

BIOLOGY (B.S.)

Degree: Bachelor of Science

Major: Biology

Concentration: None

Total Hours: 120

The Major in Biology supports the departmental mission in that students are exposed to current scientific concepts and principles. Moreover, students spend a significant amount of their educational time in the laboratory or field. By the actual performance of methods and techniques, they can engage in internal research projects or be competitive for external summer research internships. The biology degree offers seven concentrations in (see below):

- Cell and Molecular Biology
- Ecology
- Aquatic Biology
- Vertebrate Zoology
- Invertebrate Zoology
- Pre-health Professional
- Pre-medical Technology

After graduation, they can effectively compete for jobs or move into graduate or professional schools. As the study of life, Biology requires a thorough understanding of the underlying chemical and physical principles governing all life processes. Lamar students attracted to this field are well equipped to enter the professions of medicine, dentistry or one of the other career paths listed below in this section. Students are equally prepared for environmentally or biotechnology related careers in various governmental agencies, private companies, or academia. Students interested in further education leading to an advanced degree in biology are also well prepared. Those interested in teaching in secondary education (grades 7 –12) should consult the section on Biology (B.S.) Education.

Recommended Minimum Program of Study – B.S. Biology: The following is a recommended program of study for completion of the B.S. Biology degree plan in the minimum semester hours with the specified option. Additional requirements may be required for specialized areas, i.e. certain minor requirements, preparation for graduate school, certifications, or licenses. Please see a Biology Advisor or the Department Chair for advising details.

a. Code	Title	Hours
Biology Core Courses		
BIOL 1406	General Biology I (Majors)	4
BIOL 1407	General Biology II (Majors)	4
BIOL 2421	Microbiology for Science Majors	4
BIOL 3450	General Botany	4
BIOL 3470	Genetics	4

Select one invertebrate biology course of the following:

BIOL 3460 Invertebrate Zoology
or BIOL 441 Parasitology

Select one of the following vertebrate biology courses:

BIOL 3428 Comparative Anatomy
BIOL 4408 Mammalogy

BIOL 4409	Ornithology
BIOL 4431	Ichthyology
BIOL 4440	Vertebrate Natural History
BIOL 4445	Herpetology
Select one molecular-cellular biology course of the following:	
BIOL 4404	Molecular Biology
or BIOL 4470	Cell Biology/Histology

Capstone Course

BIOL 4344	Development of Biological Thought ¹	3
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Biology Electives

Any additional 22 semester hours of BIOL at the 3000-4000 level

- The B.S. Biology degree offers seven possible concentrations. A concentration requires a minimum of 15 credits over and above courses required and claimed in the Biology core curriculum.
- Concentrations do not include credits from any of the following courses: BIOL 1406 General Biology I (Majors), BIOL 1407 General Biology II (Majors), BIOL 2421 Microbiology for Science Majors, BIOL 3450 General Botany, BIOL 3470 Genetics, BIOL 4344 Development of Biological Thought, a course used to fulfill the invertebrate, vertebrate, or Cell/Molecular core requirements, or any of the supporting courses in chemistry or physics listed on the biology degree plan.
- It is the student's responsibility to declare a concentration.
- Students must take one 4000-level Biology course that is designated as "Scientific Report Writing Intensive". These courses include: Environmental Microbiology, Ecology, Advanced Physiology, Molecular Biology, Conservation Biology, Medical Botany and Limnology.
- Supporting Sciences:

Code	Title	Hours
General Chemistry		
CHEM 1311 & CHEM 1111	General Chemistry I and General Chemistry I Laboratory	4
CHEM 1312 & CHEM 1112	General Chemistry II and General Chemistry II Laboratory	4
Organic Chemistry		
CHEM 3311 & CHEM 3111	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 3312 & CHEM 3112	Organic Chemistry II and Organic Chemistry II Laboratory	4
General Physics		
PHYS 1401 & PHYS 1402	College Physics I and College Physics II	8
Statistics		
PSYC 2317	Introduction to Statistical Methods ²	3

- Free Electives: Sufficient advanced (3000-4000 level) elective credits to complete a total of 120 semester hours; typically 4 credits.
- MATH 1314 College Algebra(Non-Calculus) and MATH 1316 Trigonometry may be substituted for MATH 2312 Pre Calculus and Elementary Functions in the Biology B.S. degree plan.
- A maximum of three (3) Special Topics research biology elective credits may apply toward the B.S. in Biology degree. In addition, three (3) credits of Special Topics research may be taken to fulfill the University Free Elective requirement in the B.S. degree plan. Thus,

a total of six (6) Special Topics research credits may be taken in fulfillment of degree requirements.

- j. A maximum of two (2) Special Topics readings elective credits may apply toward the B.S. in Biology degree. If 2 readings credits are applied, they must be completed as two separate 1 credit courses taken in different semesters.
- k. A maximum of four (4) credits combined Special Topics research and Special Topics readings Biology elective credits may apply toward the B.S. in Biology degree.

¹ Requires students to pass the ETS Major Field Exam in Biology.
² Fulfills 3 credits of Mathematical Science core.

