

S
&
E



**College of
Science and Engineering
2009-11**

College of Science and Engineering

DR. EDWIN LEMASTER, DEAN

Engineering Building, Room 1.294
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-2404
Fax: 956/381-2428
E-mail: elemaster@utpa.edu
www.utpa.edu/colleges/cose.cfm

▲ GENERAL OVERVIEW

The College of Science and Engineering consists of the departments of Biology, Chemistry, Computer Science, Electrical Engineering, Manufacturing Engineering, Mechanical Engineering, Mathematics, and Physics and Geology.

▲ ACADEMIC PROGRAMS

The college offers the Bachelor of Science in biology, chemistry, computer science, computer engineering, electrical engineering, manufacturing engineering, mathematics, applied mathematics, mechanical engineering, physics, environmental science, and Bachelor of Science in interdisciplinary studies degrees in middle school mathematics and middle school science.

Students may minor in biology, chemistry, biochemistry, computer science, electrical engineering, elementary mathematics, geology, manufacturing engineering, mathematics, mechanical engineering/thermal, middle school mathematics, physical science, and physics and statistics. Secondary certification is available in life sciences and mathematics, and middle school teacher certification is available in mathematics and middle school science.

Also included in the biology and chemistry departments are programs for pre-dental, premedical, and pre-optometry students. Chemistry also has a plan of study for pre-pharmacy students.

At the graduate level, students can earn master's degrees in biology, chemistry, computer science, electrical engineering, engineering management, information technology, manufacturing engineering, mechanical engineering, mathematical sciences or mathematics teaching. More information on master's degrees is available in the Graduate Catalog.

The College of Science and Engineering provides several options to satisfy the University core curriculum requirements in science, mathematics and computer literacy.

New state-of-the-art facilities house the departments

of biology, chemistry, mechanical engineering, electrical engineering, manufacturing engineering and computer science.

▲ Overview

The School of Engineering and Computer Science is an organization within the College of Science and Engineering that groups together four of the eight academic departments in the college. The school is made up of three engineering departments: electrical, manufacturing and mechanical engineering plus the computer science department. The school is headed by an associate dean and director who oversee the academic program development, the accreditation processes and the effective interactions with industry for the departments within the school. There is an external industry advisory council for computer science and also an engineering advisory council that provide advice on program development, evaluation of our placement processes for graduates and general feedback on the preparation of our students for jobs in industry or government facilities.

▲ ACADEMIC PROGRAMS

Each of the four departments in the School of Engineering and Computer Science offers the bachelor's and the master's degree in the discipline. The graduates of these four departments are among the most sought-after University graduates and command the highest starting salaries for bachelor's degrees, according to a recent survey of the National Association of Colleges and Employers.

All four departments share the new Engineering Building that contains more than \$7 million of teaching and research equipment. More than 63 percent of the funded research in the College of Science and Engineering resides in the School of Engineering and Computer Science. The enrollment of majors in the school is about 1,400 and makes up about half the total enrollment of the college.

DR. MIGUEL GONZALEZ, ASSOCIATE DEAN

Telephone: 956/381-3522
E-mail: gonzalezma@utpa.edu
School of Engineering and Computer Science
Engineering Building, Room 1.294
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-3510
Fax: 956/381-2428
E-mail: ldutschman@utpa.edu
Web site: www.utpa.edu/colleges/cose.cfm

▲ SPECIAL PROGRAMS IN MEDICINE AND DENTISTRY

The Department of Biology houses a Special Programs Office (SCIE Bldg., Room 1.352) which administers

several cooperative programs in premedical and pre-dental education. These programs are designed to provide a pipeline of highly competitive South Texas students into medical and dental school. Each program requires a separate application which must be filed with the Special Programs Office.

Application deadlines vary depending on the program with several programs requiring an application as a high school senior. Please contact the special programs coordinator at 956/316-5216 or stop by the Special Programs Office for applications and additional information. Students accepted into these programs hold a guarantee of acceptance to the partner medical/dental school provided specific program requirements are met. These requirements generally include maintaining a specific overall and science grade point average and earning a specific minimal score on the required standardized test. There may be additional program opportunities and requirements depending on the specific program. The following programs are available through the Special Programs Office:

Programs in Medicine:

- Joint Admission Medical Program with the State of Texas Medical Schools
- Premedical Honors College with Baylor College of Medicine
- Early Medical School Acceptance Program with The University of Texas Medical Branch at Galveston
- Facilitated Admissions for South Texas Scholars with The University of Texas Health Science Center at San Antonio School of Medicine

Programs in Dentistry:

- Early Dental School Acceptance Program with The University of Texas Dental Branch at Houston
- Dental Early Acceptance Program with The University of Texas Health Science Center at San Antonio Dental School
- 3-4 and 4-4 Dual Degree Program with Baylor College of Dentistry

▲ Biology ▲

Dr. Mohammed Y.H. Farooqui,
Department Chair
Science Building, Room 2.352
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-3537
Fax: 956/381-3657
E-mail: farooqui@utpa.edu
www.utpa.edu/dept/biology

FULL-TIME FACULTY

Brush, Timothy, Professor
Cadena, Maria, Senior Lecturer
De La Pena, Antonio, Lecturer
Dearth, Robert, Assistant Professor
DeYoe, Hudson, Associate Professor
Dirrigl, Frank, Assistant Lecturer
Edwards, Robert J., Professor
Egle, Ardath L., Lecturer
Farooqui, Mohammed Y. H., Professor
Faulkes, Zen, Assistant Professor
Feria, Teresa Patricia, Assistant Professor
Fredensborg, Brian, Assistant Professor
Gunn, Bonnie, Lecturer
Gunn, Scott J., Professor
Judd, Frank W., Research Professor
Kuang, Anxiu, Associate Professor
Lieman, Jonathon, Assistant Professor
Little, Christopher, Assistant Professor
Lonard, Robert I., Research Professor
Lowe, Kristine, Assistant Professor
Materon, Luis A., Associate Professor
McDonald, John, Assistant Professor
Persans, Michael W., Associate Professor
Summy, Kenneth R., Associate Professor
Terry, Matthew, Assistant Professor
Vitek, Christopher, Assistant Professor
Wedig, Cindy M., Lecturer
Zaidan, Frederic III, Assistant Professor

EMERITUS FACULTY

Allison, Terry

▲ GENERAL OVERVIEW

The Department of Biology offers a major leading to a Bachelor of Science degree and a minor in biology. Biology students may elect a curriculum for a major in biology or biology with certification in 8-12 life science.

The department also offers study beyond the bachelor's degree leading to a Master of Science in biology. A limited number of teaching assistantships are usually available.

Interested persons should consult the Graduate Catalog or the chair of the Department of Biology.

NOTE: Students are typically expected to furnish their own transportation for laboratory sessions and field work.

▲ DEGREE REQUIREMENTS

Major in Biology

University Core Curriculum Requirements 43 hours

Complete the University core curriculum requirements as shown on pages 99-101 of this catalog, using CHEM 1301, 1101, 1302, and 1102 to satisfy the eight hours of natural science requirement.

Core Courses 12 hours

BIOL	1401	General Biology
		or
BIOL	1487	General Biology (Honors)
BIOL	1402	General Biology
		or
BIOL	1488	General Biology (Honors)
BIOL	4100	Biology Seminar
BIOL	3302	Biological Writing

Designated Electives 22 hours

Select one course from each of the following areas: molecular biology, cellular biology, microbiology or biotechnology

BIOL	3401	General Microbiology
BIOL	3403	Medical Microbiology and Immunology
BIOL	3412	Cell Biology
BIOL	3415	Introduction to Molecular Biology
BIOL	4404	General Virology
BIOL	4418	Electron Microscopy
BIOL	4420	Biotechnology

Genetics or Biological Evolution

BIOL	3301	Biological Evolution
BIOL	3413	Genetics
BIOL	4317	Disease Epidemiology
BIOL	4330	Molecular Evolution
BIOL	4417	Bacterial Genetics

Developmental or Morphological Biology

BIOL	2401	Vertebrate Zoology
BIOL	2402	Comparative Vertebrate Anatomy

BIOL	3406	Developmental Mechanisms
BIOL	3405	Histology
BIOL	3407	Comparative Embryology
BIOL	3408	Plant Morphology

Organismal or Environmental Biology

BIOL	2406	Environmental Biology
------	------	-----------------------

BIOL	3409	Ecology
BIOL	3414	Invertebrate Zoology
BIOL	4303	Mammalogy
BIOL	4304	Ichthyology
BIOL	4409	Herpetology
BIOL	4414	Plant Taxonomy
BIOL	4318	Ethnobotany
BIOL	4319	Medical Entomology
BIOL	4402	Marine Zoology
BIOL	4403	Introduction to Remote Sensing Technology
BIOL	4406	Mycology
BIOL	4407	Animal Parasitology
BIOL	4408	Plant Pathology
BIOL	4410	Marine Botany
BIOL	4412	Ornithology
BIOL	4415	Entomology
BIOL	4416	Environmental Toxicology
BIOL	4419	Aquatic Entomology
BIOL	4424	Microbial Ecology
BIOL	4426	Marine Ecology

Physiology

BIOL	2403	Anatomy and Physiology
BIOL	2404	Anatomy and Physiology
BIOL	3310	Neurobiology
BIOL	3411	Mammalian Physiology
BIOL	4405	Plant Physiology
BIOL	4411	Ecological Physiology of Animals
BIOL	4422	Neurobiology Methods

Select additional biology courses to complete 32 hours in biology, of which 22 must be advanced.

Other Requirements

Where appropriate, the following requirements may also be used to satisfy University core curriculum requirements.

Chemistry

Complete all of the following:

CHEM	2302/2102	Organic Chemistry I, Organic Chemistry Lab I Statistics
------	-----------	---

Complete three hours from the following:

MATH	2330	Elementary Statistics and Probability
		or
STAT	2330	Survey of Elementary Statistics

Other Science

PHYS 1401 and PHYS 1402 or GEOL 1401 and GEOL 1402 are recommended, but not required.

Minimum GPA Requirements

A minimum GPA of 2.5 in the required hours for both the

major and minor fields is required. A minimum GPA of 2.5 is required for pre-dental, premedical and pre-optometry majors.

Pre-Dental/Premedical/Pre-Optometry

Biology majors interested in attending dental, medical or optometry school are advised to include the following suggested and required courses in their major to maximize their potential for success. A minor in chemistry is suggested for all pre-professional students. Students should check with the health professions advisor at 956/381-3540 for updated requirements.

Pre-dental students are required to complete BIOL 1401, BIOL 1402, CHEM 1101/1301, CHEM 1102/1302, CHEM 2102/2302, CHEM 2130/2303, and PHYS 1401/1402. The students must complete a minimum of 90 hours and take the Dental Admissions Test (DAT) to apply to Texas dental schools. CHEM 3303 is required by U.T. Dental Branch in Houston and is highly suggested by the other dental schools. There is no specific mathematics requirement beyond the biology core requirements.

Premedical students are required to complete BIOL 1401, BIOL 1402, CHEM 1101/1301, CHEM 1102/1302, CHEM 2102/2302, CHEM 2130/2303, PHYS 1401 and PHYS 1402. The students must complete a minimum of 90 hours and take the Medical College Admissions Test (MCAT) in order to apply to Texas medical schools. CHEM 3303, BIOL 2402 and PSY 1310 are suggested by the medical schools. Either MATH 1401 or MATH/STAT 2330 is required for acceptance into medical school, however completion of both courses is suggested.

