THE COLLEGE OF SCIENCES & MATHEMATICS

ANTHONY J. DUBEN
Dean

Miller Building, 100
Phone: (936) 468-2805
Fax: (936) 468-1226

P.O. Box 13034
Nacogdoches, TX 75962-3034
E-mail: dubenaj@sfasu.edu
Web: www.fp.sfasu.edu/science

Overview

A primary aim of the College of Sciences and Mathematics is to contribute to the liberal education of all students through the presentation of fundamental concepts and methods of science and mathematics. Another objective is to provide the counseling and fundamental education required for professional programs in health and engineering sciences and for professional studies and careers of a scientific or mathematical nature.

Mission

The primary mission of the College of Sciences and Mathematics is teaching of the highest quality at both the undergraduate and graduate levels. The college, through its departments and divisions, attempts to provide students with the following:

- the knowledge and skills necessary for lifelong learning,
- an understanding of the world in which we live, and
- the ability to comprehend scientific and mathematical advancements and their benefit to future generations.

To assist in the accomplishment of this mission, the College of Sciences and Mathematics fosters research and scholarship of the highest quality among the faculty.

To provide outreach as an educational institution, the College of Sciences and Mathematics assists its faculty in utilizing their expertise to the benefit of the university community and regional, state, national and international communities.

The mission of the Office of the Dean of the College of Sciences and Mathematics is to support the primary mission of the college by providing and maintaining an environment that will permit effective teaching, research/scholarly activities, and outreach.

Advising & Student Services

All students in the College of Sciences and Mathematics, in consultation with the dean and the chair of a department, select a faculty adviser. The program for each semester, including the major and minor programs, along with all other requirements for the baccalaureate degree are worked out by the student in consultation with the adviser. Participation in this counseling program is a requirement for all students registered in this college and provides each with the opportunity to secure qualified advice regarding academic problems and programs.

Scholarships & Fellowships

Goethe-Miller College of Sciences and Mathematics Award

The award is presented to an outstanding senior major in the College of Sciences and Mathematics. C.M. Goethe of Sacramento, Calif., E. L. Miller, former dean of the SFA College of Sciences and Mathematics and others contributed to the fund. The recipient is selected by the dean of the college and the provost/vice president for academic affairs, upon the recommendations of the college's department chairs/directors. Each department chair/director presents to the dean of the college on March 1 the name of the outstanding senior who is a major in the department, giving primary consideration to scholarship, personal qualifications and dedication to professional goals. Only those planning to pursue graduate programs in the sciences and mathematics are considered. To be eligible for consideration a student must have completed at least 100 semester hours on the SFA campus. Grades completed elsewhere are not considered, and, in the case of repeated courses on the SFA campus, all grades for such courses are included in the computation.

Undergraduate Taking Graduate Work for Credit

See the Graduate Bulletin, *Admission* section, *Overlap Program Admission*, and *Overlap Program* in the *Academic Programs & Policies* section of this bulletin.

Choice of Major Program in Sciences and Mathematics

By the time students have earned 45 semester hours of course work, they should have selected major and minor programs and prepared an outline of degree requirements with the assistance of the dean of the College of Sciences and Mathematics and their departmental adviser. In order to be accepted as a major student in this college, a student must have attained a minimum C average for all work taken in the intended major department. All undergraduate major programs in the College of Sciences and Mathematics lead to the Bachelor of Science degree.

Certification for High School Science and Mathematics Teaching

The minimum requirements for science and mathematics teaching fields for candidates for high school certificates are outlined in the *Teacher Certification* section of this bulletin.

Procedures for Reinstatement of Students on Suspension

Students in the College of Sciences and Mathematics whose academic record is such that they are placed on suspension should contact the dean's office as soon as possible after having received grades with a notice of suspension. The College of Sciences and Mathematics will adhere to the university policy for *Reinstatement* as explained under the heading *Academic Programs & Policies* of this bulletin.

Bachelor of Science Degree

Biology, Biochemistry, Chemistry, Geology, Mathematics, Physics

Core Curriculum Requirements

A. Communication
   (1) English rhetoric/composition (six hours)
   ENG 131, 132, 133, 235
   (2) Communication Skills (six to eight hours)
   BCM 247; COM 111, 170; ENG 273; FRE 131, 132; ILA 111, 112; SPA 131, 132; SPH 172, 272; LAT 131, 132

B. Mathematics (three hours)
   MTH 133, 138, 139, 140, 220, 233, 234

C. Natural Sciences (six to eight hours)
   BIO 131, 133, 225, 238; CHE 133, 134; GOL 131, 132; PHY 110, 131, 132, 241, 242; AST 105

D. Humanities and Visual and Performing Arts
   (1) Visual and Performing Arts (three hours)
   ART 280, 281, 282; MUS 140; MHL 245; THR 161, 370; DAN 140, 341
   (2) Other (Literature) (three hours)
   ENG 200 - 235, 300

E. Social and Behavioral Sciences
   (1) U.S. History (w/Texas option) (six hours)
   HIS 133, 134
   (2) Political Science (six hours)
   PSC 141, 142
   (3) Social/Behavioral Science (three hours)
   ANT 231; ECO 231, 232; GEO 131, 230; PSY 133, 153; SOC 137, 139; EPS 380

College Requirements

A. Three semester hours from MTH 133, 138, 139, 140, 220, 233, 234, but different from the course selected in 1-B above.
B. Six to eight semester hours from BIO 131, 133, 225, 238; CHE 133*, 134*; GOL 131, 132; PHY 110*, 131*, 132*, 241*, 242*; AST 105*. The natural science courses used to satisfy 1-C above and this requirement must have at least two different sciences represented.
C. Three semester hours from CSC 101, 102, 121, 201.

* An asterisk following a course number indicates that the appropriate laboratory course must be taken in conjunction with the lecture course.

Additional Requirements

- An academic major in the range of 30 to 45 specified semester hours is required for all departments. At least 12 of the 15 advanced semester hours must be in residence at SFA.
- An academic minor of at least 18 semester hours and not more than 24 semes-

ter hours, with at least six in advanced SFA work.

- A minimum of 42 semester hours of work in residence at SFA, at least 36 hours of which must be advanced (courses numbered 300-499 inclusive).
- Enough additional hours to make a total of at least 120 semester hours.
- A grade of at least C in each freshman English course; a C average at SFA, and a C average in all specified work completed in the major and minor fields, considered separately, at SFA. These required averages are based on those courses in each category that are included in the student's official degree plan.

Bachelor of Science in Nursing Degree [B.S.N.]

Core Curriculum Requirements

A. Communication
   (1) English rhetoric/composition (six hours)
   ENG 131, 132, 133, 235
   (2) Communication Skills (six to eight hours)
   BCM 247; COM 111, 170; ENG 273; FRE 131, 132; ILA 111, 112; SPA 131, 132; SPH 172, 272; LAT 131, 132

B. Mathematics (three hours)
MTH 220

C. Natural Sciences (four hours)
CHE 111

D. Humanities and Visual and Performing Arts
   (1) Visual and Performing Arts (three hours)
   ART 280, 281, 282; MUS 140; MHL 245; THR 161, 370; DAN 140 or 341
   (2) Other (Literature) (three hours)
   ENG 200 - 235, 300

E. Social and Behavioral Sciences
   (1) U.S. History (w/Texas option) (six hours)
   HIS 133, 134
   (2) Political Science (six hours)
   PSC 141, 142
   (3) Social/Behavioral Science (three hours)
   ANT 231 or SOC 139

F. College Designated Option (three hours)
CSC 101, 102, 121, 201

TOTAL 47–49

Additional Requirements

- Academic courses required by the School of Nursing. These must include BIO 238 and 239, PSY 133,seven hours from Microbiology and Nutrition, and 10 or 11 hours from PSY 210 or HMS 236, NUR 312, and HMS 239 or 339.
- A nursing major of at least 51 to 55 hours.
- Enough additional hours to make a total of at least 120 semester hours of acceptable credit.

- A minimum of 42 hours of residence (on SFA campus) work, at least 36 semester hours of which must be advanced (300-400 level).
- A grade of at least C in each freshman English course; a C average in course work completed at SFA; minimum of C in each course in the major field, specified cognates and a comprehensive final exam. These required averages are based upon those courses in each category that are included in the student's official degree plan.

DEPARTMENT OF BIOLOGY

Dennis A. Gravatt, Chair
Science 101
(936) 468-3601
Fax: (936) 468-2056
www.sfasu.edu/biology

Faculty

Professors

D. Brent Burt, William W. Gibson, James Van Kley, Robert Wiggers

Associate Professors

Dennis A. Gravatt, Robert S. Stewart, Josephine Taylor, Stephen C. Wagner

Assistant Professors

Michael L. Collyer, Matthew Kwiatkowski, J. Kevin Langford, Neal F. McCord, Donald B. Pratt

Lecturer

Nancy Mathis

Program Coordinator

Dennis A. Gravatt

Lab Coordinators

Cortney R. Charba, Ronald Havner, Gene Sullivan

Areas of Study & Degrees

B.S. Biology

Emphasis Areas:

- Anatomy-Physiology
- Botany
- Field Biology (Animal, Aquatic, & Plant Ecology)
- General Biology
- Genetics
- Invertebrate Zoology
- Microbiology
- Teacher Certification

Objectives

The Department of Biology has a three-fold purpose: (1) to give students familiarity with the methods of science and the facts of biology needed by an educated person in the modern world; (2) to provide opportunity for a broad foundation in biology for future professional work or study; and (3) to give basic training in several specialized fields to students who need training in biology in connection with major work in other departments.

Student Organizations

Biology Club

Botany Interest Group

Tri-Beta

Pre-Dental Club

Pre-Professional Club

Definition of the Major

Students wishing to choose a major in biology should consult the chair of the department early in their university career. Since the department includes a number of biological fields in zoology and botany, no single curriculum can be listed for all majors. All students majoring in biology are required to take 31-34 hours from a "core" curriculum that includes BIO 130, 131, 133, 341, 370, 470 as well as four courses (one each) from the following disciplines: Botany, Field Biology, Physiology and Zoology. See below for a detailed explanation under the heading "Biology Major Requirements." Each student is strongly encouraged to work closely with a departmental adviser to design the program best suited to the interests and goals of the student.

Biology courses may be selected so as to emphasize one of several fields: anatomy and physiology, aquatic biology, botany, general biology, genetics, invertebrate zoology, microbiology, wildlife science or zoology. An emphasis must be selected by all biology majors. The list of "Recommended Courses" within each emphasis is not "etched in stone." Other courses may be substituted with the approval of one's adviser. Concentrations in various pre-professional programs also are available. These emphases are described in more detail in the bulletin under the heading of "Pre-Professional Programs."

A minimum of 40 semester hours of biology, including the core curriculum, (with 15 hours in advanced courses) is required for a B.S. degree with a major in biology. A biology major also must satisfy all the requirements for the B.S. degree for the College of Sciences and Mathematics outlined earlier in the bulletin.

Students who major in biology must complete the following requirements: ENG 273; six semester hours from MTH 133, 138, 139, 220, 233, 234; eight semester hours from CHE 133, 134; six to eight semester hours from CHE 231, 331, 332, GOL 131, 132, PHY 131, 132. Biology majors contemplating graduate work are advised to complete MTH 233, CHE 331 and 332 and PHY 131 and 132.

Each student also is required to complete a minor of 18 to 24 semester hours in a single discipline. At least six hours in the minor must be in advanced level courses at SFA. Biology majors may choose a -sciences minor consisting of CHE 133, 134; eight hours from GOL 131, 132 or PHY 131, 132; plus six advanced hours from CHE, GOL, or PHY. Biology majors contemplating graduate work are advised to elect a minor in a selected science or in mathematics.

Definition of the Minor

A biology minor may be earned by taking 18-24 hours of biology, with a maximum of eight hours of Principles of Biology (100 level) and a minimum of six hours in advanced residence courses. The following courses may not be used to complete a minor: BIO 121, BIO 123, BIO 210 and BIO 301. A maximum of three hours of BIO "300" may be applied toward the minor.

Certification for High School Life Sciences Teaching

Requirements for certification are listed in the *Educator Certification* section of this bulletin. A summary of the biology course requirements for certification is listed below under the emphasis "Educator Certification."

Biology Major Requirements: B.S. Degree

Core Requirements (31-34 hours)*:

130(three), 131(four), 133(four), 341(four), 370(three), 470(one)

Botany, three to four hours from 225, 251, 401, 404, 424, 435

Field Biology, three to four hours from: 312, 313, 433, 435, 436, 437, 438, 450

Physiology, three to four hours from: 327, 404, 406

Zoology, three to four hours from: 241, 327, 343, 406, 430, 433, 436, 437, 438, 439, 445, 449, 450

*A particular biology course can be used to fill only one of the core requirements. However core courses also may be applied to an emphasis. Consult your adviser for assistance in selecting courses pertinent to your emphasis.

Emphases*

Students are encouraged to select one of the emphases listed below. Consult your adviser for assistance in selecting courses pertinent to your emphasis. Remember, a minimum of 40 semester hours (of biology courses) is required to major in biology.

Areas of Emphasis and Recommended Courses

Anatomy-Physiology

241,327or406,309,402,410, 431,445, 449

Aquatic Biology

303, 343 ,430,438,450

Botany

251,401,404,424,435

General Biology

241,251,309, plus one advanced course each from botany and zoology

Genetics

309, 402,410,431,445

Invertebrate Zoology

309, 343 or 353, 430, 439, 450

Microbiology

309, 312, 402, 408, 410, 415, 420, 424, 431

Wildlife Science

241, 313, 435, and two from: 433, 436, 437, 438

Zoology

241, 343 or 353, 430, 433, 436, 437, 438, 439, 449

Pre-Professional

see list in pre-professional programs

Teacher Certification

(A 36 hour program):

Note: Refer to the Educator Certification portion of this bulletin in the College of Education section for specific professional teacher education coursework requirements.

**Most emphases include recommended courses that also are listed in the "Core Requirements" and may be applied in both places.*

Freshman Year

BIO 130 or 131, 131L or 133, 133L	4	BIO 130 or 131, 131L or 133,133L	4
Freshman English	3	Freshman English	3
CHE 133, 133L	4	CHE 134, 134L	4
MTH 138	3	MTH 133	3
Elective	3	Elective	3
	17*		17*

**Upon approval of the adviser, certain courses required for the B.S. degree outlined for the College of Sciences and Mathematics earlier in this bulletin may be substituted for one or more of the courses shown above.*

The Graduate Major and Minor

The biology department offers a graduate program for students who plan to work toward the master's degree. For detailed information concerning the graduate major and minor programs in the biology department, refer to the Graduate Bulletin.

