AIMS OF THE DEPARTMENT

The objectives of the department are:

- to encourage the study of living organisms,
- to prepare biology majors in basic and advanced courses that provide a foundation for graduate study, teaching, and research in biology,
- to prepare pre-professional students in courses that satisfy entrance requirements for medical, dental, and veterinary medical school, and other professional programs,
- to prepare students anticipating careers in nursing and allied health fields,
- to prepare students seeking to fulfill general education lab science requirements, and
- to prepare students to respond intelligently to Creation/Evolution issues.

The department offers a Bachelor of Arts and a Bachelor of Science degree in biology. The B.A. degree requires 36 semester hours in biology and includes a foreign language component. The B.S. degree requires 44 semester hours in biology and emphasizes course work in biology and the sciences. Required cognate courses are specified for each degree. The program has flexibility to allow students the choice of elective biology courses of special interest beyond the basic requirements listed below. Suggested class schedules can be found at http://Biology.swau.edu.

PROGRAMS

Biology, B.A.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>BIOL 111, 112</td>
<td>General Biology</td>
<td>8</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>General Ecology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 240</td>
<td>Genetics</td>
<td>4</td>
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<tr>
<td>BIOL 280</td>
<td>Principles of Research and Statistics</td>
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</tr>
<tr>
<td>BIOL 340, 344</td>
<td>Molecular Biology and Molecular Bio Tech</td>
<td>5</td>
</tr>
<tr>
<td>BIOL 419</td>
<td>Philosophy of Science</td>
<td>3</td>
</tr>
<tr>
<td>BIOL</td>
<td>Elective from Group I</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 480**</td>
<td>Research in Biology</td>
<td>2-3</td>
</tr>
<tr>
<td>BIOL 481</td>
<td>Senior Thesis</td>
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TOTAL: 36-38

Required Cognates: CHEM 111, 112; MATH 121.
Recommended Cognates: CHEM 331, 332.

Biology, B.S.

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<td>BIOL 340, 341</td>
<td>Molecular Biology I, II</td>
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<td>Molecular Biology Techniques</td>
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<td>Elective from Group I</td>
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<tr>
<td>BIOL</td>
<td>Elective from Group II</td>
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<td>BIOL</td>
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<td>BIOL 480**</td>
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<td>1-2</td>
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<tr>
<td>BIOL 481</td>
<td>Senior Thesis</td>
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TOTAL: 45

Required Cognates: CHEM 111*, 112*, 331*, 332*; PHYS 121*, 122*; MATH 121*.

PRE-PROFESSIONAL REQUIREMENTS

The entrance requirements for most medical, dental and veterinary medical schools are satisfied by the Biology B.S. degree and its cognate requirements of Chemistry, Physics and Math. Medical schools may require additional math and schools of veterinary medicine often have unique entrance requirements. The pre-professional student must choose a major from the list on page 34 and should consult with his/her pre-professional advisor to develop the best degree plan to satisfy specific pre-professional requirements.

TEACHING CERTIFICATION PROGRAM

The following Life Science major and minor are for teaching certification only. Requirements for certification are listed in the Education section of this bulletin.

You must make formal application for admittance to the Teacher Education Program. Applications are available at the Education Department office.

Life Science B.A. or B.S. - Secondary Teaching Area

The student must meet the requirements for a B.A. or B.S. degree in Biology.

Life Science Minor - Secondary Teaching Area

Option II

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<td>BIOL</td>
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<td>4</td>
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<td>BIOL 480**</td>
<td>Research in Biology</td>
<td>1-2</td>
</tr>
<tr>
<td>BIOL 481</td>
<td>Senior Thesis</td>
<td>2</td>
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</tbody>
</table>

TOTAL: 24

Required Cognates: CHEM 111*, 112*, 331*, 332*; PHYS 121*, 122*; MATH 121*.

* The standard courses required for MCAT (Medical College Admission Test) & DAT (Dental Admission Test) preparation and for medical, dental and veterinary medical school entrance requirements.