Pre-optometry students must complete a bachelor's degree prior to entering the University of Houston College of Optometry (some out of state schools require only 90 hours). Required coursework to enter optometry school includes: BIOL 1401, BIOL 1402, BIOL 2403, BIOL 2404, BIOL 3401, BIO 3411, CHEM 1101/1301, CHEM 1102/1302, CHEM 2102/2302, CHEM 2130/2303, CHEM 3303, MATH 1401, MATH/STAT 2330, PHYS 1401, PHYS 1402 and PSY 1310. Students must take the Optometry Admissions Test (OAT) in order to apply to optometry school.

Pre-dental, premedical and pre-optometry students who have completed a minimum of 90 hours and the general core curriculum requirements at UTPA may apply for a Bachelor of Science degree after completion of two years in an accredited college of medicine, dentistry or optometry, with grades acceptable for transfer to UT Pan American. The hours accepted will be credited toward a major and minor in biology or chemistry.

Major in Life Sciences with Teacher Certification

Thirty-six hours are required, 21 of which must be advanced.

Teacher Certification Programs and Requirements

Admission to College of Education (COE) teacher education programs is required for all undergraduate students seeking teacher certification. Students following high school certification degree plans (grades 8-12) should consult with their advisor in the department in which their degree is offered. They should also seek information from the COE Office of Teacher Certification and Admission Services at the Education Complex, Room 1.302, for admission requirements. Students may call the office at 956/381-3420 or log on to the Web site for more information at www.utpa.edu/colleges/coe/studentsservices.

The professional education courses for high school (8-12) certification include the following: EDHS 4301, EDHS 4302, EDHS 4303, EDHS 3305, READ 4351, EDHS 4398 and EDHS 4399.

University Core Curriculum Requirements 43 hours

Complete the University core curriculum requirements as shown on pages 99-101 of this catalog, using CHEM 1301, 1101, 1302, and 1102 to satisfy the eight hours of natural science requirement.

Core Courses 12 hours

BIOL	1401	General Biology or
BIOL	1487	General Biology (Honors)
BIOL	1402	General Biology or
BIOL	1488	General Biology (Honors)
BIOL	4100	Biology Seminar
BIOL	4315	Inquiry-Based Science

Designated Electives 24 hours

Select at least three hours from each of the following areas:		
molecular biology or cellular biology		
BIOL	3412	Cell Biology
BIOL	3415	Introduction to Molecular Biology
BIOL	4404	General Virology
BIOL	4404	Virology
BIOL	4416	Environmental Toxicology
BIOL	4420	Biotechnology

Genetics or Biological Evolution

BIOL	3301	Biological Evolution
BIOL	3413	Genetics

Environmental Biology

BIOL	2305	Environmental Biology
BIOL	3409	Ecology
BIOL	4426	Marine Ecology

Zoology

BIOL	3310	Neurobiology
BIOL	3405	Histology
BIOL	3407	Comparative Embryology
BIOL	3414	Invertebrate Zoology
BIOL	4303	Mammalogy

BIOL	4304	Ichthyology
BIOL	4407	Animal Parasitology
BIOL	4409	Herpetology
BIOL	4402	Marine Zoology
BIOL	4412	Ornithology
BIOL	4415	Entomology
BIOL	4419	Aquatic Entomology

Botany

BIOL	3408	Plant Morphology
BIOL	4405	Plant Physiology
BIOL	3410	A Survey of the Plant Kingdom
BIOL	4411	Ecological Physiology
BIOL	4414	Plant Taxonomy
BIOL	4318	Ethnobotany
BIOL	4406	Mycology
BIOL	4408	Plant Pathology
BIOL	4410	Marine Botany
BIOL	4418	Electron Microscopy
BIOL	4424	Microbial Ecology

Prokaryotic Biology

BIOL	3401	General Microbiology
BIOL	3403	Medical Microbiology and Immunology
BIOL	4417	Bacterial Genetics
BIOL	4424	Microbial Ecology
BIOL	4317	Disease Epidemiology

**Bachelor of Interdisciplinary Studies
Science 4-8 Certification**

Teacher Certification Programs and Requirements

Admission to College of Education (COE) teacher education programs is required for all undergraduate students seeking teacher certification. Students following middle school certification degree plans (grades 4-8) should consult with their advisor in the department in which their degree is offered. They should also seek information from the COE Office of Teacher Certification and Admission Services at the Education Complex, Room 1.302, for admission requirements. Students may call the office at 956/381-3420 or log on to the Web site for more information at www.utpa.edu/colleges/coe/studentservices.

The professional education courses for middle school (4-8) certification include the following: EDMS 3353, EDMS 3354, READ 3325, EDMS 3305, EDMS 3355, READ 3326, EDMS 4398 and EDMS 4399.

University Core Curriculum Requirements 43 hours

Complete the University core curriculum requirements as shown on pages 99-101 of this catalog, using PSCI 1421 and 1422 to satisfy the 8 hours of natural science requirement.

Middle School Content 50 hours/24adv.

ASTR	1401	General Astronomy
BIOL	1401	General Biology

BIOL	1402	General Biology
BIOL	3301	Evolution
BIOL	3409	Ecology
BIOL	2305	Environmental Biology
CHEM	1301	General Chemistry I
CHEM	1101	General Chemistry Lab I
GEOG	2313	Principles of Physical Geography
GEOL	1401	Physical Geology
GEOL	3401	Geomorphology
GEOL	3403	Oceanography
PHYS	3308 or 3309	Introduction to Nanotechnology or Introduction to Medical Imaging
PSCI	1421	Physical Science (from General Ed)
PSCI	1422	Physical Science (from General Ed)
SCIE	4240	Capstone Course
SCIE	4360	Applications of the Natural Sciences for Teachers
SCIE	4370	Planet Earth and its Inhabitants

Professional Development 15 hours

EDMS	3353	Young Adolescent Development and Learning
EDMS	3354	Middle School Curriculum Development and Assessment
EDMS	3305	Instructional Methods for English Language Learners and Learners with Exceptionalities in Middle Schools
EDMS	3355	Instructional Technology Methods and Classroom Management for Middle School Classrooms
EDMS	4398	Integrated Internship II: Seminar - Middle School

Additional Requirements 12 hours

READ	3326	Reading Across the Curriculum Content Areas
READ	3325	Cognitive Development and Reading Comprehension
EMAT	2306	Foundations of Mathematics I
EMAT	2307	Foundations of Mathematics II

Miscellaneous Requirements 6 hours

MMAT	3315	Probability and Statistics
------	------	----------------------------

Minor in Biology

Requires 18 hours in biology, of which six hours must be advanced.

Course Descriptions

A listing of courses offered by the Department of Biology can be found on page 228.

▲ ENVIRONMENTAL SCIENCE ▲

Dr. Robert J. Edwards, Director

Science Building, Room 1.316
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-3537
Fax: 956/381-3657
E-mail: redwards@utpa.edu

▲ GENERAL OVERVIEW

The interdisciplinary Bachelor of Science program in Environmental Science provides students with a broad foundation in the sciences and specialized knowledge in environmental biology, chemistry and geology. The program prepares students for careers in government, consulting, and industry as well as entry into graduate school. Employment opportunities include state and federal agencies charged with monitoring and managing the environment, environmental consulting firms, and industry positions in air and emissions monitoring, pollution prevention and remediation, and safety and health. An especially effective and marketable skill developed in this program is the use of geographic information systems and remote sensing techniques, which allow scientists and planners to map, analyze, and predict environmental scenarios.

▲ DEGREE REQUIREMENTS

Major in Environmental Science

University core Curriculum Requirements 43 hours

Complete the requirements shown in the core curriculum requirements section on pages 99-101 of this catalog EXCEPT for the following sections, groups or areas listed, which must be satisfied only as shown.

Natural Science and Mathematics
MATH 1401 Calculus

Core Courses

BIOL	1401	General Biology I
		or
BIOL	1487	General Biology I (Honors)
BIOL	1402	General Biology II
		or
BIOL	1488	General Biology II (Honors)
BIOL	3406	Conservation Biology
CHEM	1301	General Chemistry I

CHEM	1101	General Chemistry I Lab
CHEM	1302	General Chemistry II
CHEM	1102	General Chemistry II Lab
GEOL	1401	Physical Geology
GEOL	1402	Historical Geology
PHYS	1401	General Physics I
PHYS	1402	General Physics II
MATH	1401	Calculus I
MATH	2330	Elementary Statistics and Probability
ENVS	3400	Environmental Science and Public Policy
ENVS	3401	Environmental Regulations and Impact Analysis

Designated Electives 21 hours
Select a minimum of 21 hours from the following list of courses

BIOL	2305	Environmental Biology
BIOL	3409	Ecology
BIOL	4403	Introduction to Remote Sensing Technology
BIOL	4416	Environmental Toxicology
CHEM	2101	Analytical Chemistry Lab
CHEM	2301	Analytical Chemistry
CHEM	4104	Instrumental Analysis Lab
CHEM	4304	Instrumental Analysis
CHEM	4401	Environmental Chemistry
GEOL	3308	Introduction to Geographic Information Systems
GEOL	4302	Environmental Geology
GEOL	4408	Application of Geographic Information Systems

Students are required to select electives that will bring their total number of advanced hours to 51 and total hours for the completion of their degree to 120.

Minimum GPA Requirements

A minimum GPA of 2.5 in the required hours for the major is required.

Course Descriptions

A listing of courses can be found under the individual department listings.

▲ CHEMISTRY ▲

Dr. Hassan Ahmad, Department Chair
 Science Building, Room 3.316
 1201 W. University Drive
 Edinburg, TX 78539-2999
 Telephone: 956/381-3372
 Fax: 956/384-5006
 E-mail: ahmadh@utpa.edu
 Web site: www.utpa.edu/dept/chemistry

FULL-TIME FACULTY

Ahmad, Hassan, Professor, Biochemistry
 Banik, Bimal, Professor,
 Organic Chemistry
 Bhat, Narayan, Professor, Organic Chemistry
 Bullard, James, Assistant Professor
 DeLassus, Phillip, Professor,
 Physical Chemistry
 Diaz, Sylvia, Lecturer
 Gutierrez-Gonzales, Jose Juan,
 Assistant Professor, Organic Chemistry
 Han, Aijie, Assistant Professor
 Physical Chemistry
 Ibrahim, Elamin, Associate Professor,
 Analytical Chemistry
 Macossay-Torres, Javier, Assistant Professor,
 Organic Chemistry
 Mondal, Jalal U., Professor, Inorganic Chemistry
 Parsons, Jason, Assistant Professor
 Rampersad-Ammons, Joanne,
 Assistant Professor, Biochemistry
 Smith, Kenneth C., Assistant Professor,
 Chemical Education
 Villarreal, John R., Professor, Physical Chemistry
 Whelan, Thomas, Associate Professor, Chemistry

EMERITUS FACULTY

Baca, Ernest

▲ GENERAL OVERVIEW

The Department of Chemistry offers a major leading to a Bachelor of Science degree, certified by the American Chemical Society, and a minor in chemistry. The department also offers programs of study for premedical and pre-dental studies, each leading to a Bachelor of Science degree in chemistry. In addition, the department offers plans of study for pre-pharmacy and teacher certification in chemistry.

The Department of Chemistry offers undergraduate research projects to highly motivated chemistry majors interested in conducting individual research under the supervision of a faculty member. Such projects offer students

the opportunity to obtain knowledge of research methods in a specialized area and proceed to graduate school.

All new students who intend to major in chemistry should schedule an appointment with a faculty advisor within the department. Students are encouraged to consult with their faculty advisors regarding the degree requirements needed to satisfy their professional goals.

