



Biology

Objectives

The objectives of the biology department at PLNU coincides with the University mission to Teach, Shape, and Send.

To Teach: Our commitment is to provide students the opportunity to build a broad foundation in the major disciplines of biology, in the process of science skills, and in the critical thinking/quantitative skills that are required to apply their education to real world settings.

To Shape: In addition to the formal academic interactions, each student will have opportunities to enter into mentoring relationships with our faculty through advising, lab assisting, research experiences, and departmental social functions. In these contexts, students can expect to dialogue about issues relating to their own personal and professional goals, the interface between biology and our society, and the relationship between faith and science.

To Send: The graduates of the Biology department will be able to apply both their faith and education in biology related professions, such as medicine, allied health fields, education, or industry. They will feel confident that they have been well prepared to positively contribute in these fields, and society in general.

Tradition of Excellence

The Department of Biology is dedicated to the success of the students, and offers a wealth of opportunities for students who are interested in pursuing work in science related fields. For students whose interests and academic needs lie in both biology and chemistry, an interdepartmental major in Biology-Chemistry has been designed to prepare students for biochemistry, immunology, molecular biology, pharmacology, physiology, medicine, and dentistry. Biology students have the opportunity to work side-by-side with their professors doing faculty-assisted research projects, and may become co-authors on scholarly papers in national and international scientific journals. Many students present research

at various science conferences. Students also have sophisticated instrumentation and computational resources at their fingertips for use in science courses and research labs.

All of these opportunities have been given to students through the help of numerous grants from governmental agencies such as the National Institutes of Health and the National Science Foundation, various private organizations including the Howard Hughes Medical Institute, steady cooperation from University administration, and strong financial backing by Biology and Chemistry alumni. Since 1977, alumni of the Department of Biology have contributed an average of more than \$12,000 per year in support of the science instruction and research programs.

Career Opportunities

Students who graduate with a degree from the Department of Biology leave PLNU prepared for graduate schools or careers in industry. Over the last 25 years, approximately 80 percent of PLNU's applicants have gained acceptance to medical schools (roughly twice the national average), and the acceptance rate for Biology and Chemistry students applying to graduate (M.A., M.S., and Ph.D.) and dental school programs is over 95 percent.

Majors

Majors

Biology

- Organismal
- Cell and Molecular

Biology-Chemistry

Faculty

David E. Cummings, Ph.D.
University of Idaho

Darrel R. Falk, Ph.D.
University of Alberta

- Rebecca J. Flietstra, Ph.D.
University of Kansas Medical Center
- Kerry D. Fulcher, Ph.D., Chair
University of Idaho
- David K. Kerk, Ph.D.
University of California, Los Angeles
- Michael R. McConnell, Ph.D.
Tufts University School of Medicine
- Michael S. Mooring, Ph.D.
University of California, Davis
- Dawne M. Page, Ph.D.
University of California, San Francisco

Biology (B.A.) *Major*

LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
<i>Biology</i>		
BIO 210*	Cell Biology and Biochemistry	.4
BIO 215*	Animal Biology	.4
<i>Chemistry</i>		
CHE 152*	General Chemistry I	.4-5
CHE 153*	General Chemistry II	.4
CHE 295*	Organic Chemistry	.5
<i>Mathematics</i>		
MTH 144*	Calculus with Applications	.4
MTH 131	Computer Aided Calculus	.1
TOTAL		.26-27

UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
BIO 300*	Biomathematics and Bioinformatics	.3
BIO 310	General Botany	.3
BIO 345*	Genetics	.4
BIO 350	Advanced Cell Biology	.3
BIO 360	Ecology	.3
BIO 380	Molecular Biology	.3
BIO 420	Vertebrate Physiology	.3
BIO 497 *	Biology Seminar	.1
TOTAL		.23

Complete one of the following three options.

Track I - Organismal Emphasis- Take Track I electives to a minimum of 8 units.

Track II - Cell and Molecular Emphasis- Take Track II electives to a minimum of 9 units.

Track III - Individualized Emphasis - Take one elective from Track I or one elective from Track II (minimum 3 units) plus a combination of two upper-division, non-GE courses from inside or outside of Biology approved by the Department Chair.

Track I Electives

COURSE #	TITLE	UNITS
BIO 320	Marine Zoology	.3
BIO 330	Marine Invertebrate Zoology 2 (Quad)	
BIO 340	Field Biology:	.2 (Quad)
BIO 370	Marine Plant and Microbial Life	.2 (Quad)
BIO 410*	Vertebrate Biology	.3
BIO 430	Animal Behavior	.3

Track II Electives

COURSE #	TITLE	UNITS
BIO 315	Microbiology	.3
BIO 390	Immunology	.3
BIO 400	Developmental Biology	.3
BIO 450	Advanced Biochemistry	.4
BIO 470	Neuroscience	.3
Upper Division Elective Total		.8-9
Bachelor of Arts Total		.58-60

Note: Courses with "*" are required by the state for the Teacher Education concentration in Life Sciences.

