

# DEPARTMENT OF BIOLOGICAL SCIENCES

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**Website:** Department of Biological Sciences (<http://www.shsu.edu/academics/biological-sciences/>)

## Mission

The Department of Biological Sciences is dedicated to the pursuit and dissemination of knowledge and scientific discovery in the life sciences through innovative teaching and research programs. The department strives to instill in its students the philosophy of lifelong scholarship, producing scientifically literate members of society who have the knowledge to contribute and compete in a rapidly changing world.

## Academic Programs

Biology, the study of living things, is an exciting and dynamic field that offers many areas of focus. Students may choose to study how life functions at the molecular, cellular, organismal, or ecological levels. The biological sciences provide opportunities to study viruses, bacteria, fungi, plants, and animals and to investigate the biochemical, physiological, morphological, anatomical, behavioral, ecological, and evolutionary processes that make each organism unique.

## Highlights

The Department of Biological Sciences is located in the Life Sciences Building, which houses the following teaching and research capabilities:

- microscopy (scanning electron microscopy, transmission electron microscopy, and confocal microscopy)
- molecular biology
- microbiology
- morphology

The department operates the Pineywoods Environmental Research Laboratory (PERL), a 250-acre field station within 5 miles of campus that is dedicated to biological and environmental research and teaching. Additionally, the department is affiliated with the Sam Houston State University Natural History Collections.

## Curriculum

### Major in Biology

The Bachelor of Arts or Bachelor of Science in Biology are ideal degrees for students interested in gaining a broad background in the biological sciences, while allowing flexibility to focus on a specific biology sub-discipline. All students majoring in biology will develop competence in the fundamental principles of biology and will gain experience in botany, zoology, cellular biology, microbiology, genetics, ecology and evolution. Students take an active role in creating a degree plan that best meets their interests and their career goals by choosing one out of four concentrations. Most students pursue careers in terrestrial ecology, animal physiology, animal behavior, medical professions, biotechnology, or teacher education.

### Required Courses for the Major

The biology major may choose from two degree programs, the Bachelor of Arts or Bachelor of Science. All majors must complete the following core courses:

Code	Title	Hours
<b>Required Courses</b>		
BIOL 1406	General Biology I	4
BIOL 1407	General Biology II	4
BIOL 2110	Being a Professional Biologist	1
BIOL 2440	Introductory Cell Biology	4
BIOL 3450	Introductory Genetics	4
BIOL 4110	Undergraduate Seminar	1
or BIOL 4111	Undergraduate Seminar	
BIOL 4361	Evolutionary Biology	3
MATH 1420	Calculus I	4
MATH 1430	Calculus II	4
or MATH 3379	Statistical Methods in Practice	
or STAT 3379	Statistical Methods in Practice	
CHEM 1411	General Chemistry I	4
CHEM 1412	General Chemistry II	4

CHEM 2123	Organic Chemistry I: Lab	1
CHEM 2323	Organic Chemistry I: Lecture	3
PHYS 1301	General Physics-Mechanics and Heat	3
PHYS 1101	General Physics Laboratory I	1
PHYS 1302	General Physics-Sound, Light, Electricity, and Magnetism	3
PHYS 1102	General Physics Laboratory II	1
<b>Total Hours</b>		<b>49</b>

## Major in Biomedical Sciences

The Biomedical Sciences degree offered by the Department of Biological Sciences provides a robust, yet flexible curriculum with an emphasis on studying the biological basis of health and disease. All students majoring in Biomedical Sciences will develop competence in the fundamental principles of biology and will gain experience in basic biology, cellular biology, microbiology, genetics, chemistry, mathematics and evolution. The Biomedical Sciences degree is designed to thoroughly prepare students for entrance into medical, dental, pharmacy, physician assistant, and other professional schools, as well as graduate study in the biomedical sciences, and employment as a laboratory research assistant. No minor is required for the degree.

### Required Courses for the Major

All Biomedical Sciences majors must complete the following core courses:

Code	Title	Hours
<b>Course Requirements</b>		
BIOL 1406	General Biology I	4
BIOL 1407	General Biology II	4
BIOL 2440	Introductory Cell Biology	4
BIOL 3450	Introductory Genetics	4
BIOL 3470	General Microbiology	4
BIOL 4110	Undergraduate Seminar	1
or BIOL 4111	Undergraduate Seminar	
BIOL 4361	Evolutionary Biology	3
CHEM 1411	General Chemistry I	4
CHEM 1412	General Chemistry II	4
CHEM 2323	Organic Chemistry I: Lecture	3
CHEM 2123	Organic Chemistry I: Lab	1
CHEM 2325	Organic Chemistry II: Lecture	3
CHEM 2125	Organic Chemistry II: Lab	1
CHEM 3438	Biochemistry I	4
MATH 1420	Calculus I	4
PHYS 1301	General Physics-Mechanics and Heat	3
PHYS 1101	General Physics Laboratory I	1
PHYS 1302	General Physics-Sound, Light, Electricity, and Magnetism	3
PHYS 1102	General Physics Laboratory II	1
<b>Total Hours</b>		<b>56</b>