Mission

The Department of Chemistry is committed to the mission of providing quality education in the process of preparing students for graduate work or careers in chemistry and the biomedical sciences. The department strives to fulfill its mission by offering a program that leads to an undergraduate major or minor in chemistry. In addition, the department prepares students for admission to schools of dentistry, pharmacy and medicine. The department also offers a program that leads to teacher certification. The chemical curriculum is designed to introduce students to the fundamental fields of chemistry and provides opportunities for chemical research.

The department is committed to engaging in its activities of teaching, research and professional service in an environment of academic freedom.

The chemistry department at The University of Texas-Pan American provides an excellent program in helping the University fulfill its responsibility of providing high quality academic programs for the people of this region and the state of Texas.

▲ DEGREE REQUIREMENTS

Major in Chemistry

University Core Curriculum Requirements 43 hours

Complete the requirements shown in the university core curriculum requirements section on pages 99-101 of this catalog EXCEPT for the following sections, groups or areas listed, which must be satisfied only as shown.

Natural Science and Mathematics		
CHEM	1301	General Chemistry I
CHEM	1101	General Chemistry Lab I
CHEM	1302	General Chemistry II
CHEM	1102	General Chemistry Lab II
MATH	1460	Calculus (only 3 semester credit hours will be applied to the math core requirement)

Major Course Requirements 32 hours
 Chemistry Core Courses

CHEM	2301	Analytical Chemistry
CHEM	2101	Analytical Chemistry Lab
CHEM	2302	Organic Chemistry I
CHEM	2102	Organic Chemistry Lab I
CHEM	2303	Organic Chemistry II

CHEM	2103	Organic Chemistry Lab II
CHEM	3301	Inorganic Chemistry
CHEM	3202	Inorganic Chemistry Lab
CHEM	3103	Biochemistry Lab
CHEM	3303	Biochemistry
CHEM	3304	Physical Chemistry I
CHEM	3104	Physical Chemistry Lab I
CHEM	3305	Physical Chemistry II
CHEM	3105	Physical Chemistry Lab II
CHEM	4101	Chemistry Seminar
CHEM	4201	Chemistry Problems I
CHEM	4304	Instrumental Analysis
CHEM	4104	Instrumental Analysis Lab
CHEM	4105	Chemistry Capstone

Designated Electives in Chemistry

In addition to the major course requirements shown above, the Department of Chemistry offers the following elective courses: (These may be used to help satisfy the college requirement of 51 advanced hours or to acquire greater depth in a specific area of chemistry.)

CHEM	3306	Polymer Science and Engineering
CHEM	4202	Chemistry Problems II
CHEM	4301	Advanced Inorganic Chemistry
CHEM	4302	Advanced Biochemistry
CHEM	4303	Advanced Organic Chemistry
CHEM	4378	Special Topics in Chemistry

Other Course Requirements 16 hours

MATH	1460	Calculus I (only one semester credit hour applies to this area; the other three apply to the core)
MATH	1470	Calculus II
PHYS	1401	General Physics
PHYS	1402	General Physics

TOTAL 120 hours

Students are required to select electives that will bring their total number of advanced hours to 51 and the total number of hours for the completion of their degree to 120.

NOTE: The Department of Chemistry allows students to receive credits for courses in the curriculum if proficiency is demonstrated in these courses by advanced placement exams such as CEEB or CLEP. Contact the UT Pan American Testing Center for information on advanced placement tests.

Minimum GPA Requirements

A minimum GPA of 2.0 is required for both major and minor fields.

Pre-Dental and Premedical

Chemistry majors in pre-dental and premedical programs are required to complete 18 hours of biology of which six hours must be advanced.

Teacher Certification in Chemistry

Teacher Certification Programs and Requirements
Admission to College of Education (COE) teacher education programs is required for all undergraduate students seeking teacher certification. Students following high school certification degree plans (grades 8-12) should consult with their advisor in the department in which their degree is offered. They should also seek information from the COE Office of Teacher Certification and Admission Services at the Education Complex, Room 1.302, for admission requirements. Students may call the office at 956/381-3420 or log on to the Web site for more information at <http://www.utpa.edu/colleges/coe/studentsservices>.

The professional education courses for high school (8-12) certification include the following: EDHS 4301, EDHS 4302, EDHS 4303, EDHS 3305, READ 4351, EDHS 4398 and EDHS 4399.

Pre-Pharmacy

Students are required to complete the following courses in their freshman and sophomore years:

Freshman Year: ENG 1301, ENG 1302; CHEM 1301, CHEM 1101, CHEM 1302, CHEM 1102; BIOL 1401, BIOL 1402; MATH 1401; HIST 2313, HIST 2314;

Sophomore Year: English (sophomore literature) six hours; CHEM 2302, CHEM 2303, CHEM 2102, CHEM 2103; MATH 2330; PHYS 1401; POLS 2313, POLS 2314.

NOTE: The University of Texas at Austin requires one semester of freshman English and one of sophomore English. BIOL 3401 is required by the University of Houston and UT Austin, while Texas Southern University requires BIOL 2402. The University of Houston also requires COMM 1303, PSY 1310, three hours of social science electives, and six hours of cultural heritage electives, while UT Austin requires six hours of electives. Texas Southern University requires one hour of medical terminology and a three-hour elective in philosophy, music, sociology or psychology. Texas Tech University offers only the Pharm.D. degree. The prerequisites include COMM 1303, ECO 1301, PHYS 1402 and a minimum of 15 hours of electives in the humanities and social sciences. See the faculty advisor in the Department of Chemistry for more information, since curricula at other institutions may vary.

Minor in Chemistry

Requires 18 hours of chemistry of which six must be advanced.

Minor in Biochemistry

Requires 21 hours of CHEM courses of which nine hours must be advanced.

Required courses	12 hours
CHEM 1301	General Chemistry I
CHEM 1101	General Chemistry I Lab
CHEM 1302	General Chemistry II
CHEM 1102	General Chemistry II Lab
CHEM 2302	Organic Chemistry I

CHEM 2102 Organic Chemistry I Lab

Advanced Biochemistry courses 9 hours

CHEM 3303 Biochemistry
CHEM 4302 Advanced Biochemistry

Choose from:

CHEM 3101 Biochemistry Lab
and
CHEM 4203 Advanced Biochemistry Lab
or
CHEM 4306 Special Topics in

Biochemistry

Course Descriptions

A listing of courses offered by the Department of Chemistry can be found on page 233.

▲ COMPUTER ENGINEERING ▲

Professor Pearl W. Brazier, Program Director
 Computer Engineering Office
 Engineering Building, Room 3.245
 1201 W. University Drive
 Edinburg, TX 78539-2999
 Telephone: 956/292-7375
 Web Site: <http://cmpe.utpa.edu>
 E-mail: brazier@utpa.edu

FACULTY

The Computer Engineering Program is a Cooperative program with the Departments of Electrical Engineering and Computer Science.

The faculty associated with the Computer Engineering Program have appointments with those departments and teach computer engineering courses.

Affiliated faculty from the Departments of Electrical Engineering and Computer Science:

Abraham, John, Professor
 Asgharian, Laleh, Lecturer
 Brazier, Pearl, Associate Professor
 Yul Chu, Assistant Professor
 Kuang, Weidong, Assistant Professor
 Kumar, Sanjeev, Associate Professor
 Liu, Fang, Assistant Professor
 Liu, Yang, Assistant Professor
 Tsai, Ping-Sing, Senior Lecturer

Introduction

Computer engineering is a discipline that embodies the science and technology of design, construction and implementation of software and hardware components of modern computing systems and computer-controlled equipment. The body of knowledge for computer engineering includes algorithms, computer architecture and organization, computer systems engineering, circuits and signals, database systems, digital logic, digital signal processing, electronics, embedded systems, computer networks, operating systems, programming, software engineering and discrete structures. The curriculum has been designed following the guidelines of ACM and IEEE model curricula for computer engineering and in anticipation of meeting Accreditation Board for Engineering and Technology (ABET) standards (111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.) As a new program it is not yet accredited by ABET; however, the program intends to seek ABET accreditation as soon as all requirements to do so are met. The program awards a Bachelor of Science in Computer Engineering (BSCE).

Mission/Objectives

An objective of the BSCE program is to produce computer engineers who are prepared for both industry and further study at the graduate level. Graduates of the program will understand the importance of lifelong learning, and have the ability to understand and learn new technological developments in their field. Students graduating from the Computer Engineering Program should have the following: a knowledge of mathematics and basic sciences necessary for the analysis and design of computer hardware and software; an understanding of the principles of electronics as applicable to computer systems, including analysis, synthesis, simulation and testing of digital and analog electronics; an understanding of programming and software engineering, including specification, design and testing; an ability to combine hardware and software techniques to produce integrated systems; an in-depth knowledge beyond the basic level in one or more specific computer engineering topics selected by the student; and the ability to use their engineering knowledge to successfully complete design projects of substantial complexity including a capstone design project.

There are two distinct tracks available in the Computer Engineering Program - the hardware track and the software track. The objective of the software track is to provide additional concentrated skills in the area of software engineering, and quality assurance, database design, and networks. The objective of the hardware track is to provide additional concentrated skills in interfacing, embedded control, instrumentation and electronics.

▲ DEGREE REQUIREMENTS

Computer engineering education involves the traditional computer hardware education from electrical engineering department with the computer software education from

computer science department. A computer engineer should have a deep understanding of both hardware and software. In addition, their education program has extensive components of mathematics and science disciplines.

During the first two years of the program, students take comprehensive courses in mathematics, physics and chemistry along with introductory courses in computer science and electrical engineering. During the last two years of the program, students take an extensive set of courses in electronics, computing hardware and computing software.

With a computer engineering degree, an individual has a balanced view of hardware, software, hardware-software trade-offs, analysis, design and implementation techniques.

Computer Engineering -Hardware Track

The hardware track focuses on digital circuits and systems, microprocessor interfacing and systems design, system security and computer system architecture and design. The hardware track will encompass many electrical engineering classes, but will focus more on computer and digital systems.

- Computer networks
- Communication systems
- Computer system architecture and design
- Embedded systems
- Microcomputers
- Microprocessor interfacing and system design
- VLSI circuits and systems
- Large-scale hardware and software systems

Computer Engineering -Software Track

The software track allows students to learn about a broad range of topics in computer engineering, including software engineering, computer security, computer networks, computer graphics, computer languages, computer organization and architecture, parallel and distributed systems and artificial intelligence. The software track is designed to encompass many computer science classes, but focuses more on networking, database systems, operating systems and software engineering.

- Software Engineering
- Computer networks
- Computer architecture
- Computer systems
- Fault-tolerant computing
- Computer and network security
- Parallel and distributed systems
- Client and server-based tools for the Internet

Requirements

Foundation Courses

University Core Curriculum Requirements 43 hours

- ENG 1301 or 1387
- ENG 1302 or 1388
- ENG/Literature Course
- HIST 2313, 2333 or 2387
- HIST 2314 or 2388

- POLS 2313 or 2387
- POLS 2314 or 2388
- MATH 1460*
- PHYS 2401 and PHYS 2402
- CMPE 1370*
- Three hours art, music, dance or theatre
- PHIL 2393 or PHIL 2390
- Three hours from ANTH, ECO, PSY, SOC or CRIJ

Math and Sciences 18 hours

- CHEM 1301 and 1101 Chemistry for Engineers
- MATH 1460* Calculus
- MATH 1470 Calculus II
- MATH 3349 Differential Equations
- MATH 2346 Math for EE/CE
- CMPE 3342 Probability and Statistics for Electrical Engineers
- or
- MATH 4339 Probability and Statistics

*Three hours of MATH 1460 and two hours of CMPE 1370 are used to satisfy the University core curriculum requirements, the remaining hours are counted to fulfill mathematics and computer engineering requirements.

Computer Engineering Courses 44 hours

Courses required of all students in the program.