Biology (B.S.) *Major*

LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
BIO 210*	Cell Biology and Biochemistry	.4
BIO 215*	Animal Biology	.4
CHE 152*	General Chemistry I	.4-5
CHE 153*	General Chemistry II	.4
CHE 295*	Organic Chemistry	.5
MTH 144*	Calculus with Applications	.4
MTH 131	Computer Aided Calculus	.1
PHY 141	General Physics I	.4
PHY 142	General Physics II	.4
TOTAL		.34-35

UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
BIO 300 *	Biomathematics and Bioinformatics	.3
BIO 310	General Botany	.3
BIO 345*	Genetics	.4
BIO 350	Advanced Cell Biology	.3
BIO 360	Ecology	.3
BIO 380	Molecular Biology	.3
BIO 420	Vertebrate Physiology	.3
BIO 497 *	Biology Seminar	.1
TOTAL		.23

Complete one of the following two options.

Track I: Organismal Emphasis - Take three Track I electives and one Track II elective (minimum 10 units).

Track II: Cell and Molecular Emphasis - Take three Track II electives and one Track I Elective (minimum 11 units).

Track I Electives

COURSE #	TITLE	UNITS
BIO 320	Marine Zoology	3
BIO 330	Marine Invertebrate Zoology ² (Quad)	
BIO 340	Field Biology: 2 (Quad)	
BIO 370	Marine Plant and Microbial Life 2 (Quad)	
BIO 410*	Vertebrate Biology	3
BIO 430	Animal Behavior	3

Track II Electives

COURSE #	TITLE	UNITS
BIO 315	Microbiology	3
BIO 390	Immunology	3
BIO 400	Developmental Biology	3
BIO 450	Advanced Biochemistry	4
BIO 470	Neuroscience	3
	Upper-Division Elective Total	16
	Bachelor of Science Total	68-72

Note: Courses with “” are required by the state for the Teacher Education concentration in Life Sciences.*

UPPER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
BIO 380	Molecular Biology	3
BIO 345	Genetics	4
BIO 497	Biology Seminar	1
CHE 300	Organic Chemistry II	2
CHE 325	Physical Chemistry I	5
CHE 351	Organic Qualitative Analysis	2
CHE 466	Advanced Inorganic Chemistry	2
CHE 326	Physical Chemistry II OR	
CHE 370	Instrumental Analysis OR	
CHE 453	Advanced Organic Chemistry	2
BIO 450	Advanced Biochemistry OR	
CHE 450	Advanced Biochemistry	4
<i>Three courses from:</i>		
BIO 300	Biomathematics and Bioinformatics	3
BIO 350	Advanced Cell Biology	3
BIO 390	Immunology	3
BIO 400	Developmental Biology	3
BIO 420	Vertebrate Physiology	3
	TOTAL	34

Biology-Chemistry (B.S.)

Major

The interdepartmental major in Biology-Chemistry has been designed for those students whose academic needs and interests include both biology and chemistry. The major was instituted because a large segment of contemporary scientific investigation lies at the intersection of these two fields. Areas well served by this preparation include medicine, dentistry, and several graduate disciplines, including biochemistry, physiology, and molecular biology. This major earns a Bachelor of Science degree.

LOWER-DIVISION REQUIREMENTS

COURSE #	TITLE	UNITS
BIO 210	Cell Biology and Biochemistry	4
BIO 215	Animal Biology	4
CHE 152	General Chemistry I	4
CHE 153	General Chemistry II	4
CHE 211	Analytical Chemistry	2
CHE 295	Organic Chemistry I	5
PHY 141	General Physics I AND	
PHY 142	General Physics II	4
	OR	
PHY 241	University Physics I AND	
PHY 242	University Physics II	4
MTH 144	Calculus for the Life Sciences and Business	4
	TOTAL	36

**Cell and Molecular
Biology** *Minor*

REQUIRED

COURSE #	TITLE	UNITS
BIO 210	Cell Biology and Biochemistry	4
BIO 215	Animal Biology	4
BIO 345	Genetics	4
CHE 152	General Chemistry I	4
CHE 151	Chemistry Tutorial (can test out with good math background)	1
<i>Nine units from the following electives:</i>		
BIO 380	Molecular Biology	3
BIO 300	Biomathematics and Bioinformatics	3
BIO 350	Advanced Cell Biology	3
BIO 315	Microbiology	3
BIO 370	Neuroscience	3
BIO 390	Immunology	3
BIO 400	Developmental Biology	3
	TOTAL	26

