

ENVIRONMENTAL SCIENCE, BS - GRADES 4-8 SCIENCE EDUCATION CONCENTRATION

Program Description

Introduction

The College of Science is committed to the support of students seeking to become science, mathematics and technology educators at all levels. The Science, Mathematics and Technology Education (SMTE) program offers content courses for students seeking K-12 science, mathematics and technology education. SMTE classes are also an integral part of the course work for degrees preparing students for Teacher Certifications. The SMTE program does not offer a degree; rather, degrees leading to Teacher Certification are offered by other Science and Technology programs and by the College of Education and Human Development. Students seeking to teach in the elementary and secondary schools of Texas must meet degree requirements as well as certification requirements. The requirements and procedure to become a science, mathematics or technology teacher in Texas are outlined below. Undergraduate students who are graduating from the College of Science or the College of Liberal Arts who are seeking initial teacher certification at the 4-8, 7-12 and EC-12 levels prior to graduation, automatically qualify for the Minor in Education.

How to Become a Science, Mathematics or Technology Teacher in Texas

In order to be recommended for teacher certification at this university, a candidate must fulfill three basic requirements:

1. have a bachelor's degree from an accredited college or university that includes an academic major and teacher training courses,
2. complete teacher training through an approved program, and
3. successfully complete the appropriate teacher certification tests for the subject and grade level that the candidate wishes to teach.

Additional information on the requirements to become a teacher in Texas can be obtained at the State Board of Educator Certification (SBEC) website: <http://www.sbec.state.tx.us/SBECOnline/certinfo/becometeacher.asp>. This website also provides information on the resources available to help students pay for a teacher training program.

SBEC has approved three levels of teacher certification for regular educators:

1. Early childhood to grade 6 which includes foundation subjects and enrichment areas such as art, PE, and music,
2. Grade 4-8 which includes the foundation areas only, and
3. Grade 7-12 certification.

Students can find information on the different certifications at the official Texas Examinations of Educator Standards (TEXES) Web site: <http://www.texas.ets.org>. Texas A&M University-Corpus Christi offers several degrees leading to a number of these teacher certifications. The College of Education and Human Development offers several degrees leading to teacher certification. The College of Science offers bachelor's degrees leading to teacher certification in the sciences, mathematics and

technology at the 4-8 and the 7-12 levels. These bachelor's degrees are the following:

- Biology, BS - Grades 7-12 Life Science Education Concentration (<http://catalog.tamucc.edu/undergraduate/science/teaching-certificates/biology-bs-grades-7-12-life-science-education-concentration/>) (120-122 sem. hrs.)
- Chemistry, BS - Grades 7-12 Physical Science Education Concentration (<http://catalog.tamucc.edu/undergraduate/science/teaching-certificates/chemistry-bs-grades-7-12-physical-science-education-concentration/>) (126-128 sem. hrs.)
- **Environmental Science, BS - Grades 4-8 Science Education Concentration** (125-130 sem. hrs.) Details immediately follow below.
- Elementary Education, BS - Grades 4-8 with Mathematics Certification (<http://catalog.tamucc.edu/undergraduate/science/teaching-certificates/elementary-education-bs-grades-4-8-mathematics-certification/>) (College of Education and Human Development)
- Mathematics, BS - Grades 7-12 Mathematics Education Concentration (<http://catalog.tamucc.edu/undergraduate/science/teaching-certificates/mathematics-bs-grades-7-12-education-concentration/>) (120 sem. hrs.)

Mathematics 7-12 teacher certification is also possible with an undergraduate major other than mathematics. Details can be found in the Mathematics, Grades 7-12 Teacher Certification Without a Mathematics Major (<http://catalog.tamucc.edu/undergraduate/science/teaching-certificates/mathematics-grades-7-12-teacher-certification-without-major/>) section.

The individual programs, Biology, Chemistry, Environmental Science, and Mathematics offer these degrees and courses.

Students seeking Teacher Certification are also strongly urged to contact the Certification Officer in the College of Education and Human Development about current requirements and procedures that must be met to obtain the certificate. In particular, students following a degree plan leading to teacher certification must be admitted to the Teacher Education Program at Texas A&M University-Corpus Christi **prior** to enrolling in any 4000 level EDCI or EDUC courses. Application forms for admission to the teacher education program may be obtained from the Undergraduate or Certification Office, room FC 201. The students are referred to the College of Education and Human Development section of this catalog for more information on the Teacher Education Program.

