

Biology Major

73-76 units

A well-balanced complement of courses in the field of biology is offered to provide solid academic training for the student who wishes to major in this area. The biology faculty stimulate curiosity and creativity within each student to utilize basic scientific knowledge in the practical solutions of problems related to living organisms and in understanding the wonders of God's world. Biology majors specialize in upper-division courses in the areas of ecological, microbiological, molecular, neurobiological or organismal emphases.

Students majoring or minoring in biology may enter biomedical/pharmaceutical sales, become elementary or secondary school science teachers, or serve as technicians in conservation, agriculture, food or health sciences, university research laboratories, or hospitals. The major also prepares the student for studies leading to graduate professional degrees in medicine, dentistry, optometry, veterinary science, pharmacology, biotechnology, biomedical research, or university teaching positions. Students desiring to matriculate into a physical therapy or physician assistant program should view the allied health major (<http://catalog.apu.edu/undergraduate/liberal-arts-sciences/biology-chemistry/allied-health-major>). For information on the premedical/pre dental track, visit Preprofessional Programs (<http://catalog.apu.edu/undergraduate/academic-programs/preprofessional-programs>).

Note: Entry requirements differ among graduate schools and jobs. Students are responsible to research the requirements of graduate programs and professions in which they are interested.

Au Sable Institute of Environmental Studies

The Au Sable Institute (<http://ausable.org>) serves evangelical Christian colleges by offering environmental studies in a natural environment at multiple sites in the United States and in other countries. Azusa Pacific University students may attend the institute as part of APU's involvement with the Council for Christian Colleges & Universities and receive credit for courses taken there with prior approval. Please see the biology faculty representative for further information.

Requirements

- A student must complete all prerequisites for a BIOC, BIOL, or CHEM course with a C- or better before taking the course (except as noted in the course description).
- A minimum cumulative GPA of 2.0 in all biology, chemistry, biochemistry, math, and physics courses required for the major must be maintained.
- A student must complete each BIOC, BIOL, or CHEM course with a C- or higher for the course to meet a degree requirement in the Department of Biology and Chemistry.

Code	Title	Units
Biology		
BIOL 151	General Biology I ¹	4
BIOL 152	General Biology II	4
BIOL 240	Biology of Microorganisms	4
BIOL 280	Cell Biology	4
BIOL 300	Genetics	4
BIOL 496	Writing 3: Ethics and the Sciences ²	3
Chemistry		
CHEM 151	General Chemistry I ^{1,3}	4
CHEM 152	General Chemistry II	4
CHEM 251 & CHEM 261	Organic Chemistry - Theory I and Organic Chemistry - Lab	5
CHEM 252 & CHEM 262	Organic Chemistry: Theory II and Organic Chemistry - Lab	5
Mathematics		
MATH 165	Calculus I ³	3
MATH 166	Calculus II ³	3
Physics		
Select one of the following:		8-10
PHYC 151 & PHYC 152	Physics for Life Sciences I and Physics for Life Sciences II ^{1,3}	

PHYC 161 Physics for Science and Engineering I
& PHYC 162 and Physics for Science and Engineering II ^{1,3}

Additional upper-division courses (See below) 18-19

Total Units 73-76

¹ Meets the General Education Natural Sciences requirement: BIOL 151 (<http://catalog.apu.edu/undergraduate/liberal-arts-sciences/biology-chemistry/#courseinventory>), CHEM 151, (<http://catalog.apu.edu/undergraduate/liberal-arts-sciences/biology-chemistry/#courseinventory>) PHYC 151, and PHYC 161.

² Meets the General Education Writing 3 requirement.

³ This course may be waived with an appropriate Advanced Placement test score.

