ENVIRONMENTAL SCIENCE, MS

Program Description

The mission of the Master of Science program in Environmental Science is to provide a rich and rewarding setting in which students and faculty can develop and communicate innovative and practical solutions to present and future environmental challenges, with a focus on urban and coastal issues.

Fast Track Environmental Science BS to Environmental Science MS and Fast Track Geology BS to Environmental Science MS

The university allows the opportunity for high-achieving undergraduate students to count a select number of graduate credits toward their undergraduate degree and thereby obtain a graduate degree at an accelerated pace. Students interested in the Fast Tracks in Environmental Science should see the undergraduate catalog.

Student Learning Outcomes

Students will:

- Possess a broad understanding of environmental science.
- Possess enhanced knowledge of a specific area of environmental science, including relevant scientific literature, related to their thesis or professional paper.
- Have the ability to accurately describe and assess environmental research both orally and in writing.

Students will choose between thesis and professional (non-thesis) options. The professional option is designed for students who desire a greater breadth of understanding of environmental science than the thesis option provides. The curriculum will specially benefit individuals employed in scientific or technical fields who seek advancement or additional training to enhance their knowledge and skills. Professional option students must complete a professional research project with a written final report and seminar. The thesis option requires a thesis based upon original research, supported by the scientific literature, and analyzed statistically, when appropriate. The thesis master's degree will allow a person to pursue advanced graduate study, or to obtain employment in most areas requiring a detailed knowledge of a specific aspect of environmental science.

Students following either option will be required to take a core of interdisciplinary courses to provide a broad background, and to select elective courses in consultation with their advisory committee to provide in-depth education in a particular area of emphasis related to environmental science. The elective courses may derive from one science discipline but they will often be interdisciplinary.

For Additional Information

Website:
http://gradschool.tamucc.edu/degrees/science/environmental_science.html

Campus Address:
Carlos F. Truan Natural Resource Center Room 1100
Phone (361) 825-2681

Mailing Address:
Environmental Science Program, Unit 5850
College of Science and Engineering
Texas A&M University-Corpus Christi
6300 Ocean Drive
Corpus Christi, Texas 78412-5850

Admission Requirements

Applicants must comply with university procedures for admission to the degree program. Incomplete applications will not be considered. Persons seeking admission to the MS Program in Environmental Science should first contact the program faculty and identify a faculty member willing to serve as the graduate advisor. Applicants will not be admitted to the program without a graduate advisor. Consult the Admissions (http://catalog.tamucc.edu/graduate/admissions/) section of this catalog for university requirements for admission. In addition to the documents required by the Office of Recruitment and Admissions, applicants must submit GRE general test scores, an essay of at least 300 words describing their educational and career interests, goals, and challenges, and three letters of evaluation from persons knowledgeable about their potential for success in graduate studies. Applicants may optionally submit other relevant materials, e.g., copies of published works or reports of past scientific research. All materials submitted will be considered. Applicants who already hold an earned graduate degree from a regionally accredited university need not submit GRE scores. The applicant will be notified by letter of acceptance or rejection.

Students accepted to the degree program in environmental science are expected to enter the program with undergraduate degrees in science or substantial undergraduate or graduate science background. Students accepted to the degree program with insufficient background in science, computer science, mathematics, or communication skills will be required to take undergraduate or graduate prerequisite courses prescribed by their advisory committees. These courses may or may not apply towards the total required for the master's degree.

Teaching assistant positions are available to graduate students admitted as degree-seeking students. The completed Teaching Assistant Application and letters of recommendation should be submitted to the address indicated on the application. The deadline for submitting applications is February 1 for the following academic year.

Program Requirements

Each student accepted to the Master of Science in Environmental Science degree program must complete a minimum of 36 semester hours under either the thesis or professional (non-thesis) options.

A graduate student who has met with his or her advisory committee, formulated a degree plan approved by the graduate committee, and has the plan on file is considered a degree candidate. A student must have advanced to degree candidacy by the end of the second full semester of graduate study following admission to the program. A student's advisory committee must approve any subsequent changes to the degree plan. A change from thesis to professional option or vice versa requires that the student file a new degree plan as approved by the advisory committee.

All students must successfully complete at least six semester hours per academic year to remain in the program. Students should enroll in ESCI 6101 Environmental Research Seminar (1 sch), ESCI 6203 Professional Skills for Scientists (2 sch), and MATH 6315 Statistical Methods in Research I (3 sch) as early as possible during their graduate course of study. All students must pass a final oral exam, to be

administered by their advisory committee, during their last semester before graduation.