Grade Point Average for Admission to Teacher Education

A minimum grade point average of 2.75 (4.0 = A) in all work attempted, a minimum grade point average of 2.75 in all science, math, or specialization areas, and no grade below "C" in any science or mathematics course on a student's degree plan and/or education courses within the professional block of courses are required. (See College of Education and Human Development, "Admission to Teacher Education" and "Admission to Student Teaching" for other requirements.)

Alteration of a Certification Plan

Any amendment to a degree plan originally filed must be approved by the student's academic advisor, the Department Chair, the Dean of the College of Science, and the Certification Officer of the College of Education and Human Development for the degree to be granted.

General Requirements

The minimum requirement for a Bachelor of Science Degree in Environmental Science with a science education concentration is a total of 120 hours. The concentration is designed for those students who plan on obtaining a 4-8 Science certificate. The degree requirements are divided among the following areas:

Requirements	Credit Hours
Core Curriculum Program (http://catalog.tamucc.edu/undergraduate/university-college/programs/core-curriculum-program/)	42
First-Year Seminars (when applicable) ¹	0-2
Science Content Courses ²	41
Mathematics Courses	3-4
Professional Development and Reading Sequence	27
Electives as Required	7
Total Credit Hours	120-123

1

Full-time, first time in college students are required to take the first-year seminars.

- UNIV 1101 University Seminar I (1 sch)
- UNIV 1102 University Seminar II (1 sch)

2

Science Content Courses have a range between 38-41 hours.

Program Requirements

Code	Title	Hours
Full-time, First-year Students		
UNIV 1101	University Seminar I *	1
UNIV 1102	University Seminar II *	1
Core Curriculum Program		
University Core Curriculum		42
Science Education Concentration must take:		
MATH 1442	Statistics for Life	
BIOL 1406	Biology I	
CHEM 1411	General Chemistry I *	
ESCI 1401	Environmental Science I: Intro to Environmental Science	
Science Content Courses		
PHYS 1304	Introduction to Astronomy: Solar System	3
BIOL 1406	Biology I (included in University Core) ¹	
BIOL 1407	Biology II	4
CHEM 1411	General Chemistry I (included in University Core) ¹	
ESCI 1401	Environmental Science I: Intro to Environmental Science (included in University Core) ¹	1
ESCI 4202	Issues in Environmental Science	2
GEOL 1403	Physical Geology	4
GEOL 1404	Historical Geology	4
PHYS 1401	General Physics I	4
SMTE 4217	Secondary Approaches to the Life Sciences	2

SMTE 4270	Science Education Topics I ^	2
SMTE 4320	Secondary Science Laboratory Techniques	3
ESCI 3351	Oceanography	3-4
or ESCI 3403	Introduction to Meteorology	
SMTE 3315	Foundational Approaches to the Physical Sciences	3-4
or PHYS 1402	General Physics II	
Select one of the following:		2-4
ESCI 3443	Environmental Biology	
CHEM 4443	Environmental Chemistry	
ESCI 3351	Oceanography	
ESCI 3403	Introduction to Meteorology	
ESCI 4230	Oil Spill Prevention and Response Theory	
ESCI 4335	Climate and Climate Variability	
ESCI 4360	Physical Oceanography	
GEOL 3443	Environmental Geology	

Mathematics Courses

MATH 1442	Statistics for Life (included in University Core) *,^	
Select one of the following:		3-4
MATH 1316	Trigonometry	
MATH 2312	Precalculus	
MATH 2413	Calculus I	

Professional Development Sequence

EDUC 2211	Foundations of Education	2
SPED 3310	Individual Differences in Schools and Communities	3
READ 3353	Content Area Reading for Secondary Students	3
or READ 3352	Content Area Reading for Elementary Students	
EDUC 3211	Culturally and Linguistically Responsive Teaching	2
BIEM 4357	Methods of Teaching English as a Second Language	3
EDUC 4305	Seminar I	3
IDET 3210	Design and Development of Technology-Integrated Learning Environments	2
EDUC 4694	Clinical Teaching	6
EDUC 4395	Seminar II	3

Electives as Required

Electives as needed to fulfill university graduation requirements	7
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Total Hours **120-123**

1

Only BIOL 1406 Biology I (4 sch) (4 hours), CHEM 1411 General Chemistry I (4 sch) (4 hours) and ESCI 1401 Environmental Science I: Intro to Environmental Science (4 sch) (3 hours) are counted in the University Core. The 1-hour laboratory component of ESCI 1401 Environmental Science I: Intro to Environmental Science (4 sch) will be counted in the major requirements rather than the University Core.

