

Certificate Proposal Overview
College of Sciences
Environmental Science Academic Programs
Certificate in Environmental Science

1. Statement of Purpose.

This 15-hour certificate in Environmental Science is designed to meet the needs of prospective students interested in developing skills in environmental science. The purpose of this certificate is to provide professionals who already have undergraduate degrees with graduate instruction in environmental science as a means of maintaining and promoting their professional development. Environmental science is an interdisciplinary subject; therefore the certificate program is designed to provide graduates with course work in environmental science in appropriate areas outside of their undergraduate major. The certificate provides students with a post-baccalaureate educational opportunity that is narrower in scope and shorter in duration than its associated master's graduate degree program in the Environmental Science Academic Programs.

Educational Goals.

The goal of this certificate is to fill specific gaps in knowledge for environmental professionals who are seeking advancement in their organization, for people wishing to get into environmental professions, or for secondary educators wanting to teach environmental science. The certificate also builds a strong foundation for participants to obtain a master's degree at a future date. The coursework will develop interdisciplinary skills that are important for a successful environmental science professional including scientific writing, environmental law, applied ecology, and environmental assessment.

Successful students

- 1) Will be able to critically assess multi-disciplinary approaches to the interaction of scientific and socio-legal factors related to environmental science,
- 2) Will be able to perform an environmental assessment,
- 3) Will demonstrate proficiency in oral and written communication for an environmental science audience, and
- 4) Will demonstrate proficiency in teamwork skills needed for environmental science assessment teams.

Link to Existing Programs. The certificate in environmental science will be housed in the Environmental Science Academic Programs Office. Degree-seeking, special graduate or non-degree-seeking students from any discipline at UTSA will be allowed to complete the Certificate in Environmental Science.

2. Statement of Need.

Environmental scientists use their knowledge of the natural sciences to protect the environment and human health. Environmental science is the study of the social, political, and ethical movements of the environment. Environmental scientists apply a scientific understanding of the natural world to the protection of nature and balance human needs with the needs of organisms in the natural environment and the needs of future generations who may be harmed by environmental abuses. Nationally, employment of environmental scientists and specialists is projected to grow 15 percent and environmental science and protection technicians is growing 19% faster from 2012 to 2022, faster than the average for all occupations

(1). Heightened public interest in the hazards facing the environment, as well as the increasing

demands placed on the environment by population growth, is expected to spur demand for environmental scientists and specialists.

Regionally, employment in the natural resources and mining super sector has increased 51.2% for the state of Texas from 2001-2012 (2). All oil and gas companies must have environmental scientists as part of their workforce and environmental scientist who work in the oil and gas are some of the highest paid environmental scientists. The recent expansion and development of the petroleum industry in San Antonio as a result of the Eagle-Ford Shale exploration is increasing the need for environmental scientists at a dramatic rate. The Eagle Ford Shale is possibly the largest single economic development in the history of the state of Texas and ranks as the largest oil and gas development in the world based on capital investment. The oil and gas industry in the Eagle Ford is estimated to have generated total impacts of nearly \$72 billion in the core 15-county area, supporting almost 115,000 full-time equivalent jobs, while contributing just over \$2 billion both to local governments and to the state government. In addition, the total impact of oil and gas industry activity in west Texas for 2022 is forecasted to be more than \$20 billion in the moderate scenario, with 30,540 jobs anticipated, and revenues of \$664 million for the local governments and \$701 million for the state government (2).

Locally, there is a significant amount of support and need for the environmental scientists in the San Antonio community from governmental and consulting entities. Graduates receiving bachelor and master's degrees in Environmental Science at UTSA are gainfully employed. Some examples of where these students are employed are Texas Department of Transportation, Texas Commission on Environmental Quality, City of San Antonio, San Antonio

Water Systems, San Antonio River Authority, and City Public Service; as well as many of the local private consultant firms.

3. Statement of Resources. No additional resources are needed for this certificate. Currently, the Environmental Science Academic Program employs quality faculty to oversee and teach courses as well as provide supervision to students who are interested in attaining the Environmental Science certificate. Existing courses, classrooms, and technologies will support the program delivery. No new courses are being created for this certificate. No course release or buy-outs are integrated into the program or for course development. The current Graduate Advisor of Record currently receives course release for duties related to the master's program, and will also assume the duties of managing the certificate program, but no additional course releases are being sought.

4. Description of Curriculum.

Requirements for completion include:

Completion of **15 graduate** hours of approved UTSA coursework with a "B" or better in each course.