Thesis Option

Code	Title	Hours
Core Courses [1]		
ESCI 6101	Environmental Research Seminar	1
ESCI 6203	Professional Skills for Scientists	2
MATH 6315	Statistical Methods in Research I [*,^]	3
Thesis Option		
ESCI 5392	Thesis I: Thesis Proposal	3
ESCI 5393	Thesis II: Thesis Research	3
ESCI 5394	Thesis III: Thesis Submission	3
Select 18 hours of electives in specialty area to be chosen in consultation with a student's advisory committee [2]		18
Select one of the following:		3
BLAW 5330	Environmental Law and Policy	
ESCI 6302	Federal Environmental Laws and Regulations	
ESCI 6360	Coastal Management and Ocean Law	
Total Hours		**36**

1

Core requirements may be waived if a student can demonstrate equivalent competencies in that area.

2

At least 9 hours must be from ATSC, BIMS, BIOL, CHEM, CMSS, ESCI, FAMA, GEOL, MARB, PHYS, or SMTE.

*

Online offering

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Blended offering

Professional (Non-Thesis) Option

Professional option students must write a professional paper and present a seminar based on work completed in ESCI 5397 Directed Research (3 sch). The paper and seminar will be on a topic approved by the student's advisory committee and will demonstrate the student's ability in organization, data collecting, scientific writing, and oral presentation.

Code	Title	Hours
Core Courses [1]		
ESCI 6101	Environmental Research Seminar	1
ESCI 6203	Professional Skills for Scientists	2
MATH 6315	Statistical Methods in Research I [*,^]	3
Professional (Non-Thesis) Option		
ESCI 5397	Directed Research	3
Select 24 hours of electives in specialty area to be chosen in consultation with a student's advisory committee [2]		24
Select one of the following:		3
BLAW 5330	Environmental Law and Policy	
ESCI 6302	Federal Environmental Laws and Regulations	
ESCI 6360	Coastal Management and Ocean Law	
Total Hours		**36**

1

Core requirements may be waived if a student can demonstrate equivalent competencies in that area.

2

At least 9 hours must be from ATSC, BIMS, BIOL, CHEM, CMSS, ESCI, FAMA, GEOL, MARB, PHYS, or SMTE.

*

Online offering

^

Blended offering

Emphasis Areas, Tracks, and Designated Electives

A student will define an emphasis area or track for his or her graduate studies with assistance from the graduate advisor and advisory committee. Marine Policy and Human Dimensions is one possible track; another is Coastal and Marine System Science. These are described in further detail below. The emphasis area is a unique word or phrase which best expresses the student's intended focus of graduate studies within the broad field of environmental science. Suggested emphasis areas (not an exclusive list) include: bioremediation, coastal ecosystems, coastal geomorphology, conservation, contaminants, ecotoxicology, environmental monitoring, environmental regulations, fisheries, geospatial sciences and remote sensing applications, and hydrogeology. Other emphasis areas are possible as approved by a student's graduate committee. The emphasis area is stated on the degree plan. Students must demonstrate that the selection of electives produces a coherent graduate program focused around the emphasis area. Designated electives must receive the approval of a student's advisory committee. Electives from the natural sciences, computer science, geographic information science, mathematics, political science, public administration, business law, or other areas may be approved.

Marine Policy and Human Dimensions Track

Students with an interest in studying the application of environmental science to ocean/coastal policy may choose the Marine Policy and Human Dimensions track. The track provides an understanding of the physical and biological coastal environment and its interaction with human behaviors and policies. This transdisciplinary program is designed to prepare students to work with a wide variety of marine and coastal constituencies to translate sound environmental science to public policy. Suggested electives include:

Code	Title	Hours
ESCI 6340	Ocean Resources	3
ESCI 6345	Living with Coastal Hazards	3
ESCI 6360	Coastal Management and Ocean Law	3

Coastal and Marine System Science Track

This track is appropriate for students who may wish to apply selected Coastal and Marine System Science courses to a MS degree in Environmental Science, as approved by the student's graduate committee.

Thesis and Professional Paper Format and Style

The thesis or professional paper must be prepared in a standard format and style dictated by the advisory committee. The format and style requirements will specify paper size, paper quality, margins, pagination, etc. Thesis formatting and submission requirements have

changed. Please visit the following link for further information: http://gradschool.tamucc.edu/current_students/doctoral_dissertation.html.

Upon approval by a student's advisory committee, a copy of the thesis will be sent to the Office of the Dean of the College of Science and Engineering. At the time of successful completion of the oral exam, committee members will sign the thesis and return it to the Dean of the College of Science and Engineering for final approval and signature. All submitted copies of the thesis must be bound in prescribed buckram. The student must pay the fee for this service.