- CMPE 1370** Engineering Computer Science I
- CMPE 1170 Engineering Computer Science Lab
- CMPE 2380 Computer Science II
- CMPE 3333 Algorithms and Data Structures
- CMPE 3334 Systems Programming
- CMPE 3340 Software Engineering
- CMPE 4334 Operating Systems
- CMPE 2330 Digital Systems I
- CMPE 2130 Digital Systems I Lab
- CMPE 2320 Electrical Circuits I
- CMPE 2120 Electrical Circuits I Lab
- CMPE 3403 Electronics for CMPE
- CMPE 4303 Digital Systems II
- CMPE 4375 Introduction to VLSI
- CMPE 4335 Computer Architecture
- or
- CMPE 4380 Computer Architecture

Choose (4371 and 4372) or (4373 and 4374).

- CMPE 4371 Senior Design I Software and
- CMPE 4372 Senior Design II Software
- or
- CMPE 4373 Senior Design I Hardware and
- CMPE 4374 Senior Design II Hardware

** One hour of CMPE 1370 is used in the computer engineering required courses.

Take 15 hours from the software track or 15 hours from the hardware track below:

Software Track		15 hours
CMPE 3341	Software Engineering II	
CMPE 4345	Computer Networks	
CMPE 4333	Database Design and Implementation	
CMPE 4343	Software Verification, Validation and Quality Assurance	
CMPE 2333	Computer Organization and Assembly Language	
Hardware Track		15 hours
CMPE 2322	Signals and Systems	
CMPE 3226	Instrumental Lab	
CMPE 3331	Microcontroller and Embedded Systems Lab	
CMPE 4390	Communications Networks	
CMPE 3437	Microprocessor Systems	
Technical Electives		6 hours
Choose six hours from:		
CMPE 4301	Digital Image Processing	
CMPE 4327	Compiler Construction	
CMPE 4336	Parallel and Distributed Computing	
CMPE 4363	Computer and Network Security	
CMPE 4341	Topics in Computer Engineering	
CMPE 4343	Software Verification, Validation and Quality Assurance	
CMPE 4350	Artificial Intelligence	
CMPE 4365	Digital Signal Processing	
CMPE 4366	Introduction to Image Processing	
CMPE 4367	Fiber Optics Communication	
CMPE 4378	Signal Integrity and Electromagnetic Compatibility	
CMPE 4381	Interactive Systems and User Interface Design	
CMPE 4382	Computer Visualization	
Total		126 hours

Special Requirements

As part of the degree, all students must complete a two-semester capstone senior design project, represented by CMPE 4371 and 4372 or CMPE 4372 and 4374 in the degree plan. This project must be of substantial scope and complexity, demonstrate competencies from across the curriculum (in particular, the ability to design computer software, electronic hardware and integrate the two in systems) and address the social, economic and ethical consequences of the project.

Course Descriptions

A listing of courses offered by the Department of Computer Engineering can be found on page 240.

▲ COMPUTER SCIENCE ▲

Dr. Zhixiang Chen, Department Chair
Engineering Building, Room 3.295
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-3520
Fax: 956/384-5099
E-mail: chen@cs.utpa.edu

FULL-TIME FACULTY

Abraham, John P., Professor
Brazier, Pearl W., Associate Professor
Chebotko, Artem, Assistant Professor
Chen, Zhixiang, Professor
Dietrich, Gustavo D., Lecturer
Egle, David L., Lecturer
Figueroa-Lozano, Andres, Assistant Professor
Fowler, Richard H., Professor
Fu, Bin, Associate Professor
Grabowski, Laura M., Assistant Professor
Lawrence-Fowler, Wendy A., Professor
Liu, Fang, Assistant Professor
Liu, Yang, Assistant Professor
Schweller, Robert T., Assistant Professor
Tomai, Emmett, Assistant Professor

▲ INTRODUCTION

Computer science is the study of the structure, function and application of computers and is central to the rapidly expanding use of information technology. Computers have traditionally been used in business, engineering and scientific applications, and now applications are found in almost all human activities from art to zoology. Computer science is both an applied and theoretical discipline, supported by the principles of science, engineering and mathematics that has a direct and profound impact on the quality of life and society at large.

Mission

The department offers four degrees: Bachelor of Science in Computer Science (BSCS) as a broad-field major, Bachelor of Science (BS) with a major in computer science with a required minor field, Master of Science (MS) with a major in computer science, and Master of Science in Information Technology (MSIT). The BSCS degree is accredited by the Accreditation Board for Engineering and Technology Computing Accreditation Commission (CAC/ABET), 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700. The department offers a Bachelor of Science in Computer Engineering (BSCE) in cooperation with the Department of Electrical Engineering. The

department also offers courses leading to teacher certification in computer science, service courses to fulfill University core curriculum requirements, and computer science courses required for degree programs in engineering, science, and mathematics. Faculty conduct research in computer science, computer science education, and interdisciplinary fields, and contribute their professional service to student advising, mentoring, professional organizations, University activities, industrial interactions and to the community through professional expertise.

Goals

The undergraduate curricula in computer science are based on the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers Computer Society recommendations for curricula and reflect the goals of a liberal arts education. The graduate curricula provide advanced and specialized study in the areas of computer science and information technology. The curricula in computer science provide the student with marketable expertise to enter the computing and information technology fields, the skills and education required to adapt to the rapidly changing characteristic of the fields, and the foundation to pursue graduate study in computer science and information technology.

Objectives

The objectives for the BSCS degree are to provide graduates with a thorough grounding in the key principles and practices of computing, and in the basic mathematics and scientific principles that underpin them; to provide graduates with an understanding of the mathematical and scientific concepts that underlie computer science; to provide graduates with an understanding of human and social issues that will enable them to be informed and involved members of their communities, and responsible engineering and computing professionals; to provide students with appropriate social and organizational skills, and to prepare graduates for employment in the computer science profession upon graduation, as well as for successful careers in the rapidly changing profession, and for graduate study in computing.

Departmental Admission Requirements

Students must have computer experience equivalent to CSCI 1300 or CSCI 1360 and must have completed or be concurrently enrolled in MATH 1340 before enrolling in CSCI 1380 Computer Science I, or CSCI 1370 Engineering Computer Science I and CSCI 1170 Engineering Computer Science I Laboratory.

Other Information

The department has access to the well-equipped University computing facilities, which include IBM-compatible and Macintosh computers and Sun Workstations with networked access to the University VAX cluster and the Internet. Advanced courses and research efforts are supported by departmental Unix workstations.

▲ DEGREE REQUIREMENTS

The Department of Computer Science offers a 127-hour Bachelor of Science in Computer Science (BSCS) degree as a 49-hour broad-field major with supporting mathematics and science requirements to meet CAC/ABET accreditation standards, and a Bachelor of Science degree with a 40-hour major with a required minor field. The department offers two 18-hour minors in computer science and a 24-hour minor in computer science teacher certification. The Computer Science for Science and Engineering (CSSE) minor is designed for engineering, science, and mathematics majors, and the CSCI minor is designed for majors in any discipline. The computer science major can be completed to fulfill a plan for high school teacher certification.

For the 40-hour bachelor's degree with a major in computer science, students are required to complete a minor and are encouraged to select the minor from a supporting discipline. Typical minors include mathematics, business administration, and electrical engineering; however, a variety of other minors can support the degree. Students should seek continual advisement from the computer science faculty beginning from their freshman year to plan a timely completion of their degree. An official degree plan must be filed with the department upon completion of 60 hours of University courses.

Bachelor of Science in Computer Science (BSCS) as a Broad-Field Major

Students pursuing the (BSCS) as a broad-field major must complete the University core curriculum requirements and a computer science core. No minor is required for this degree; however, students may elect to complete a minor.

University Core Curriculum Requirements 43 hours

Complete the requirements shown in the University core curriculum requirements section shown on pages 99-101 of this catalog. PHIL 2390 or PHIL 2393 (Professional Ethics) must be taken to meet the philosophy requirement. Courses to meet the natural science requirement must be taken from biology, chemistry or physics.

NOTE: The computer literacy and mathematics requirements of the University core curriculum requirements can be met by required courses listed below. CSCI 1360 is the recommended computer literacy course for students who need an introduction to the concepts of computer science and programming experience before taking CSCI 1370 and 1170.

Computer Science Core Courses 34 hours

CSCI	1370	Engineering Computer Science I
CSCI	1170	Engineering Computer Science I Laboratory
CSCI	1381	Foundations of Computer Science
CSCI	2333	Computer Organization and Assembly Language

CSCI	2344	Programming in the Unix®/Linux Environment
CSCI	2380	Computer Science II
CSCI	3333	Algorithms and Data Structures
CSCI	3334	Systems Programming
CSCI	3336	Organization of Programming Languages
CSCI	3340	Software Engineering I
CSCI	4325	Automata, Formal Languages and Computability
CSCI	4390	Senior Project

Designated Computer Science Electives 15 hours

Select three hours from the following programming language courses:
 CSCI 3326, CSCI 3327 or CSCI 3328.
 Select six hours from the following:
 CSCI 4333, CSCI 4334, CSCI 4335, CSCI 4345.
 Any six advanced CSCI courses, excluding programming language courses.

NOTE: Only CSCI 4341 may be repeated for credit when topics change.

Mathematics/Engineering 21 hours

MATH	1460	Calculus I
MATH	1470	Calculus II
MATH	3345	Applied Linear Algebra
MATH	3373	Discrete Structures
ELEE	2130	Digital Systems Laboratory
ELEE	2330	Digital Systems Engineering I

Select three hours from the following:

MATH	3337	Applied Statistics I
MATH	4339	Mathematical Probability and Statistics
ELEE	3340	Probability and Statistics for Electrical Engineers

Communications/English 6 hours

ENG	3333	Technical Report Writing
-----	------	--------------------------

Select three hours from the following:
 COMM 1303 Presentational Speaking
 COMM 1313 Fundamentals of Speech Communication

Lab Science 4 hours

Any four-hour laboratory science course from biology, chemistry or physics. (This is in addition to the University core curriculum requirement but need not be in the same subject as the eight hours taken for that requirement.)

Other Electives 6-9 hours

Students must select electives to complete a total of 51 advanced hours in their degree. Depending on the selection of electives, this will require from six to nine hours of advanced electives.

Other Requirements

Students must complete all computer science core courses with a grade of C or better.

Total 127 hours

Bachelor of Science with a Major in Computer Engineering (BSCE)

The computer engineering degree is a cooperative program offered jointly with the electrical engineering department. The curriculum for the degree and description of the program can be found on page 186. Courses from computer science are cross-listed as CSCI and CMPE courses. Courses from electrical engineering are cross-listed as ELEE and CMPE courses.

Bachelor of Science (BS) with Major in Computer Science (minor required)

Students wishing to major in computer science must complete the University core curriculum requirements, a computer science core and the requirements for a related minor. It is recommended that students wishing to pursue graduate study in computer science complete Sequence one under the mathematics requirements.

University Core Curriculum Requirements 43 hours

Complete the requirements shown in the University core curriculum requirements section shown on pages 99-101 of this catalog. For the computer literacy requirement, CSCI 1360 or higher CSCI course may be recommended by the department for students with prior computer experience. Mathematics requirement can be satisfied by requirements listed below.

Computer Science Core Courses 28 hours

CSCI	1370	Engineering Computer Science I
CSCI	1170	Engineering Computer Science I Laboratory
CSCI	1381	Foundations of Computer Science
CSCI	2333	Computer Organization and Assembly Language
CSCI	2344	Programming in the UNIX®/Linux Environment
CSCI	2380	Computer Science II
CSCI	3333	Algorithms and Data Structures
CSCI	3334	Systems Programming
CSCI	3336	Organization of Programming Languages
CSCI	3340	Software Engineering I

Designated Electives in Computer Science 12 hours

Select three hours from the following:
 CSCI 3326, CSCI 3327, CSCI 3328
 Select six hours from the following:
 CSCI 4333, CSCI 4334, CSCI 4335 or CSCI 4345.
 Select three hours of advanced CSCI courses, excluding programming language courses.