* Online offering

^ Blended offering

Professional Development Sequence

Students who seek a 4-8 level Science teaching certificate should contact a Certification Officer in the College of Education and Human Development about requirements and procedures that must be met to

obtain the certificate. The professional development sequence must be taken in a specific order and it is recommended that students contact the College of Education and Human Development early in their academic careers for specific details on these courses.

Course Sequencing

First Year

		Hours
Fall		
UNIV 1101	University Seminar I	1
ESCI 1401	Environmental Science I: Intro to Environmental Science	4
GEOL 1403	Physical Geology	4
ENGL 1301	Writing and Rhetoric I	3
HIST 1301	U.S. History to 1865	3
Hours		15

Spring

UNIV 1102	University Seminar II	1
MATH 1442	Statistics for Life	4
GEOL 1404	Historical Geology	4
ENGL 1302	Writing and Rhetoric II	3
or COMM 1311	or Foundation of Communication	
EDUC 1354	Child Growth and Development	3
HIST 1302	U.S. History Since 1865	3
Hours		18

Second Year

		Hours
Fall		
BIOL 1406	Biology I	4
PHYS 1401	General Physics I	4
POLS 2305	U.S. Government and Politics	3
EDUC 2211	Foundations of Education	2
MATH 2312	Precalculus	3-4
or MATH 1316	or Trigonometry	
or MATH 2413	or Calculus I	
Hours		16-17

Spring

BIOL 1407	Biology II	4
PHYS 1304	Introduction to Astronomy: Solar System	3
CHEM 1411	General Chemistry I	4
Language, Philosophy & Culture Core Requirement		3
POLS 2306	State and Local Government	3
SPED 3310	Individual Differences in Schools and Communities	3
Hours		20

Third Year

		Hours
Fall		
READ 3353	Content Area Reading for Secondary	3
or READ 3352	Students	
	or Content Area Reading for Elementary	
	Students	
ESCI 3351	Oceanography	3-4
or ESCI 3403	or Introduction to Meteorology	
SMTE 4217	Secondary Approaches to the Life Sciences	2
EDUC 3211	Culturally and Linguistically Responsive Teaching	2

Creative Arts Core Requirement	3
Hours	14

Spring

BIEM 4357	Methods of Teaching English as a Second Language	3
Select one of the following: (refer to catalog)		2-4
SMTE 3315	Foundational Approaches to the Physical	3-4
or PHYS 1402	Sciences	
	or General Physics II	
SMTE 4270	Science Education Topics I	2
ESCI 4202	Issues in Environmental Science	2
SMTE 4320	Secondary Science Laboratory Techniques	3
Hours		16-18

Fourth Year

		Hours
Fall		
EDUC 4305	Seminar I	3
IDET 3210	Design and Development of Technology-Integrated Learning Environments	2
Elective to reach 120		3
Elective to reach 120		3
Elective to reach 120		1
Hours		12

Spring

EDUC 4694	Clinical Teaching	6
EDUC 4395	Seminar II	3
Hours		9
Total Hours		120-123

Courses

ESCI 1401 Environmental Science I: Intro to Environmental Science

4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)

Principles of the scientific method and critical thinking provide a foundation for subsequent consideration of environmental issues through a multidisciplinary approach. Laboratory exercises and local field experiences reinforce concepts introduced in the lectures. Fall, Spring.

Co-requisite: SMTE 0096.

TCCNS: ENVR 1401

ESCI 1490 Selected Topics

1-4 Semester Credit Hours (1-4 Lecture Hours)

Subject materials variable. May be repeated for credit when topics are significantly different. Faculty approval required. Offered on sufficient demand.

ESCI 3202 Professional Skills

2 Semester Credit Hours (2 Lecture Hours)

Presentation and discussion of selected topics relating to the professional skills of practicing environmental scientists including literature searches, reviews, paper presentation, professional and career opportunities, professional ethics. Fall, Spring.