General Course Prerequisites:

A minimum grade of C is required in all courses that are prerequisites to a biology course. Students must have completed all required developmental courses with Cs or better in order to enroll in BIO 130, 131, 133, 238, 239.

Courses in Biology (BIO)

121. **Concepts of Biology** - Four semester hours, three hours lecture per week, two hours laboratory per week. Concepts-oriented course for the non-science major. Study of the origin of life, the cell, growth and reproduction, genetics and evolution. May not be used to meet graduation requirements by students majoring in the College of Sciences and Mathematics or for certification of high school teachers in biology. Required lab fee.

123. **Human Biology** - Four semester hours, three hours lecture per week, two hours laboratory per week. Biological principles for non-science majors. Study of the evolution of man, organ systems and the human organism. May not be used to meet graduation requirements of students majoring in the College of Sciences and Mathematics or for certification of high school teachers in biology. Required lab fee.

130. **Principles of Cell and Molecular Biology** - Three semester hours, three hours lecture per week. An introductory cell biology course. Topics include the structure of the cell and cell components, both eukaryotic and prokaryotic. The processes of DNA replication

and gene expression including protein processing and routing. Photosynthesis, respiration, and chemotrophy as means of energy production. The cell cycle and its regulation.

131. **Principles of Botany (BIOL 1411)** - Four semester hours, three hours lecture per week, two hours lab per week. Introduction to the fundamental principles of botany and the plant sciences. Topics include the study of plant form, function, reproduction, and an overview of plant diversity including bryophytes, ferns, and seed plants. Required lab fee.

133. **Principles of Zoology (BIOL 1413)** - Four semester hours, three hours lecture per week, two hours lab per week. Fundamental principles of animal life, including invertebrate and vertebrate animals. Required lab fee.

220. **Medical Terminology** - Three semester hours, three hours lecture per week. Covers the highly specialized and specific medical terms used in the health care professions, providing explanations of terms, clinical procedures, and abbreviations. Prerequisites: BIO 130, 133, or 238.

225. **Local Flora** - Three semester hours, two hours lecture, three hours lab per week. Field and laboratory studies of common local ferns, conifers and wildflowers. Recommended for biology and non-biology majors. Required field trips. Required travel fee. Required lab fee.

238. **Human Anatomy and Physiology I (BIOL 2401)** - Four semester hours, three hours lecture, three hours lab per week. Structure and function of the skeletal, muscular, and nervous systems, including sense organs. Not open to students who have received credit for BIO 327. Not open for credit for biology majors or minors. Required lab fee.

239. **Human Anatomy and Physiology II (BIOL 2402)** - Four semester hours, three hours lecture, three hours lab per week. Structure and function of the circulatory, respiratory, digestive, excretory, endocrine and reproductive systems. Not open to students who have received credit for BIO 327. Not recommended for biology majors or minors. Prerequisite: Successful completion of BIO 238. Required lab fee.

241. **Comparative Vertebrate Zoology (BIOL 2428)** - Four semester hours, three hours lecture, six hours lab per week. Anatomical study of the vertebrates, with major emphasis on comparisons of organ systems. Vertebrate relationships, origins and adaptations. Representative forms in the laboratory. Prerequisite: BIO 133 or equivalent. Required lab fee.

250. **Economic Botany** - Three semester hours, three lecture hours per week. Fundamental concepts and processes involving plants; examination of the diversity of plants and their role in the biosphere. The relationship and importance of plants to humans. Recommended for biology and non-biology majors.

251. **Plant Kingdom** - Three semester hours, two hours lecture, three hours lab per week. Comparative study of organisms traditionally classified in the plant kingdom including: algae, bryophytes, ferns, and allies and seed plants. The course will highlight evolutionary trends in reproductive morphology and adaptations to a dessicating environment. Required lab fee. Prerequisite: BIO 131.

275. **Special Problems** - Individual study and/or laboratory research conducted under the supervision of a biology faculty member. Variable credit one to three hours. May be repeated for a maximum of three credit hours toward a degree plan.

300. **Contemporary Biology** - Three semester hours, three hours lecture per week. Survey of biological principles and their application to the contemporary newsworthy problems as they apply to the biological future of man. Variable topics, such as recent advances of medicine, the population explosion, world food problems, environmental pollution, genetic engineering, epidemics and natural disasters. Maximum of six hours for biology major.

301. **Planetary and Space Life Sciences** - Four semester hours, three hours lecture, two hours laboratory per week. Designed for Interdisciplinary Studies EC-4 or grades 4-8 degree programs for teacher certification, this concept-based course concentrates on Earth as a life-support system for its inhabitants and is taught from the perspective that the students are part of the living, changing Earth. This course may not be used to meet graduation requirements by students majoring/minoring in the College of Sciences and Mathematics.

302 **Cancer Biology**- Three semester hours, three hours lecture. Survey of topics relevant to the biology of cancer, including cancer epidemiology, viral development, the role of DNA damage in cancer, events leading to metastasis, and methods of treating cancer, including the development of targeted therapies. Prerequisites: BIO 130, 131, or 133 or permission of the instructor.

303. **Pollution of the Aquatic Environment** - Three semester hours, three hours lecture per week. An introduction to the impact of human activities on aquatic ecosystems, including cultural eutrophication, thermal pollution, impact of the nuisance invasive species, radioactive contamination, acid rain, and toxic wastes. Prerequisites: BIO 131 and 133.

304 **Marine Biology**- Three semester hours, three hours lecture per week. This course introduces all main aspects of Marine Environment including property of seawater, ocean currents, classification of marine environments, structure and functioning of aquatic communities, as well as, impact of the habitiat destruction and nusiance invasive species on the biodiversity and productivity of marine ecosystems. Prerequisites: BIO 131 and 133.

308. **Pre-nursing Microbiology** - Four semester hours, three hours lecture, four hours laboratory per week. Nursing majors will study the nature of micro-organisms and their ability to interact with humans. Students also will learn current techniques used to identify, culture, and control microorganisms. Does not meet degree requirements for biology major. Prerequisites: one semester of biology and one semester of chemistry. Required lab fee. Prerequisites: BIO 238 and CHE 111 or 133.

309. **Microbiology** - Four semester hours, three hours lecture, four hours lab per week. Morphology, physiology, genetics and classification of micro-organisms, with relationship to man. Prerequisite: One semester of biology and one of chemistry. Required lab fee. Required travel fee. Prerequisites: BIO 130, 131, 133 and CHE 133.

312. **Mycology** - Three semester hours, two hours lecture, three hours lab per week. Structure, classification and identification of fungi including those of economic importance. Prerequisite: Two semesters of biology. Required lab fee. Prerequisites: BIO 131 and 133.

313. **General Ecology** - Three semester hours, two hours lecture, three

hours lab per week. Principles of ecology, with special reference to populations and their ecosystems, distribution, biotic communities and environmental relationships. Required field trips. Prerequisite: Two semesters of biology. Required travel fee. Required lab fee. Prerequisites: BIO 131 and 133

327. **Human Physiology** - Three semester hours, three hours lecture per week. Functions of the major systems of the body. Not open to students who have received credit for BIO 238. Prerequisites: BIO 130 and 133.

341. **Genetics** - Four semester hours, three hours lecture, three hours lab per week. An introduction to modern genetics principles including inheritance patterns, chromosomes structure and function, gene expression and regulation, DNA replication and repair, and the behavior of genes in populations. Required lab fee. Prerequisites: BIO 130, 131, 133, CHE 133, 134.

343. **General Entomology** - Three semester hours, two hours lecture, three hours lab per week. Basic principles of insect life. Anatomy, physiology, life cycles, classification, ecology and control methods. Required lab fee. Prerequisite: BIO 131 and 133, or permission of instructor.

345. **Vertebrate Embryology** - Four semester hours, two hours lecture, six hours lab per week. Animal development. Laboratory studies of the frog, chick, and pig embryos, with reference to human development. Prerequisite: BIO 241. Required lab fee.

353. **Economic Entomology** - Four semester hours, three hours lecture, three hours lab per week. Study of destructive and beneficial insects. Emphasis on recognition and control. Required lab fee. Prerequisites: BIO 131, 133 or permission of the instructor.

370. **Evolution** - Three semester hours, three hours lecture per week. Basic principles, mechanism and patterns of evolution, including a historical survey of related ideas. Prerequisite: BIO 341 or permission of the instructor.

401. **Plant Anatomy** - Three semester hours, two hours lecture, three hours lab per week. Study of plant cells, tissues, tissue systems, and development of seed plant stems, roots, and leaves. Required lab fee. Prerequisite: BIO 130 and 131, or permission of the instructor.

402. **Cellular Biology** - Three semester hours, three hours lecture per week. Structure and function of eukaryotic cells. Topics include architecture of the cell and function of cellular components, the cytoskeleton, interactions between the cell and the extra-cellular matrix, regulation of cell growth, differentiation, and division, and mechanisms of cellular transport. Prerequisites: BIO 341

404. **Plant Physiology** - Four semester hours, three hours lecture, three hours lab per week. Survey of the principal physiological processes of higher plants including water relations, respiration, photosynthesis, and mineral nutrition. Required lab fee. Prerequisites: BIO 130, 131 and CHE 133, 134.

406. **Comparative Animal Physiology** - Four semester hours, three hours lecture, three hours lab per week. A comparative study of physiological principles common to all animals, with an emphasis of vertebrates. Physical and chemical processes, detailed consideration of organ systems, and an integrative, evolutionary approach to understanding how animals meet the demands placed upon them. Required lab fee.

407. **Behavioral Ecology** - Three semester hours, three hours lecture per week. The study of how animal behaviors influence survival and reproduction of individuals in different ecological settings. The course will examine the ecological context in which behaviors evolve. The course will consist of lectures and class discussions of assigned readings of important behavioral studies.

408. **Pathogenic Bacteriology** - Four semester hours, three hours lecture, three hours lab per week. Basic survey of medically important bacteria. Includes mechanisms of pathogenesis, collection and transport of specimens, initial specimen processing, and identification of isolates by classical, automated and molecular techniques. Prerequisite: BIO 309. Required lab fee.

410. **Fundamentals of Immunology** - Four semester hours, three hours lecture, three hours lab per week. Basic survey of the immune system with focus on the human and mouse models. Covers the origin and differentiation of the hematopoietic system, antibody structure and function, basic serologic techniques such as ELISA, fluorescence microscopy, agglutination, precipitation and gel diffusion. Prerequisites: BIO 309 and BIO 341. Required lab fee.

411. **Phylogenetics** - Three semester hours, three hours lecture per week. Examination of the methods used to reconstruct and evaluate the strength of evolutionary trees (phylogenies). The methods used to test evolutionary hypotheses using these evolutionary trees also will be examined. Additionally, the course will examine the logic and assumptions associated with each methodological approach. Outside readings as well as participation in class discussions will be required. Prerequisite: BIO 130, 131, 133, 341, 370 or permission of instructor.

412. **Field Biology** - six semester hours, five-week summer session. Quantitative studies of ecological communities. Analysis of biodiversity and ecological relationships through participation in field research projects. Possible topics include population, community ecosystem, evolutionary and/or behavioral ecology. A maximum of six credits of 412 or 414 may be applied to the biology major. An additional six credits may be used toward advanced electives. Transportation expenses will be required. Lab fee required. Prerequisites: 18 hours of biology, Biology major or minor and permission of the instructor.

414. **Field Course in Applied Ecological Methods** - Six semester hours, five week summer session. Research projects will involve methods and instrumentation for documenting ecological patterns. Students will learn to collect and analyze data using the newest and/or most widely accepted tools available. A maximum of 6 credits of 412 or 414 may be applied to the Biology major. An additional six credits may be used towards advanced electives. Transportation expenses will be required. Lab fee required. Prerequisite: 18 hours of biology, Biology major or minor and permission of the instructor.

415. **Principles of Electron Microscopy** - Four semester hours, two hours lecture, six hours lab per week. Introduction to the biological applications of transmission and scanning electron microscopy. Required lab fee. Prerequisite: Senior standing with a major or minor in the sciences and permission of the instructor.

420. **Virology** - Four semester hours, three hours lecture, three hours lab per week. Basic study of viruses with laboratory. Covers viral structure, genome organization, replication strategies, and medical implications of infection. Laboratory includes bacteriophages, animal and plant viral propagation, basic tissue culture, PCR for viral detection and fluorescence and electron microscopy for viral identification. Prerequisites: BIO 309 and BIO 341. Required lab fee.

424. **Plant Pathology** - Three semester hours, two hours lecture, three hours lab per week. Principles of plant pathology. Survey of fungal, bacterial and viral diseases of plants. Required lab fee. Prerequisite: BIO 131 and junior or senior standing (60 or more credit hours completed)

430. **Invertebrate Natural History** - Three semester hours, two hours lecture, three hours lab per week. Animals without backbones. Laboratory emphasis on recognition. Brief treatment of insects and parasites. Prerequisite: BIO 131 and 133. Required lab fee.

431. **Molecular Biology** - Three semester hours, three hours lecture per week. Structure, function and organization of DNA, DNA replication, the transcription, and translation of RNA. Mechanisms of gene expression and regulation. Prerequisite: BIO 341.

433. **Ornithology** - Four semester hours, three hours lecture, three hours lab per week. Classification, distribution, ecology and evolution of birds. Emphasis on identification of local species in lab. Field trips required. Travel fee required. Lab fee required. Requires concurrent enrollment in lab. Prerequisite: BIO 133 or permission from the instructor.

435. **Plant Systematics** - Three semester hours, two hours lecture, three hours lab per week. Diversity of plants, their identification, naming, classification and evolution. Required field trips. Required travel fee. Required lab fee. Prerequisite: BIO 131 and BIO 130 or 133.

436. **Mammalogy** - Four semester hours, three hours lecture, three hours lab per week. Classification, evolution, natural history and distribution of mammals. Emphasis on natural history and identification of regional species in lab. Field trips required. Requires outside readings and/or research projects. Prerequisites: Three semesters of biology. Travel fee required. Lab fee required. Requires concurrent enrollment in lab. Prerequisite: BIO 133 or permission of the instructor.

437. **Herpetology** - Four semester hours, three hours lecture, three hours lab per week. Classification, distribution, ecology and evolution of amphibians and reptiles. Emphasis on natural history and identification of regional species in lab. Field trips required. Requires outside readings, papers and/or research projects. Prerequisites: Three semesters of biology. Travel fee required. Lab fee required. Requires concurrent enrollment in lab. Prerequisite: BIO 133 or permission of instructor.

