

# Biology

## Purpose and Goals

The curriculum of the Department of Biology is designed to provide students with a wealth of biological knowledge. The department prepares students for careers as scientists and biology educators. The department also provides the undergraduate foundation for students who plan to pursue professional studies leading to the Doctorate in Medicine, Dentistry, Veterinary Medicine, Optometry, Pharmacy, Allied Health, and other graduate studies. The department is committed to integrating instruction and research to develop our students' critical thinking skills and produce life-long learners.

## Academic Standards

Students must earn a minimum grade of "C" in all classes taken in their major disciplines, a minimum grade of "C" in all classes taken in their minor disciplines and physics courses. (if applicable).

## Special Emphasis Options

In addition to the degree programs listed above, students may select alternate required courses in the major in such a way as to pursue specific career options. Emphasis options are available in Biology teacher preparation, Pre-Medicine, Pre-Dentistry, Pre-Veterinary, Pre-Podiatry, Pre-Pharmacy, Pre-Physical Therapy, or other Allied health professions. Please refer to course listings on the following pages.

## Optional Minor

A minor is not required for the BS Biology. However, Biology majors are required to take 20 credits of chemistry support courses for the biology degree. By completing CHEM 4303 and CHEM 4204, Biochemistry lecture and lab, a Biology major is eligible to complete the 24 SCH catalog requirement for a minor in chemistry. It is highly recommended that biology majors interested in graduate school or professional school select the chemistry minor.

## Bachelor of Science in Biology Degree Program Requirements

BS Biology Recommended Degree Sequence ([http://catalog.pvamu.edu/academicprogramsanddegreeplans/marvindandjunesamuelbrailsfordcollegeofartsandsciences/biology/BIOL\\_BS\\_21-22.pdf](http://catalog.pvamu.edu/academicprogramsanddegreeplans/marvindandjunesamuelbrailsfordcollegeofartsandsciences/biology/BIOL_BS_21-22.pdf))

<b>Core Curriculum</b> <sup>1</sup>		<b>42</b>
<b>Foreign Language Requirements (one language)</b>		<b>6</b>
<b>Major Requirements</b> <sup>2,3</sup>		
BIOL 1501	General Biology	5
BIOL 1102	Biology Seminar	1
BIOL 1502	General Biology	5
BIOL 1103	Biology Seminar	1
BIOL 1411	Botany	4
BIOL 2416	Genetics	4
BIOL 3401	Human Physiology and Anatomy	4
BIOL 3402	Human Physiology and Anatomy	4
BIOL 3403	General Microbiology	4
BIOL 3307	Molecular Biology I	3
<b>Major Electives</b>		
Select 15 hours from the courses below:		<b>15</b>
BIOL 3404	Immunology	
BIOL 3405	Gross Anatomy	
BIOL 3406	Animal Histology	
BIOL 3308	Molecular Biology II	
BIOL 3412	Cell Biology	
BIOL 3413	Synthetic Biology	
BIOL 4201	Medical Terminology	
BIOL 4301	Topics in Genomics	
BIOL 4401	Vertebrate Embryology	
BIOL 4402	Comparative Anatomy	
BIOL 4403	Practicum in Biology	

BIOL 4105	Research	
BIOL 4106	Research	
<b>Support Requirements</b>		
CHEM 1203	General Chemistry Lab	2
CHEM 1303	General Inorganic Chemistry	3
CHEM 1204	General Chemistry Lab	2
CHEM 1304	General Inorganic Chemistry	3
CHEM 2203	Organic Chemistry I	2
CHEM 2303	General Organic Chemistry I	3
CHEM 2204	Organic Chemistry Lab II	2
CHEM 2304	General Organic Chemistry II	3
PHYS 1101	General Physics Lab I	1
or PHYS 2125	University Physics Lab I	
PHYS 1102	General Physics Lab II	1
or PHYS 2126	University Physics Lab II	
MATH 2413 (1 hour counts in the support area and 3 hours meets the core curriculum Math component requirement)		1
Biology majors are required four (4) hour credit physical activity courses (DANC, KINE, or HUPF).		4
Total Hours		125