** May be substituted by up to 2 hours of mentored internship.
BIOLOGY COURSES

BIOL 101, 102 Anatomy & Physiology I, II 4, 4 hours
An integrated two-semester study of the anatomy and physiology of human organ systems as well as cellular biology and fluid, electrolyte and acid-base balance. 3 Lec 3 Lab. Does not apply toward a biology major nor minor. (BIOL 101 Fall, BIOL 102 Spring)

BIOL 104, 105 Human Biology I, II 4, 4 hours
A two-semester survey-study of the human body including structure and function, life-span from conception to death, impact of disease processes and injury on the human body, and the interaction of humans with each other and with the environment. Discussion of the impact of healthful living on human physiology is a very important part of this course. This course is designed to meet the General Education Science requirement and does not apply toward a Biology major nor minor. 3 Lec 3 Lab. (BIOL 104 Fall, BIOL 105 Spring)

BIOL 111, 112 General Biology I, II 4, 4 hours
A two-semester course covering the basic disciplines of life science. General concepts in genetics, taxonomy, behavior, ecology, morphology, physiology and speciation of living organisms are taught. High school chemistry highly recommended. 3 Lec 3 Lab. (BIOL 111 Fall, BIOL 112 Spring)

BIOL 220 Microbiology and Immunology 4 hours
Prerequisite: BIOL 111, 112 or BIOL 101, 102
Introduction to the structure, function and control of microorganisms in the environment with special emphasis on those organisms of medical importance. Introduction to immune responses and mechanisms including antibody and host-antigen interactions, bursal and thymic influences on the lymphoid system, and humoral and cellular immunological response mechanisms. 3 Lec 3 Lab. Lab fee. (Fall)

BIOL 230 General Ecology 4 hours
Prerequisite: BIOL 111, 112
A general course including study of plant and animal distribution, ecological interrelationships, and observations of the delicate balance in nature. The laboratory includes a four-day field trip. 3 Lec 3 Lab. Field trip fee. (Fall)

BIOL 240 Genetics 4 hours
Prerequisite: BIOL 111, 112
The study of inheritance as it relates to man, animals and plants, including a detailed study of molecular genetics. Experimental work in the laboratory involves both lower and higher organisms. 3 Lec 3 Lab. (Spring)

BIOL 280 Principles of Research and Statistics 2 hours
Prerequisite: BIOL 111, 112, or any entry level science sequence
A general introduction to the techniques and methodologies of scientific literature and presentations based upon library and on-line research. Each student will select a specific topic for research, prepare a paper, and make an oral presentation based on that work. The student will learn scientific methodology, basic statistical skills, and critical data analysis. (Fall)

BIOL 291 Selected Topics 1-3 hours
Prerequisite: BIOL 111, 112, and approval of instructor
A study in an area of student interest under the direction of a staff member. This study may involve data collection, or library work and will involve a written report. Content and method of study must be arranged prior to registration. May be repeated for a total of 3 credits.

BIOL 310 Invertebrate Zoology 4 hours
Prerequisite: BIOL 111, 112
A taxonomic and ecological study of invertebrates from marine, freshwater, and terrestrial environments. Considerable attention is focused on the direct role of invertebrates on human life. Laboratory includes a four-day field trip. 3 Lec 3 Lab. Field trip fee. (Offered periodically)

BIOL 312 Ornithology 3 hours
Prerequisite: BIOL 111, 112
A study of native American birds, with emphasis on avian identification, geographic distribution, migration, habits and conservation. Attention is given to anatomical and physiological features that contribute to their unique lifestyles. Laboratory sessions are largely in the field and include a four-day field trip. 2 Lec 3 Lab. Field trip fee. (Spring)

BIOL 314 Systematic Botany 4 hours
Prerequisite: BIOL 111, 112
A taxonomic study of the flowering plants of Texas. Includes methods for identification and preservation of plant specimens. Laboratory includes a four-day field trip. 3 Lec 3 Lab. Field trip fee. (Spring, odd years)

BIOL 330 Bacteriology and Virology 4 hours
A study in an area of student interest under the direction of a staff member. This study may involve data collection, or library work and will involve a written report. Content and method of study must be arranged prior to registration. May be repeated for a total of 3 credits.