438. **Ichthyology** - Three semester hours, two hours lecture, three hours lab per week. Classification, evolution, natural history, and distribution of freshwater fishes. Required field trips. Prerequisite: Four semesters of biology. Required travel fee. Required lab fee.

439. **Parasitology** - Four semester hours, three hours lecture, three hours lab per week. Basic survey of parasites primarily from the human pathogen perspective. Includes identification and pathogenesis

of protozoan, nematode and cestode parasites. Coverage of taxonomic identification of preserved and fresh clinical samples in lab. Prerequisite: BIO 309. Required lab fee.

442. **Molecular Genetics of Human Disease** - Three semester hours, three hours lecture per week. A detailed survey of genetic disease mechanisms involving case studies of specific genetic disorders. An examination of specific genes and the effects of mutations upon protein structure and chemistry, and upon the physiology of those effected. Prerequisite: BIO 341.

445. **Developmental Biology** - Three semester hours, three hours lecture per week. Fundamental mechanisms of embryonic development. Molecular, cellular and tissue interactions that direct development of vertebrate and invertebrate embryos. Prerequisite BIO 241.

449. **Histology** - Four semester hours, two hours lecture, six hours lab per week. Microscopic structure of vertebrate tissues and cells, with consideration of their origin and their function in the adult body. Prerequisite: Bio 241. Offered in fall only. Required lab fee.

450. **Limnology** - Four semester hours, three hours lecture, three hours lab per week. Study of the biological, chemical, and physical characteristics of the freshwater environment. Required field trips. Prerequisite: BIO 131 and 133. Required travel fee. Required lab fee.

470. **Seminar in Biology** - One semester hour, one hour lecture per week. For undergraduate credit only. Student participation in general and specific topics in biology; separate section for life sciences teacher certification. May be repeated once on a different topic for credit. Prerequisites: 20 hours in biology.

471. **Special Topics in Biology** - Three semester hours, three hours lecture per week. For undergraduate credit only. Special studies in the biological sciences. May be repeated in a different topic. Prerequisite: Four semesters of biology.

472. **Special Topics in Biology** - Three semester hours, two hours lecture, three hous lab per week. Special studies in the biological sciences. May be repeated in a different topic. Prerequisite: Four semesters of biology. Laboratory must be taken concurrently with the lecture.

475. **Special Problems** - Three semester hours. For undergraduate credit only. Independent investigations by students guided through individual conferences with the professor willing to work with them. May be repeated for additional credit. Prerequisites: 18 hours of biology with minimum B average and approval of the department chair.

DEPARTMENT OF CHEMISTRY

Michael A. Janusa, Chair
Chemistry 104B
(936) 468-3606
Fax: (936) 468-7634
janusama@sfasu.edu
www.sfasu.edu/chemistry

Faculty

Professors

Wayne C. Boring, Anthony J. Duben, Michele R. Harris, Michael A. Janusa, Richard H. Langley, John T. Moore

Associate Professor

Alyx S. Frantzen,

Assistant Professors

Russell J. Franks, Kefa K. Onchoke

Areas of Study & Degrees

B.S. Biochemistry

Pre-Professional Programs:
Dentistry
Medicine
Optometry
Pharmacy
Veterinary Medicine

B.S. Chemistry

Degree Tracks:
Biochemical/Pre-medical
Biotechnology
Computer Science
Environmental Chemistry
Forensic
General Chemist
Mathematics
Physics
Professional Chemist
Statistics

Minor:
Chemistry

Objectives

The objectives of the Department of Chemistry are: (1) to prepare students for graduate and/or professional schools (i.e. medical); (2) to prepare students for positions in industry, government service and teaching; (3) to allow science students with non-chemistry majors to relate chemistry to their major science; and (4) to acquaint non-science students with the methods, concepts, and achievements of the science of chemistry. The chemistry curriculum has the full approval of the American Chemical Society for training professional chemists. The chemistry program is designed to be flexible which allows students to choose electives best suited for their future career goals. Students completing the Bachelor of Science for professional chemists (American Chemical Society certified degree) can pursue opportunities in various industrial labs across the country or can continue their education in graduate school. Students interested in professional schools, chemistry associated industries, secondary education or other options may pursue the Bachelor of Science non-certified degree. This degree is designed to prepare students interested in careers combining the knowledge of chemistry with other areas.

Student Organization

Chemistry Club

Definition of Major and Minor

A minimum of 120 semester hours of course work is required for a B.S. degree in biochemistry or 120 semester hours for a B.S. degree in chemistry. Of these hours, 33 core chemistry hours are required which include: CHE 133, 134, 231, 331, 332, 337, 443, 452/452L and 470. Each degree has additional hours of required courses; these hours are classified as Major or Minor under Suggested Curriculum Sequence section. General education courses, PHY 241 and 242, and mathematics courses through MTH 234 also are required. A maximum of four hours of CHE 475/476 may be counted toward the major.

A minor in chemistry consists of a minimum of 18 hours of chemistry course work. The hours for a minor must include: CHE 133, 134, 231, 331 and two advanced hours in chemistry. A maximum of 2 semester hours of CHE 475/476 can be counted for a minor.

CHE 111, 112, 125, 302, 320 and 330 cannot be counted as hours of chemistry for a major or minor in chemistry.

American Chemical Society Certified B.S. Degree

An American Chemical Society certified B.S. degree in chemistry consists of completing one of the chemistry tracks and completion of a satisfactory supervised research project (CHE 475 or 476). Biochemistry degree requires one or two additional courses beyond the curriculum for a certified degree.

Certification for Physical Science (Chemistry–Physics) Teaching (Grades 8–12)

Students who wish to qualify for teaching certificates should consult the *Teacher Certification* section of this bulletin.

Graduate Study in Chemistry

The Overlap Graduate Degree Program permits qualified undergraduates to pursue a limited amount of graduate study (usually 12 credit hours or less) concurrently with undergraduate study. The Department of Chemistry offers a thesis and non-thesis master's degree (thesis option highly recommended). Thesis master's degree requires a minimum 21 of the required 30 semester hours in chemistry (including CHE 589 and 590). The non-thesis master's degree requires a minimum 27 of the required 36 semester hours in chemistry. Both options require a minimum of one graduate course in each area of chemistry. For more information and eligibility requirements, consult the Graduate Bulletin or the *Overlap Program* in the *Academic Programs & Policies* section of this bulletin.

Curriculum for Biochemistry/ Chemistry Majors Bachelor of Science Degree

(Suggested Sequence)

The department offers a Bachelor of Science degree in biochemistry or chemistry. All students must complete a major and minor (or second major), take the appropriate core curriculum requirements and have the required semester hours for graduation.

The biochemistry degree combines the fundamentals of the B.S. degree in chemistry with advanced courses in biochemistry and the life sciences. The biochemistry degree is designed for students interested in biochemistry-related careers or life-health sciences (i.e. medical). Biochemistry majors are required to minor in biology (24 hours).

Chemistry majors may design an interdisciplinary educational experience by selecting one of the suggested areas of interest or design their own with the approval of an adviser: biochemistry/pre-medical, biotechnology, computer science, environmental chemistry, forensic, general chemist, mathematics, physics, professional chemist, statistics. Note that courses listed in suggested areas are recommended and may be substituted with adviser approval. The chemistry degree is designed to be flexible allowing you to design a degree program that is appropriate for your career goals. The chemistry degree has 23 hours of electives which gives you the opportunity to select courses best suited for your career.

Each interdisciplinary experience has minor/electives in any area of interest leading to a minor (or second major) of which 11 hours must be approved advanced hours (six advanced hours in minor is required.)

Degree Tracks:

Biochemical/Pre-medical	CHE 453, 454 Biology minor required courses (suggested electives: BIO 241, 309, 327, 341, 449)
Biotechnology	CHE 453, 454, Bioinformatics I Biology minor required courses (suggested electives: BIO 309, 341, 402, 410)
Computer Science	CHE 400-level electives (five) Computer science minor required courses
Environmental Chemistry	CHE 420, 400-level chemistry electives (one) Environmental science or geology minor required courses

Forensic	CHE 453, BIO 341 Criminal justice minor required courses
General chemist	Advanced electives (five) Minor required courses
Mathematics	CHE 400-level electives (five) Mathematics minor required courses
Physics	CHE 400-level electives (five) Physics minor required courses
Professional chemist	CHE 400-level electives (five) Minor required courses
Statistics	CHE 400-level electives (five) Applied statistics minor required courses

Freshman Year

CHE 133/133L	4	CHE 134/134L	4	
CSC 101 or 201	3	Core Elective*	3	
ENG 131 or 133	3	ENG 132	3	
HIS 133 or 134	3	HIS 133 or 134	3	
Minor***	3	Minor***	3	
TOTALS	16		16	32

Sophomore Year

Major***	4	CHE 231	4	
CHE 331/331L	4	CHE 332/332L	4	
ENG 273	3	Eng. Literature	3	
MTH 233**	4	MTH 234	4	
TOTALS	15		15	30

Junior Year

CHE 337/337L	4	Major***	4	
CHE 452/452L	4	Core elective*	6	
PHY 241/241L	4	PHY 242/242L	4	
Minor***	3	Minor***	3	
TOTALS	15		17	32

Senior Year

Advanced Minor***	3	Advanced Minor***	3	
PSC 141	3	PSC 142	3	
CHE 443/443L	4	CHE 470	1	
Major***	3	Major***	6	
TOTALS	13		13	26

***Biochemistry - Major: BIO electives (6), CHE 453, 454, 275 or 475, advanced CHE electives (4).

Minor: BIO minor (18).

Chemistry - Major:
CHE 241, 338, 441/442L, degree track advanced electives (5).

Minor: degree track minor (18).

**MTH 233 is the entry-level course for this major. All prerequisites for MTH 233 must be met.

*Core Requirements

Communication Skills – three semester hours from:
BCM 247; COM 111, 170; FRE 131,132; ILA 111, 112; SPA 131, 132; SPH 172, 272; LAT 131, 132

Visual and Performing Arts – three semester hours from:
ART 280, 281, 282; MUS 140; THR 161, 370; DAN 140,341

Social/Behavioral Science – three semester hours from:
ANT 231; ECO 231, 232; GEO 131, 230; PSY 133,153; SOC 137, 139

Corequisite Courses

Courses that are corequisites must be taken together during the same semester. Separate grades will be awarded for these courses. Withdrawal from one corequisite course requires the dropping of the other course. A student is not required to repeat a corequisite course for which the student has received a passing grade.

Course Credit

A minimum grade of C is required in all courses that are prerequisites to a chemistry course. Unless otherwise indicated, courses are three semester hours credit, three hours lecture per week.

Courses in Chemistry (CHE)

111. **Introductory Chemistry I (CHEM 1305)** - Introduction to the principles and concepts of chemical thought. Corequisite: CHE 111L. Prerequisite: Eligibility for MTH 138.

111L. **Introductory Laboratory I (CHEM 1105)** - One semester hour, two hours lab per week. Introductory laboratory experiments. Corequisite: CHE 111. Lab fee required.

112. **Introductory Chemistry II (CHEM 1307)** - Elementary organic and biochemical systems. Prerequisites: CHE 111 and 111L. Corequisite: CHE 112L.

112L. **Introductory Laboratory II (CHEM 1107)** - One semester hour, two hours lab per week. Introductory organic laboratory experiments. Prerequisites: CHE 111 and 111L. Corequisite: CHE 112. Lab fee required.

125. **Introductory Physical Science** - Four semester hours, three hours lecture, two hours lab per week. Presents introductory concepts in physics and chemistry. Seamless combination of content and interactive lectures with hands-on laboratory exercises to give both conceptual and kinetic understanding of physical science principles. Not open to

students who have received credit in PHY 125. May not be used to meet graduation requirements by students majoring/minoring in the College of Sciences and Mathematics. Corequisite: CHE 125L.

133. **General Chemistry I (CHEM 1311)** - Atomic and molecular structures, stoichiometry, gas laws and thermodynamics. Corequisite: CHE 133L. Prerequisite: MTH 138 or concurrent enrollment.

133L. **General Laboratory I (CHEM 1111)** - One semester hour, three hours laboratory per week. Spectroscopy, quantitative experiments. Corequisite: CHE 133. Lab fee required.

134. **General Chemistry II (CHEM 1312)** - Equilibrium, kinetics, redox, descriptive chemistry and radiochemistry. Prerequisites: CHE 133, 133L, and MTH 138. Corequisite: CHE 134L.

134L. **General Laboratory II (CHEM 1112)** - One semester hour, three hours laboratory per week. Kinetics, spectrophotometry, quantitative/qualitative experiments. Prerequisites: CHE 133 and 133L. Corequisite: CHE 134. Lab fee required.

231. **Quantitative Analysis** - Four semester hours, three hours lecture, three hours lab per week. Analytical applications of solution chemistry. Prerequisite: CHE 134 and 134L. Lab fee required.

241. **Inorganic Chemistry** - Fundamental concepts of the descriptive inorganic chemistry of the elements. Prerequisite: CHE 134 and 134L. Corequisite: CHE 241L.

241L. **Inorganic Chemistry Laboratory** - One semester hour, three hours lab per week. Study of syntheses and reactions of inorganic chemistry. Prerequisite: CHE 134 and 134L. Corequisite: CHE 241. Required lab fee.

271. **Special Topics in Chemistry** - Special studies in chemistry. May be repeated once on a different topic. Prerequisite: Permission of the instructor.

271L. **Special Topics Lab** - One semester hour, three hours laboratory per week. Special studies in chemistry laboratory techniques. May be repeated once on a different topic. Prerequisite: Permission of the instructor. Required lab fee.

275. **Supervised Problems** - One to four semester hours. Individual study and/or laboratory research. Prerequisite: Permission of instructor. Pass-Fail grading.

276. **Supervised Problems** - One to four semester hours. Continuation of CHE 275. Individual study and/or laboratory research. Prerequisite: Permission of instructor. Pass-fail grading.

302. **Fundamental Applications of Chemistry** - Four semester hours, three hours lecture, two hours lab per week. Presentation of the applications of chemistry and chemical principles to everyday life with an emphasis on hands-on investigations. May not be used to meet graduation requirements by students majoring/minoring in the College of Science and Mathematics. Prerequisites: CHE 111, CHE 125 or PHY 125 or consent of instructor. Required lab fee.