- 1 Biology majors are required to take MATH 2413 or higher. Students may need to take Algebra or Pre-calculus before enrolling in Calculus. Other students may be prepared to start with Calculus I or higher math.
- 2 Electives in 15 SCH of upper division (advanced) Biology courses. A total of fifty (50) Biology SCH are required.
- 3 A minor is not required for the BS Biology. However, by completing CHEM 4303 and CHEM 4204, Biochemistry lecture and lab, a Biology major is eligible to complete the catalog requirements for a minor in chemistry.

## Special Emphasis Programs

The following electives should be selected to prepare for the specialized fields listed.

### Pre-medicine and Pre-dentistry

The minimum requirements for admission to medical or dental school include average scores on the Medical College Admission Test (MCAT) or Dental Admission Test (DAT) and the satisfactory completion of 90 semester hours of the pre-medical or pre-dental curriculum with average or better grades.

Candidates for admission are evaluated on the basis of their academic background, ability to succeed in professional school, integrity, psychological stability, motivation, judgment, and resourcefulness. The admissions committee will also evaluate the recommendations of the premedical advisory committee.

Students must apply to medical or dental school by June 1, one year in advance of their expected entrance. They are therefore advised to take the MCAT or DAT by the spring of their junior year.

### MCAT Registration

Association of American Medical Colleges

Mcat@aamc.org or [www.aamc.org/mcat](http://www.aamc.org/mcat) (<http://www.aamc.org/mcat/>)

### DAT Registration

Association of American Dental Schools

<b>MCAT Registration</b>	<b>DAT Registration</b>
American College	Testing Program Div. of Educational Measurements
P.O. Box #414	Council on Dental Education
Iowa City, IA 52240	American Dental Association
(319) 337-1305	211 East Chicago Avenue
	Chicago, IL 60611
	(312) 440-2689

The Pre-Professional curriculum qualifies students to apply to schools of Medicine, Dentistry, Pharmacy, Podiatry, Optometry, and Graduate studies. The curriculum enables students to complete the MCAT, DAT, PCAT, OAT, and GRE preparatory course by the spring of their junior year. Students are encouraged to attend at least one summer session to ensure the completion of necessary courses prior to the summer of their junior year.

## Dental School Early Admission Programs

The University of Texas Dental School at San Antonio, the Texas A&M University School of Dentistry, and the University of Texas -Houston Dental school have established early admission agreements with Prairie View A&M University. Students may apply for early admission to these schools after completing the first year of the biology curriculum for majors with a 3.0 or higher GPA.

Applications may be obtained from the Pre-Dental advisor. The application deadline is October 1 of the student's sophomore year. The dental schools will evaluate each application and make the selections of students for interviews.

### Pre-Veterinary Medicine

The Pre-veterinary medicine curriculum provides the prerequisites for admission to professional veterinary medicine schools. The curriculum also leads to a Bachelor of Science degree in biology. Students in the Pre-veterinary medicine program should apply to veterinary medical school at the beginning of their third year. Students should write to the Office of Admissions of the desired institution for information about specific admission requirements.

Most schools of veterinary medicine require the Graduate Record Examination (GRE), Veterinary Admission Test (VAT), or Medical College Admission Test (MCAT). It is the students' responsibility to determine which of these examinations is required by the institution to which they are seeking admission.

## Optional Requirements in Addition to Biology Degree Requirements

A minor is not required for the BS Biology. However, by completing CHEM 4303 and CHEM 4204, Biochemistry lecture and lab, a Biology major is eligible to complete the catalog requirements for a minor in chemistry.

### Chemistry

CHEM 4303	Biochemistry	3
CHEM 4204	Biochemistry Laboratory	2
Total Hours		5

Pre-Veterinary medical students should contact the Pre-Veterinary faculty adviser in the Department of Biology.