Ecological Emphasis (additional upper-division courses)

Select 18-19 units of 300- or 400-level BIOL courses, as follows:

Code	Title	Units
BIOL 320	Ecology ¹	4
BIOL 435	Stewardship Ecology	3
Units from field-study program ²		4
Additional units from field-study program or: ³		4

BIOL 336 Vertebrate Biology

BIOL 340 Invertebrate Biology

BIOL 350 Mammalian Physiology

BIOL 365 Plant Biology

Select at least 3 additional units from the following: 3-4

BIOL 336 Vertebrate Biology

BIOL 340 Invertebrate Biology

BIOL 346 Regional Human Anatomy

BIOL 350 Mammalian Physiology

BIOL 365 Plant Biology

Or approved (by department chair) topics in:

BIOL 495 Advanced Topics in Biology

BIOL 498 Directed Research ⁴

Total Units 18-19

¹ Meets the General Education Civic Knowledge and Engagement requirement.

² Four units from an approved, off-campus field-study program such as the Au Sable Institute described above.

³ Up to 4 additional units from an approved, off-campus field-study program.

⁴ Students may take a maximum of 3 units total from BIOL 390, BIOL 391, BIOL 490, BIOL 497, and BIOL 498 for elective credit.

Microbiological Emphasis (additional upper-division courses)

Select 18 additional units of 300- or 400-level BIOC or BIOL courses, as follows:

Code	Title	Units
BIOL 494	Advanced Topics in Biology (Immunology)	4
Select one of the following:		4

BIOC 360 Principles of Biochemistry ¹

BIOC 380 Biochemistry I

Select 10 additional units from the following (must include at least one 4-unit course): 10

BIOL 381 Biochemistry II

BIOL 342 Medical Microbiology ²

BIOL 395 Science Internship ³

BIOL 410 Molecular Biology

BIOL 495 Advanced Topics in Biology (Molecular and Biochemical Basis of Disease)

BIOL 495 Advanced Topics in Biology (Parasitology and/or Virology)

BIOL 498	Directed Research ⁴	
Total Units		18

¹ Students should take BIOC 360 if taking only one semester of biochemistry. For a two-semester sequence, BIOC 380 and BIOC 381 should be taken. Credit will not be given for both BIOC 360 and BIOC 380, nor for both BIOC 360 and BIOC 381.

² Can be applied toward Clinical Microbiology Scientist license.

³ Approved internship in the microbiology area.

⁴ Students may take a maximum of 3 units total from BIOL 390, BIOL 391, BIOL 490, BIOL 497, and BIOL 498 for elective credit.

Molecular Emphasis (additional upper-division courses)

Select 18 additional units of 300- or 400-level BIOC or BIOL courses, as follows:

Code	Title	Units
BIOL 410	Molecular Biology	4
Select one of the following:		4
BIOC 360	Principles of Biochemistry ¹	
BIOC 380	Biochemistry I	
Select 10 additional units from the following (must include at least one additional 4-unit course): ¹		10
BIOC 381	Biochemistry II (credit will not be given for both BIOC 360 and BIOC 381)	
BIOL 320	Ecology ²	
BIOL 326	Neurobiology	
BIOL 336	Vertebrate Biology	
BIOL 340	Invertebrate Biology	
BIOL 342	Medical Microbiology	
BIOL 346	Regional Human Anatomy	
BIOL 350	Mammalian Physiology	
BIOL 365	Plant Biology	
BIOL 390	Pre-health Seminar ³	
BIOL 391	Medical Missions Practicum ³	
BIOL 395	Science Internship	
BIOL 435	Stewardship Ecology	
BIOL 440	Developmental Biology	
BIOL 465	Practicum and Topics in Allied Health ⁴	
BIOL 490	Biology Seminar ³	
BIOL 495	Advanced Topics in Biology	
BIOL 497	Readings ³	
BIOL 498	Directed Research ³	
BIOL 498H	Directed Research- Honors ³	
Total Units		18

¹ Students should take BIOC 360 if taking only one semester of biochemistry. For a two-semester sequence, BIOC 380 and BIOC 381 should be taken. Credit will not be given for both BIOC 360 and BIOC 380, nor for both BIOC 360 and BIOC 381.

² Meets the General Education Civic Knowledge and Engagement requirement.