320. **Chemical Concepts** - Review of fundamentals of chemistry as related to teaching. Does not count toward a major or minor in chemistry. Prerequisite: CHE 231.

321. **Applied Chemical Concepts** - Fundamentals of laboratory safety and stockroom management/design. Prerequisite: CHE 320 or consent of instructor.

330. **Fundamentals of Organic Chemistry** - Comprehensive one semester course for students requiring only one semester of organic. Prerequisites: CHE 134 and 134L. Corequisite: CHE 330L.

330L. **Fundamentals of Organic Lab** - One semester hour, three hours of lab per week. Synthesis and characterization of organic compounds. Prerequisites: CHE 134 and 134L. Corequisite: CHE 330. Required lab fee.

331. **Organic Chemistry I** - Development of organic chemistry for chemistry majors, minors and pre-professionals. Prerequisites: CHE 134 and 134L. Corequisite: CHE 331L.

331L. **Organic Laboratory I** - One semester hour, four hours of lab per week. Synthesis and characterization of organic compounds. Prerequisites: CHE 134 and 134L. Corequisite: CHE 331. Required lab fee.

332. **Organic Chemistry II** - Continuation of CHE 331. Prerequisites: CHE 331 and 331L. Corequisite: CHE 332L.

332L. **Organic Laboratory II** - One semester hour, four hours lab per week. Continuation of 331L. Prerequisites: CHE 331 and 331L. Corequisite: CHE 332. Required lab fee.

337. **Physical Chemistry I** - Four semester hours, three hours lecture, three hours lab per week. Laws, principles and theories concerning the structure of matter as related to properties. Prerequisites: CHE 231 and MTH 234. Fall. Required lab fee.

338. **Physical Chemistry II** - Four semester hours, three hours lecture, three hours lab per week. Continuation of CHE 337. Prerequisite: CHE 337. Required lab fee.

420. **Environmental Chemistry** - Four semester hours, three hours lecture, three hours lab per week. Chemical processes involved in the environment. Prerequisite: CHE 231 and 330 or 331. Required lab fee.

441. **Advanced Inorganic Chemistry** - Reactions and structures of inorganic molecules and ions are studied. Prerequisite: CHE 337.

442L. **Advanced Inorganic Chemistry Laboratory** - One semester hour, three hours laboratory per week. The preparation and characterization of inorganic compounds. Prerequisite: CHE 441 or concurrent enrollment. Lab fee required.

443. **Instrumental Analysis** - Four semester hours, three hours lecture, three hours lab per week. Spectrochemical and electrochemical methods of analysis. Prerequisite: 231 and 337. Required lab fee.

452. **Comprehensive Biochemistry I** - Structure, function, and chemical aspects of proteins, nucleic acids, and carbohydrates; enzyme kinetics, mechanism/regulation of enzymes; introduction to metabolism; carbohydrate metabolism. Prerequisite: CHE 330 or 331.

452L. **Comprehensive Biochemistry I Laboratory** - One semester hour, three hours of lab per week. Purification and characterization of biomolecules. Prerequisite: CHE 330L or 331L and CHE 452 or concurrent enrollment. Required lab fee.

453. **Comprehensive Biochemistry II** - Continuation of Comprehensive Biochemistry I; study of the structure, function, chemistry, and metabolism of lipids, proteins and nucleic acids; control of metabolic pathways, interrelationships of metabolic pathways; bioenergetics; current issues relating metabolism to medicine and health. Prerequisite: CHE 452.

454. **Biochemical Techniques** - Three semester hours, one hour lecture, six hours lab per week. A capstone course for the biochemistry major which allows the student to obtain practice in biochemical techniques. Prerequisites: CHE 452L and CHE 453 (or concurrent enrollment). Lab fee required.

455. **Advanced Organic Chemistry** - Continuation of CHE 331-332, emphasizing spectroscopic methods and advanced topics. Prerequisite: CHE 332.

470. **Seminar** - One semester hour. Written and oral reports. Individual instruction. May be repeated for a total of four credit hours. Prerequisite: CHE 337.

471. **Advanced Special Topics** - One to four semester hours. Special studies in chemistry. May be repeated once on a different topic. Prerequisite: Permission of the instructor.

471L. **Advanced Special Topics Lab** - One semester hour, three hours laboratory per week. Special studies in chemistry laboratory techniques. May be repeated once on a different topic. Prerequisite: Permission of the instructor. Lab fee required.

475. **Advanced Supervised Problems** - One to four semester hours. May be repeated for a total of four hours credit. Undergraduate only. Individual study and/or laboratory research. Prerequisite: Consent of the instructor. Pass-fail grading.

476. **Advanced Supervised Problems** - One to four semester hours. May be repeated for a total of four hours credit. Undergraduates only. Individual study and/or laboratory research. Prerequisite: Consent of the instructor. Pass-fail grading.

480. **Industrial Internship –** Practical work in an industrial setting for a minimum of eight weeks under the joint guidance of a practicing chemist and SFA faculty member. May be repeated for credit if content differs. Prerequisite: Permission of the department chair and instructor. Pass-Fail grading.

481. **Laboratory Internship –** Three semester hours, one hour lecture, four hours lab per week. Teaching experience in undergraduate chemistry laboratory including maintenance, laboratory preparation, grading, and assistant of students in laboratory experience under the direct supervision of faculty mentor. May be repeated for credit if content differs. Prerequisite: Permission of the department chair and instructor. Pass-Fail grading.

DEPARTMENT OF GEOLOGY

R. LaRell Nielson, Chair
Science 301
(936) 468-3701
Fax: (936) 468-2437
rnielson@sfasu.edu
www.geology.sfasu.edu

Faculty

Professors
Volker W. Gobel, Ernest B. Ledger, R. LaRell Nielson
Associate Professor
Chris A. Barker
Assistant Professor
Wesley A. Brown
Instructor, Lab Coordinator
Patricia S. Sharp

Areas of Study & Degrees

B.S. Geology

Objectives

Studies and training in geology are designed (1) to give students an understanding of the methods of science and the fundamentals of Earth science as they relate to the physical environment and our dependence on Earth resources such as minerals, rocks, fuels and water; (2) to give prospective science students the fundamentals of geology as a foundation for other science studies; (3) to provide training in geology and related Earth sciences as an area of specialization for prospective elementary and secondary school teachers; and (4) to provide geology majors with a broad foundation in geology for future professional work or graduate study.

Student Organizations

American Association of Petroleum Geologists
Geology Student Association
Sigma Gamma Epsilon

Definition of Majors and Minors

Students wishing to choose a geology major should consult the chair of the department early in their university career. The geology program includes a required core curriculum for all majors plus additional courses from a choice of two options: the General Geology Option and the Environmental Geology Option. Therefore, no single curriculum can be listed for all majors.

Geology Major Requirements: B.S. Degree

Core Geology Courses:
GOL 131, 132, 241, 242, 338, 364, 408, 420, 443, and 471 (Field Methods) (total 34 semester hours).

The General Geology Option Requires:
The geology core plus two geology courses from these choices:
GOL 330, 332, 361, 449
Plus corequisites:
1. CHE 133, 134 and PHY 131, 132
2. MTH 220, 233

The Environmental Geology Option Requires:
The geology core plus two geology courses from these choices:
GOL 330, 332, 350, 449
Plus corequisites:
1. CHE 133, 134 and either PHY 131, 132, or BIO 131, 133
2. MTH 220
3. CHE 330 or MTH 233 (students are advised to take MTH 233 if planning to attend graduate school.)

A minimum grade of C is required in all geology courses numbered 200 or higher to receive the B.S. degree in geology.

Geology Minor

A minor in geology consists of six courses or a minimum of 18 semester hours of which at least six hours must be advanced. Students at SFA plan their minor program in consultation with a geology adviser. Suggested minors are: chemistry, biology, physics, mathematics, business, computer science and geography.

Second Major Programs

The courses in geology required by the major in environmental sciences with environmental geology option (College of Forestry) or the major in geography with geology minor make it possible for the interested student to complete a second major in geology during the normal four-year period for the bachelor's degree. Contact the chair of the Department of Geology for advising.

Curriculum for Geology Majors Bachelor of Science Degree
(Suggested Sequence)

Freshman Year

Fall		**Spring**		
GOL 131	4	GOL 132	4	
Freshman English	3	Freshman English	3	
CHE 133 & 133L	4	CHE 134 & 134L	4	
MTH 133, 138, 140 or 233	3-5	MTH 220 or 234	3-4	
	14-16		14-15	28-31

Sophomore Year

Fall		**Spring**		
GOL 241	4	GOL 242	3	
ENG 273	3	HIS 134	3	
PHY 131 & 131L or		PHY 132 & 132L or		
BIO 131 & 131L*	4	BIO 133 & 133L*	4	
HIS 133	3	Humanities	3	
GOL (Option choice)	3	English Lit	3	
	17		16	33

Junior Year

Fall		**Spring**		
GOL (Option choice)	3	GOL 338	3	
GOL 408	3	GOL (Option choice)	3	
Social Science	3	Humanities	3	
PSC 141	3	PSC 142	3	
GOL (Option choice)	3	CSC 101	3	
	15		15	30

Summer Field Geology

GOL 364 (Summer I)	6

Senior Year

Fall		**Spring**		
GOL 420	3	Major, Minor, Electives	13	
Major, Minor, Electives	6 or 9		13	26-29
CHE 330*	4			
	13 or 16			

*Environmental Option only

Course Credit

Unless otherwise indicated, courses are three semester hours credit, three hours lecture per week.

Courses in Geology (GOL)

131. **Introductory Geology (GOL 1403)** - Four semester hours, three hours lecture, two hours laboratory per week. Designed for the student with no geology background. Introduction to the study of minerals, rocks and the processes that modify and shape the surface features of the Earth. Focus on energy, mineral and water resources; volcanism; and other practical aspects of geology. Required lab fee.

132. **The Earth Through Time (GOL 1404)** - Four semester hours, three hours lecture, two hours laboratory per week. History and development of the continents and ocean basins, and the evolution of life on Earth. Includes earthquakes and the Earth's interior, mountain building, drifting continents and sea-floor spreading, the ice ages, space science, and oceanography. Required lab fee. Prerequisite: GOL 131.

241. **Mineralogy** - Four semester hours, three hours lecture, three hours laboratory per week. Properties of crystals and crystal systems; identification and classification of selected minerals in hand specimen; rock associations and mode of occurrence of minerals; industrial uses. Prerequisite: GOL 131. Required lab fee.

242. **Petrology** - Three lecture hours, three laboratory hours per week. Identification, origin, occurrence, and association of igneous, metamorphic, and sedimentary rocks. Prerequisites: GOL 131, 132 and 241. Required field trip. Required lab fee. Required field trip fee.

303. **Oceanography** - Study of the marine environment with emphasis on the structure, properties and processes of the ocean and their role in the total environment. Does not count toward meeting major credit for geology majors. Prerequisite: GOL 131.

330. **Geomorphology** - Genesis, characteristics and analysis of land forms based on a consideration of geological processes, stages of development and geological structures. Prerequisite: GOL 131 or GEO 130.

332. **North American Geology** - Study of the geologic evolution, history and framework of the North American continent. Prerequisite: GOL 132.

338. **Structural Geology** - Three hours lecture, three hours laboratory per week. Genesis, classification and description of structural features resulting from rock deformation. Prerequisites: GOL 242. Required field trips. Required lab fee. Required field trip fee.

350. **Environmental Geology** - Study of geological phenomena that are important in man's effective utilization of his physical environment, including soils, land use and geologic hazards. Prerequisite: GOL 131.

361. **Invertebrate Paleontology** - Four semester hours, three hour lecture, three hours laboratory per week. Morphology, classification, evolutionary history, ecology, and geologic significance of the major groups of invertebrate fossils. Prerequisite: GOL 132 or permission of the instructor. Required lab fee.

364. **Field Geology**- Six semester hours, summer camp, SSI. Capstone course of the Department of Geology. Required of all geology majors in order to graduate with the B.S. degree in geology. Methods and application of geologic field techniques. Emphasis on reconnaissance and detailed mapping. Prerequisite: GOL 338. Required field trip fee.

406. **Earth Science Activities** - Four semester hours. Practical applications of Earth science principles from geology, oceanography, astronomy and meteorology designed for students preparing to become elementary or secondary teachers.

408. **Stratigraphy and Sedimentation** - Three hours lecture, three hours laboratory per week. Study of basic stratigraphic relations and the identification, origin, distribution and correlation of sedimentary rocks. Prerequisite: GOL 242. Required lab fee.

410. **Engineering Geology** - Application of geology to engineering practice. Topics include soil mechanics, foundations, engineering classification of soils, slope stability, and drainage and storm water management. Prerequisites: GOL 131 and 350.

420. **Geochemistry** - Applications of chemical laws and methods to the solution of geological problems. Prerequisites: GOL 131; CHE 133 and 134.

435 **Introduction to Geophysics**- Two hours lecture and three hours lab per week. Introduction to the basic theories and methodologies of the major geophysical methods. This course reviews the benefits and limitations of the main geophysical technique. Prerequisite: Permission of instructor.

443. **Optical Mineralogy** - Two hours lecture and three hours laboratory per week. Optical behavior of crystals and identification of rock-forming minerals with the polarizing microscope. Prerequisite: GOL 241. Required lab fee.

449. **Ground Water** - Principles of occurrence and movement of water beneath the Earth's surface and the influence of various geologic situations upon its behavior, depletion, recharge and contamination of ground water supplies. Prerequisites: GOL 131, MTH 138.

471. **Special Topics in Geology** - One to four semester hours. Study of specific areas in geology.

475. **Special Problems** - One to four semester hours. Individual study in some field of geology, guided through individual conference with professor in charge. May be repeated once. Prerequisites: 18 hours of geology and approval of department chair. Permission of instructor must be obtained prior to enrollment.

DEPARTMENT OF MATHEMATICS & STATISTICS

Deborah A. Pace

Nursing & Math 302

(936) 468-3805

Fax: (936) 468-1669

dpace@math.sfasu.edu

www.sfasu.edu/math

Faculty

Regents Professor

E. Donice McCune

Professors

Kimberly M. Childs, William D. Clark, Joseph G. McWilliams, Deborah A. Pace,

Associate Professors

Lesa L. Beverly, J. Kelly Cunningham, Robert F. Feistel, Roy Joe Harris, Gregory K. Miller, Pamela D. Roberson, Sarah T. Stovall

Assistant Professors

Brian Beavers, Jeremy Becnel, Patricia Carlin Bahnsen, Keith E. Hubbard, Clint Richardson, Kent Riggs

Lecturers

Michelle Cook, Hilary P. Dosser, Robert R. Fleet, Hossein Hosseinpour, Danielle Johnson, Robert Payne, Angela West, Cassandra Wright

Areas of Study & Degrees

B.S. Mathematics

B.S. Mathematics with Teacher Certification

Minors:

Mathematics

Applied Statistics

Objectives

The role of the department is twofold:

(1) To provide a sound curriculum for students who wish to pursue a career in mathematics or statistics.