B.S. Biology Concentrations

Cell and Molecular Biology: Molecular Biology, Cell Biology, Immunology, Biotech Applications, Embryology, Environmental Microbiology, Biochemistry

Ecology: Evolutionary Ecology, Ecology, Conservation Biology, Environmental Microbiology, Tropical Biology, Field Parasitology, Animal Behavior

Aquatic Biology: Aquatic Entomology, Marine Biology, Limnology, Ichthyology, Tropical Biology, Field Parasitology, Invertebrate Zoology, Oceanography

Vertebrate Zoology: Mammalogy, Ornithology, Ichthyology, Herpetology, Vertebrate Natural History, Comparative Vertebrate Anatomy, Embryology

Invertebrate Zoology: Invertebrate Zoology, Parasitology, Field Parasitology, Tropical Biology

Pre-health Professional: Advanced Physiology, Parasitology, Molecular Biology, Cell Biology, Immunology, Comparative Vertebrate Anatomy, Embryology, Biochemistry, Environmental Toxicology

Pre-medical Technology: Advanced Physiology, Parasitology, Cell Biology, Immunology, Molecular Biology, Comparative Vertebrate Anatomy

Biology Bachelor of Science - Concentration in Medical Technology

The medical technologist performs the laboratory tests required by physicians in order to properly diagnose and treat patients. Most technologists find employment in hospitals, clinics or blood banks. In addition, manufacturing and sales of medical products are providing new career opportunities for medical technologists. A long-term shortage of clinical laboratory scientists has placed a premium on certified medical technologists nationwide, and employment opportunities in the field are expected to remain very good in the future.

Students completing the pre-medical technology emphasis will receive a Bachelor of Science in Biology that emphasizes the course work needed to compete for acceptance into hospital programs in the clinical laboratory sciences. Most hospital programs last for one or occasionally two years. During this time, students receive laboratory training in practical aspects of the clinical laboratory sciences. In addition, a certification exam must be passed to be employed as a clinical laboratory scientist in most states.

Students pursuing a concentration in Medical Technology should take the course recommended for that concentration (see the Concentration list

above), as well as additional courses decided upon in consultation with the program director. Entry into hospital programs is competitive, and completion of these courses will best-prepare students for acceptance into hospital programs. A list of hospital programs for the state of Texas is provided below.

Students interested in these programs should contact Dr. Ana Christensen for detailed advising (Maes 101A, christenab@lamar.edu, (409) 880-8256).

Directors of Hospital Training Programs in Clinical Laboratory Science in Southeast Texas

Methodist Hospital
Tatia Feltman, M.Ed.,MT(ASCP)SM
tfeltman@tmhs.org
(713) 790-2599

University of Texas Medical Branch
Dr. Marcela Lizarrage
301 University Boulevard Galveston, TX 77555-1028
mclizarr@utmb.edu
(409) 772-3024

M.D. Anderson Cancer Center
Brandy Greenhill, DrPH, M.S., MLS(ASCP)
1515 Holcombe Boulevard, Box 002 Houston, TX 77030
bgreenhill@mdanderson.org
(713) 563-3091

A complete list of programs providing training in the clinical laboratory sciences can be found at <https://www.naacls.org/Find-a-Program.aspx>.

Code	Title	Hours
General Education Core Curriculum		
<i>Communication</i>		
ENGL 1301	Composition I	3
Select one of the following:		3
ENGL 1302	Composition II	
COMM 1315	Public Speaking I	
COMM 1321	Business and Professional Speech	
ENGL 1302	Composition II	
FREN 1311	Beginning French I	
SPAN 1311	Beginning Spanish I	
<i>Mathematics</i>		
MATH 2312	Pre Calculus and Elementary Functions	3
<i>Life and Physical Sciences¹</i>		
BIOL 1406	General Biology I (Majors)	4
BIOL 1407	General Biology II (Majors)	4
<i>Language, Philosophy and Culture</i>		
Select three hours from the following:		3
DSDE 1374	Introduction to Deaf Studies	
ENGL 2300	Ethics and Literature	
ENGL 2322	British Literature	
ENGL 2326	American Literature	
ENGL 2331	World Literature	
ENGL 2376	African-American Literature	

