

Biology

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Faculty

Daniel K. Brannan, *Professor*
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-Patricia Hernandez, *Professor*
Jennifer Huddleston, *Assistant Professor*
Rebecca Hunter, *Assistant Professor*
Tom Lee, *Professor*
James R. Nichols, *Professor*
Qiang Xu, *Associate Professor*

Majors: Biology (BA)
Biology (BS)
High School Teacher Certification - Life Science (BS)

Minor: Biology

The Department of Biology offers the Bachelor of Science degree and the Bachelor of Arts degree with a major in biology or biology for teacher certification. The department works with the Department of Teacher Education to offer a Bachelor of Science: High School Certification Life Science (Grades 8-12) degree. A minor in biology may be added to other majors.

Introduction

The Department of Biology educates students for Christian service and leadership throughout the world by preparing them to become biological scientists, pre-college teachers and health-care professionals. The Bachelor of Science: High School Certification Life Science (Grades 8-12) is the avenue for preparation of pre-college teachers. The Bachelor of Science and Bachelor of Arts in biology are the avenues for:

- **Cellular/molecular biology emphasis.** Much of modern biology exists at the interface of biology and chemistry. Through effective classes, laboratories and research opportunities the Department of Biology effectively draws students to the molecular/biochemical level of life. Many students in health-care professions also choose this emphasis.
- **Organismal biology/field emphasis.** An array of field biology oriented courses, research opportunities, and field trips to such sites as Honduras, Big Bend, Texas, and New Mexico offer study experiences in marine, fresh water, and land-terrestrial ecosystems. These opportunities are supplemented by ACU being a participating university with the Au Sable Institute. Au Sable offers field courses in the beautiful north woods country of Michigan's Lower Peninsula and on Whidbey Island in Puget Sound between Vancouver and Seattle. Au Sable's mission is "the integration of knowledge of the creation with biblical principles for the purpose of bringing the Christian community and the general public to a better understanding of the Creator and the stewardship of God's creation." This fits well with the goal of ACU's Biology Department.

Health professions/human biology emphasis. Historically ACU Biology graduates have been accepted to medical and dental schools, as well as other health-care programs, at almost twice the national average. This is a result of high quality classes and laboratories emphasizing human biology and the leveling effect of

learning to use human healing gifts in God's service. Medical missions receives clear emphasis in the Department and many students participate during their career in one or more medical missions trips, many of them coordinated through our long-term relationship with Health Talents International (HTI). The majority of these efforts are in Guatemala. HTI's mission is "to proclaim the gospel of Jesus Christ through teaching and healing ministries." ACU's relationship with HTI provides students an opportunity to blend faith and learning in an applied manner that serves the spiritual and physical health needs of others throughout the world.

- **Pre-veterinary medicine emphasis.** ACU graduates have achieved high acceptance rates to veterinary schools as a result of high quality classes and laboratories emphasizing animal anatomy, physiology, pathology, nutrition, and genetics. The pre-veterinary option satisfies requirements for admission to veterinary school and related medical technical fields or graduate school for study in animal genetics, nutrition, pathology, and physiology.
- **Wildlife biology emphasis.** This option is designed for students interested in understanding, managing, and conserving wildlife species and the ecosystems that support them. Wildlife biology students will gain fieldwork experience throughout the American Southwest as well as at the Au Sable Institute in Michigan. Courses taken in this emphasis provide the opportunity to obtain professional certification as an Associate Wildlife Biologist through The Wildlife Society. This certification serves as a standardized mark of accomplishment and a measure of professional status and credibility in the field of wildlife biology. Professional certification also may set graduates apart from others in a competitive marketplace and allow a greater range of career opportunities.
- **General biology emphasis.** Some students prefer to pursue a more general biology program that allows them to touch many different areas. Past students have used this emphasis to enter law school, gain employment in industry or government, or in science writing.
- **Biology/business emphasis.** Students interested in mixing a strong biology education with some key courses from the world of business would find this track helpful. It includes a full set of biology courses and adds basic courses in such areas as accounting, management, and marketing. Students might use this emphasis to lead toward a career in health care administration, pharmaceutical sales, or law.

Study Abroad Expectations

All students are encouraged to participate in ACU's Study Abroad program. Classes offered at Study Abroad sites vary depending on the site. Academic advisors can assist students in planning ahead for their Study Abroad experience and should be consulted during the freshman year.

Bachelor of Science Degree (BS)

The Bachelor of Science degree in Biology is needed for most graduate schools with programs in the biological sciences. Most health professions schools require a bachelor's degree in any field including all of the liberal arts, provided the prerequisite science and math courses are taken. Discuss the specific requirements with the pre-health professions advisor.