(2) To provide service courses for students who are majoring in some other department, but who need mathematics or statistics as a tool or to satisfy general degree requirements.

Student Organizations

A student chapter of the Mathematical Association of America (MAA) is spon-

sored by the Department of Mathematics and Statistics. Membership is open to any student interested in the mathematical sciences. Benefits include reduced membership fees for the MAA and informative meetings about topics in mathematical sciences and career opportunities in mathematical sciences. Interested students should consult the MAA Student Chapter sponsor.

Pi Mu Epsilon is a mathematical honor society whose purpose is the promotion of scholarly activity in mathematics among students in academic institutions, and among staffs of qualified non-academic institutions. A chapter of Pi Mu Epsilon may be chartered only in an academic institution whose standards are excellent in all liberal arts departments and particularly in mathematics. The Texas Delta Chapter of Pi Mu Epsilon is located at SFA. Interested students should consult with one of the faculty sponsors about membership requirements and nomination for membership.

Student Scholarships and Financial Aid

Several undergraduate scholarships are available to promising mathematics students in memory of Dr. C.E. Ferguson, former chair and Jason Balusek former graduate student of the Department of Mathematics at SFA. The Alexander, Clark, Herd, Neel, and Pinson Scholarships also are available to qualified students; applications are made through the SFA Alumni Association.

The department offers additional scholarships based entirely on academic excellence. Eligible students are those with a major or minor in mathematics or statistics and those seeking teacher certification with a specialization in mathematics; applications are made through the department.

Part-time employment is available for mathematics majors and minors who have completed designated courses with good academic records.

Definition of Mathematics Major

A major in mathematics consists of MTH 233, 234, 311, 312, 317, 333, 337, 439, 440, plus six hours from MTH 305, 415, 419, 420, and 451. CSC 102 or equivalent is required.

After completing 45 hours of college credits, including MTH 233 and 234 with a minimum grade of C, a student should consult with the dean of the College of Sciences and Mathematics about a degree plan.

Definition of Mathematics Minor

A minor in mathematics consists of MTH 233, 234 plus courses selected from MTH 305, 311, 312, 317, 333, 337, 419, 420, 439, 440, 451 for a minimum of 18 semester hours.

Definition of Applied Statistics Minor

A minor in Applied Statistics consists of MTH 144 or 233, MTH 220, STA 320, STA 321, STA 322 and STA 327.

Certification for Mathematics Teaching for Grades 8–12

The major in mathematics with teacher certification for grades 8-12 requires:

MTH 220, 233, 234, 311, 312, 317, 333, 337, 345, 419, 439, and 451. CSC 102 or equivalent is required.

Note: Refer to the Educator Certification portion of this bulletin in the James I. Perkins College of Education section for specific professional teacher education coursework requirements.

Students who anticipate doing graduate study in mathematics or statistics should so indicate to their advisers who will help them plan their program accordingly.

Students who are interested in an area of specialization in mathematics for teaching in grades 4-8 should refer to the Educator Certification section of this bulletin.

The Mathematics and Statistics Graduate Program

Those interested in the graduate program in mathematics and/or statistics should consult the Graduate Bulletin.

Major in Mathematics: Bachelor of Science Degree

Curriculum for Majors

Freshman Year

Mathematics	4	Mathematics	4	
Natural Science-Astronomy, Biology, Chemistry, Geology or Physics	4	Natural Science-Astronomy, Biology, Chemistry, Geology or Physics	4	
Freshman English	3	Freshman English	3	
Minor/Core Req.	6	Minor/Core Req.	6	
	17		17	34

Sophomore Year

Mathematics	3-4	Mathematics	3-4	
Literature	3	HIS 134 or PSC 142	3	
HIS 133 OR PSC 141	3	Lab Science	4	
Lab Science	4	Electives	3	
CSC 102	3			
	16-17		13-14	30

Junior Year

Major, Minor, and Electives 28

Senior Year

Major, Minor, and Electives 28 120

General Education Requirements

The student's courses must be chosen so that the general education requirements as listed in *Degree Requirements*, *Bachelor of Science Degree* (Mathematics), earlier in this section are satisfied.

General Course Prerequisites

All credit-level mathematics courses have prerequisites of two years of high school algebra and one year of high school geometry. In addition, a minimum math

score of 250 on THEA or 19 on ACT or 500 on SAT or a C or better in MTH 099 is required for MTH 133, MTH 138, MTH 143, and MTH 220. A minimum math score of 280 on THEA or 25 on ACT or 580 on SAT is required for MTH 140. The Department of Mathematics and Statistics strongly recommends a minimum math score of 270 on THEA or 21 on ACT or 500 on SAT or a C or better in MTH 099 before taking any credit-level mathematics course.

A minimum grade of C is required in all courses that are prerequisite to a mathematics or statistics course.

Unless otherwise indicated, courses are three semester hours credit with three hours lecture per week.

Courses in Mathematics and Statistics (MTH)

098. **Fundamental Mathematics** - Computations and applications involving fractions, decimals, percent, ratio and proportion; properties of the real number system; linear equation solving; beginning algebraic concepts; geometry. Will not count toward any degree requirement including elective credit. May be required of students with a marginal background in mathematics.

099. **Intermediate Algebra** - Real number system, polynomials, exponents, radicals, first- and second-degree equations, inequalities, functions, graphs, systems of equations. Will not count toward any degree requirement including elective credit. May be required of students with a marginal background in mathematics.

110. **Math in Society** - Provides an introduction to mathematical thinking emphasizing analysis of information for decision-making. See general course prerequisites.

127. **Introduction to Mathematics for Elementary Teachers (MATH 1350)** - Elementary concepts of sets and logic, numeration systems, number theory and properties of the natural numbers, integers, rational and real number systems with an emphasis on problem solving and critical thinking.

128. **Intermediate Mathematics for Elementary Teachers (MATH 1351)** - Elementary concepts of geometry and measurement, probability, and statistics with an emphasis on problem solving and critical thinking. Prerequisite: MTH 127.

129. **Concepts and Applications –** Problem solving and critical thinking skills applied to the study of a broad range of topics including number theory, sequences and series, recursion, data analysis, mathematical modeling and algebra including connections to the grades EC-4 classroom. Students will be required to have a graphing calculator. Prerequisites: MTH 127 and 128.

133. **Plane Trigonometry (MATH 1316)** - Trigonometric functions of angles, radian measure, fundamental identities; addition, product, and half angle formulas, solution of triangles; polar coordinates; inverse trigonometric functions, complex numbers. May be required to have a graphics calculator. Prerequisites: See General Course Prerequisites.

138. **College Algebra (MATH 1314)** - Real numbers, relations and functions, inequalities, matrices, theory of equations, complex numbers, mathematical induction, sequences and series, binomial theorem, permutations and combinations. May be required to have a graphics

calculator. Prerequisites: See General Course Prerequisites.

139. **Plane Analytic Geometry (MATH 1348)** - Beginning course in plane analytic geometry including the straight line, the circle, parabola, hyperbola, and the transformation of coordinates. May be required to have a graphics calculator. Prerequisites: MTH 133 and 138 or the equivalent.

140 **Precalculus**- Five semester hours. Preparatory for the calculus sequence: properties and graphs of algebraic, exponential, logarithmic, and trigonometric (with inverses); fundamental trigonometric identities, conic sections, polar and rectangular coordinate systems. Prerequisites: See general course prerequisites.

143. **Finite Mathematics (MATH 1324)** - Mathematical functions and graphs, linear systems of equations, matrices, linear programming, mathematics of finance; applications. Prerequisites: See General Course Prerequisites.

144. **Elements of Calculus with Applications for Business (MATH 1325)** - Limits and continuity, the derivative, the antiderivative, the definite integral; applications. Prerequisite: MTH 143.

220. **Introduction to Probability and Statistics (MATH 1342)** - Probability, random variables, mean and variance, binomial distribution, normal distribution, statistical inference, and linear regression. Prerequisites: See General Course Prerequisites.

233. **Calculus I (MATH 2413)** - Four semester hours. Limits, continuity, differential calculus of algebraic and trigonometric functions with applications. May be required to have a graphics calculator. Prerequisite: MTH 139.

234. **Calculus II (MATH 2414)** - Four semester hours. Integral calculus with applications, techniques of integration, calculus of transcendental functions, indeterminant forms, improper integrals. May be required to have a graphics calculator. Prerequisite: MTH 233.

264. **Elementary Topics in Mathematics and Statistics** - Elementary topics in scientific computing, algebra, number theory, applied mathematics, geometry, probability and statistics. May be repeated once for credit on a different topic. Does not count toward a major or minor in mathematics. Prerequisite: See General Course Prerequisites.

275. **Special Problems** - One to three semester hours. Individual in-depth study or research in special topics in mathematics, statistics, or mathematics education beyond the core mathematics curriculum. May be taken for honors credit. MTH 275.

300. **Foundations of Mathematics** - Set theory, relations, functions, mathematical structure, logic and proof. Students will be required to have a graphing calculator. MTH 138 and 129.

301. **Concepts of Calculus-Limited processes and other concepts of calculus.** Includes analysis of numerical approaches to problem solving using technology and appropriate software with connections to the grades 4-8 classroom. Students will be required to have a graphing calculator. Prerequisite: MTH 300.

302. **Concepts in Geometry**- Survey of geometric topics with an emphasis on trigonometry and Euclidian geometry. Includes historical and grades 4-8 classroom connections. Prerequisite: MTH 300

305. **Introduction to Numerical Methods** - Basic numerical and

computational techniques used in the solution of mathematical problems in the real world: approximation of functions, roots and systems of equations, numerical integration, interpolation and curve-fitting, and machine computation. Prerequisites: MTH 234 and CSC 102 or equivalent.

311. **Introduction to Modern Mathematics** - Introduction to logic, basic properties of sets, relations, functions, one-to-one functions, set equivalence, Cantor's Theorem, countable and uncountable sets. Prerequisite: MTH 234.

312. **Introduction to Algebraic Systems** - Introduction to the study of algebraic systems with particular emphasis on concrete examples of the basic algebraic structures, groups, rings, integral domains, and fields. Prerequisite: MTH 311.

317. **Linear Algebra** - Matrices, systems of linear equations, linear vector spaces, functions from Rn to Rm, determinants, eigenvalues and eigenvectors. Prerequisite: MTH 311 or 234 and consent of instructor.

320. **(STA 320) Statistical Methods** - Analysis of variance, regression analysis and nonparametric methods. The course will stress the use of computer packages MINITAB or SAS and the interpretation of the outputs. Prerequisite: MTH 220.

321. **(STA 321) Applied Nonparametric Statistics** - Contingency table analysis, rank tests for one, two and many sample problems, rank correlation, introduction to nonparametric regression. Prerequisite: MTH 220.

322. **(STA 322) Regression** - Regression and model building, measure of model adequacy, transformations, prediction. Prerequisites: MTH 144 or MTH 233, and STA 320.

327. **(STA 327) Experimental Design and Analysis** - Analysis of variance, completely randomized designs, blocking and Latin square designs. Multifactor experiments, including factorial experiments, nested, blocked, and split-plot designs. Analysis of covariance. Quality control, sampling theory, reliability issues. Utilization of statistical software throughout the course. Incorporation of report writing, data driven problems and/or case studies throughout the course. Prerequisite: STA 320.

333. **Calculus III** - Four semester hours. Infinite series, power series, vectors in R2 and R3, partial derivatives, directional derivatives, gradients, multiple integrals. Prerequisite: MTH 234.

337. **Differential Equations** - Solving of differential equations of physics, chemistry and engineering, and a study of the characteristics of the solutions. Prerequisite: MTH 333.

345. **Mathematics for the Secondary School Teacher –** A review of the major topics taught in secondary schools. Historical perspectives of mathematics, technology in the classroom, inductive versus deductive reasoning, careers in mathematics, and interrelationships among various branches of mathematics. Prerequisite: MTH 311.

415. **Number Theory** - Properties of natural numbers. Unique factorization, residue solution of congruences, arithmetic functions, quadratic reciprocity law, distribution of primes. Diophantine equations, continued fractions, algebraic numbers. Prerequisite: MTH 220 and MTH 451 or concurrent enrollment in MTH 451.

419. **Probability Theory** - Introduction to elementary probability laws, random variables, distribution theory, multivariate and conditional distributions, transformations of random variables, and elementary convergence concepts. Prerequisites: MTH 311 and 333 or may be taken concurrently with MTH 333 with consent of instructor.

420 **Statistical Inference**- Sampling distributions, methods of estimating parameters, mathematical development and application of: one/two/many sample location tests and confidence intervals. analysis of variance and simple linear regression, chi-square tests for categorical data. Prerequisite: MTH 419.

439. **Advanced Calculus, I** - Elements of point set theory and an in-depth study of the basic ideas of sequences, limits, continuity and differentiability. Prerequisites: MTH 311 and 333.

440. **Advanced Calculus, II** - Continuation of MTH 439 with topics in Taylor, Fourier and other special series, and an in-depth study of Riemann-Darboux Integration. Prerequisite: MTH 439.

451. **College Geometry** - Survey of topics from classical Euclidean geometry, modern Euclidean geometry, projective geometry, transformational geometry and non-Euclidean geometries. Prerequisites: MTH 234 and 311.

464. **Advanced Topics in Undergraduate Mathematics and Statistics** -
One, two, or three semester hours. Topics in abstract algebra, analysis, applied mathematics, geometry, probability and statistics, topology, or the teaching of mathematics. May be repeated once for credit on a different topic. Prerequisite: Consent of the instructor.

475. **Special Problems** - One, two, or three semester hours. Study and research for individual instruction of the undergraduate student. Not available for graduate credit. Prerequisite: 15 semester hours of mathematics and an overall minimum B average in college work completed.

476. **Special Problems** - One, two, or three semester hours. Same as 475 for credit in a different topic. Study and research for individual instruction of the undergraduate student. Not available for graduate credit. Prerequisites: 15 semester hours of mathematics and an overall minimum B average in college work completed.