³ Students may take a maximum of 3 units total from BIOL 390, BIOL 391, BIOL 490, BIOL 497, and BIOL 498 for elective credit.

⁴ Meets the General Education Integrative and Applied Learning requirement.

Neurobiological Emphasis (additional upper-division courses)

Select 18-19 units of 300- or 400-level BIOC or BIOL courses, as follows:

Code	Title	Units
BIOL 326	Neurobiology	4
Select one of the following:		4
BIOC 360	Principles of Biochemistry ¹	
BIOL 350	Mammalian Physiology	

Select 10 additional units from the following (must include at least one additional 4-unit course): ² 10

BIOC 360	Principles of Biochemistry ¹
BIOC 380	Biochemistry I
BIOC 381	Biochemistry II
BIOL 336	Vertebrate Biology
BIOL 340	Invertebrate Biology
BIOL 342	Medical Microbiology
BIOL 346	Regional Human Anatomy
BIOL 350	Mammalian Physiology
BIOL 390	Pre-health Seminar ²
BIOL 391	Medical Missions Practicum ²
BIOL 395	Science Internship
BIOL 410	Molecular Biology
BIOL 440	Developmental Biology
BIOL 465	Practicum and Topics in Allied Health
BIOL 490	Biology Seminar ²
BIOL 495	Advanced Topics in Biology
BIOL 497	Readings ²
BIOL 498	Directed Research ²
BIOL 498H	Directed Research- Honors ²

Total Units 18

¹ Students should take BIOC 360 if taking only one semester of biochemistry. For a two-semester sequence, BIOC 380 and BIOC 381 should be taken. Credit will not be given for both BIOC 360 and BIOC 380, nor for both BIOC 360 and BIOC 381.

² Students may take a maximum of 3 units total from BIOL 390, BIOL 391, BIOL 490, BIOL 497, and BIOL 498 for elective credit.

Organismal Emphasis (additional upper-division courses)

Select 18 additional units of 300- or 400-level BIOC or BIOL courses, as follows:

Code	Title	Units
Select two of the following (only one of BIOL 336 and BIOL 346 may count toward this requirement):		8
BIOL 320	Ecology ¹	
BIOL 326	Neurobiology	
BIOL 336	Vertebrate Biology	
BIOL 346	Regional Human Anatomy	
BIOL 350	Mammalian Physiology	
BIOL 365	Plant Biology	
Select 10 additional units from the following (must include at least one additional 4-unit course): ²		10
BIOC 360	Principles of Biochemistry ³	
BIOC 380	Biochemistry I ³	
BIOC 381	Biochemistry II ³	
BIOL 320	Ecology	
BIOL 326	Neurobiology	
BIOL 336	Vertebrate Biology	
BIOL 340	Invertebrate Biology	
BIOL 342	Medical Microbiology	
BIOL 346	Regional Human Anatomy	
BIOL 350	Mammalian Physiology	
BIOL 365	Plant Biology	
BIOL 390	Pre-health Seminar ²	
BIOL 391	Medical Missions Practicum ²	
BIOL 395	Science Internship	
BIOL 410	Molecular Biology	

BIOL 435	Stewardship Ecology
BIOL 440	Developmental Biology
BIOL 465	Practicum and Topics in Allied Health ¹
BIOL 490	Biology Seminar ²
BIOL 495	Advanced Topics in Biology
BIOL 497	Readings ²
BIOL 498	Directed Research ²
BIOL 498H	Directed Research- Honors ²

Total Units

18

¹ Meets the General Education Writing 3 requirement.

² Students may take a maximum of 3 units total from BIOL 390, BIOL 391, BIOL 490, BIOL 497, and BIOL 498 for elective credit.

³ Students should take BIOC 360 if taking only one semester of biochemistry. For a two-semester sequence, BIOC 380 and BIOC 381 should be taken. Credit will not be given for both BIOC 360 and BIOC 380, nor for both BIOC 360 and BIOC 381.