ESCI 3351 Oceanography

3 Semester Credit Hours (3 Lecture Hours)

Methods and principles of oceanography. A survey of oceanography with emphasis placed on the physical processes affecting water and water masses of the world oceans. Fall (on sufficient demand), Spring.

Prerequisite: CHEM 1412, ESCI 1401 or GEOL 1403.

ESCI 3403 Introduction to Meteorology**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

This course is an introduction to meteorology and the dynamics of planetary atmospheres. Emphasis on atmospheric accretion, composition, evolution, structure, and dynamics. Lab exercises cover basic measurement techniques, weather maps, and forecasting. Fall, Spring (on sufficient demand).

Co-requisite: SMTE 0096.

ESCI 3443 Environmental Biology**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

Historical, contemporary, and projected concerns of human activities on biological aspects of ecosystem functioning.

Prerequisite: BIOL 1407.

Co-requisite: SMTE 0096.

ESCI 4130 Oil Spill Prevention and Response Lab**1 Semester Credit Hour (2 Lab Hours)**

Practical techniques for control, containment, countermeasures, removal, and disposal of oil spills in an environmentally safe manner. Field exercises will include use of boats, booms and skimmers. Fall, Spring, Summer (on sufficient demand).

Prerequisite: ESCI 4230*.

* May be taken concurrently.

Co-requisite: SMTE 0096.

ESCI 4170 Hazardous Waste Operations and Emergency Response Lab**1 Semester Credit Hour (2 Lab Hours)**

Practical techniques for handling, reducing, and disposing of hazardous wastes in an environmentally safe manner. Lab exercises in use of personal protective gear and safe handling of hazardous substances. Fall, Spring, Summer (on sufficient demand).

Prerequisite: ESCI 4270*.

* May be taken concurrently.

Co-requisite: SMTE 0096.

ESCI 4201 Scientific Diving Techniques**2 Semester Credit Hours (2 Lecture Hours)**

Theory, science, and art of underwater diving technology and its application to scientific objectives. Course helps fulfill some training requirements of the Texas A&M University-Corpus Christi Guidelines for scientific diving.

ESCI 4202 Issues in Environmental Science**2 Semester Credit Hours (2 Lecture Hours)**

Exploration of major issues in environmental science posing past, present and future challenges. Selected readings, student presentations and papers.

Prerequisite: ESCI 1401.

ESCI 4230 Oil Spill Prevention and Response Theory**2 Semester Credit Hours (2 Lecture Hours)**

Historical perspective of laws and regulations governing oil spill prevention and response. Current methods for control, containment, countermeasures, removal, and disposal of oil spills in an environmentally safe manner. Fall, Spring, Summer (on sufficient demand).

ESCI 4270 Hazardous Waste Operations and Emergency Response Theory**2 Semester Credit Hours (2 Lecture Hours)**

Study of the laws and regulations of hazardous waste management from an historical perspective followed by current techniques for handling, reducing, and disposing of hazardous wastes in an environmentally safe manner. Fall, Spring, Summer (on sufficient demand).

ESCI 4301 Environmental Regulations**3 Semester Credit Hours (3 Lecture Hours)**

A survey of state and federal environmental laws and regulations, and their impact on the environment. Case studies of environmental issues and legislated regulations.

Prerequisite: POLS 2305 and 2306.

ESCI 4320 Environmental Health**3 Semester Credit Hours (3 Lecture Hours)**

Overview of the toxicology and epidemiology of pollutants in the air, water and soil. Associations of environmental exposure with adverse health effects such as cancer, cardiovascular disease, and reproductive outcomes; also chemical markers and symptoms of disease. Pollutants studied include lead, asbestos, radiation, radon, noise, metals, halogenated hydrocarbons, aromatic hydrocarbons, silica, indoor air quality, formaldehyde, and outdoor air pollutants. Offered on sufficient demand.

ESCI 4321 Introduction to Soil and Groundwater Restoration**3 Semester Credit Hours (3 Lecture Hours)**

Introduction to methods for restoring contaminated soil and groundwater by examining the factors and processes influencing the efficacy of remediation systems. An emphasis will be placed on the scientific principles upon which soil and groundwater remediation is based. Cross listed with GEOL 4321.