RICHARD AND LUCILLE DEWITT SCHOOL OF NURSING

Glenda C. Walker, D.S.N., R.N., Director

Nursing & Math 104

(936) 468-3604

Fax: (936) 468-1696

gwalker@sfasu.edu

www.fp.sfasu.edu/nursing

Greta Haidinyak, M.Ed., M.S.N., JD., R.N., Assistant Director

Faculty

Professor

Glenda C. Walker, D.S.N., R.N.

Associate Professors

Patty J. Ellison, Ph.D., R.N., Greta Haidinyak, J.D., R.N.

Assistant Professors

Sara Bishop, Ph. D., R.N.; Cindi McCarley, D.S.N., R.N.; Rose Powell, Ph.D., R.N.

Clinical Instructors

Debbie Arnold, R.N., Carol Athey, R.N., Erin Bailey, R.N., Susan Bullard, R.N., Anita Dawn Barnes, R.N., Wendy Donnell R.N., Della Connor, R.N., Deborah Ellisor, R.N., Jeanne Freitag, R.N., Christine Harper, R.N., Janice Hensarling, R.N., Laura Logan, R.N., Regina Low, R.N., David McCann, R.N., Susan McDonald, R.N., Karen Migl, R.N., Mary Pack, R.N., Tammy Robinson, R.N., Joanie Selman, R.N.

Areas of Study & Degrees

B.S.N.

Mission

Our mission is to provide students a foundation for success as graduate nurses in the evolving world who are ethical, competent, critical thinkers and life-long learners by providing an educational environment that promotes holistic health care in a community dedicated to teaching, research, creativity and service.

Core Values

In the School of Nursing at Stephen F. Austin State University, we will:

The Individual Student:

Value and respect each student, faculty member, administrator, and staff as unique individuals and partners in the learning process.

Teaching and Learning:

Offer a broad foundation on which to base graduate education in the discipline of nursing. Each nursing graduate is expected to meet the academic and ethical standards of the profession of nursing by thinking in disciplined, critical, quantitative and qualitative ways.

Intellectual and Creative Discovery:

Encourage the student to investigate the health needs of a changing society and to think in creative ways to provide holistic health care in a culturally diverse world.

Service:

Produce graduates who collaborate with other health care professionals and clients in meeting the health care needs of a culturally diverse society; provide opportunities to enrich and improve the community through service-learning projects.

Academic Achievement:

Provide an environment in which the student becomes an ethically guided critical thinker who uses a substantive general education in traditional and nontraditional ways to provide proactive, compassionate care.

Vision

Be a model of nursing education proficiency and excellence whose graduates are ethical and competent practitioners and leaders in the profession.

Terminal Objectives for Graduates of the School of Nursing

Upon graduation from our program, the graduate is expected to:

- Apply knowledge of the physical, social and behavioral sciences in the provision of nursing care based on theory, research and evidence-based practice.
- Deliver nursing care within established legal and ethical parameters in collaboration with clients and members of the interdisciplinary health care team.
- Provide holistic nursing care to individuals, families, communities, and society as a whole while respecting individual and cultural diversity.
- Demonstrate effective leadership that fosters independent thinking and collaborative communication in the management of nursing care.
- Assume responsibility and accountability for delivery of safe and effective nursing care.
- Serve as an advocate for clients and for the profession of nursing.
- Demonstrate continuing competence, growth, and development in the profession.

Student Scholarships

Many scholarships are available to students entering the nursing program at SFA. These scholarships have been established through the generosity of individuals, family members, and organizations that recognize and support the role of education in the advancement of the nursing profession. Further information regarding nursing scholarships may be obtained by contacting the Alumni Office or the University Advancement Office.

Army ROTC also provides two-, three-, and four-year scholarships to nursing students with an opportunity to attend specialized training while still in school. Contact the Department of Military Science for further details.

Student Organization

Student Nurses Association (SNA)

Honor Society

- Sigma Theta Tau -
- Omicron Eta Chapter - International Nurse's Honor Society

Admission Requirements

A student requesting admission to the baccalaureate program in nursing must meet the following criteria:

1. Full Admission
   a. Acceptance to SFA.
   b. Overall GPA of 2.5 in college work including transfer courses.
   c. Science GPA of 2.75 in college work including transfer courses. Courses calculated for science GPA are: BIO 238, 239, CHE 111, NUR 312, and BIO 308 or 309.
   d. Successful completion of the entrance testing. Scores to be submitted with application. Tests may be scheduled through SFASU Counseling and Career Services office.
   e. Grades for repeated courses will be averaged
   f. Completion of the following academic courses:

*BIO 238 & 239		8 hrs.
*CHE 111		4 hrs.
PSY 133		3 hrs.
*HMS 236 or PSY 210		3 hrs.
*HMS 236L		1 hr.
ENG 131 & 132		6 hrs.
SOC 137		3 hrs.
Prescribed Elective I	see model curriculum outline	3 hrs.
Prescribed Elective II	see model curriculum outline	3 hrs.
Prescribed Elective III	see model curriculum outline	6 hrs.
*BIO 308 or 309		4 hrs.
SOC 139 or ANT 231		3 hrs.
*NUR 312		4 hrs.
*HMS 239 or 339		3 hrs.
MTH 220		3 hrs.
CSC 101, 102, 121 or 201		3 hrs.

*cognates

Total Prerequisites: 59 or 60 hrs, depending on choice of HMS 236 with lab or PSY 210. Specified cognates must be completed with at least a grade of C for acceptance into the Nursing Program.

g. Applicant must submit official transcripts from all colleges. This is in addition to the official transcripts given to SFA Admissions office. (The SFA transcript may be unofficial).

2. Conditional Admission - This category is used only if there are vacancies after full/provisional applicants. Each student is reviewed on an individual basis.

A. **Admission Process** - Sixty students may be admitted each fall and spring semester based on completion of prerequisites and attainment of admission criteria. Admission is competitive based upon the applicant's overall and science grade point averages as well as a testing process. To be considered for admission review, the student must be admitted to the university and the completed application packet must consist of the following:
    1. Completed application to the School of Nursing
    2. Complete, official copies of transcripts from all previous college credit and SFA transcript. (SFA may be unofficial).
    3. Copies of accepted or denied petitions or petitions being submitted
    4. Completed Student Checklist which includes a written list of all courses currently being attempted for provisional admission. (If all courses are completed, no further action is needed). The Student Checklist is on the School of Nursing Web site. (www.fp.sfasu.edu/nursing)
    5. Copy of entrance test (NET)
    6. Student essay
    7. Copy of Anatomy and Physiology RN version entrance test
B. **Application Deadlines** - Applications for admission to the fall class will be accepted from January 15 to February 15 each year. Applications for admission to the spring class will be accepted from September 1 to September 30 each year. Applications received after these deadlines will be considered only if vacancies still exist in the incoming class. It is the responsibility of the student to make sure that all application materials are received by the School of Nursing prior to the deadline. Students applying for fall semester must have all prerequisites completed by the end of the spring semester prior to admittance in the fall. **Applications are not retained from semester to semester. A full application package must be resubmitted.**
C. **Eligibility** - Any applicant who is not in good standing at another nursing program and is not eligible to continue or return to that program will not be eligible for admission into the School of Nursing program. Criminal background checks will be conducted on all nursing students upon being accepted into the program. A positive background check shows the student was arrested, charged, and/or convicted of a crime. A positive background check may result in a student's inability to attend clinical classes until a declaratory order is obtained from the Texas Board of Nursing (BON). Resulting time delays could affect student progress. If a student knows of a possible problem, the student should seek a declaratory order from the BON prior to or concurrent with application to the program.
D. Students who have completed courses at other institutions may transfer credits under the policies of SFA. Nursing hours will be evaluated individually for transfer. Nursing courses are to be taken in order or

concurrently within their block. Any exception will be the decision of the Student Affairs Committee and the director.

Other Expenses

Uniforms, shoes, name pin, stethoscope, lab kit and health insurance are all purchased prior to the first nursing course. A urinalysis for drug screening must be submitted prior to the first nursing course. Other requirements include MMR immunization, HBV immunization, (or serological confirmation of immunity), two doses of varicella vaccine unless first dose was received prior to age 13, serologic confirmation of immunity or written confirmation of varicella disease), annual TB screening and current BLS certification. The BLS Healthcare Provider card MUST be the American Heart Association. Traveling accommodations and expenses to clinical sites are the student's responsibility.

Curriculum

The curriculum of the School of Nursing allows for individual planning and is based on the mission statement and core values. The curriculum plan includes courses in general education, science and the humanities and a nursing core. The curriculum exposes students to each of the major practice areas of nursing; clinical practice aids in development of skill competencies. The Nursing curriculum is being revised, please check the website and School of Nursing for updates.

The baccalaureate program is accredited by the NLNAC and the Texas Board of Nursing. Upon successful completion, students may apply to take the State Licensure exam.

Model Curriculum Outline

Freshman Year				
ENG 131	3	ENG 132	3	
Prescribed Elect. I	3	*BIO 238	4	
*CHE 111	4	PSY 133	3	
CSC 101,102,121 or 201	3	Prescribed Elect III	3	
	13		13	26

Sophomore Year				
*HMS 236/236L	4	MTH 220	3	
(or *PSY 210)	(3)	*BIO 308 or 309	4	
*HMS 239/339	3	*NUR 312	4	
Prescribed Elect. III	3			
HIS 133	3	SOC 139 or ANT 231	3	
*BIO 239	4	Prescribed Elect II	3	
	16-17		17	33-34

Junior Year

NUR 302	8	NUR 317	5	
NUR 316	2	NUR 320	5	
NUR 421 Pharm	2	NUR 325	3	
PSC 141	3		13	
	15			28

Senior Year

NUR 324	2	NUR 423	6	
NUR 414	5	NUR 415	5	
NUR 417	5	NUR 416	3	
PSC 142	3	Comprehensive Final		
HIS 134	3		14	32
	18			

Total hours for degree = 120 hrs.

*Specified cognates must be completed with at least a grade of C for acceptance into the nursing program.

Comprehensive final must be successfully completed in the senior year.

Prescribed electives:

Group I (select one course, 3hrs.)	**Group II** (select one course, 3hrs.)
ART 280, 281, 282	ENG 200-235, 300
MUS 140; MHL 245	
THR 161, 370	
DAN 140, 341	
Group III (select two 3 hr. courses)	
BCM 247	ILA 111, 112
COM 111, 170	SPH 172, 272
ENG 273	
FRE 131, 132	
SPA 131, 132	

Courses in Nursing (NUR)

300. **Issues in Nursing –** Four semester hours. Introduction to current issues and trends in nursing with an emphasis on legal, ethical and political aspects. The course will provide information upon which to base life-long learning.

302. **Nursing Fundamentals** - Eight semester hours, four hours didactic

and 12 hours clinical practicum. Basic nursing theory and skills for beginning clinical practicum. Required lab fee.

303. **Nursing Theory, Process and Skills** - Eight semester credit hours, five hours didactic and 9 hours clinical practicum. Bridge course for previously licensed nurses. Basic nursing theory and skills for beginning clinical program. Required lab fee.

312. **Pathophysiology** - Four hours didactic. Group study on the effects of the pathological processes and the compensatory mechanisms on normal physiological functioning. Assessment of health status and the rationale for selected therapies. Prerequisites: BIO 238 and BIO 239. Prerequisite or corequisite: BIO 308 or BIO 309.

316. **Health Assessment** - Two semester hours, one hour didactic and three hours clinical practicum. Includes learning concepts and performing health assessments for well individuals, including a complete history and physical examination, counseling and retrospective audits. Corequisite: NUR 302. Required lab fee.

317. **Individuals in Situational Crisis** - Five semester hours, two hours didactic and nine hours clinical practicum. Clinical application of nursing practice with patients experiencing pathological processes and the compensatory mechanisms on normal physiological functioning the assessment of health status and the rationale for selected therapies. Prerequisite: NUR 302. Corequisite: NUR 320. Required lab fee.

320. **Individuals in Developmental Crisis** - Five semester hours, two hours didactic and nine hours clinical practicum. Clinical application of nursing practice with patients experiencing developmental insufficiency. Prerequisite: NUR 302. Required lab fee.

324. **Nursing in Community Systems** - Two semester hours, two hours didactic. Introduction to primary nursing care with the community viewed as a social system. Prerequisites: NUR 317 & 320.

325. **Nursing Research** - Three semester hours, three hours didactic. Introduction to the concepts and process of research in nursing. Emphasis on critiquing published studies and developing plans for using research findings in practice. Prerequisite: MTH 220.

414. **Families in Crisis** - Five semester hours, two hours didactic and nine hours clinical practicum. Clinical application of nursing practice with both patients and their families when a patient is experiencing either a predictable or unpredictable crisis. Prerequisites: NUR 317, NUR 320, NUR 324. Corequisite: NUR 417. Required lab fee.

415. **Leadership in Nursing Systems** - Five semester hours, three hours didactic, and six hours clinical practicum. Preparation of baccalaureate educated nurses to assume beginning leadership roles in existing and/or emerging heath delivery systems, focusing on nursing application utilizing management skills, decision-making process and problem-solving. Prerequisites: NUR 325, 414, 417. Required lab fee.

416. **Systems Health Promotion** - Three semester hours, one hour didactic, and six hours clinical practicum. Practical application of theory in community clinical situations. Prerequisites: NUR 324, 414, 417. Required lab fee.

417. **Family Self-Care in Situational Crisis** - Five semester hours, two hours didactic, and nine hours clinical practicum. Focuses on the family as a unit with a sick child of any age. Content related to the care

and treatment of the child and education for the family member care provider. Prerequisites: NUR 317, 320, 324. Corequisite: NUR 414. Required lab fee.

421. **Pharmacology** - Two hours didactic. Pharmacotherapeutic aspects of nursing care are introduced. Emphasis is on drug pharmacological actions and responses associated with major drug classifications, patient assessment and education about medications. Prerequisite: Consent of instructor.

423. **Nursing Process Practicum** - Six semester hours, three hours didactic, and nine hours clinical practicum. Practical application of the theoretical base and leadership skills. Prerequisite: All required nursing courses. Required lab fee.

425. **Advanced Nursing Theory – Process and Skills.** Six semester hours.

475. **Special Problems** - One to six semester hours. Individual study in some area of nursing, guided through individual conference with assigned instructor.