Admission Requirements

Before being admitted to the BS in biology, a student must satisfy the requirements listed in the *ACT/SAT Placement Information* section of this catalog (page 20).

BIOLOGY (BS)**BS: BIOLOGY DEGREE PLAN (BIOL)****UNIVERSITY REQUIREMENTS**

Please see the University Requirements section of this catalog (page 39).

MAJOR REQUIREMENTS**Biology**

BIOL 112 General Biology I	(3) ¹
BIOL 114 General Biology I Lab	1
BIOL 113/115 General Biology II Lecture/Lab	4
BIOL 221/223 Animal Biology Lecture/Lab or	
BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 312 Cell Biology	3
BIOL 362 Ecology	3
BIOL 497 Seminar in Biology (capstone and writing-intensive course)	3

TOTAL **48**¹¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours**SUPPLEMENT FOR MAJOR (TRACKS)****CELLULAR/MOLECULAR BIOLOGY Track (BICM)**

BIOL 221/223 Animal Biology Lecture/Lab or	
BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 312 Cell Biology	3
BIOL 472 Biochemistry I	3

BIOL 475 Molecular Genetics	3
BIOL 476 Biotechnology Laboratory	2
BIOL or BIOL Selections: 13 hours of which 9 hours are 300-499	13

TOTAL **24**²⁸**GENERAL BIOLOGY Track (BIOG)**

BIOL 221/223 Animal Biology Lecture/Lab or	
BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 312 Cell Biology or BIOL 351 Genetics	3
21 hours BIOA or BIOL of which 17 hours are 300-499	21

TOTAL **24**²⁸**HEALTH PROFESSIONS Track (BIOH)**

BIOL 221/223 Animal Biology Lecture/Lab or	
BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 312 Cell Biology	3
BIOL 355/357 Microbiology	4
BIOL 491/493 Human Anatomy	4
BIOL 492/495 Physiology	4
BIOL Selections: 9 hours of which 5 hours are 300-499	9

TOTAL **24**²⁸**ORGANISMAL BIOLOGY Track (BIOO)**

BIOL 221/223 Animal Biology Lecture/Lab	4
BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 312 Cell Biology	3
BIOL 351 Genetics	3
BIOL 364 Ecology Laboratory	1
BIOL 492 Physiology	3

Choose 2-2 from **8**⁷

BIOL 355/357 Microbiology or BIOL 370 Field Biology or	
BIOL 380 General Mammalogy or BIOL 403 Marine	
Biology or BIOL 425 Behavioral Biology: Theory &	
Methods or BIOL 481 Plant Systematics or BIOL 483	
Biostatistics or BIOL 492/495 Physiology	

~~BIOL or BIOL Selections: 10 hours of which 6 hours are 300-499~~⁴⁶**TOTAL** **24**²⁸**PRE-VETERINARY MEDICINE Track (BIOV)**

BIOL 221/223 Animal Biology Lecture/Lab	4
BIOL 312 Cell Biology	3
BIOL 351 Genetics	3
BIOL 355/357 Microbiology Lecture/Lab	4
BIOL 472 Biochemistry I	3
BIOL 492/495 Physiology Lecture/Lab	4

TOTAL **21****WILDLIFE BIOLOGY Track (BIOW)**

BIOL 221/223 Animal Biology Lecture/Lab	4
BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 345 Wildlife Ecology	4
BIOL 351 Genetics	3
BIOL 362 Environmental Applications for Geographic Information	
Systems (GIS)	4
BIOL 364 Ecology Laboratory	1
BIOL 370 Field Biology	4
BIOL 380 General Mammalogy	4
BIOL 481 Plant Systematics	4
BIOL 483 Biostatistics	3

TOTAL **35****BIOLOGY/BUSINESS Track (BIOB)**

BIOL 221/223 Animal Biology Lecture/Lab or	
BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 312 Cell Biology	3
BIOA or BIOL Selections: 21 hours of which 17 hours are 300-499	21

TOTAL **24**²⁸¹Course offered at Au Sable Institute. Travel to site required.**SUPPLEMENT FOR MAJOR (BICM, BIOG, BIOH, BIOO)****Chemistry**

CHEM 133 General Chemistry I	(3) ¹
CHEM 131 General Chemistry I Lab	1
CHEM 132/134 General Chemistry II Lecture/Lab	4
CHEM 221/223 Organic Chemistry I Lecture/Lab	4
CHEM 322/324 Organic Chemistry II Lecture/Lab	4

Physics

PHYS 110/111 General Physics I Lecture/Lab	4
PHYS 112/113 General Physics II Lecture/Lab	4

Mathematics

MATH 124 Precalculus II or MATH 131 Calculus for	
Application or MATH 185 Calculus I	(3) ¹