ESCI 4322 Introduction to Industrial Hygiene**3 Semester Credit Hours (3 Lecture Hours)**

Introduction to health protection practices in the industrial environment. Health basis for OSHA laws, regulations. Sampling and testing procedures.

ESCI 4324 Introduction to Industrial Toxicology**3 Semester Credit Hours (3 Lecture Hours)**

Review of human physiology, general concepts of toxicology: dose-response relationship, interactions between the host and the agents, risk assessment, to provide an introductory understanding of toxicology related to the chemicals in the workplace.

ESCI 4332 Wetlands and Water Quality**3 Semester Credit Hours (3 Lecture Hours)**

Introduction to wetland ecosystems (natural, constructed and restored) with an emphasis on the role of wetlands in water quality. Topics include wetland systems, their history and role in society, relationships between biology, geology, ecology, hydrology and chemistry in wetland environments. Offered on sufficient demand.

Prerequisite: BIOL 1407, CHEM 1411 or ESCI 1401.

ESCI 4335 Climate and Climate Variability**3 Semester Credit Hours (3 Lecture Hours)**

Course intended to guide environmental science majors in developing a conceptual understanding of Earth's global climate and its variability. Review of past climates, present mean state of the climate system, climate variability from seasonal to multidecadal time scales, and climate change. Special attention given to climates of the Gulf of Mexico, Caribbean Sea and surrounding land regions. Plausible climate-change scenarios, as well as mitigation and adaptation strategies are also discussed. Cross listed with ATSC 4335. Spring.

Prerequisite: (ESCI 3351 or 3403) and (PHYS 1401 or 2425).

ESCI 4340 Severe Weather**3 Semester Credit Hours (3 Lecture Hours)**

Introduction to mesoscale weather systems including thunderstorms, squall lines and hurricanes, as well as the mechanisms of tornado and lightning. Methods of observing, analyzing, and predicting these severe weather systems with the interpretation of satellite and radar images will also be introduced in this class.

Prerequisite: ESCI 3403.

ESCI 4344 Air Pollution and the Clean Air Act**3 Semester Credit Hours (3 Lecture Hours)**

Introduction to the chemistry and physics of air pollution and regulations. Topics include photochemistry, acid rain, air pollution meteorology and dispersion, global change, and the Clean Air Act.

ESCI 4360 Physical Oceanography**3 Semester Credit Hours (3 Lecture Hours)**

Physical description of the sea, physical properties of seawater and sea ice, methods and measurements, wind-driven ocean circulation, thermohaline ocean circulation, boundary processes, waves, tides and mixing. Seasonal and interannual variability such as El Niño/Southern Oscillation phenomena. Implications for marine biology, marine geology, human impacts, other topics. Fall.

Prerequisite: PHYS 2426.

ESCI 4365 Occupational Safety and Accident Prevention**3 Semester Credit Hours (3 Lecture Hours)**

This course provides students with fundamental knowledge of regulatory requirements on occupational safety and practical techniques on accident prevention in the work environment. Offered on sufficient demand.

ESCI 4408 Environmental Microbiology**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

Relationships between microorganisms and their biotic and abiotic environment. Current topics such as air quality (i.e., molds), water quality and bioremediation will be discussed. Laboratory will include techniques for sampling from soil, air and water. Offered on sufficient demand.

Prerequisite: BIOL 2421.

Co-requisite: SMTE 0096.

ESCI 4480 Environmental Site Assessment**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

Interdisciplinary application of environmental regulations, risk assessment to specific examples. Knowledge of United States environmental regulations assumed; ESCI 4301 Environmental Regulations recommended.

ESCI 4490 Selected Topics**4 Semester Credit Hours (4 Lecture Hours, 4 Lab Hours)**

Subject materials variable. May be repeated for credit when topics are significantly different. Faculty approval required. Offered on sufficient demand.

ESCI 4496 Directed Independent Study**1-4 Semester Credit Hours**

Requires a formal proposal of study to be completed in advance of registration and to be approved by the supervising faculty, the Chairperson, and the Dean of the College. Fall, Spring, Summer.

ESCI 4498 Internship in Environmental Science**1-4 Semester Credit Hours**

Two to four semester hours of credit may be earned by working in an internship position in a governmental agency or industry.