RN Transition Program

The School of Nursing at SFA encourages nurses who have completed their nursing education in either an associate degree or diploma program to obtain the baccalaureate degree in nursing. The RN-BSN online Transition program was established for the student who has previously passed the NCLEX-RN and has current licensure as a registered nurse and wishes to obtain the baccalaureate degree. The RN transition program courses will be online.

RN-BSN Online Transition Admission Policy

A student requesting admission to the baccalaureate program in nursing must meet the following criteria:

1. Full Admission
   a. Acceptance to SFA
   b. a current licensure to practice as a registered nurse(RN)

   The following may be completed before or after admission to the School of Nursing:

*BIO 238 & 239	8 hrs	
*CHE 111	4 hrs	
PSY 133	3 hrs	
*HMS 236 or PSY 210	3 or 4 hrs	
ENG 131 & 132	6 hrs	
Prescribed Elective I (See curriculum model - Grp I)		3 hrs
Prescribed Elective II (See curriculum model - Grp II)		3 hrs
Prescribed Elective III (See curriculum model – Grp III)		6 hrs
*BIO 308 or 309		4 hrs
SOC 139 or ANT 231		3 hrs
*HMS 239 or 339		3 hrs
MTH 220		3 hrs
CSC 101, 102, 121, 201		3 hrs

A. Admission Process - Students may be admitted based on completion of prerequisites and attainment of admission criteria. When spaces are limited, admission of qualified applicants will be processed in the order received. To be considered for admission, the completed application packet must consist of the following:
    1. Completed application to the School of Nursing
    2. Complete, official (SFA may be unofficial) copies of transcripts from all previous college credit and SFA transcript (official or unofficial).
    3. Copies of accepted petitions or petitions being submitted
    4. Completed admission checklist which includes a written list of all courses currently being attempted.
    5. Current licensure to practice as a Registered Nurse (RN)
B. Application Deadline - Applications for admission will be accepted from January 15 to February 15 each year. Applications received after this deadline will be considered only if vacancies still exist in the incoming class. It is the responsibility of the student to make sure that all application materials are received by the School of Nursing prior to the deadline.

Students who have completed courses at other collegiate institutions may transfer credits under the policies of SFA. A maximum of 66 academic semester hours may be transferred from a junior college. There is no limit to the number of senior college hours that may be transferred; however, 42 hours of which 36 hours are advanced (300-499 level) must be completed in residence at SFA (Advanced Placement credit does not count as hours toward residency).

RN-BSN Online Transition Progression Procedure

Nursing 303 is the bridging course for the transition student. The student will receive eight hours of credit for Nursing 303.

The student will complete a six credit hour Nursing 425 course (Advanced Nursing Theory, Process, and Skills). Following successful completion of these two courses (NUR 303 and NUR 425) the students will be given advanced credit for the following nursing courses: 302, 317, 320, 421, 414, 417, and 423. Students in the transition program will complete the following nursing courses: 312, 316, 324, 325, 415, and 416.

Suggested Program of Study

After completion of all prerequisite courses, the suggested program of study is based on the professional portfolio and needs of the student. One example of a course of study is:

Summer I

Nursing 303, Transitions in Nursing, eight hours

Summer II

Nursing 425, Advanced Nursing Theory, Process, and Skills, six hours

Fall

Nursing 316, Health Assessment, two hours

Nursing 325, Nursing Research, three hours

Nursing 324, Nursing in Community Systems, two hours

Nursing 312, Pathophysiology, four hours

Spring

Nursing 416, Systems Health Promotion, three hours

Nursing 415, Leadership in Nursing Systems, five hours

The SFA School of Nursing is accredited by both the Texas Board of Nursing (BON) and the National League of Nursing Accreditation Council (NLNAC).

If further information is required please contact:

The Texas Board of Nursing

P.O. Box 430, Austin, TX 78767-0430

(512) 305-7400

National League of Nursing Accreditation Council

61 Broadway, New York, NY 10006

(800) 669-1656

All School of Nursing information is available online at: www.fp.sfasu.edu/nursing. Specific helpful links are Admission Process and Brochures.

DEPARTMENT OF PHYSICS & ASTRONOMY

Harry D. Downing, Chair
Science 322B
(936) 468-3001
Fax: (936) 468-4448
hdowning@sfasu.edu
www.physics.sfasu.edu

Faculty

Regents Professors
Thomas O. Callaway, Norman L. Markworth

Professors
Harry D. Downing, Robert W. Gruebel

Associate Professors
W. Dan Bruton, Robert B. Friedfeld, Walter L. Trikosko

Lecturers
Philip F. Blackburn, Edward J. Michaels, Ali A. Piran

Areas of Study & Degrees

B.S. Physics
Minors:
Physics
Astronomy
Engineering

Objectives

The courses in physics, astronomy, and engineering are designed to acquaint students with the general all-embracing principles that are the foundations of the present understanding of physics, astronomy and engineering and to furnish experiences in lecture and laboratory that will develop scientific attitudes, insights and techniques. The department seeks to prepare students for graduate study or to provide students preparing to teach at pre-college level with a background appropriate with their needs, to provide students with the physics background required for work in engineering, related sciences and medicine, and to assist non-science majors in developing an insight into the physical aspects of our environment and the extensive scientific activity of our society.

Definition of Majors and Minors

Programs for physics majors and minors vary with the student's goals and interests. The recommended curriculum for the student preparing for graduate study in physics or employment as a professional physicist is detailed below. Students interested in both physics and engineering may wish to consider the Physics-Engineering Dual Degree Program described in this bulletin in the next section. The minimum

course requirements for a major in physics consist of 36 hours of physics. This must include PHY 321, 333, 347, 440 and 470 plus four additional advanced physics hours, three of which must be 400 level. CHE 133 and 134 are also required.

The requirements for a minor are 18 semester hours, six of which are advanced aat SFA, and must include PHY 131 (or 241), 132 (or 242), and 333. All programs must be approved on the degree plan by the chair of the department. Majors, minors and those seeking teacher certification should consult with an adviser in the Department of Physics and Astronomy at their earliest opportunity to plan their program with the proper sequencing of courses.

Astronomy Minor

The astronomy minor has been developed for students who have interests in astronomy beyond the introductory level. The course of study includes introductory physics, introductory astronomy, observational astronomy and astrophysics. A student majoring in physics may minor in astronomy, but those courses that are applied to the minor cannot be applied to the major at the same time unless the student has a second minor from another department.

The requirements for the minor in astronomy are PHY 131 (or 241), 132 (or 242), AST 105, 305, and 335. All minor programs must be approved on the degree plan by the chair of the department.

Engineering Minor

The engineering minor includes courses in introductory engineering, statics, dynamics, electrical circuits and devices, and digital systems. This minor would prepare students for employment or continued study in the areas of mechanical, electrical, and civil engineering. (This minor does not qualify a student to take the professional engineering exam.)

A minor in engineering requires a minimum of 18 hours of engineering course work. The requirements for the minor in engineering are EGR 111 or 112, EGR 215, 250, 321 and 343. All minor programs must be approved on the degree plan by the chair of the department.

A student majoring in physics may minor in engineering, but those courses that are applied to the minor cannot be applied to the major at the same time unless the student has a second minor from another department.

Teacher Certification Programs

Requirements for certification in the physical sciences are listed in the Teacher Certification section of this bulletin.

Physics Freshman Scholarships and Financial Aid

In addition to those opportunities provided through the Office of Student Financial Assistance described elsewhere in this bulletin, the Department of Physics and Astronomy offers a number of scholarships to well-qualified students majoring in physics. Inquiries regarding scholarships should be directed to the chair of the Physics and Astronomy Department. Beginning freshmen are advised to make application for a scholarship during their senior year in high school. Part-time employment opportunities within the department are usually available to physics majors and minors, astronomy minors, and engineering minors who have completed, with good academic records, a portion of their physics, astronomy, and engineering courses.

Student Organizations

The Society of Physics Students (SPS) at SFA has been extremely active since the 1970s. The club is a support organization involved with activities that serve the department, the university and the local public. These activities include public viewing sessions at the SFA Observatory, Physics Olympics and Physics Magic Shows for local area schools. From 1982-07, SPS won 23 National Outstanding Chapter Awards. Twelve to 16 students each semester attend SPS meetings held in conjunction with the Texas Sections of the American Association of Physics Teachers and the American Physical Society.

Recommended Curriculum for Majors

During the summer prior to their beginning the program outlined below, students unprepared for MTH 233 are encouraged to enroll for preparatory mathematics courses equivalent to MTH 133, 138, and 139. Students who cannot obtain the preparatory mathematics before beginning this program may, in consultation with the physics faculty, work out an alternate plan which leads to the B.S. degree with a major in physics.

Students majoring in physics regularly minor in mathematics. Many elect to pursue a double major in physics and mathematics. The following recommended curriculum includes courses meeting the requirements for a major in physics and a minor in mathematics. To obtain a double major in physics and mathematics students should take additional mathematics courses in place of electives to meet the requirements listed in the Department of Mathematics and Statistics.

Major in Physics, Minor in Mathematics

Recommended Curriculum For Professional Physics Option

Freshman Year

PHY 108 or 110 or				
AST 105	3-4	*PHY 241	4	
CHE 133	4	CHE 134	4	
MTH 233	4	MTH 234	4	
Required English	3	Required English	3	
	14-15		15	29-30

Sophomore Year

*PHY 242	4	PHY 321	4	
PHY 250	4	PHY 262	4	
MTH 333	4	CSC 102	3	
PSC 141	3	HIS 134	3	
	15	Required Literature	3	
			17	32

Junior Year

PHY 333	4	Advanced PHY/AST	3	
PHY 347	3	PSC 142	3	
MTH 317	3	MTH 337	3	
PSC 141	3-4	Core Req.	3-4	
ART/MUS/THR/DAN	3	Elective	3	_____
	16-17		15-16	31-33

Senior Year

PHY 470	2	PHY 440	3	
PHY 347	3	Advanced PHY/AST	3	
PHY 431	3	Electives	5-8	
Core Req.	3			
Elective	3			
	14		11-14	25-28
				120

**Not open to students with junior and senior physics major or minor standing without approval of the chair of the Physics and Astronomy Department.*

Course Credit

Unless otherwise indicated, courses are three semester hours credit, three hours lecture per week.

Corequisite and Prerequisite Courses

Physics, astronomy and engineering courses that are corequisites must be taken together during the same semester. Separate grades will be awarded for these courses unless otherwise specified in the course description. Withdrawal from one corequisite course requires the dropping of the other course. A student is not required to repeat a corequisite course for which he/she has received a passing grade.

A minimum grade of C or departmental approval is required in all prerequisite courses to a physics, astronomy, or engineering course.

Courses in Physics (PHY)

101. **General Physics I** - **(PHYS 1305)** - Presentation with a minimum of mathematics of the basic concepts of mechanics, light and sound. May not be used to meet graduation requirements by students majoring in the College of Sciences and Mathematics. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 101L.

101L. **General Physics I Laboratory** - **(PHYS 1105)** - One semester hour, two hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 101. Lab fee required.

102. **General Physics II** - **(PHYS 1307)** - Continuation of PHY 101

presenting with a minimum of mathematics the basic concepts of heat, electricity, magnetism and certain aspects of modern physics. May not be used to meet graduation requirements by students majoring in the College of Sciences and Mathematics. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 102L.

102L. **General Physics II Laboratory - (PHYS 1107)** - One semester hour, two hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 102. Lab fee required.

108. **Introduction to Engineering/Physics** - Three semester hours, two hours lecture and two hours recitation per week. Introductory course on engineering/physics analysis with practice in analyzing and solving problems in physics and engineering. Includes use of computational devices and methods.

110. **Fundamentals of Electronics** - Introductory study of fundamental electrical circuits, including dc and ac circuits, filter networks, amplifiers, diodes, transistors, and logic gates. Corequisite: PHY 110L.

110L. **Fundamentals of Electronics Laboratory** - One semester hour, three hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 110. Lab fee required.

118. **Musical Acoustics*** - Waves, resonance, frequency, pitch, waveform, hearing, intervals, scales, strings, air columns, rods, plates, vocal apparatus, instruments. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Prerequisite: Ability to read music. Corequisite: PHY 118L.

118L. **Musical Acoustics Laboratory** - One semester hour, two hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 118. Lab fee required.

125. **Introductory Physical Science** - Four semester hours, three hours lecture, two hours lab per week. Introduction to properties of matter, kinematics, dynamics and chemical bonding. Presentation of selected topics in a manner which will integrate principles of physics and chemistry.

131. **Mechanics and Heat (PHYS 1301)** - Fundamental principles of mechanics and heat. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Prerequisite: High school trigonometry. Corequisite: PHY 131L.

131L. **Mechanics and Heat Laboratory (PHYS 1101)** - One semester hour, three hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 131. Lab fee required.

132. **Electricity, Sound, and Light (PHYS 1302)** - Basic electrical and magnetic phenomena, wave motion, sound and light. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Prerequisite: PHY 131. Corequisite: PHY 132L.

132L. **Electricity, Sound, and Light Laboratory (PHYS 1102)** - One semester hour, three hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 132. Lab fee required.

214. **Selected Topics –** Non-advanced. One to four hours. Non-advanced material covered will vary from semester to semester and will be announced. May be repeated for additional credit in a different topic.

241. **Technical Physics I (PHYS 2325)** - Presentation of the principles of mechanics and heat. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisites: MTH 233, PHY 241L.

241L. **Technical Physics I Laboratory (PHYS 2125)** - One semester hour, three hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHYS 241. Lab fee required.

242. **Technical Physics II (PHYS 2326)** - Presentation of the principles of sound, electricity, magnetism, and optics. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Prerequisites: MTH 233, PHY 241. Corequisite: PHY 242L.

242L. **Technical Physics II Laboratory (PHYS 2126)** - One semester hour, three hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 242. Lab fee required.

250. **Engineering Statics** - Four semester hours, three hours lecture, three hours lab per week. Prerequisites: MTH 234 and PHY 241. (same as EGR 250)

262. **Electrical Circuits and Devices** - Basic AC, DC and digital circuits and their applications in instrumentation. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Prerequisites: PHY 132 (or 242) and MTH 233. Corequisite: PHY 262L (Same as EGR 215).

262L. **Electrical Circuits and Devices Laboratory** - One semester hour, three hours lab per week. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 262. Lab fee required. (Same as EGR 215L).

315. **A, B. Selected Topics** - One to four hours. Material covered varies from semester to semester and will be announced. May be repeated for additional credit in a different topic. Prerequisites: Eight hours from any of the sciences.