- Bachelor of Applied Arts and Sciences: Biotechnology Concentration (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/agricultural-science/career-technology-program/biotechnology-baas/>)
- Bachelor of Arts, Major in Biology (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/biological-science/ba-biology/>)
- Bachelor of Science, Major in Biology (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/biological-science/bs-biology/>)
- Bachelor of Science, Major in Biomedical Sciences (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/biological-science/bs-biomedical-science/>)
- Minor in Biology (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/biological-science/minor-biology/>)

- Minor in Conservation Biology (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/biological-science/minor-conservation-biology/>)

## Student Organizations

- Beta Beta Beta (TriBeta) (<https://shsu.collegiatelink.net/organization/TriBeta/>) is an undergraduate national Biological Honor society. The organization was founded in 1922 and the Delta Tau chapter at SHSU was chartered in 1965. TriBeta is dedicated to advancing the understanding and appreciation of the biological sciences and encouraging/supporting undergraduate student scientific research. TriBeta membership requires:
  - a declared major in Biology or Biomedical Sciences; and
  - a dedicated interest in the life sciences (associate member) or completion of at least one 3000- or 4000-level biology course with a BIO GPA of 3.0 and overall SHSU GPA of 2.75 (regular member).

Membership invitations are sent to eligible students each fall and spring semester. (jmh091@shsu.edu) Dr. Diane Neudorf (BIO\_DLN@shsu.edu) serves as faculty advisor to TriBeta.

- Sam Houston Association of Medical Oriented Students (SHAMOS) ([http://www.shsu.edu/~org\\_shamos/](http://www.shsu.edu/~org_shamos/)) membership is available to any student interested in pursuing a career in the medical or health professions. Activities include fundraisers, community service projects, blood drives with the Gulf Coast Regional Blood Center, and canned food drives. SHAMOS sponsors an outside speaker program to inform students of the opportunities and benefits of the various disciplines of the health professions (e.g., general and specialist dentistry, general and specialist medicine, occupational therapy, physician assistant, podiatry, forensic pathology, and EMS). Dr. Aaron Lynne (aaronlynne@shsu.edu) (bio\_arg@shsu.edu) serves as faculty advisor to SHAMOS.

## Internships and Undergraduate Research

The Department of Biological Sciences believes that "hands on" experiences, through either internships or faculty-directed undergraduate research projects, are an important complement to a student's formal coursework. Moreover, undergraduate research experience is critical for students applying to graduate programs or professional schools. We therefore strongly encourage Biology students to consider participating in an undergraduate research project. Students seeking information regarding internships and/or undergraduate research experiences should contact the Department Chair Dr. Aaron Lynne (aaronlynne@shsu.edu). Individual faculty members may be contacted for details regarding their research programs and independent research possibilities.

## Academic Distinction

Graduation with "Academic Distinction in Biological Sciences" is available at SHSU. This honor is recognized at the commencement ceremony, posted to the diploma, and to the academic transcript. Requirements for earning Academic Distinction are:

- 1) Students must maintain a GPA in their major of 3.50 or above and overall GPA of 3.25 or above to be eligible for Academic Distinction.
- 2) Students must complete six hours in the Academic Distinction program by taking in sequence Senior Thesis I (BIOL 4398) and Senior Thesis II (BIOL 4399). These credits, by University rule, cannot count towards any requirement in the degree plan, i.e. they must be in addition to normal graduation requirements.
- 2) Before a student enrolls in BIOL 4398 and declares an intention to earn Academic Distinction, the student must obtain written permission from the Department Chair, the Director of the Honors College, and the Academic Dean (Dean of Science and Engineering Technology).

If you are interested in the Academic Distinction program, please contact the Department Chair.

## Scholarships

Academic scholarships are available from both the Department of Biological Sciences and the University to support student studies.

The Department of Biological Sciences scholarships include:

- Biology & Environmental Science Academic Scholarship
- Emma Normand Academic Scholarship
- Everett Wilson Biology Endowment
- Harold F. Foerster Scholarship Endowment
- James D. Long Biology Endowment
- James Patrick Weber Environmental Science Award
- Patrick Neil O'Bryant Academic Scholarship
- Roy Turner Scholarship Endowment
- S.R. Warner Academic Scholarship
- William (Bill) R. Brinkley Scholarship Endowment

- Wilson-Warner Endowed Scholarship in the Biological Sciences
- Dr. James R. DeShaw Endowed Scholarship
- Christopher M. Wilson Memorial Endowed Scholarship
- Gregory E. and Mary Kay Crouch Endowed Scholarship
- G. Scott and Mary S. McCarley Endowed Scholarship

Information concerning Biology and University scholarships may be obtained by visiting Scholarship 4 Kats (<https://shsu.academicworks.com/>).