Grades of In Progress (IP) for Thesis or Directed Research

The following courses are eligible for awarding a permanent mark of In Progress (IP) if the work is not completed by the end of the semester in which a student has enrolled in the course:

Code	Title	Hours
ESCI 5392	Thesis I: Thesis Proposal	3
ESCI 5393	Thesis II: Thesis Research	3
ESCI 5394	Thesis III: Thesis Submission	3
ESCI 5397	Directed Research	3

University rules stipulate that the student must register for the same course in the subsequent semester, paying the appropriate tuition and fees, to receive a letter grade for the course.

For thesis students, the student's graduate committee must sign the completed Thesis Proposal before the student is awarded a letter grade for ESCI 5392 Thesis I: Thesis Proposal (3 sch). If the proposal is not signed and on file in the College of Science and Engineering(Dean's Office) by the end of the semester, a permanent mark of IP will be awarded. The student will receive a permanent mark of IP for each semester of ESCI 5393 Thesis II: Thesis Research (3 sch) until the student has presented a rough draft of the thesis. At that time the student's graduate advisor will award a letter grade which reflects the overall quality of the thesis research and the draft. Finally, the student will receive a permanent mark of IP for each semester of ESCI 5394 Thesis III: Thesis Submission (3 sch) until the student has defended the thesis and the graduate committee has approved and signed the final thesis manuscript. At that time the student's graduate advisor will award a letter grade which reflects the overall quality of the thesis defense and the manuscript itself. Thesis students who receive marks of IP must continuously enroll for ESCI 5392 Thesis I: Thesis Proposal (3 sch), ESCI 5393 Thesis II: Thesis Research (3 sch), or ESCI 5394 Thesis III: Thesis Submission (3 sch) in order to receive letter grades for these hours. Any student receiving a mark of IP for ESCI 5392 Thesis I: Thesis Proposal (3 sch), ESCI 5393 Thesis II: Thesis Research (3 sch), or ESCI 5394 Thesis III: Thesis Submission (3 sch) will have to enroll in more than six hours of ESCI 5392 Thesis I: Thesis Proposal (3 sch)/ESCI 5393 Thesis II: Thesis Research (3 sch)/ESCI 5394 Thesis III: Thesis Submission (3 sch) in total, to earn the requisite hours of thesis credit with an assigned letter grade.

For non-thesis students, the student must have successfully defended the professional project, the student's graduate committee must have accepted the professional paper, and a final copy must be on file in the College of Science and Engineering (Dean's Office) by the end of the semester before the student is awarded a letter grade for ESCI 5397 Directed Research (3 sch). The letter grade will reflect the overall quality of the professional project research and the final professional paper. Otherwise the student will receive a permanent mark of IP and must sign up again for ESCI 5397 Directed Research (3 sch) in a subsequent semester to receive a letter grade for this work.

Final Oral Exam

Each student must pass a final oral exam during the last semester before graduation, to be administered by the student's advisory committee. The oral exam will cover topics related to

1. all graduate coursework undertaken for the environmental science program,
2. a student's emphasis area (including the thesis or directed research project), and
3. broad concepts of environmental science, including a familiarity with the literature and appropriate professional societies.

The student is responsible for scheduling the exam with the faculty involved. A student who fails the final oral exam may repeat it once, but only after an interval of four months or more. If a student fails the second oral examination, the student will be terminated from the program.

Graduate Coursework

General prerequisite for 5000- and 6000-level courses: graduate standing. Senior undergraduates in their last semester or summer session of undergraduate work may take graduate-level courses provided that they have a cumulative grade point average of 3.0 or better, and that written approval is obtained from the Dean of the college in which the work is offered. Weekly lecture and laboratory hours associated with each course are designated by (lecture:lab) following the semester hours. The indicated laboratory hours are laboratory instructional time. In most cases, additional laboratory time will be required to complete assigned work.

Graduate courses can be found in the Courses (https://catalog.tamucc.edu/content.php?catoid=25&navoid=1178) A-Z (http://catalog.tamucc.edu/graduate/courses-az/) section of the catalog.

Courses

ESCI 5350 Fundamentals of Physical Oceanography
3 Semester Credit Hours (3 Lecture Hours)
Principles that rule water motions and associated transport and dispersion of natural and man-made substances in the sea including a review of the mean ocean circulation and its spatial and temporal variability, observational methods, ocean circulation theories and air-sea interactions. Calculus II strongly recommended.