321. **Engineering Dynamics** - Four semester hours, three hours lecture, three hours lab per week. Prerequisite: PHY 250 or EGR 250. (same as EGR 321).

333. **Modern Physics** - Introduction to relativity, quantum phenomena, atomic and nuclear physics. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Prerequisites: PHY 132 (or 242) and MTH 233. Corequisite: PHY 333L.

333L. **Modern Physics Laboratory** - One semester hour, three hours lab per week. Computation of lecture and laboratory grades into

one grade; same grade recorded for both lecture and laboratory. Corequisite: PHY 333. Lab fee required.

343. **Electronics** - Three semester hours, two hours lecture, three hours lab per week. Design and integration of basic circuits into electronic instrumentation. Prerequisite: PHY 132 (or 242). Lab fee required. (Same as EGR 343).

347. **Mathematical Applications in Physics I** - Formulation and solution of physical problems using vector analysis, partial differential equations, complex variables and transforms. Prerequisites: PHY 132 (or 242) and MTH 234.

410. **Experimental Techniques of Physics** - Four semester hours, three hours lecture and two hours lab per week. Presentation of the experimental techniques used to measure the physical observables associated with matter, mechanics, waves, sound, light, electricity and magnetism. Prerequisites: PHY 101 and either PHY 102 or AST 105. Lab fee required.

430. **Thermodynamics** - Includes the kinetic theory of gases, Maxwell-Boltzmann statics, Fermi-Dirac statistics, the Debye Approximation, magnetic cooling and the theory of heat engines. Prerequisite: PHY 333.

431. **Introductory Quantum Mechanics** - DeBroglie wave, Schroedinger formulation, step and barrier potentials, perturbation theory, harmonic oscillator, annihilation and creation operations, commutation relations, representations. Prerequisite: PHY 333.

440. **Introduction to Electricity and Magnetism** - Electrical and magnetic field theory, properties of dielectrics and magnetic materials. Prerequisites: PHY 132 (or 242) and MTH 234.

441. **Optics** - Four semester hours, three hours lecture, three hours lab per week. Fundamentals of physical and geometrical optics including polarization and diffraction. Prerequisite: PHY 440. Lab fee required.

470. **Undergraduate Research and Technical Presentations** - Two semester hours. An individual instruction course involving undergraduate research and technical presentations. The purpose of this course is to give the student experience in research and preparation of oral presentations on scientific research. Prerequisite: Junior or senior major status.

475. **Special Problems** - One to four hours. For undergraduate credit only. Experimental or theoretical independent study in research. Prerequisite: 12 semester hours of physics.

476. **Special Problems** - One to four hours. For undergraduate credit only. A continuation of PHY 475. Prerequisite: PHY 475.

485. **Internship in Physics and Engineering –** One to three hours. Supervised on-the-job training in one or more facets of the field of physics or engineering. Internships are to be arranged by students and approved by instructor. This course is an elective and cannot be used to satisfy any of the course requirements for a major or minor in physics.

**May be offered as an Internet course.*

Courses in Astronomy (AST)

105. **Classical and Modern Astronomy* (PHYS 1311)** - Introductory study of planetary astronomy, astrophysics, and cosmology. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: AST 105L.

105L. **Classical and Modern Astronomy Laboratory (PHYS 1111)** - One semester hour, two hours lab per week including night viewing sessions by arrangement. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: AST 105. Lab fee required.

305. **Observational Astronomy** - Two hours lecture and three hours lab per week. Fundamentals of practical sky observing including visual, photographic, and photometric techniques using the research telescopes at the SFA Observatory. Prerequisites: MTH 133, 138. Lab fee required.

335. **Astrophysics** - Properties of light, stellar evolution, and galactic dynamics are treated in a quantitative manner. Prerequisites: PHY 132 (or 242) and MTH 233.

**Frequently has section offered as an Internet course.*

PRE-ENGINEERING & PHYSICS-ENGINEERING DUAL DEGREE PROGRAMS

W. Dan Bruton, Pre-engineering Program Adviser
Science 322
Email: astro@sfasu.edu
(936) 468-3001
Fax: (936) 468-4448
www.engineering.sfasu.edu

Students wishing to major in any of the many branches of engineering may take their first two years in pre-engineering at SFA and transfer to a college of engineering for their final two years to complete their course of study.

The Physics-Engineering Dual Degree Program provides an option through which students may spend three years at SFA before transferring, during which time they complete requirements for a major in physics, a minor in mathematics and the core of courses which are part of the pre-engineering program. Students who complete the Dual Degree curriculum outlined below will receive a B.S. degree in physics from SFA upon transferring back sufficient semester hours (approximately 30) from the upper-division engineering program. (Of these 30 hours, six must be advanced engineering hours. The remainder may be core courses and electives.) Upon completion of the engineering program, the student will receive a B.S. degree in engineering.

Students in either of these programs should consult with their advisers to adjust the programs outlined below to meet the variations in requirements particular to the branch of engineering and the terminal university.

Pre-engineering Curriculum

Freshman Year				
PHY 108	3	PHY 241	4	
MTH 233	4	MTH 234	4	
EGR 111	3	EGR 112	3	
HIS 133	3	HIS 134	3	
Required English	3	Required English	3	
	16		17	33

Sophomore Year				
EGR 250	4	EGR 215	4	
PHY 242	4	EGR 321	4	
MTH 333	4	CSC 102	3	
*Elective or Political Sci	3-4	*Elective or Political Sci	3-4	
		Required Literature	3	
	15-16		17-18	32-34

Summer Sessions

MTH 337, CHE 133 and 134 and *Electives, History, or Political Science

Physics-Engineering Dual Degree Curriculum

Freshman Year

PHY 108	3	PHY 241	4	
MTH 233	4	MTH 234	4	
EGR 111	3	EGR 112	3	
Required English	3	Required English	3	
HIS 133	3	HIS 134	3	
	16		17	33

Sophomore Year

EGR 250	4	EGR 215	4	
PHY 242	4	EGR 321	4	
MTH 333	4	CSC 101`	3	
PSC 141	3	PSC 142	3	
		Required Literature	3	
	15		17	32

Junior Year

PHY 347	3	PHY 440	3	
PHY 333	4	MTH 337	3	
MTH 317	3	Core Req.	3	
Core Req.	3-4	Core Req.	3	
ART/MUS/THR/DAN	3	*Electives	3	
		PHY 470	2	
	16-17		17	33-34 98-99

Summer Sessions

CHE 133, 134 and required social science

*Students pursuing the specific engineering degree may include the following among their electives:

Petroleum Engineer: GOL 131, 132

Chemical Engineer: CHE 231, 331, 332

Biochemical Engineer: BIO 131, 133; CHE 231, 331, 332

SFA has a formal agreement with Lamar University on a Dual Degree Physics-Engineering Program and articulation agreements with Texas A&M University and the University of Texas at Tyler on the transfer of courses from SFA to TAMU and UTT. Details of the programs can be obtained from the pre-engineering adviser at SFA. Students should contact terminal engineering schools about the compatibility of the above suggested curriculum with their program.

Courses in Engineering (EGR)

111. **Foundations in Engineering I** — Three semester hours, two hours lecture, two hours lab per week. Introduction to the engineering profession, ethics and disciplines; development of skills in teamwork, problem solving, logic processing, algorithm development, estimation, design and drawing; emphasis on computer applications and design. Software used: Windows 95, Office 97, AutoCAD and the Internet.

112. **Foundations in Engineering II** — Three semester hours, two hours lecture, two hours lab per week. Development of skills in problem solving, design, analysis, estimation and teamwork; utilization of computer tools for documentation and presentation; introduction to logic processing and computer programming; introduction to accounting and conservation principles in engineering. Software used: Windows 95, Office 97, AutoCAD and the Internet.

215. **Principles of Electrical Engineering** — Basic AC, DC, and digital circuits and their applications in instrumentation. Lecture and laboratory grades are computed into one grade and the same grade is recorded for both lecture and lab. Prerequisites: EGR 112 or PHY 242 and MTH 233. Corequisite: EGR 215L. (Same as PHY 262).

215L. **Principles of Electrical Engineering Laboratory** — One semester hour, three hours lab per week. Lecture and laboratory grades are computed into one grade and the same grade is recorded for both lecture and laboratory. Corequisite: EGR 215. Lab fee required. (Same as PHY 262L).

250. **Engineering Statics** — Four semester hours, three hours lecture, three hours lab per week. Prerequisites: MTH 234 and PHY 241. (same as PHY 250).

321. **Engineering Dynamics** — Four semester hours, three hours lecture, three hours lab per week. Prerequisite: PHY 250 or EGR 250. (Same as PHY 321).

343. **Electronics** — Three semester hours, two hours lecture, three hours lab per week. Design and integration of basic circuits into electronic instrumentation. Prerequisite: PHY 132 (or 242). Lab fee required. (Same as PHY 343).

PRE-PROFESSIONAL PROGRAMS

J. Kevin Langford, Director
Kennedy Auditorium 101
(936) 468-2315
Fax: (936) 468-6256
klangford@sfasu.edu
www.sfasu.edu/prepro/

Overview

Within the pre-health professions programs at SFASU, undergraduate students will be mentored and guided toward successful fulfillment of prerequisites for the professional program of their choosing. Their SFASU education will be the foundation upon which professional training will be built.

Classification as a pre-health professional is a declaration of intent to pursue professional training following undergraduate studies. As an undergraduate, pre-health professions students will work toward a Bachelor of Science degree (some students choose a Bachelor of Arts degree path). The discipline within which to focus, the major, is the choice of the student. None of the professional schools in Texas specify a required major. However, due to the number of science prerequisites, as well as the topics covered on many admissions examinations, majors and/or minors in disciplines such as biology and chemistry are common among professional school applicants.

Pre-professional programs at SFA covered by the pre-health professions adviser include: pre-chircopractic , pre-dental hygiene, pre-dentistry, pre-clinical laboratory sciences (medical technology), pre-medicine, pre-occupational therapy, pre-optometry, pre-pharmacy, pre-physical therapy, pre-physician assistant and pre-veterinary medicine (also may be advised within the Department of Agriculture for animal science majors).

Other pre-professional programs at SFA that are advised outside of the pre-health professions include: pre-nursing (School of Nursing), pre-law (Department of Political Science) and pre-engineering and pre-architecture (Department of Physics).

SFA Pre-professional Programs

The following specific descriptions are current as of the publication of this bulletin. Since prerequisites are defined by each individual school, they can and do vary from year to year and school to school. Completing the recommended coursework will allow the student to apply to all of the programs in the state. When given a choice of freshman-and sophomore-level courses in the sciences, the schools generally require those offered for the science majors. Some course substitutions may be permitted for those not majoring in the sciences. Current information on each of the following is available in the pre-health professions adviser's office located in the entrance foyer of Kennedy Auditorium (KA-101).

Joint Admissions Medical Program (JAMP)

SFA is one of more than 30 public universities in Texas administering JAMP.

JAMP is a special program created to support and encourage highly qualified, economically disadvantaged students pursuing a medical education through continued appropriations from the Texas Legislature. Those students who satisfy both academic and non-academic requirements are guaranteed admission to at least one participating medical school in Texas. Applications can be obtained in the pre-health professions office.

Pre-Dentistry

There are three dental schools in Texas, and they require a minimum of 90 semester hours, although more than 90 percent of applicants will have completed a bachelor's degree prior to admission. Minimum course prerequisites include 14 hours of biology, 19 hours of chemistry (inorganic, organic, and biochemistry), eight hours of physics, and six hours of English. The Dental Admission Test (DAT) also is required and may be scheduled at any time through Sylvan Technology Centers.

Pre-Medicine

There are eight medical schools in Texas, and they require a composite minimum of 90 semester hours, although more than 95 percent of applicants will have completed a bachelor's degree prior to admission. Minimum course prerequisites include 14 hours of biology, 16 hours of chemistry (general and organic), eight hours of physics, and six hours of English. The Medical College Admissions Test (MCAT) also is required.

Pre-Optometry

There is one Texas school offering a Doctor of Optometry degree and it requires a baccalaureate for admission. This school requires a minimum of 20 semester hours of biology, 15 hours of chemistry (inorganic, organic and biochemistry), nine hours of mathematics, eight hours of physics, and three hours of psychology. The Optometric Admissions Test (OAT) also is required for admission.

Pre-Occupational Therapy

There are six schools that offer occupational therapy programs in Texas all at the master's level. Composite course prerequisites include 19 semester hours of biology (including medical terminology), four hours of inorganic chemistry, four hours of physics, six hours of mathematics, nine hours of English, nine hours of psychology, six hours of sociology, and the remainder in history, political science and humanities, kinesiology and electives. Additionally, most schools require 20-40 hours of field observation time in support of the application, and one school requires the Health Occupations Aptitude Exam (HOAE).

Pre-Pharmacy

There are six pharmacy schools in Texas, none of which require a bachelor's degree for admission. However, because of the competitiveness of the programs, a bachelor's degree is recommended. Composite course requirements include 20 semester hours of biology, 16 hours of chemistry (inorganic and organic), eight hours of physics, six hours of mathematics, 12 hours of English and speech, and the remainder in history, political science, and behavioral, cultural, or social sciences. The Pharmacy College Admissions Test (PCAT) also is required for admission.

Pre-Physical Therapy

There are nine physical therapy schools that offer the master's-level entry degree,

all of which require a bachelor's degree for admission. Composite course prerequisites include 19 semester hours biology (including medical terminology), eight hours of inorganic chemistry, eight hours of physics, six hours of mathematics, 15 hours of English and speech, six hours of psychology, and the remainder in history, political science, and behavioral, cultural, or social sciences. Additionally, a minimum of 75-150 hours of field observation time in up to three different settings are required in support of the application.

Pre-Physician Assistant

There are seven schools in Texas, none of which require a bachelor's degree for admission. However, because of the competitiveness of the programs, a bachelor's degree is recommended. Composite course requirements include 20 semester hours of biology, 16 hours of chemistry (inorganic and organic), six hours of mathematics, 12 hours of English and speech, and the remainder in history, political science, and behavioral, cultural, or social sciences, medical terminology (recommended). The Graduate Record Exam (GRE) also is required for admission

Pre-Veterinary Medicine

There is only one veterinary school in Texas. It does not require a bachelor's degree for admission; but because of the competition, a bachelor's degree is highly recommended. Prerequisites include 12 semester hours of biology, 19 hours of chemistry (inorganic, organic, and biochemistry), three hours of mathematics, eight hours of physics, 12 hours of English and speech, and four hours of animal nutrition. Experience in working with large animals is recommended.