**BIOL 1401. Environmental Science. 4 Hours. [TCCN: ENVR 1401]**

A general course designed to cover all areas relating to contemporary environmental issues. Topics may include air, water, and soil pollution; biodiversity, climate change; agriculture; pesticides; population growth; and energy. This course is designed for non-science majors to help them meet their General Education science requirement and as a required course in the Environmental Science degree. Includes a two-hour lab. BIOL 1401 cannot be applied to either a major or a minor in Biology. Fall, Spring, Summer. Course Equivalents: BIOL 1301

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

**BIOL 1406. General Biology I. 4 Hours. [TCCN: BIOL 1406]**

Students examine the chemical basis of life, the structure and biology of the cell, molecular biology, genetics, and mechanisms of evolution. This course is one of two introductory courses (BIOL 1406 and BIOL 1407) which comprise a two-semester survey of modern biology. The course requires a 3 hour laboratory that is concurrently taken with the course. Fall, Spring, Summer.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

**BIOL 1407. General Biology II. 4 Hours. [TCCN: BIOL 1407]**

Students undertake a detailed survey of the major phylogenetic lineages. This includes a comparison of the systems of different organisms, the ecological roles and relationships of organisms, and their behavior. This course is one of two introductory courses (BIOL 1406 and BIOL 1407) which comprise a two-semester survey of modern biology. The course requires a 3 hour laboratory that is concurrently taken with the course. Fall, Spring, Summer.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

**BIOL 1408. Contemporary Biology. 4 Hours. [TCCN: BIOL 1408]**

This course is a presentation for the non-science major of contemporary hypotheses and the unifying principles of biology, including but not limited to: the scientific method and hypothesis testing, the definition of life, cell theory, the central dogma of biology (transcription of DNA to RNA to protein), genetic regulation and heredity, metabolism and homeostasis, organismal evolution, biodiversity, and ecology. The class builds scientific literacy and critical thinking skills for use in everyday life. Credit in BIOL 1408 as a laboratory science is contingent upon completion of the laboratory section. This course is designed for non-science majors to help them meet their General Education science requirement and cannot be applied to either a major or minor in Biology. Includes a two-hour lab. Fall, Spring, Summer. >b> Course Equivalents: BIOL 1308 .

**BIOL 1436. Foundations Of Science. 4 Hours.**

The course focuses on the nature of science as a reliable method of acquiring knowledge about the natural world. Students will learn how to apply key scientific facts, concepts, laws and theories to distinguish science from non-science, bad science, and pseudoscience by analyzing a variety of claims and case studies. By employing an innovative, interdisciplinary approach to science education, this course is designed to increase science literacy and critical thinking skills for introductory-level students. This course is designed for non-science majors to help them meet their General Education science requirement and cannot be applied to either a major or a minor in Biology. Students must enroll concurrently in the corresponding lab for this course. Includes a two-hour lab. Fall, Spring, Summer. Course Equivalents: GEOG 1436, GEOL 1436, ISCI 1436 .

**BIOL 2110. Being a Professional Biologist. 1 Hour.**

Students explore the biological sciences as a profession and gain proficiency in the skills required of successful professional biologists. Content areas in this seminar course may include career exploration, retrieval and use of scientific literature, bibliographic procedures, critical evaluation of claims, scientific professionalism, and locating/using campus resources.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407.

**BIOL 2401. Human Anatomy. 4 Hours. [TCCN: BIOL 2401]**

This course deals with structure and form of the human body. It includes studies of cells, tissues, and organ systems. Registration is primarily for students in prenursing or majors in kinesiology or health. Two-hour laboratory. Fall, Spring, Summer as needed. Credit in this course cannot be applied to either a major or minor in Biology.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

**BIOL 2402. Human Physiology. 4 Hours.**

This course will help students identify and understand the function of several important human organ systems and how these systems maintain homeostasis. Topics and the mechanisms involving circulation, digestion, metabolism, muscle action and respiration will receive the most emphasis. This course is designed to emphasize a clinical knowledge of physiology and techniques required by students studying nursing, physical therapy, and related health fields. Two-hour laboratory. Fall and Spring. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Minimum grade of C in BIOL 2401 and CHEM 1406 or CHEM 1306 and CHEM 1106 or CHEM 1411 or CHEM 1311 and CHEM 1111.

**BIOL 2403. Human Anatomy & Physiology I. 4 Hours.**

This course is the first course in a two-semester sequence that examines the systems of the human body using an integrated approach. Emphasis will be given to the study of cells and tissues, and the anatomical and physiological interrelationships of the skeletal, muscular, and nervous systems and special senses. Laboratory exercises will enhance the student's appreciation and comprehension of the biological concepts of structure and function of the human body.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

**BIOL 2404. Human Anatomy & Physiology II. 4 Hours.**

This course is the second course in a two-semester sequence that examines the systems of the human body using an integrated approach. Emphasis is placed on the study of the following systems: endocrine, cardiovascular, lymphatic and immune, respiratory, digestive, urinary, and reproductive. In addition this course requires in-depth application of topics related to cellular function and metabolism and of organ systems studied during Human Anatomy and Physiology I. Laboratory exercises will enhance the student's appreciation and comprehension of the biological concepts of structure and function of the human body.

**Prerequisite:** Minimum grade of C in BIOL 2403 and demonstrated college-level readiness in reading, writing, and math.

**BIOL 2411. General Botany. 4 Hours. [TCCN: BIOL 1411]**

Students are study general principles of botany. Emphasis is placed on morphology, taxonomy, genetics, physiology, and ecology of plants in an

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