Mathematics 11 hours

MATH 3373 Discrete Structures
 Complete at least two of the following courses:
 MATH 1450 Pre-calculus with Trigonometry
 MATH 1460 Calculus I
 MATH 1470 Calculus II

Communications/English 6 hours

ENG 3333 Technical Report Writing

Select three hours from the following:

COMM 1303 Presentational Speaking
 COMM 1313 Fundamentals of Speech
 Communication

Minor 18 hours

Students must complete all requirements for a related minor.

Other Electives 12 hours

Students must select electives to complete a total of 51 advanced hours in their degree. Depending on the number of advanced courses for the minor, the selection of elective hours in the major and the selection of other course requirements, this will require 12 hours of advanced electives.

Other Requirements

Students must complete all computer science core Courses with a grade of C or better.

TOTAL 125 hours

Teacher Certification in Computer Science

Teacher certification in computer science is required for teachers of Computer Science I and II in the high schools. This certification also allows teachers to teach the computer literacy course in the junior high school. Admission to College of Education (COE) teacher education programs is required for all undergraduate students seeking teacher certification. Students following high school certification degree plans (grades 8-12) should consult with their advisor in the department in which their degree is offered. They should also seek information from the COE Office of Teacher Certification and Admission Services at the Education Complex, Room 1.302, for admission requirements. Students may call the office at 956/381-3420 or log on to the Web site for more information at <http://www.utpa.edu/colleges/coe/studentsservices>.

Minor in Computer Science**Core Courses** 10 hours

CSCI 1370 Engineering Computer Science I
 CSCI 1170 Engineering Computer Science I
 Laboratory
 CSCI 1381 Foundations of Computer Science
 CSCI 2380 Computer Science II

Designated Electives 9 hours

Select one of CSCI 3326, CSCI 3327 or CSCI 3328.

Select six hours of advanced computer science courses.

TOTAL 19 hours

Minor in Computer Science for Engineering Majors**Required Course** 16 hours

CSCI 1370 Engineering Computer Science I
 CSCI 1170 Engineering Computer Science I
 Laboratory
 CSCI 2344 Programming in UNIX@/
 Linux Environments
 CSCI 2380 Computer Science II
 CSCI 3333 Algorithms and Data Structures
 CSCI 3334 Systems Programming

Designated Elective 3 hours

Select one from the following courses:

CSCI 3336 Organization of Programming
 Languages
 CSCI 3340 Software Engineering I
 CSCI 4333 Database Design and
 Implementation
 CSCI 4334 Operating Systems
 CSCI 4350 Artificial Intelligence
 CSCI 4360 Interactive Computer Graphics
 and Systems

Minor in Computer Science with Teacher Certification in Computer Science**Core Courses** 12-13 hours

CSCI 1380 Computer Science I
 or
 CSCI 1370 and CSCI 1170
 CSCI 1381 Foundations of Computer Science
 CSCI 2380 Computer Science II
 CSCI 3333 Algorithms and Data Structures

Designated Electives 12 hours

Select one of CSCI 3326, CSCI 3327, or CSCI 3328.

Select nine advanced hours in computer science (up to six hours from CIS 3335, CIS 3338 and CIS 4308 may be used to partially satisfy this requirement).

TOTAL 24 hours

Course Descriptions

A listing of courses offered by the Department of Computer Science can be found on page 254.

ENGINEERING ▲

Dr. Heinrich D. Foltz, Department Chair
Engineering Building, Room 3.214
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-2609
Fax: 956/381-3527
E-mail: hfoltz@utpa.edu

FULL-TIME FACULTY

Banatoski, Edward, Lecturer
Ben Ghalia, Mounir, Associate Professor
Chu, Yul, Assistant Professor
Dong, Wenjie, Assistant Professor
Foltz, Heinrich, Professor
Huq, Hasina, Assistant Professor
Kuang, Weidong, Assistant Professor
Kumar, Sanjeev, Associate Professor
LeMaster, Edwin, Professor
Li, Junfei, Associate Professor
Peng, Jun, Assistant Professor
Ramos-Salas, Jaime, Assistant Professor
Son, Jae Sok, Associate Professor

▲ OVERVIEW

Electrical engineering is a broad field with applications in almost all areas of industry, including computer systems, control systems, telecommunications, semiconductors, electronics, and electric power.

The Department of Electrical Engineering offers a Bachelor of Science in Electrical Engineering (BSEE) degree that is accredited by the Engineering *Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

This degree provides a broad, solid education in engineering fundamentals as well as the opportunity for in-depth study in specialized topics. Students completing the program will have rigorous foundation for engineering practice in industry as well as for graduate studies in engineering and other disciplines. The program has well-equipped, accessible laboratories and extensive computing facilities.

A Master of Science in Engineering (MSE) degree is also offered. For more information, consult the graduate catalog. *ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202

Mission

The Department of Electrical Engineering will provide students a quality education to prepare them for the practice of engineering with sufficient depth to continue their education beyond the baccalaureate degree. The curriculum will provide skills that enhance the understanding of the applications of engineering sciences. In order to provide an awareness of current and emerging industrial practice, the department will provide the students the opportunity to participate in professional organization, industrial internships or co-op experiences, and scholarly activities including supervised research. The faculty will be readily accessible and will continuously strive to improve their instructional materials and the methods of dissemination. The faculty will also practice lifelong learning by keeping abreast of and participating in the latest developments in their chosen areas of expertise and interacting across disciplines. The opportunity for student success in the undergraduate programs will be enhanced by liberal access to the computational facilities and laboratories.

▲ DEGREE REQUIREMENTS

University Core Curriculum Requirements 43 hours

Students must meet the University core curriculum requirements; however, some of the requirements must be fulfilled with particular courses in order to graduate with the minimum number of hours:

English and Literature	9 hours
Same as University Requirements	
The Arts	3 hours
Same as University Requirements	
Philosophy	3 hours
PHIL 2390 or PHIL 2393	
Natural Science	8 hours
PHYS 2401 PHYS 2402	
Mathematics	3 hours
MATH 1460*	
Computer Literacy	2 hours
CSCI 1380*	
History	6 hours
Same as University Requirements	
Political Science	6 hours
Same as University Requirements	
Other Social Science	3 hours
ECON 2301	

*NOTE: Three hours of MATH 1460 and two hours of CSCI 1380 are used to satisfy the University core curriculum requirements, the remainder fall under "Other Course Requirements."

Electrical Engineering Required Courses 45 hours

ELEE 1101	Introduction to Electrical Engineering
ELEE 2319	Numerical Computation and Data Visualization
ELEE 2330	Digital Systems Engineering I

ELEE 2130	Digital Systems Laboratory
ELEE 2320	Electrical Circuits I
ELEE 2120	Electrical Circuits I Laboratory
ELEE 2321	Electrical Circuits II
ELEE 3301	Electronics I
ELEE 3225	Electrical Engineering Lab I
ELEE 3435	Microprocessor Systems
ELEE 3315	Electromagnetic Engineering
ELEE 3302	Electronics II
ELEE 3330	Electrical Engineering Lab II
ELEE 4303	Digital Systems Engineering II
ELEE 4321	Automatic Control Systems
ELEE 4351	Communication Theory
ELEE 4328	Solid State Electronic Devices

Electrical Engineering Elective Courses 9 hours

Students choose nine hours of additional ELEE courses with faculty advisor approval. The following courses have been approved as electives:

ELEE 3370	Power Electronics
ELEE 3371	Electrical Power Systems Design and Application
ELEE 4323	Rapid Control Prototyping
ELEE 4325	Introduction to Robotics
ELEE 4360	Microwave Systems Engineering
ELEE 4365	Digital Signal Processing
ELEE 4366	Image Processing
ELEE 4367	Fiber Optic Communications
ELEE 4372	Electrical Machinery and Power Systems Fundamentals
ELEE 4375	Introduction to VLSI Design
ELEE 4380	Computer Architecture
ELEE 4390	Communications Networks
ELEE 4333	Topics in Electrical Engineering (may be repeated for credit)

Other elective course options may be available. Consult your faculty advisor for approval. ELEE 3305, ELEE 3306, and ELEE 3307 are not acceptable as technical electives.

Senior Design 6 hours

Students must complete a major capstone design project, to be completed over a two-semester period.

ELEE 4361	Senior Design I
ELEE 4362	Senior Design II

Other Course Requirements* 22 hours

MATH 1470	Calculus II
MATH 2346	Mathematics for Electrical Engineers
MATH 2401	Calculus III
MATH 3349	Differential Equations
ELEE 3340	Probability and Statistics for Electrical Engineers
	or
MATH 4339	Mathematical Probability and Statistics
MECE 2305	Engineering Mechanics

or
CHEM 1301 General Chemistry I

*Includes one hour each from MATH 1460 and CSCI 1380.

Total 125 hours

A grade of C or higher is required in any course that is a prerequisite (directly or indirectly) for an ELEE course. Electrical Engineering courses in which a grade of C or higher has been earned cannot be repeated in an attempt to earn a higher grade.

Minor in Electrical Engineering

This minor is suitable for students who wish to have a general introduction to applications of electricity and electronics.

Required Courses 3 hours

ELEE 3307 Electrical/Electronic Systems

Elective Courses 15 hours

Select 15 hours of ELEE course, at least six hours of which must be advanced.

Minor in Electrical Engineering for Computer Science Majors

This minor is designed for computer science majors and other students with a particular interest in the area of computer engineering.

Required Courses 10 hours

ELEE 2330	Digital Systems Engineering I
ELEE 2130	Digital Systems I Lab
ELEE 3307	Electrical/Electronic Systems
ELEE 3340	Probability and Statistics for Electrical Engineers
	or
MATH 4339	Mathematical Probability and Statistics

Elective Courses 9 hours

Select three courses from the following:

ELEE 4303	Digital Systems Engineering II
ELEE 4375	Introduction to VLSI Design
ELEE 4380	Computer Architecture
ELEE 4390	Communication Networks

NOTE: Students should not take both ELEE 4380 and CSCI 4335, or ELEE 4390 and CSCI 4345.

Course Descriptions

A listing of courses offered by the Department of Electrical Engineering can be found on page 273.

▲ MANUFACTURING ENGINEERING ▲

Dr. Douglas H. Timmer, Department Chair
 Engineering Building, Room 3.224
 1201 W. University Drive
 Edinburg, TX 78539-2999
 Telephone: 956/381-2606
 Fax: 956/381-3527
 E-mail: timmer@utpa.edu

FULL-TIME FACULTY

Bose, Subhash C., Professor
 Butler, Alley, Professor
 Gonzalez, Miguel, Associate Professor
 Ignizio, James, Professor
 Lee, Kye-Hwan, Assistant Professor
 Li, Jianzhi, Assistant Professor
 Lloyd, John, Research Professor
 Nambiar, Rajiv V., Associate Professor
 Timmer, Douglas H., Associate Professor

▲ GENERAL OVERVIEW

UT Pan American offers the Bachelor of Science degree in manufacturing engineering that is equivalent in scope to engineering programs at other institutions in Texas. The bachelor's degree has accreditation from the Engineering Accreditation Commission of the *Accreditation Board for Engineering and Technology (ABET) effective May 1996. The engineering curriculum provides a rigorous foundation for engineering practice in industrial and governmental organizations as well as for graduate studies in engineering, business administration, law and medicine. In addition, a number of graduate engineering courses are offered for professional development and a Master of Science degree in engineering-concentration manufacturing.