Literature (not including ENGL 351) 3**TOTAL** **24**¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours**SUPPLEMENT FOR MAJOR (BIOB)****Chemistry**

CHEM 133 General Chemistry I	(3) ¹
CHEM 131 General Chemistry I Lab	1
CHEM 132/134 General Chemistry II Lecture/Lab	4

College of Business Administration

ACCT 210 Financial Accounting	3
FIN 310 Financial Management	3
MGMT 330 Management and Organizational Behavior	3
MKTG 320 Principles of Marketing or	
MKTG 343 Personal Selling	3

Mathematics

MATH 124 Precalculus II or	
MATH 131 Calculus for Application	(3) ¹

Literature (Not including ENGL 351) 3**TOTAL** **20**¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours**SUPPLEMENT FOR MAJOR (BIOV)****Animal Science**

ANSC 336 Animal Nutrition	3
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Chemistry

CHEM 133 General Chemistry I	(3) ¹
CHEM 131 General Chemistry I Lab	1
CHEM 132/134 General Chemistry II Lecture/Lab	4
CHEM 221/223 Organic Chemistry I Lecture/Lab	4
CHEM 322/324 Organic Chemistry II Lecture/Lab	4

Physics

PHYS 110/111 General Physics I Lecture/Lab	4
PHYS 112/113 General Physics II Lecture/Lab	4

Mathematics

MATH 131 Calculus for Application	
or MATH 185 Calculus I	(3) ¹

MATH 377 Statistical Methods I 3**Psychology**

PSYC 120 Introduction to Psychology	(3) ¹
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Writing

ENGL 326 Business & Professional Writing	3
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TOTAL **30**¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours**SUPPLEMENT FOR MAJOR (BIOW)****Environmental Science**

ENVR 345 Rangeland Plants	3
ENVR 410 Environmental Law	3
ENVR 420 Environmental Thought	3
ENVR 458 Wildlife Management Techniques	3

Chemistry

CHEM 133 General Chemistry I	(3) ¹
CHEM 131 General Chemistry I Lab	1
CHEM 114 Introductory Organic and Biological Chemistry	3

Physics

PHYS 110/111 General Physics I Lecture/Lab	4
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Mathematics

MATH 124 Precalculus II or MATH 131 Calculus for	
Application or MATH 185 Calculus I	(3) ¹

Social SciencesChoose 2 (in different disciplines) from **(6)¹**

ECON 260 Principles of Macroeconomics or ECON 261	
Principles of Microeconomics or GLST 120 Introduction to	
Global Issues or HIST 117 Civilization I or HIST 118	
Civilization II or HIST 131 World History: Cultures and	
Connections since 1400 or HIST 221 American History I or	
HIST 222 American History II or HIST 250 Introduction to	
American Ethnic and Women's Studies or POLS 221	
Government and Business or POLS 222 National	
Government or POLS 226 States and Federal System or	
POLS 227 Introduction to International Relations or PSYC	
120 Introduction to Psychology or SOCI 111 Introduction to	
Sociology	

Writing

ENGL 327 Scientific and Technical Writing	3
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TOTAL **23**¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

ELECTIVES	
Minimum (BICM, BIOG, BIOH, BIOO)	9
Minimum (BIOV)	10
Minimum (BIOW)	3
Minimum (BIOB)	13
TOTAL MAJOR HOURS	72
OTHER GRADUATION REQUIREMENTS	
Minimum GPA in major	2.00
Minimum GPA for graduation	2.00
Minimum advanced hours	33
Minimum total hours	128
<i>Courses numbered 0** do not count in minimum hours required for degree.</i>	

HIGH SCHOOL TEACHER CERTIFICATION - LIFE SCIENCE (BS)

BS: HIGH SCHOOL TEACHER CERTIFICATION – LIFE SCIENCE DEGREE PLAN (BIOT)

UNIVERSITY REQUIREMENTS

Please see the University Requirements section of this catalog (page 39).

MAJOR REQUIREMENTS

Biology

BIOL 112 General Biology I	(3) ¹
BIOL 114 General Biology I Lab	1
BIOL 113/115 General Biology II Lecture/Lab	4
BIOL 221/223 Animal Biology Lecture/Lab <i>or</i> BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 312 Cell Biology Lecture	3
BIOL 353/354 General Microbiology Lecture/Lab	4
BIOL 362/364 Ecology Lecture/Lab	4
BIOL 401 Secondary Science Teaching Methods	3
BIOL 492/495 Physiology Lecture/Lab	4
BIOL 497 Seminar in Biology (capstone and writing-intensive course)	3
Additional Advanced Biology Selection from BIOA or BIOL	3
TOTAL	33

¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

SUPPLEMENT FOR MAJOR

Other

CHEM 133 General Chemistry I	(3) ¹
CHEM 131 General Chemistry I Lab	1
CHEM 134/132 General Chemistry II Lecture/Lab	4
MATH 124 Precalculus II or 185 Calculus I	(3) ¹

Professional Education

EDUC 211 Educational Foundations and Multi-cultural Perspective	3
EDUC 221 Educational Psychology	3
EDUC 412 Secondary Curriculum and Media (capstone course) ...	3
EDUC 432 Secondary Management and Methods (capstone course)	3
EDUC 476 Effective Strategies for English Language Learners	3
EDUC 490 Student Teaching (capstone course)	6
READ 322 Reading in Secondary Content Areas	3
SPED 371 Teaching Students with Special Needs (writing-intensive course)	3
TOTAL	32

¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

ELECTIVES

Minimum	7
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TOTAL MAJOR HOURS	72
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CRITERIA FOR ADMISSION TO TEACHER EDUCATION

In accordance with Texas state law, students must meet the admission criteria described on page 114.

OTHER GRADUATION REQUIREMENTS

Minimum grade for majors courses	C
Minimum GPA for graduation	2.75
Minimum advanced hours	33

Minimum total hours	128
<i>Courses numbered 0** do not count in minimum hours required for degree.</i>	

Minimum advanced hours	33
Minimum total hours	128
<i>Courses numbered 0** do not count in minimum hours required for degree.</i>	

Bachelor of Arts Degrees (BA)

The Bachelor of Arts degree in biology serves as a professional degree for those who typically do not wish to pursue graduate work in the biomedical or laboratory sciences. It may serve as a foundation for field and ecological sciences provided a sufficient statistics course is also taken. It may serve as a solid liberal arts degree for students wishing to pursue science writing, for example.

Admission Requirements

Before being admitted to a program, a student must satisfy the requirements listed in the *ACT/SAT Placement Information* section of this catalog (page 20).

BIOLOGY (BA)

BA: BIOLOGY DEGREE PLAN (BIOL)

UNIVERSITY REQUIREMENTS

Please see the University Requirements section of this catalog (page 39).

MAJOR REQUIREMENTS

Biology

BIOL 112 General Biology I	(3) ¹
BIOL 114 General Biology I Lab	1
BIOL 113/115 General Biology II Lecture/Lab	4
BIOL 221/223 Animal Biology Lecture/Lab <i>or</i> BIOL 222/224 Plant Biology Lecture/Lab	4
BIOL 497 Seminar in Biology (capstone and writing-intensive course)	3
Advanced Biology (BIOA or BIOL 300-499)	17
TOTAL	29

¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

SUPPLEMENT FOR MAJOR

Chemistry

CHEM 113 Introductory Chemistry	(3) ¹
CHEM 111 Introductory Chemistry Lab	1
<i>and</i> CHEM 114/112 Introductory Organic and Biological Chemistry Lecture/Lab	4
<i>or</i> CHEM 133 General Chemistry I (<i>requires MATH 124 or 185</i> <i>or placement into MATH 124 or 185</i>)	(3) ¹
CHEM 131 General Chemistry I Lab	1
<i>and</i> CHEM 132/134 General Chemistry II Lecture/Lab	4

Course Concentration

Courses in another department (required CHEM and University Requirements courses are excluded)

Foreign Language

FLLA, FREN, GER, *or* SPAN 221, 222

Literature (Not including ENGL 351)

TOTAL

¹Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

ELECTIVES

Minimum

TOTAL MAJOR HOURS

OTHER GRADUATION REQUIREMENTS

Minimum GPA in major

Minimum GPA for graduation

Cooperative Bachelor of Science Degrees (BS)

ACU awards the bachelor's degree to certain qualified students who have satisfactorily completed three years of prescribed work at ACU (a minimum of 104 hours) plus one year at a recognized professional school. Students in the cooperative degree program are advised by the advisors for health professions (see the *Academic Advising* section of this catalog (page 28)). See the Health Professions Cooperative Degree in the *Interdisciplinary Programs* section of this catalog for complete course requirements (page 122).

Admission Requirements

Before being admitted to a program, a student must satisfy the requirements listed in the *ACT/SAT Placement Information* section of this catalog (page 20).

Minor in Biology

MINOR: BIOLOGY (BIOL)

Biology selections from:

BIOL 100-299

Advanced biology selections from:

BIOA or BIOL 300-499

TOTAL

Note: A grade of at least C is required in BIOL 112/114 and BIOL 113/115 to enroll in any subsequent Biology course for which they are prerequisites.

Course Descriptions

Please see the *Course Descriptions* section of this catalog (page 160).

Courses offered by the Au Sable Institute include those with the following designation: BIOA. Au Sable Institute courses are designated in the course descriptions. Courses offered by the Department of Biology include those with the following designation: BIOL.