## Biology Teacher Preparation

Biology majors who plan to teach should follow the biology curriculum and the Teacher Certification Program in order to be eligible for certification as a teacher of biology, grades 7-12.

Student teaching is required of all students preparing to teach. Program prerequisites for student teaching should be completed before applying for student teaching. Additional information and the suggested curriculum for the Bachelor of Science degree with a Teacher Education option may be obtained from the biology teacher education faculty advisor in the biology department.

## Requirements for a Minor in Biology

BIOL 1501	General Biology	5
BIOL 1502	General Biology	5
BIOL 2416	Genetics	4
BIOL 3401	Human Physiology and Anatomy	4
BIOL 3402	Human Physiology and Anatomy	4
BIOL 3403	General Microbiology	4
Total Hours		26

## Honor Societies and Clubs

*Beta Beta Beta Biological Honor Society* stimulates sound scholarship, promotes the dissemination of scientific knowledge, and encourages investigation in the life sciences. To be eligible for selection, candidates must have a superior scholarship record and have completed at least two courses in biology totaling not less than 10 semester hours, or the equivalent of that number. They must also have completed at least one term of the second year of a four-year curriculum or its equivalent and exemplify high ethical and moral ideals.

*Beta Kappa Chi Honor Society* encourages and advances scientific education through original investigation, dissemination of scientific knowledge, and stimulation of high scholarship in the pure and applied sciences. To be eligible for membership, students must be in the upper fifth of their university

class and have completed at least 64 semester hours of university work. Candidates for membership in Beta Kappa Chi must have completed 17 semester hours in one of the sciences recognized by the society with a grade average of at least B.

*Minority Association of Pre-health Students* provides activities through partnerships with near-by chapters of Student National Medical Association (SNMA) to achieve the goal of increasing the matriculation of undergraduate students into professional health related programs by providing information, materials and mentorship opportunities. The Premedical Club exists to establish a rapport between the biology department and medical schools; to establish a better relationship between premedical students and the staff of professional schools; to provide opportunities for students to visit various health professional schools for tours, chats, and informal lectures; and to assist students in becoming competent test takers and broaden their cultural perspective. The Premedical Club is open to all students interested in a medical career.

*The Pre-Veterinary Medicine Club* exists to establish a rapport between the Biology Department, Veterinarians and Colleges of Veterinary Medicine; to establish student veterinary preceptor ships to provide opportunities for visits to zoos and the College of Veterinary Medicine at Texas A&M University; and to become aware of the vast differences in entry requirements for the 27 colleges of Veterinary medicine and to assist students in becoming competent test takers. The club is open to all students interested in veterinary medicine.

*The Pre-Dental Club* exists to establish a rapport between the biology department and dental schools; to establish a better relationship between pre-dental students and dental school staff; to provide opportunities for students to visit dental schools; and to assist students in becoming competent test takers and to strengthen skills of students interested in a dental career.

*The Allied Health Club* is designed to provide students with an opportunity to acquire knowledge in reference to the allied health discipline. This club enables students interested in physical therapy, pharmacy, physician's assistant, occupational therapy, optometry, dental hygiene, medical record administration, and public health an opportunity to learn about their chosen professions. Students are introduced to professionals in allied health; visit the campuses and hospitals of the various programs; and establish relationships with the faculty and other students interested in the allied health fields. The Allied Health Club is open to all students interested in a health professional career.

*The Pre-Optometry Club* is designed to educate and prepare students for careers in optometry. The Optometry Club provides opportunities for its members to visit optometry schools and attend seminars in reference to becoming adequately prepared for entry into optometry school. Seminars are given to assist the students in becoming competent test takers for the Optometry Admissions Test. The club is open to all students interested in optometry as a profession.