UT Pan American is located in an industrialized region with numerous manufacturing facilities that provide an unusual opportunity for students to participate in practical applications of engineering knowledge in both the United States and Mexico.

*ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202

Mission

The UTPA Department of Manufacturing Engineering will provide a quality engineering education to prepare students for the practice of engineering. A strong laboratory component in the curriculum, with opportunities for industrial internships and research experience, will provide engineering

skills that enhance the understanding of the applications of engineering sciences and the importance of lifelong learning. A strong emphasis on verbal and written communication is stressed in all aspects of the curriculum.

▲ DEGREE REQUIREMENTS

University Core Curriculum Requirements 43 hours
 (Sixteen hours of the University core curriculum requirements are satisfied as part of the basic engineering requirements.) All students must complete the University's core curriculum requirements shown on pages 99-101 of this catalog EXCEPT for the sections, groups and areas noted below which must be satisfied as shown.

Humanities and Visual and Performing Arts	12 hours
Must select Art, Music, Dance or Theatre Appreciation	3 hours
PHIL 2390	3 hours
English Literature	3 hours
Science and Mathematics	11 hours
Computer Literacy	2 hours
Social Sciences	3 hours
U.S. History	6 hours
Political Science	6 hours
Economics	3 hours

TOTAL 43 hours

Manufacturing Engineering Required Courses 40 hours
 Students must complete the following required courses that includes two technical electives that are selected from upper-level manufacturing engineering courses not included in this list.

MANE 2332	Engineering Statistics
MANE 3164	Manufacturing Processes Lab
MANE 3300	Computer-Aided Design
MANE 3302	Computer-Aided Manufacturing
MANE 3337	Engineering Economics
MANE 3340	Fundamentals of Industrial Engineering
MANE 3351	Manufacturing Engineering Analysis
MANE 3364	Manufacturing Processes
MANE 4311	Quality Control
MANE 4321	Automation Systems
MANE 4340	Operations Research
MANE 4331	Manufacturing Planning and Control
MANE 33xx/43xx	Technical Elective 1
MANE 33xx/43xx	Technical Elective 2

Senior Design 6 hours
 Students must complete a major capstone design project, to be completed over a two-semester period.

ENGR	4361	Senior Design 1	
ENGR	4362	Senior Design 2	
Other Course Requirements			8 hours
CHEM	1301	General Chemistry 1	
CHEM	1101	General Chemistry 1 Lab	
CSCI	1380	Computer Science	
ENGR	1101	Introduction to Engineering	
ELEE	3305	Electrical Systems	
MATH	1470	Calculus II	
MATH	3349	Differential Equations	
MECE	1221	Engineering Graphics	
MECE	2303	Statics	
MECE	2304	Dynamics	
MECE	2335	Thermodynamics I	
MECE	2440	Engineering Materials	
MECE	3315	Fluid Mechanics	
MECE	3321	Mechanics of Solids	

Total 127 hours

Engineering courses in which a grade of C or higher has been earned cannot be repeated in an attempt to earn a higher grade.

Minor in Manufacturing Engineering

This minor provides a background in manufacturing engineering. It is intended to support business majors and other engineering majors and will be especially valuable for those who will be involved in manufacturing enterprises. It requires 18 hours in engineering, six of which must be at the advanced level.

The minor requires certain support courses as prerequisites. Check with the department for more information.

Required Courses			11 hours
MANE	3332	Engineering Statistics	
MANE	3364	Manufacturing Processes	
MANE	3164	Manufacturing Processes Lab	
MECE	2440	Engineering Materials	

Designated Electives			7 hours
Select seven hours from the following:			
MANE	3101	Projects in Manufacturing Engineering	
MANE	3300	Computer-Aided Design	
MANE	3302	Computer-Aided Manufacturing	
MANE	4311	Quality Control	
MANE	4331	Manufacturing Planning and Control	
MANE	4352	Manufacturing Simulation	

Course Descriptions

Courses offered by the Department of Manufacturing Engineering can be found under their respective headings in the course descriptions section beginning on page 302.

▲ MECHANICAL ENGINEERING ▲

Dr. Robert A. Freeman, Department Chair
Engineering Building, Room 3.222A
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-2381
Fax: 956/381-3527
E-mail: rafree@utpa.edu

FULL-TIME FACULTY

Ahn, Seokyoung, Assistant Professor
Caruntu, Dumitru, Assistant Professor
Choutapalli, Isaac, Assistant Professor
Crown, Stephen, Professor
Freeman, Robert, Professor
Fuentes, Arturo, Associate Professor
Jones, Robert, Professor
Kypuros, Javier, Associate Professor
Lozano, Karen, Professor
Mihut, Dorina, Assistant Professor
Park, Young-Gil, Assistant Professor
Qubbaj, Ala, Associate Professor
Sarkar, Kamal, Lecturer
Tarawneh, Constantine, Associate Professor
Vasquez, Horacio, Assistant Professor

Mission

The Department of Mechanical Engineering will provide students a quality education to prepare them for the practice of engineering, with sufficient depth to continue their education beyond the baccalaureate degree. The curriculum will provide skills that enhance the understanding of the applications of engineering sciences. In order to provide an awareness of current and emerging industrial practice, the department will provide the students the opportunity to participate in professional organizations, industrial internships or co-op experiences, and scholarly activities including supervised research. The faculty will be readily accessible and will continuously strive to improve their instructional materials and the methods of dissemination. The faculty will also practice lifelong learning by keeping abreast of and participating in the latest developments in their chosen areas of expertise and interacting across disciplines. The opportunity for the student success in the undergraduate programs will be enhanced by liberal access to the computational facilities and laboratories.

▲ GENERAL OVERVIEW

The School of Engineering and Computer Science offers an accredited Bachelor of Science degree in mechanical

engineering from the Engineering Accreditation Commission of the *Accreditation Board for Engineering and Technology (ABET) effective 1996.

The mechanical engineering curriculum provides a rigorous foundation for engineering practice in industrial and governmental organizations as well as graduate studies in engineering.

Mechanical engineers possess a broad technical background that enables them to work in virtually every industrial sector. They are concerned generally with the development of energy systems, power generation, environmental control machines and vehicles, as well as materials processing. Mechanical engineers usually work closely with engineers having other specializations.

*ABET, Inc., 111 Market Place, Suite 1050; Baltimore, MD 21202

The total course requirements for a Bachelor of Science in mechanical engineering consist of the following:

▲ DEGREE REQUIREMENTS

University Core Curriculum Requirements 43 hours

Humanities 15 hours

A course in visual and performing arts.

ENG 1301 Composition

ENG 1302 Rhetoric

ENG 23xx Sophomore Literature

PHIL 2390 Professional Ethics

Science and Math 12 hours

MATH 1460 Calculus I

PHYS 2401 Physics Science and Engineering I

PHYS 2402 Physics Science and Engineering II

Computer Literacy 2 hours

Social Science 15 hours

ECON 2301 Principles of Economics

HIST 2313 American Heritage I

HIST 2314 American Heritage II

POLS 2313 U.S. and Texas Government and Politics

POLS 2314 U.S. and Texas Government and Politics

Other Non-Engineering Courses 8 hours

CHEM 1107 Chemistry in Engineering Lab

CHEM 1307 Chemistry in Engineering

MATH 1470 Calculus II

Highly qualified students are expected to obtain advanced standing credit through acceptable test scores on ACT, CEEB (Advanced Placement Test) or CLEP. Common courses for which advanced standing credit can be obtained are:

CHEM	1107	ECON	2301
HIST	2313	PHYS	2402
CHEM	1307	ENG	1301
HIST	2314	POLS	2313
ENG	1302	MATH	1460
POLS	2314	ENG	23xx
PHYS	2401		

Engineering Courses 68 hours

ELEE	3307	Electrical and Electronic Systems
MANE	3164	Manufacturing Processes Lab
MANE	3364	Manufacturing Processes
MECE	1101	Introduction to Mechanical Engineering
MECE	1221	Engineering Graphics
MECE	2303	Statics
MECE	2304	Dynamics
MECE	2335	Thermodynamics I
MECE	2140	Engineering Materials Lab
MECE	2340	Engineering Materials
MECE	2450	Numerical Methods and Statistics
MECE	3115	Fluid Mechanics Laboratory
MECE	3160	Heat Transfer Laboratory
MECE	3304	System Dynamics
MECE	3315	Fluid Mechanics
MECE	3320	Measurements and Instrumentation
MECE	3321	Mechanics of Solids
MECE	3336	Thermodynamics II
MECE	3449	Mechanical Engineering Analysis I
MECE	3450	Mechanical Engineering Analysis II
MECE	3360	Heat Transfer
MECE	3380	Kinematics and Dynamics of Machines
MECE	4101	Fundamentals of Engineering
MECE	4350	Machine Elements
MECE	4361	Senior Design Project I
MECE	4362	Senior Design Project II

Technical Electives (choose nine hours) 9 hours

MECE	3385	Mechanical Vibrations
MECE	4304	Automatic Control Systems
MECE	4305	Vehicle Systems Modeling and Control
MECE	4315	Compressible Fluid Flow
MECE	4316	Introduction to Acoustics
MECE	4320	Introduction to Mechatronics
MECE	4322	Introduction to the Practice of Finite Elements
MECE	4323	Introduction to Combustion Engineering
MECE	4325	Composite Material Design
MECE	4326	Introduction to Ceramics Engineering
MECE	4327	Intermediate Materials Engineering
MECE	4328	Polymer Engineering
MECE	4329	Introduction to Nanotechnology
MECE	4330	Introduction to Physical Metallurgy
MECE	4360	Solar Energy
MECE	4365	Heating, Air Conditioning and Refrigeration Design

MECE	4380	Introduction to Computational Biomechanics
MECE	4381	Orthopedic Biomechanics

TOTAL 127 hours

Additional Program Requirements

Students must receive a grade of C or better in all courses that are prerequisites for mechanical engineering courses.

Minor in Mechanical Engineering/Thermal

This minor provides a background in thermal sciences, fluids and heat transfer. It is intended to support majors in chemistry, physics and mathematics. The minor requires a total of 18 hours of mechanical engineering courses, of which six must be at the advanced level. The minor requires certain support courses as prerequisites as shown below.

Required Courses

MECE	2335	Thermodynamics I
MECE	2140	Engineering Materials Lab
MECE	2340	Engineering Materials
MECE	3315	Fluid Mechanics
MECE	3115	Fluid Mechanics Laboratory
MECE	3336	Thermodynamics II
MECE	3360	Heat Transfer
MECE	3160	Heat Transfer Laboratory

Prerequisites

MATH	2401	Calculus III
MATH	3349	Differential Equations
PHYS	2401	Physics Science and Engineering I

Course Descriptions

A listing of courses offered by the Department of Mechanical Engineering can be found on page 310.

