirement or Minor course	4
		Credits	17
		Total Credits	50
	Course	Title	Credits Milestone
	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 educa studies	ation course in arts and letters or social	4
		Credits	17
	Winter		
	CH 335	Organic Chemistry II	4
	Upper-division	biology courses, MAPS requirement	8
	General educa	ation course in arts and letters or social	4
		Credits	16
	Spring		
	Upper-division	biology courses	8
	General educa studies	ation course in arts and letters or social	4
	Elective or cou	urse for minor	4
		Credits	16
		Total Credits	49
nes	Course	Title	Credits Milestone

Course	Title	Credits Milestones
Second Ye	ar	
Fall		
BI 211	General Biology I: Cells	5
CH 223	General Chemistry III	4
CH 229	General Chemistry Laboratory	2
General ed science	ucation course in arts and letters or social	4
PE or semir	nar elective	1
	Credits	16

Course

Course	Title	Credits Mileston
Fourth Year		
Fall		
PHYS 201	General Physics	4
Upper-division need it	on biology course, MAPS course if still	4
Upper-divisio	on biology course or elective	4
Elective cou	rses - consider BI 401, BI 402, or BI 406	4
	Credits	16

Winter

Second Year

or BI 281H

General Biology I: Cells

Organic Chemistry I

or Accelerated Biology I: Cells, Biochemistry and Physiology

Fall Bl 211

CH 331

gy course gy course or elective- Consider Bl 06 lits	4 4 12		
gy course gy course or elective- Consider BI 06	4		
gy course	4		
Upper-division biology course			
eral Physics	4		
lits	12		
Elective course or MAPS if still need it Consider BI 401, BI 402, or BI 406, depending on career plans			
Upper-division biology course or elective			
eral Physics	4		
	eral Physics gy course or elective IAPS if still need it Consider BI 06, depending on career plans its eral Physics		

Bachelor of Science in Biology

Course First Year	Title	Credits Milestones
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 seminal	r elective	1
	Credits	15
Winter		
CH 222	General Chemistry II	4
CH 228	General Chemistry Laboratory	2
MATH 246 or MATH 251	Calculus for the Biological Sciences I (MATH 246 recommended) or Calculus I	4
WR 123 or WR 122Z	College Composition III (WR 123 recommended) or Composition II	4
PE or seminar elective		1
Spring	Credits	15
CH 223	General Chemistry III	4
CH 229	General Chemistry Laboratory	2
MATH 247 or MATH 252	Calculus for the Biological Sciences II (Math 247 recommended) or Calculus II	4
General-educ multicultural re	ation course that also satisfies equirement	4
PE or semina	relective	1
	Credits	15
	Total Credits	45
Course	Title	Credits Milestones

	General-educa multicultural re	4	
	General educa	ation or minor requirement	4
		Credits	17
	Winter		
	BI 212 or BI 282H	General Biology II: Organisms or Accelerated Biology II: Genetics and Molecular Biology	5
	CH 335	Organic Chemistry II	4
	Elective or ger multicultural re	neral education course that also satisfy a equirement	4
	General educa science	ation course in arts and letters or social	4
		Credits	17
	Spring		
es	BI 213 or BI 214 or BI 282H	General Biology III: Ecology and Evolution or General Biology IV: Biochemistry and Consting	5
	Ы 200П	or Accelerated Biology III: Evolution, Diversity and Ecology	
	General-educa	ation courses	8
	General educa	ation or minor requirement	4
		Credits	17
		Total Credits	51
	Course Third Year	Title	Credits Milestone
	BI 214	General Biology IV: Biochemistry and	5
	01 01 213	or General Biology III: Ecology and Evolution	
	PHYS 201	General Physics	4
	Upper-division	biology course, MAPS	4
	Elective cours	e - Consider BI 401, BI 402, or BI 406	4
	Winter	Credits	17
	PHYS 202	General Physics	4
	Upper-division	biology courses, MAPS	8
	Elective cours	e - Consider BI 401, BI 402, or BI 406	4
	Spring	Credits	16
	PHYS 203	General Physics	4
	Upper-division	biology courses	8
	Upper-division	elective course	4
	All students are required to take 62 upper-division (300- or 400-level) credits		
es		Credits	16
		Total Credits	49
	Course	Title	Credits Milestone
	Fourth Year Fall		

Upper-division biology courses, MAPS if still need it

5

4

6 Biology (BA/BS)

Upper-division elective course - Pre-med students will need biochemistry (CH 360 or CH 461)		
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	