*The Pre-Pharmacy Club* is designed to educate and prepare students for careers in pharmacy. The Pharmacy Club invites pharmacists to speak to their club to inform them about the pharmaceutical sciences. The students visit pharmacy schools and gain knowledge in reference to successful matriculation in pharmacy school. The club assists students in becoming competent test takers for the Pharmacy College Admissions Test. The club is open to all students interested in pharmacy as a profession.

## Courses

### ***BIOL 1102 Biology Seminar: 1 semester hour.***

Discussion and presentations of current biological topics by students, faculty, and guest lecturers.

### ***BIOL 1103 Biology Seminar: 1 semester hour.***

Discussion and presentations of current biological topics by students, faculty, and guest lecturers.

### ***BIOL 1108 Biology for Non-Science Major I Lab: 1 semester hour.***

Introductory laboratory course for non-biology majors. Emphasis on basic biological principles and their application to human life.

### ***BIOL 1307 General Microbiology: 3 semester hours.***

Morphology and physiology of microorganisms related to health and sanitation; disinfection, growth, and control of those organisms causing common infectious diseases.

### ***BIOL 1308 Biology for Non-Science Major I: 3 semester hours.***

Introductory course for non-biology majors. Emphasis on basic biological principles and their application to human life. Contemporary biology that covers the chemical basis of life, structure and function of the cell, molecular biology and genetics.

### ***BIOL 1309 Biology for Non-Science Majors II: 3 semester hours.***

A reflection of the interdependence of plants on animals and how man's existence is depending on successful interactions between plants and animals.

### ***BIOL 1411 Botany: 4 semester hours.***

Morphology and physiology of flowering plants. Structure, method of reproduction, and biotic relationships of type representatives of lower plants.

### ***BIOL 1501 General Biology: 5 semester hours.***

Basis of life, cell theory, structure and energy transformation, reproduction, and genetic variability. Origins of diversity of organisms.

### ***BIOL 1502 General Biology: 5 semester hours.***

Structure and function of living organism systems. Ecological relationships, natural selection, evolution, and human ecology.

**BIOL 2306 Hlthcare Minort Com: 3 semester hours.**

Introduction to the major health concerns that afflict minority and underserved communities. This course will examine the infectious diseases of special concern to public health and will identify and present for discussion. The course will examine current health policy and the availability of health services as modifiable influences on the health status of minority and underserved communities.

**BIOL 2401 Anatomy and Physiology I: 4 semester hours.**

An introductory course examining the organization of a human body and the mechanisms for maintaining homeostasis. Topics include chemistry of life, cell and tissue structure, metabolism, skeleton, muscular, nervous, endocrine, and integumentary system. Designed for students who will pursue a career in nursing.

**BIOL 2402 Anatomy and Physiology II: 4 semester hours.**

An introductory course examining the organization of a human body and the mechanisms for maintaining homeostasis. Topics include metabolism, the cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems. Designed for students who will pursue a career in nursing.

**BIOL 2416 Genetics: 4 semester hours.**

Analysis of the structure, function, and transmission of genetic materials.

Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025) and (BIOL 1411 or BIOL 1034).

**BIOL 3307 Molecular Biology I: 3 semester hours.**

The dynamics of carbohydrate, fat, protein and nucleic acid metabolism; recombinant DNA evolution, gene structure and function in specialized eukaryotic systems.

Prerequisites: (BIOL 1502 or BIOL 1025) and (CHEM 2304 or CHEM 2043).

**BIOL 3308 Molecular Biology II: 3 semester hours.**

Regulation of gene function in bacterial cells; the functioning of eukaryotic chromosomes; the extraordinary diversity of eukaryotic viruses.

Prerequisites: BIOL 1502 or BIOL 1025 and (CHEM 2304 or CHEM 2043).

**BIOL 3401 Human Physiology and Anatomy: 4 semester hours.**

For biology and physical education majors. Human structure, physiology, organ systems, and related principles.

Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025).

**BIOL 3402 Human Physiology and Anatomy: 4 semester hours.**

For biology and physical education majors. Human structure, physiology, organ systems, and related principles.

Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

**BIOL 3403 General Microbiology: 4 semester hours.**

Morphology, physiology, classification, and cultivation of the microorganism relevant to agriculture, pre-medicine, and industry.

Prerequisites: (BIOL 1501 or BIOL 1015) and (CHEM 1303 or CHEM 1033).

**BIOL 3404 Immunology: 4 semester hours.**

Fundamental aspects of immunology, antigenic systems, hypersensitivity, and serology.

Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

**BIOL 3405 Gross Anatomy: 4 semester hours.**

Introduce the basic principles and facts relating to the gross anatomy of the human body.

Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025).

**BIOL 3406 Animal Histology: 4 semester hours.**

Microscopic study of tissues and organs of vertebrates. Relation of structure to function.

Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

**BIOL 3412 Cell Biology: 4 semester hours.**

A study of the ultrastructure and macro-molecular organization of cells, with emphasis on eukaryotic cells. The convergence of structure and function in life phenomena will be highlighted.

Prerequisites: BIOL 1502 or BIOL 1025 and (CHEM 2304 or CHEM 2043).

**BIOL 3413 Synthetic Biology: 4 semester hours.**

The interdisciplinary study of the implementation and application of synthetic biology applied to design and construction of new biological parts, devices and systems.

Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025) and (BIOL 2416 or BIOL 2054) and (BIOL 3307 or BIOL 3073).

**BIOL 4105 Research: 1 semester hour.**

Library and laboratory work in specific biological problems.

**BIOL 4106 Research: 1 semester hour.**

Library and laboratory work in specific biological problems.

**BIOL 4201 Medical Terminology: 2 semester hours.**

Emphasis is on understanding basic medical terms and learning how they are used in documenting and reporting patient care procedures. Practical applications are provided by exercises and medical record analyses in each chapter.

**BIOL 4301 Topics in Genomics: 3 semester hours.**

The study of the human genome in a holistic manner. Physical mapping and large scale DNA sequencing of the human genome: gene expression and micro arrays; the application of genome data to the incidence of disease markers and gene based therapeutics.

Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025) and (BIOL 2416 or BIOL 2054) and (CHEM 2303 or CHEM 2033) and (CHEM 2304 or CHEM 2043).

**BIOL 4401 Vertebrate Embryology: 4 semester hours.**

Structure, principles, and progress in vertebrate development. Chickens and pigs as principle laboratory materials.

Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

**BIOL 4402 Comparative Anatomy: 4 semester hours.**

Anatomy of organs and organ systems, their function and evolution in major vertebrate types.

Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

**BIOL 4403 Practicum in Biology: 4 semester hours.**

Recent advances in biology. Emphasis placed on investigation and inquiry as a means of acquiring knowledge in biology.

**BIOL 5301 Genomics: 3 semester hours.**

The study of the genomes on a holistic manner, thus providing information on the uses and shortcomings of genetic information. The application of genomic data to determine the incidences of disease; to identify disease markers and develop gene based therapeutics.

**BIOL 5306 Micro Activ Toxic: 3 semester hours.**

Survey of microbial actions in the field of environmental toxicology. Toxigenic microorganisms, major microbial toxins and use of microbial systems in toxicological studies. Microbial alterations of environmental contaminants.

**BIOL 5312 Cell Biology: 3 semester hours.**

An in-depth study of the morphological and functional aspects of the cell. Emphasis will be placed on the current understanding of cell structure and how this relates to physiological and biochemical processes.

Prerequisites: CHEM 2303 or CHEM 2033 and (CHEM 2304 or CHEM 2043).

**BIOL 5399 Independent Study: 1-3 semester hour.**

Reading, research and/or field work on selected topics in Biology. Prerequisite: Consent of advisor. Students may register for this course each semester. Only six credit hours may be earned.

**BIOL 5402 Microscopic Anatomy: 4 semester hours.**

Microscopic study of tissues and organ of vertebrates; relation of structure to function.