▲ MATHEMATICS ▲

Dr. Lokenath Debnath, Department Chair
Mathematics and General Classrooms Building
Room 3.202

1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-3451
Fax: 956/384-5091
E-mail: debnathl@utpa.edu

Dr. Monty Taylor, Assistant Chair
Mathematics and General Classrooms Building
Room 3.802

Telephone: 956/381-3557
E-mail: taylor@utpa.edu

Dr. Mau Nam Nguyen, Undergraduate Coordinator

Mathematics and General Classrooms Building
Room 3.808
Telephone: 956/381-2372
E-mail: nguyennm@utpa.edu

FULL-TIME FACULTY

Alvarado, Frances E.M., Lecturer
Andaverdi, Saul, Lecturer
Balogh, András, Associate Professor
Bede, Barnabas, Assistant Professor
Bernard, John E., Professor
Bhatta, Dambaru, Associate Professor
Bose, Ramendra, Assistant Professor
Bracken, Paul, Associate Professor
Chakraborty, Santanu, Assistant Professor
Cruz, Gustavo, Lecturer
Debnath, Lokenath, Professor and Department Chair
Devanaboina, Madhavi, Lecturer
Donnell, William, Lecturer
Ebaseh-Onofa, Benjamin O., Associate Professor
Fatehi, Mohammed, Lecturer
Feng, Bao-Feng, Associate Professor
Feng, Zhaosheng, Assistant Professor
Galstyan, Anahit, Assistant Professor
Gkioulekas, Eleftherios, Assistant Professor
Heller, William, Associate Professor
Huber, Timothy, Assistant Professor
Knobel, Roger A., Jr., Associate Professor
Korotkova, Tatyana, Lecturer
Lawton, Sean, Assistant Professor
Mahmood, Salma, Lecturer
Maruno, Kenichi, Assistant Professor
Mukherjea, Arunava, Professor
Nguyen, Mau Nam, Assistant Professor
Nguyen, Nam, Lecturer
Onica, Constantin, Assistant Professor
Pierce, Virgil, Assistant Professor
Poletaeva, Elena, Assistant Professor
Pontius, Paul, Assistant Professor
Qiao, Zhijun, Associate Professor
Rai, Rajendra, Lecturer
Ramirez, Olga M., Professor
Ray, Partha, Lecturer
Riahi, Daniel, Professor
Rivera, Gustavo, Lecturer
Roy, Ranadhir, Assistant Professor
Roychowdhury, Mrinal, Assistant Professor
Skow, Donald P., Lecturer
Taylor, Monty B., Professor
Torres, J. Rene, Lecturer
Tsay, Jenq-Jong, Assistant Professor
Uddin, Muhammad, Lecturer
Varlamov, Vladimir, Associate Professor
Villalobos, Maria Cristina, Associate Professor
Wang, Xiaohui, Assistant Professor
Watkins, William, Professor
Wiener, Bella, Lecturer
Yagdjian, Karen, Associate Professor

Yanev, George, Assistant Professor
 Yoon Ann, Eun-Mee, Lecturer
 Yoon, Jasang, Assistant Professor

EMERITUS FACULTY
 Schaefer, Geralda

▲ DEGREE PROGRAMS

The Department of Mathematics offers a major in mathematics leading to a Bachelor of Science degree with five concentrations: Applied Mathematics, Secondary Mathematics, Middle School Mathematics, Statistics, and Science and Engineering. It also offers a Bachelor of Interdisciplinary Studies degree in mathematics for certification in grades 4-8 (middle school). In addition, the department offers five minors: Mathematics, Applied Mathematics, Mathematics with Secondary Certification, Middle School Mathematics, and Statistics.

▲ DEGREE REQUIREMENTS

Bachelor of Science in Mathematics
University Core Curriculum Requirements 43 hours

Complete the requirements shown in the University core curriculum section on pages 99-101 of this catalog EXCEPT for the sections, groups or areas listed below, which must be satisfied only as shown.

Section B. Science and Mathematics
 Group 2. Mathematics
 MATH 1460 is the recommended beginning course.

Core Requirements for Mathematics Major
(required for all concentrations) 30 hours

MATH	1460	Calculus I (grade of C or better)
MATH	1470	Calculus II (grade of C or better)
MATH	2401	Calculus III
MATH	3328	Introduction to Proofs (grade of C or better)
MATH	3345	Applied Linear Algebra (grade of C or better)
MATH	4339	Probability and Statistics I
MATH	4351	Modern Algebra (grade of C or better)
MATH	4357	Real Analysis (grade of C or better) 3 hours of any advanced MATH electives

NOTE: The Student must complete these major course requirements with a 2.25 or better GPA.
 Students must also satisfy one of the five concentrations

shown below.

Applied Mathematics Concentration Requirements 47 hours

Required Courses		
MATH	3337	Applied Statistics I
MATH	3349	Differential Equations
MATH	3368	Numerical Methods

Designated Advanced MATH Electives: 9 hours from MATH 3338, MATH 3355, MATH 4317, MATH 4318, MATH 4319, MATH 4329, MATH 4379*, and MATH 4390 (*MATH 4379 can be used only once).

Other Advanced MATH Electives: 3 hours of any advanced MATH electives.

Natural Science: 3 hours beyond core. At least one physics course with lab must be in the core or this concentration.

Computer Science: 3 hours of CSCI. At least one CSCI programming course at or above CSCI 1380 must be in the core or this concentration.

General Electives: 8 additional hours from any subject.

General Advanced Electives: 12 additional advanced hours from any subject.

Secondary Mathematics Concentration Requirements 48 hours

Required Courses		
MATH	3303	History of Mathematics
MATH	3311	Organizational Structures and Processes of Mathematics
MATH	3333	Mathematics in a Computer Environment
MATH	3373	Discrete Structures
MATH	4302	Number Theory
MATH	4304	Modern Geometries

Advanced MATH Electives: 3 hours of any advanced MATH electives.

Natural Science: 3 hours beyond core. At least one physics course with lab must be in the core or this concentration.

Computer Science: 3 hours of CSCI. At least one CSCI programming course at or above CSCI 1380 must be in the core or this concentration.

Required Teacher Preparation Courses		
READ	4351	Development Reading in Secondary Schools
EDHS	3305	Instructional Methods for English Language Learners and Learners with Exceptionalities

		in High Schools
EDHS	4301	Foundations of Education
EDHS	4302	Instructional Planning and Assessment
EDHS	4303	Instructional Strategies and Classroom Management
EDHS	4398	Integrated Internship II: 8-12
EDHS	4399	Supervised Internship II: 8-12

Middle School Mathematics Concentration Requirements 51 hours

Required Courses

EMAT	2306	Foundation of Mathematics I
EMAT	2307	Foundation of Mathematics II
MMAT	3309	Foundation of Mathematics III: Intermediate
MMAT	3312	Measurement and Geometry
MMAT	3313	Algebraic Structures
MMAT	3315	Probability and Statistics
MMAT	3316	Mathematics in a Computer Environment
MMAT	3321	Mathematical Problem Solving

Designated Advanced MMAT Electives: 3 hours from MMAT 3314, MMAT 3317, MMAT 3318, and MMAT 3319.

Required Teacher Preparation Courses

READ	3325	Cognitive Development and Reading Comprehension
READ	3326	Reading Across the Curriculum Content Areas
EDMS	3305	Instructional Methods for English Language Learners and Learners with Exceptionalities in Middle Schools
EDMS	3353	Young Adolescent Development and Learning
EDMS	3354	Middle School Curriculum Development and Assessment
EDMS	3355	Instructional Technology Methods and Classroom Management for Middle School Classrooms
EDMS	4398	Integrated Internship II Seminar: Middle School
EDMS	4399	Supervised Internship II: Middle School

Statistics Concentration Requirements 47 hours

Required Courses

MATH/STAT	2330	Elementary Statistics and Probability
MATH/STAT	3337	Applied Statistics I
MATH/STAT	3338	Applied Statistics II
MATH/STAT	4336	Sampling
MATH	3368	Numerical Methods
MATH	4340	Probability and Statistics II
MATH	4377	Applied Regression

Advanced MATH Electives: 3 hours of any advanced

MATH electives.

Computer Science: 3 hours of CSCI. At least one CSCI programming course at or above CSCI 1380 must be in the core or this concentration.

General Electives: 8 additional hours from any subject.

General Advanced Electives: 12 additional advanced hours from any subject.

Science and Engineering Concentration Requirements 47 hours

3 hours of any advanced MATH electives.

3 hours of COSE electives (excluding MATH, STAT, MMAT, EMAT).

18 hours of advanced COSE electives (excluding MATH, STAT, MMAT, EMAT).

At least one physics course with lab must be in the core or this concentration.

Computer Science: 3 hours of CSCI. At least one CSCI programming course at or above CSCI 1380 must be in the core or this concentration.

General Electives: 8 additional hours from any subject.

General Advanced Electives: 12 additional advanced hours from any subject.

Bachelor of Interdisciplinary Studies - Mathematics Teacher Certification for Grades 4-8

This degree option is intended for students seeking certification in mathematics grades 4-8.

University Core Curriculum Requirements 43 hours

Complete the requirements shown in the University core curriculum requirements section of this catalog.

Middle School Mathematics Requirements 36 hours

MMAT	3309	Foundations of Mathematics III: Intermediate
MMAT	3312	Measurement and Geometry
MMAT	3313	Algebraic Structures
MMAT	3314	Basics of History of Mathematics
MMAT	3315	Probability and Statistics
MMAT	3316	Mathematics in a Computer Environment
MMAT	3317	Basics of Discrete Mathematics
MMAT	3318	Basics of Number Theory
MMAT	3319	Mathematical Structures and Processes
MMAT	3320	Basics of Mathematical Modeling
MMAT	3321	Mathematical Problem Solving
MMAT	4322	Capstone Research Project

Interdisciplinary Component 22 hours

MATH	1450	Precalculus with Trigonometry
EMAT	2306	Foundation of Mathematics I
EMAT	2307	Foundation of Mathematics II
READ	3325	Cognitive Development and Reading Comprehension
READ	3326	Reading Across the Curriculum

Content Areas

Science (beyond the core): 6 hours chosen from ASTR, GEOL, PSCI, PHYS (at least one physics course with lab is required if not in the core).

Education Component for Teacher Certification

			18 hours
EDMS	3305	Instructional Methods for English Language Learners and Learners with Exceptionalities in Middle Schools	
EDMS	3353	Young Adolescent Development and Learning	
EDMS	3354	Middle School Curriculum Development and Assessment	
EDMS	3355	Instructional Technology Methods and Classroom Management for Middle School Classrooms	
EDMS	4398	Integrated Internship II: Middle School	
EDMS	4399	Supervised Internship II: Middle School	

General Electives: 1 additional hour from any subject.

Note: Grade of C or better required in all EMAT and MMAT courses. A GPA of 2.25 or greater is required for these courses.

Minors in Mathematics

The Department of Mathematics offers five minors tailored to students with various majors and career goals. Consult with the mathematics department undergraduate advisor for the minor that best fits your needs.

Minor in Mathematics

A minor in mathematics requires 23 hours of MATH courses, of which 15 hours must be advanced. This minor must include MATH 1460 or MATH 1487, MATH 1470 or MATH 1488, MATH 3328, MATH 3345, and nine advanced hours of approved MATH courses which must include at least one of the following: MATH 4302, MATH 4351, MATH 4357, or MATH 4360. All courses in this minor must be completed with a grade of C or better.

Minor in Applied Mathematics

A minor in applied mathematics requires 23 hours of MATH courses, of which 12 hours must be advanced. This minor includes MATH 1460 or MATH 1487, MATH 1470 or MATH 1488, and 15 hours chosen from MATH 2401,

MATH 3337, MATH 3338, MATH 3345, MATH 3349, MATH 3355, MATH 3368, MATH 3373, MATH 4317, MATH 4318, MATH 4319, MATH 4329, MATH 4339, MATH 4340, and MATH 4377. All courses in this minor must be completed with a grade of C or better.

Minor in Mathematics with Secondary Certification

A minor in mathematics with secondary certification requires 26 hours of MATH courses, of which 18 hours must be advanced. This minor includes MATH 1460 or MATH 1487, MATH 1470 or MATH 1488, MATH 3311, MATH 3345, MATH 3337 or MATH 4339, MATH 4304 and six hours chosen from MATH 3303, MATH 3333 and MATH 4302. All courses in this minor must be completed with a grade of "C" or better.