FREN 2312	Intermediate French II	
PHIL 1370	Philosophy of Knowledge	
PHIL 2306	Ethics	
SPAN 2312	Intermediate Spanish II	
<i>Creative Arts</i>		
Select three hours from the following:		3
ARTS 1301	Art Appreciation	
ARTS 1303	Art History I	
COMM 1375	Film Appreciation	
COSC 1324	The Art of Computer Game Development	
DANC 2303	Dance Appreciation	
MUSI 1306	Music Appreciation	
MUSI 1309	Jazz History and Appreciation	
MUSI 1310	History of Rock and Roll	
PHIL 1330	Arts and Ideas	
THEA 1310	Theatre Appreciation	
<i>American History</i>		
Select six hours from the following:		6
HIST 1301	U S History I 1763-1877	
HIST 1302	U S History II Since 1877	
HIST 2301	Texas History	
<i>Government/ Political Science</i>		
POLS 2301	Intro to American Government I	3
POLS 2302	Intro/American Government II	3
<i>Social and Behavioral Sciences</i>		
Select three hours from the following:		3
ANTH 2346	Introduction to Anthropology	
ANTH 2351	Cultural Anthropology	
BULW 1370	Business Environment and Public Policy	
CRIJ 1301	Intro to Criminal Justice	
ECON 1301	Principles and Policies	
ECON 2301	Principles of Economics I Macro	
ECON 2302	Principles of Economics II Micro	
FINC 2310	Intro to Consumer Finance	
INEN 2373	Engineering Economics	
PSYC 2301	General Psychology	
PSYC 2315	Lifespan Development	
POLS 1301	Intro to Political Science	
SOCI 1301	Introduction to Sociology	
SOWK 2361	Intro Social Work	
<i>Component Area Option</i>		
PSYC 2317	Introduction to Statistical Methods	3
Any core course not already applied.		3
Required Major Courses		
<i>Biology Core</i> ²		
BIOL 2421	Microbiology for Science Majors	4
BIOL 3450	General Botany	4
BIOL 3470	Genetics	4
BIOL 4344	Development of Biological Thought	3
BIOL 3460	Invertebrate Zoology	4
or BIOL 4410	Parasitology	
Select one of the following:		4

BIOL 3428	Comparative Anatomy	
BIOL 4408	Mammalogy	
BIOL 4409	Ornithology	
BIOL 4431	Ichthyology	
BIOL 4440	Vertebrate Natural History	
BIOL 4445	Herpetology	
BIOL 4470	Cell Biology/Histology	4
or BIOL 4404	Molecular Biology	
<i>Supporting Courses</i>		
CHEM 1311	General Chemistry I	3
CHEM 1111	General Chemistry I Laboratory	1
CHEM 1312	General Chemistry II	3
CHEM 1112	General Chemistry II Laboratory	1
CHEM 3311	Organic Chemistry I	3
CHEM 3111	Organic Chemistry I Laboratory	1
CHEM 3312	Organic Chemistry II	3
CHEM 3112	Organic Chemistry II Laboratory	1
PHYS 1401	College Physics I	4
PHYS 1402	College Physics II	4
<i>Biology Electives</i>		
Advanced Biology Electives 3000-4000		22
<i>General Electives</i>		
3 hours of any upper level (3000-4000) courses		3
Total Hours		120

- 1 The additional hours are applied to the 120 needed to complete the degree.
- 2 Core lab science excess hours applied to the degree.

Course	Title	Hours
First Year		
Fall		
Communication		3
BIOL 1406	General Biology I (Majors)	4
HIST 1301	U S History I 1763-1877	3
MATH 2312	Pre Calculus and Elementary Functions	3
Creative Art Core		3
Hours		16
Spring		
ENGL 1301	Composition I	3
BIOL 1407	General Biology II (Majors)	4
HIST 1302	U S History II Since 1877	3
PSYC 2317	Introduction to Statistical Methods	3
Social and Behavioral Science		3
Hours		16
Second Year		
Fall		
Component Area Option		3
POLS 2301	Intro to American Government I	3
CHEM 1311 & CHEM 1111	General Chemistry I and General Chemistry I Laboratory	4
PHYS 1401	College Physics I	4
Hours		14
Spring		
POLS 2302	Intro/American Government II	3
CHEM 1312 & CHEM 1112	General Chemistry II and General Chemistry II Laboratory	4

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PHYS 1402	College Physics II	4
BIOL 2421	Microbiology for Science Majors (or Lang/Phil/Culture)	4
Hours		15
Third Year		
Fall		
CHEM 3311 & CHEM 3111	Organic Chemistry I and Organic Chemistry I Laboratory	4
BIOL 4410 or BIOL 3460	Parasitology or Invertebrate Zoology	4
Advanced Biology Elective 3000-4000		4
BIOL 4470 or BIOL 4404	Cell Biology/Histology or Molecular Biology	4
Hours		16
Spring		
CHEM 3312 & CHEM 3112	Organic Chemistry II and Organic Chemistry II Laboratory	4
Advanced Biology Elective 3000-4000		4
Select one of the following:		4
BIOL 3428	Comparative Anatomy	
BIOL 4408	Mammalogy	
BIOL 4409	Ornithology	
BIOL 4431	Ichthyology	
BIOL 4440	Vertebrate Natural History	
BIOL 4445	Herpetology	
General Advanced Elective 3000-4000		3
Hours		15
Fourth Year		
Fall		
COMM		3
BIOL 3450	General Botany	4
Advanced Biology Elective 3000-4000		3
Advanced Biology Elective 3000-4000		4
Hours		14
Spring		
BIOL 3470	Genetics	4
BIOL 4344	Development of Biological Thought	3
Advanced Biology Elective 3000-4000		3
Advanced Biology Elective 3000-4000		4
Hours		14
Total Hours		120