ESCI 5392 Thesis I: Thesis Proposal
3 Semester Credit Hours (3 Lecture Hours)
Review of the literature on a thesis topic. Completion of a written research proposal including proposed experimental design. If the thesis proposal is not completed by the end of the semester, a mark of "IP" will be awarded. An "IP" is a permanent, non-punitive grade notation. In order to receive a qualitative grade in the course, the student must enroll in and complete this course in a subsequent semester.

ESCI 5393 Thesis II: Thesis Research
3 Semester Credit Hours (3 Lecture Hours)
Collection and organization of research data and presentation of a rough draft of the thesis manuscript to the thesis advisor. May be repeated; no more than three hours may be taken per semester. If the thesis draft is not completed by the end of the semester, a mark of "IP" will be awarded. An "IP" is a permanent, non-punitive grade notation. In order to receive a qualitative grade in the course, the student must enroll in and complete this course in a subsequent semester.
Prerequisite: ESCI 5392.

ESCI 5394 Thesis III: Thesis Submission
3 Semester Credit Hours (3 Lecture Hours)
Thesis defense and completion of the thesis manuscript including acceptance of the final copy by the advisory committee. May be repeated; no more than three hours may be taken per semester. If the thesis is not completed by the end of the semester, a mark of "IP" will be awarded. An "IP" is a permanent, non-punitive grade notation. In order to receive a qualitative grade in the course, the student must enroll in and complete this course in a subsequent semester.
Prerequisite: ESCI 5392.

ESCI 5397 Directed Research
3 Semester Credit Hours (3 Lecture Hours)
Emphasis on experimental design as related to environmental science. For students selecting the professional (non-thesis) option. Only three semester hours will count towards the non-thesis degree. Requires presentation of results in a written paper and seminar. If the professional paper is not completed by the end of the semester, a mark of "IP" will be awarded. An "IP" is a permanent, non-punitive grade notation. In order to receive a qualitative grade in the course, the student must enroll in and complete this course in a subsequent semester.

ESCI 5596 Directed Independent Study
1-5 Semester Credit Hours (1-5 Lecture Hours)
DIRECTED INDEPENDENT STUDY. Study in areas of current interest. (A total of six hours of Directed Independent Study may be counted toward the MS degree.)

ESCI 5940 Project Research
1-9 Semester Credit Hours
Research related to the MS project. Requires consent of graduate advisor. Does not count as credit toward the MS degree in Environmental Science. Course is taken as credit/no credit.

ESCI 6101 Environmental Research Seminar
1 Semester Credit Hour (1 Lecture Hour)
Studies and analysis of pertinent literature. May be repeated for credit, but credit may count only once towards the degree plan.

ESCI 6130 Oil Spill Management Lab
1 Semester Credit Hour (1 Lab Hour)
Field exercises in Oil Spill Response, utilizing a Spill Management Team incorporating the elements of incident command.
Prerequisite: ESCI 6230*.
* May be taken concurrently.
Co-requisite: SMTE 0096.

ESCI 6170 Hazardous Waste Treatment Technologies Lab
1 Semester Credit Hour (1 Lab Hour)
Review of practical techniques for handling, reducing and disposing of hazardous wastes in an environmentally safe manner.
Prerequisite: ESCI 6270*.
* May be taken concurrently.
Co-requisite: SMTE 0096.

ESCI 6201 Advanced Scientific Diving Techniques
2 Semester Credit Hours
Advanced study of the 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 6203 Professional Skills for Scientists
2 Semester Credit Hours
Presentation and discussion of professional skills of practicing scientists including literature searches, evaluation of information sources, oral and written communication skills, lifelong learning, careers and professional opportunities.

ESCI 6230 Oil Spill Management Theory
2 Semester Credit Hours (2 Lab Hours)
REVIEW 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. DEVELOPMENT OF A SPILL MANAGEMENT TEAM INCORPORATING THE ELEMENTS OF INCIDENT COMMAND.

ESCI 6270 Hazardous Waste Treatment Technologies Theory
2 Semester Credit Hours (2 Lecture Hours)
REVIEW OF THE LAWS AND REGULATIONS OF HAZARDOUS WASTE MANAGEMENT FROM AN HISTORICAL PERSPECTIVE FOLLOWED BY REPORTS ON CURRENT TECHNIQUES FOR HANDLING, REDUCING, AND DISPOSING OF HAZARDOUS WASTES IN AN ENVIRONMENTALLY SAFE MANNER.

ESCI 6302 Federal Environmental Laws and Regulations
3 Semester Credit Hours (3 Lecture Hours)
Advanced study of case histories involving the application of state and federal environmental laws and regulations. Review of permits, waste registrations, manifests, self-reporting and inspection reports.