Minor in Middle School Mathematics

A minor in middle school mathematics requires the following 24 hours of EMAT and MMAT courses: EMAT 2306, EMAT 2307, MMAT 3309, MMAT 3312, MMAT 3313, MMAT 3315, MMAT 3316, and MMAT 3321. All courses in this minor must be completed with a grade of "C" or better.

Minor in Statistics

A minor in statistics requires 18 hours of MATH or STAT courses, of which at least 9 hours must be taken from the following list: MATH/STAT 2330 or MATH 2387, MATH/STAT 2335 or MATH 2388, MATH/STAT 3337, MATH/STAT 3338, MATH 4339, MATH 4340, and MATH/STAT 4336. At least 9 hours must be advanced, and the 18 hours of this minor cannot be used simultaneously to fulfill requirements in the student's major. All courses in this minor must be completed with a grade of "C" or better.

Course Descriptions

A listing of courses offered by the Department of Mathematics can be found on page 305.

▲ PHYSICS AND GEOLOGY ▲

Dr. Steven C. Tidrow, Department Chair
Physical Science Building, Room 123
1201 W. University Drive
Edinburg, TX 78539-2999
Telephone: 956/381-3521
Fax: 956/381-2423

FULL-TIME FACULTY

Bhatti, Muhammad Idrees, Professor
Charleston, Santiago, Lecturer
Chipara, Dorina, Assistant Professor
Chipara, Mircea, Assistant Professor
Corpuz, Edgar, Assistant Professor
Cortez, Jose, Lecturer
Cunningham, Mark, Associate Professor
Dimakis, Nicholas, Assistant Professor
Gonzalez, Juan, Assistant Professor
Hannan, Mohammad A., Associate Professor
Hinthorne, James, Senior Lecturer
Lee, Hyun-Chul, Lecturer
Lin, Yuankun, Associate Professor
Mazariegos, Rubén A., Associate Professor
Naqvi, Husney
Pereya, Nicolás, Assistant Professor
Tidrow, Steven, Associate Professor
Zeng, Liang, Associate Professor

Mission

The Department of Physics and Geology serves the Rio Grande Valley Community and the State of Texas through the development and execution of education programs that provide opportunities for students and professionals to learn about the physical principles, laws of nature, in support of a broad range of disciplines, so that those students and professionals may achieve the foundation, knowledge, skills and abilities, for lifelong learning and the opportunity to earn a reasonable living throughout their lifetime by providing goods and services, as responsible citizens, to improve the standard and quality of living of people within the local, regional and global communities.

▲ GENERAL OVERVIEW

The Department of Physics and Geology offers a Bachelor of Science degree with a major in physics and minors in earth science, geographic information systems (GIS), physical science and physics. The department also offers secondary and elementary teaching fields in physics, physical science and earth science as well as offers a Master of Science in Interdisciplinary Studies (MSIS) in physics that

is geared toward teachers.

The departmental program includes interdisciplinary research and teaching that brings the unique perspectives of physics and geology to scientific problems at many spatial and temporal scales. Departmental areas of expertise encompass a range of physics and geology disciplines including, but not limited to astronomy with an active planetarium, atomic, biophysics, computation physics, environmental, molecular, nuclear and particle physics, material science, geophysics, earth science and physics education.

Students are encouraged to actively participate in research endeavors being carried out by faculty. Research facilities include a number of experimental laboratories: Remote Sensing and GPS, Neutron Activation Analysis, Laser Optics, X-ray Diffraction, and Physics Education Research laboratories. Departmental computational facilities include a GIS/Remote Sensing laboratory, an S-node computer cluster (for parallel computations) and state-of-the-art computational biophysics software. For more information about the department and course offerings see the departmental Web site at www.utpa.edu/dept/physci/.

▲ DEGREE REQUIREMENTS

Major in Physics

The Bachelor of Science in physics is a 121 hour degree program consisting of a 43 hour university core curriculum, 36 specified hours of physics, 12 hours of physics electives, 18 other hours of which six must be advanced, and 12 hours of other specified requirements in mathematics.

University Core Curriculum Requirements 43 hours including:

PHYS 2401 Physics for Scientists and Engineers I
PHYS 2402 Physics for Scientist and Engineers II

that fill the science core curriculum requirement.

The University core curriculum is shown on pages 99-101 of this catalog. 36-Hour Physics Core, 12-Hour Physics Electives

Physics Core Courses Offered at Least Once Per Year:

PHYS 3303	Thermodynamics
PHYS 3402	Modern Physics
PHYS 3305	Classical Mechanics
PHYS 3311	Math Methods for Physicists
PHYS 3101	Junior Laboratory Research I
PHYS 3404	Optics
PHYS 4305	Statistical Mechanics
PHYS 3102	Junior Laboratory Research II
PHYS 3301	Electromagnetic Theory I
PHYS 4303	Quantum Mechanics I
PHYS 4101	Senior Laboratory Research I
PHYS 4304	Quantum Mechanics II
PHYS 3302	Electromagnetic Theory II
PHYS 4102	Senior Laboratory Research II

Electives offered each semester:

PHYS 4308 Seminar in Physics

Electives offered once every two years:

PHYS 3306 Introduction to Biophysics
 PHYS 3307 Introduction to Solid State Physics
 PHYS 4309 Nuclear and Particle Physics
 PHYS 4310 Introduction to Atomic Physics
 PHYS 4311/GEOL 4301/GEOP 4301 Exploration

Geophysics I

PHYS 3308 Introduction to Nanotechnology
 PHYS 3309 Introduction to Medical Imaging
 PHYS 3310 Radiation Biophysics

Minor in Physics

Eighteen hours of physics of which six must be advanced.

Course Offering Cycle

Physics Core Hours

Fall, Spring, Summer:

PHYS 2401 Physics for Scientists and Engineers I
 PHYS 2402 Physics for Scientists and Engineers II
 PHYS 3101 Junior Laboratory Research
 PHYS 3102 Junior Laboratory Research
 PHYS 4101 Senior Laboratory Research
 PHYS 4102 Senior Laboratory Research
 PHYS 4103 Senior Laboratory Research
 PHYS 4104 Research Laboratory in Physics Education
 PHYS 4308 Seminar in Physics (Elective)

Fall:

PHYS 3301 Electromagnetic Theory I
 PHYS 3303 Thermodynamics
 PHYS 3305 Classical Mechanics
 PHYS 4303 Quantum Mechanics I
 PHYS 3311 Math Methods for Physicists

Spring:

PHYS 3404 Optics
 PHYS 3302 Electromagnetic Theory II
 PHYS 3402 Modern Physics
 PHYS 4304 Quantum Mechanics II
 PHYS 4305 Statistical Mechanics

Elective Hours

Electives offered each semester:

PHYS 4308 Seminar in Physics

Electives offered once every two years:

Fall Odd Years

PHYS 3306 Introduction to Biophysics
 PHYS 4309 Nuclear and Particle Physics

Spring Even Years

PHYS 3310 Radiation Biophysics
 PHYS 4310 Introduction to Atomic Physics

Fall Even Years

PHYS 3309 Introduction to Medical Imaging
 PHYS 3308 Introduction to Nanotechnology

Spring Odd Years

PHYS 4311/ GEOL 4301/GEOP 4301
 Exploration Geophysics
 PHYS 3307 Introduction to Solid State Physics

Suggested Course Sequence for Physics Majors:

Freshman

Fall (14 hours): MATH 1460, PHYS 2401, plus 6 hours of core curriculum requirements
 Spring (16 hours): MATH 1470, PHYS 2402, plus 8 hours of core curriculum requirements

Sophomore

Fall (16 hours): MATH 2401 PHYS 3303, plus 9 hours of core curriculum requirements
 Spring (16 hours): Math 3349, PHYS 3402, plus 9 hours of core curriculum requirements

Junior

Fall (16 hours): PHYS 3305, PHYS 3311, PHYS 3101, 3-hour physics elective, plus 6 minor elective hours*
 Spring (17 hours): PHYS 3404, PHYS 4305, PHYS 3102, plus 3 hour physics elective, plus 6 minor elective hours*

Senior

Fall (13 hours): PHYS 3301, PHYS 4303, PHYS 4101, 3-hour physics elective, plus 3 minor elective hours*
 Spring (13 hours): PHY 3302, PHYS 4304, PHYS 4102, 3-hour physics elective, plus 3 minor elective hours*

* NOTE: Of the 18 minor elective hours, nine must be advanced hours (level 3000 or 4000).

Minor in Earth Science

Eighteen hours in geology (GEOL) or the combination of courses in (GEOL), Geography (GEOG), and Geophysics (GEOP) of which six hours must be advanced.

NOTE: To obtain a minor in earth science, the natural science core requirements must be satisfied by a course sequence other than GEOL 1401/GEOL 1402.

Minor in Geographic Information Systems

Choose two from: (8 hours)*
 GEOL 1401, GEOL 1402, PSC 11421, PSC 11422, PHYS 1401, PHYS 1402, PHYS 2401, PHYS 2402; ASTR 1401, ASTR 1402

plus		
GEOL 3308		3 hours
GEOL 4408		4 hours
or		
BIOL 4403		4 hours
GEOL 4309		3 hours

Total: 18 hours

*NOTE: The selected course sequence will satisfy the minor in geographic information systems. The natural science core requirements should be satisfied with an additional course sequence.

Minor in Physical Science

Eighteen hours in the physical sciences of which six hours must be advanced.

NOTE: To obtain the minor in physical science, the natural science core requirements must be satisfied by a course sequence other than PSCI 1421/PSC 11422.

Physical Science Core (required) Courses 8 hours

PSCI 1421		4 hours
PSCI 1422		4 hours

Electives Courses (Choose one) 3 hours

GEOG 2313, PSCI 3310, GEOL 3308

Advanced Required Courses (Choose one each from 3000 and 4000 level) 7 hours

PSCI 3408		4 hours
GEOL 3401		4 hours
GEOL 3403		4 hours
PSCI 4311		3 hours
GEOL 4309		3 hours

Total: 18 hours

Course Offering Cycle (Minors: Earth Science, Geographic Information Systems, and Physical Science)

Curriculum Core Hours

Fall, Spring, Summer:

ASTR 1401	Introduction to Astronomy I
ASTR 1402	Introduction to Astronomy II
GEOL 1401	Physical Geology
GEOL 1402	Historical Geology
PSCI 1421	Physical Sciences I
PSCI 1422	Physical Sciences II
PHYS 1401	General Physics I
PHYS 1402	General Physics II
PHYS 2401	Physics for Scientists and Engineers I
PHYS 2402	Physics for Scientists and Engineers II

Other Hours

Fall:

GEOL 3401	Geomorphology
GEOL 3308	Introduction to Geographic Information Systems

Spring:

GEOG 2313	Principles of Geography
GEOL 3403	Oceanography
GEOL 4408	Applications of Geographic Information Systems
GEOL 4309	Undergraduate Research in Geoscience

Fall Odd Years:

PSCI 3408	Survey of Physical Science
-----------	----------------------------

Spring Even Years:

SCI 4311	Topics in Physical Science
----------	----------------------------

Spring Odd Years:

GEOL 4301/GEOP 4301/PHYS 4311	Exploration Geophysics
-------------------------------	------------------------

As Scheduled:

GEOL 3310	Hydrologic Systems
GEOL 3404	Stratigraphy-Sedimentation
GEOL 4302	Environmental Geology
PSCI 3310	Planet Earth and Its Place in the Solar System

Course Descriptions

A listing of courses offered by the Department of Physics and Geology may be found in this catalog on pages:

228 (Astronomy)
285 (Geography)
285 (Geology)
335 (Physical Sciences)
327 (Physics)