Organismal Biology *Minor*

REQUIRED

COURSE #	TITLE	UNITS
BIO 210	Cell Biology and Biochemistry	4
BIO 215	Animal Biology	4
BIO 360	Ecology	3
<i>Nine units from the following electives:</i>		
BIO 310	Botany	3
BIO 315	Microbiology	3
BIO 320	Marine Vertebrate Biology	2
BIO 330	Marine Invertebrate Biology	3

BIO 340	Field Biology	2
BIO 370	Neuroscience	3
BIO 410	Vertebrate Biology	3
BIO 430	Animal Behavior	3
	TOTAL	20

Biology Courses

BIO 101 (4) HUMAN BIOLOGY AND BIOETHICS-GE

An exploration of assorted topics in human biology as they intersect with bioethical and sustainability issues of current interest in society. Topics include human physiology, health, reproduction, genetics, and ecology. Course examines the underlying scientific basis of specific examples and how they relate to everyday life. Course approach emphasizes the process of science, critical thinking, active learning, social relevancy, and building connections between case studies and general concepts of biology. Lecture and inquiry-based lab. Offered every year.

BIO 102 (4) ENVIRONMENT AND PEOPLE-GE

A systematic overview of major topics in global ecology as they relate to environmental science and human use of natural resources. Includes such topics as sustainable development, population growth, food, agriculture, land degradation, urbanization, pollution, poverty, sanitation, health care, biodiversity, and war. The implications for wise resource management, bioethics, economics, and governmental policy. Course approach emphasizes the process of science, critical thinking, active learning, social relevancy, and building connections between case studies and general concepts. Lecture. Offered every year.

BIO 103 (4) INTRODUCTION TO BIOLOGY-GE

Designed to meet the requirements for the California Multiple Subject Teaching Credential for teaching grades K-8 (but open to all students). The subject areas include zoology, botany, physiology, cell structure, ecology, genetics, and evolution. Course explores major themes in these subject areas as they relate to everyday life, ethical concerns, conservation issues, and common misunderstandings. Course approach emphasizes the process of science, critical thinking, active learning, social relevancy, and building connections between case studies and general concepts of biology. Lecture and inquiry-based lab. Offered every year.

BIO 104 (4) BIOTECHNOLOGY AND SOCIETY-GE

An examination of current topics in biotechnology as they impact society, bioethics, and sustainable living. Course addresses the questions "What is biotechnology?", "How does it work?", and "How does it affect our lives?". Topics may include genetic engineering, gene amplification, genome projects, gene therapy,

DNA fingerprinting, cloning, assisted reproductive technology, genetic screening, recombinant DNA, knock-outs, AIDS research, and GM foods. Course approach emphasizes the process of science, critical thinking, active learning, social relevancy, and building connections between case studies and general concepts of biology. Lecture. Offered every year.

BIO 105 (4) ECOLOGY AND CONSERVATION-GE

A wide-ranging exploration of major topics in ecological science relating to current issues in conservation biology. Drawing from academic and applied fields, the course examines major concepts in conservation biology and how they impact society, public policy, wise management of natural resources, and ethical choices encountered in everyday life. Focus topics include biodiversity, habitat destruction, exotic species introductions, human harvesting, protected areas, and future prospects. Course approach emphasizes the process of science, critical thinking, active learning, social relevancy, and building connections between case studies and general concepts. Lecture and inquiry-based lab. Offered every year.

BIO 130 (4) HUMAN ANATOMY AND PHYSIOLOGY I-GE

The first course of a two-semester sequence which examines the human body from an integrated perspective. Topics include an introduction to chemistry and cell function, tissue types, skeletal system, muscular system, and nervous system. Does not count for credit toward a Biology major. Lecture and lab. Offered every year.

Prerequisite or Corequisite: Chemistry 103 or Chemistry 152.

BIO 140 (4) HUMAN ANATOMY AND PHYSIOLOGY II

The second semester of a sequence which examines the human body from an integrated perspective emphasizing the interrelationship of structure and function. Topics include endocrine system and reproduction, cardiovascular system, immune system, respiratory system, digestive system, and urinary system. Does not count for credit toward a Biology major. Lecture and lab. Offered every year.

Prerequisite: Biology 130.

BIO 210 (4) CELL BIOLOGY AND BIOCHEMISTRY-GE

An introduction to the principles of cell biology and biochemistry. Topics to be discussed include the chemical basis of life, the structure and function of cellular organelles, basic metabolic pathways, the expression of the genetic material, recombinant DNA technology and models for the origin of cells. Lecture and lab. Offered every year.

Prerequisite: Must have a previous course in high school or university-level chemistry.