ESCI 6310 Fundamentals of Remote Sensing
3 Semester Credit Hours (3 Lecture Hours)
Fundamenal theory of satellite/airborne remote sensing techniques, sensor performance and calibration, and the scientific applications for land, ocean and atmosphere observations. Topics include physical principles of remote sensing, radiometry, sensors and sensor technology from infrared to microwave sensing, and scientific applications for land, ocean and atmosphere observations.

ESCI 6314 Biogeochemical Processes
3 Semester Credit Hours
Water and element cycling in the atmosphere, hydrosphere and geosphere. Microbial interactions and physical processes will be emphasized.
Prerequisite: CHEM 1311, 1312 and GEOL 1403 or ESCI 1401 or 3351.

ESCI 6315 Environmental and Geological Applications of GIS
3 Semester Credit Hours (3 Lecture Hours)
The Geographic Information System (GIS) provides a vehicle for capturing, storing, querying, analyzing, and displaying multidimensional geospatial datasets. This course is designed to introduce students to advanced concepts of GIS and their applications to manage, analyze, and display of multidimensional environmental, geological, and geophysical datasets.
Prerequisite: (PHYS 1401 or 2425) and MATH 2413.

ESCI 6320 Advanced Environmental Health
3 Semester Credit Hours
Advanced study 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.

ESCI 6321 Advanced Soil and Groundwater Restoration
3 Semester Credit Hours (3 Lecture Hours)
Advanced study of 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.

ESCI 6322 Industrial Hygiene
3 Semester Credit Hours
Health protection practices in the industrial environment. Health basis for OSHA laws, regulations. Sampling and testing procedures.

ESCI 6324 Advanced Industrial Toxicology
3 Semester Credit Hours (3 Lecture Hours)
Advanced review of human physiology, general concepts of toxicology: dose-response relationship, interactions between the host and the agents, risk assessment, to provide a fundamental understanding of toxicology related to the chemicals in the workplace.

ESCI 6332 Advanced 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.

ESCI 6340 Ocean Resources
3 Semester Credit Hours (3 Lecture Hours)
Investigation of topics related to the discovery, distribution, and exploitation of marine resources of the ocean with a focus on the Gulf of Mexico, including the impact of resource exploitation on biological systems, and the development of marine policy.

ESCI 6345 Living with Coastal Hazards
3 Semester Credit Hours (3 Lecture Hours)
Study of how coastal processes, such as hurricanes, sea-level rise, and erosion, intersect with human activities to create hazardous conditions and how society responds to these conditions, presented through discussion, case studies, and field trips.

ESCI 6359 Ecosystem Dynamics
3 Semester Credit Hours (3 Lecture Hours)
Investigation of the interactions between organisms and physical processes that regulate marine ecosystem functions.

ESCI 6360 Coastal Management and Ocean Law
3 Semester Credit Hours (3 Lecture Hours)
The legal and policy framework associated with the coastal zone and ocean environment. Public access to coastal lands and waters, public trust, wetlands regulation; international law of the sea, fisheries law, and marine pollution.

ESCI 6365 Managing Occupational Safety and Accident Prevention
3 Semester Credit Hours (3 Lecture Hours)
This course provides students with advanced knowledge of regulatory requirements on occupational safety and practical techniques on accident prevention in the work environment.

ESCI 6380 Environmental Management Systems
3 Semester Credit Hours (3 Lecture Hours)
This course explores the systems management approach used by businesses and governments to promote environmental quality and sustainability. EMS and ISO 14001 standards go beyond minimally acceptable environmental compliance.

ESCI 6408 Environmental Microbiology
4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)
Relationships between microorganisms and their biotic and abiotic environments. Role of microorganisms in biogeochemical cycling. Methodology in microbial ecology. Biotechnological aspects.
Prerequisite: BIOL 2421.

ESCI 6416 Advanced Geochemistry
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
Advanced study of the Earth processes using principles of chemical equilibrium, thermodynamics, isotope geochemistry and organic geochemistry. Applications of low-temperature geochemistry to geologic problems.

ESCI 6480 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 or ESCI 6203 - Professional Skills for Scientists recommended.

ESCI 6590 Advanced Topics
1-5 Semester Credit Hours (1-3 Lecture Hours, 4 Lab Hours)
Advanced study in a specific area of environmental science. May be repeated for credit when topics vary. Offered on sufficient demand.

ESCI 6596 Directed Independent Study
1-5 Semester Credit Hours (1-5 Lecture Hours)
Study in areas of current interest. (A total of six hours of Directed Independent Study may be counted toward the MS degree.)