BIOL 340, 341 Cellular and Molecular Biology I, II 3 hours
Prerequisite: BIOL 111, 112; CHEM 332.
Co-requisite: BIOL 344
A study of the internal workings of the cell. The molecular basis of various cell activities is emphasized. Particular attention is paid to molecular genetics, energetics, replication and synthesis, molecular transport, and excitability of cells. 3 Lec (Fall, Spring)

BIOL 344 Molecular Biology Techniques 2 hours
Co-requisite: BIOL 340
Laboratory course in modern molecular biology techniques for gene manipulation and analysis in prokaryotes and eukaryotes. Evaluation and discussion of experimental results in group sessions. Techniques include: plasmid prep., genomic DNA prep., digestion, ligation, making competent cells, knock-out construction, transformation, electroporation, Southern analysis, Northern analysis, SDS-PAGE, Western analysis. 1 Lec 3 Lab (Fall)
**Biology**

**BIOL 360  Plant Dynamics  4 hours**
Prerequisite: BIOL 111, 112 or permission of instructor

A broad course emphasizing the biological importance of plants in the world ecosystem as well as their direct vital role in human life. This is an applied botany course in which plant physiology, plant structure, ecology, and systematics are studied. Methods in experimental horticulture are examined. Laboratory includes a four-day field trip. 3 Lec 3 Lab. Field trip fee. (Spring, even years)

**BIOL 410  Principles of Human Physiology  4 hours**
Prerequisite: BIOL 111, 112 or BIOL 101, 102

Principles of Human Physiology is the study of the physiological processes that occur in humans. This one semester course is designed to make students competent in their understanding of human body functions, system by system, and dynamically. Topics included are, an in depth review of metabolism, endocrinology, neurology, muscle physiology, cardiovascular studies, urology and sexual reproduction. 3 Lec 3 Lab (Fall, even years)

**BIOL 419  Philosophy of Science  3 hours**
A study of the philosophies and methodologies of science. Includes a review of the history of scientific and religious thought and the role each has played in the development of modern theories of origin. (Also taught as RLGN or GEOL 419.) This course meets the upper division writing component for senior year English. (Spring)

**BIOL 420  Animal Behavior  3 hours**
Prerequisite: BIOL 112

A comparative study of behavioral patterns seen in animals and the forces behind them. This course draws from biological fields such as physiology, ecology and genetics, and interfaces with disciplines such as psychology and sociology. (Offered periodically)

**BIOL 440  Mammalogy  4 hours**
Prerequisite: BIOL 111, 112

A systematic study of mammals with emphasis on natural history and ecology. 3 Lec 3 Lab. (Fall, odd years)

**BIOL 443  Comparative Vertebrate Anatomy  4 hours**
Prerequisite: BIOL 111, 112

An introduction to the classification and diversity of chordates and a comparison of the different vertebrate organ systems. Special consideration will be given to taxonomic comparisons of the skeletal and muscular systems. 3 Lec 3 Lab. (Spring, odd years)

**BIOL 450  Histology  4 hours**
Prerequisite: BIOL 111, 112

An investigation of the structure and function of the tissues of the human body. The course is lab intensive and is intended to acquaint the student with the microscopic characteristics of tissues. 3 Lec 3 Lab. (Spring, even years)

**BIOL 480  Research in Biology  1-3 hours**
Prerequisite: BIOL 380 and approval of instructor

A supervised research experience involving the development of a research proposal, data collection, and a written paper. Research proposal may be developed in BIOL 380. May be repeated for a total of 5 credits. (Offered periodically)

**BIOL 481  Senior Thesis  1 hour**
Prerequisite: BIOL 480

This course is designed to permit the student to develop a publishable-quality research paper. Instruction consists of writing techniques and guidance in the completion of the project. Students will give several oral progress-reports, a final presentation at the Biology Research Symposium, and a completed Senior Thesis. This course meets the upper division writing component for senior year English. (Spring)

**BIOL 491  Selected Topics  1-3 hours**
Prerequisite: BIOL 111, 112; two upper division courses; and permission of the instructor

Special study may be pursued beyond completed course work under the direction of a staff member. This study may involve data collection or library work and will involve a written report. Content and method of study must be arranged prior to registration. May be repeated for a total of 3 credits.