ES Required Courses:

ES 5013 Survey Topics in Environmental Science (3-0) 3 hours credit. Prerequisite: Graduate standing. Analysis of the basic concepts and new scientific developments in environmental science. Case studies will cover a range of relevant topics to promote a thorough understanding of the emergent issues in environmental science. Emphasis will be placed on developing both written and verbal scientific presentation skills. (Formerly EES 5013. Same as BIO 5013. Credit can be earned for only one of the following: BIO 5013, EES 5013, or ES 5013.)

ES 5103 Applied Ecology (3-0) 3 hours credit. The impact of humanity's activities on the environment: their effect on water, land, animal, and human resources. An evaluation of present and future strategies to preserve a healthy environment. (Formerly EES 5103. Credit cannot be earned for both EES 5103 and ES 5103.)

ES 5133 - Fundamentals of Environmental Law (3-0) 3 hours credit. Prerequisites: Graduate Standing. This course exposes students to basic legal theories relevant to contemporary environmental practice, and provides an introduction to administrative law as well as six federal environmental statutes: the Clean Air Act, Clean Water Act, National Environmental Policy Act, Endangered Species Act, Resource Conservation and Recovery Act, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

ES 5143 - Technical Writing for Environmental Scientists (3-0) 3 hours credit. Prerequisites: Graduate standing. A course designed to give graduate students the skills necessary to write a manuscript for peer review and to prepare other professional materials for presentation or publication. Topics covered in this course include: searching the scientific literature; scientific writing style; writing graduate level papers, proposals, projects, and thesis components; preparing scientific presentations; presentation of data; using visual aids; and using word processing, spreadsheet, and presentation software.

ES 6103 – Environmental Assessment (3-0). 3 hours credit. Prerequisites: graduate standing. This course evaluates the framework of an impact assessment and details regarding the environment (air, water, soil), its pollutants (atmospheric, noise, water, solid waste), their impacts (physical, social, economic), relevant regulations, and pollution minimization or management strategies. Students will use this information to prepare a hypothetical

Environmental Impact Statement (EIS). (Formerly EES 6103 and ES 5203. Credit can be earned for only one of the following: EES 6103, ES 5203, or ES 6103.)

5. Faculty List. Because this certificate draws from existing course offerings, five faculty members from the Environmental Science Academic Programs will be appointed to the certificate program. Additional Environmental Science Academic Program faculty will support the program as needed.

The certificate program appointed faculty members are:

Janis K. Bush, Ph.D., Associate Professor (Technical Writing)

Karen Engates, Ph.D., Senior Lecturer (Applied Ecology)

Fernando Martinez, Ph. D, Lecturer III (Environmental Assessment)

Terri Matiella, Ph.D, Lecturer III (Survey Topics)

Robert Thompson, JD, Senior Lecturer (Fundamentals of Environmental Law)

6. Program Administration. The Environmental Science Certificate will be housed in the Environmental Science Academic Program, whose members will support students. The Program Director will be Dr. Janis Bush, the director of the Environmental Science Academic Program. Dr. Fernando Martinez, the Graduate Advisor of Record for the Environmental Science Academic Programs will serve as the Program Advisor. The Environmental Science Academic Program Graduate Committee will be responsible for overseeing the processes related to admissions' decisions. The Program Advisor will supervise students' progress, prepare certificate plans for students, and work with the Dean's Office in the College of Science to certify students who have completed the requirements for the certificate. Students who declare the certificate will be admitted as a special student in the Environmental Science

Academic Program. The Program Advisor will also work with the Environmental Science Academic Program Graduate Studies committee, which he chairs and is composed of at least two faculty members in the Certificate Program. This committee will participate in decision-making about advising, recruitment, scheduling courses, and program policies. Certificates will be awarded upon completion of the 15 approved UTSA hours in the areas of environmental science with a "B" or better in each course.

7. Admissions Requirements. The prerequisites for this program are a bachelor's degree with a current status as a degree-seeking, non-degree seeking, or special status student in a graduate-level school program. The following statement will be added to the next Graduate Catalog:

"Students who are not currently enrolled in a graduate degree program will be required to apply for admission to UTSA as a special graduate student and to indicate their intent to seek admission into a certificate program. Applicants will be required to meet University admission requirements for *special graduate students*. Once admitted as a special graduate student, the student will contact the Program Advisor and complete a form requesting permission to enter and complete the certificate program. The Program Advisor and the Dean of the College Science will sign the form. A copy of this form will be sent to the Graduate School."

To maintain enrollment in the certificate program, students should maintain a 3.0 GPA throughout tenure in the program.

8. Projected Enrollments. While the certificate is likely to draw new students to UTSA, it is also likely that UTSA graduates would pursue this certificate. This certificate will increase the student's marketability in the field for job placement.

Table 1. Projected Admissions and Enrollments

Category	Year 1	Year 2	Year 3	Year 4	Year 5
Admissions	10	15	20	20	20
Enrollments	10	15	20	20	20

9. Budget. There are no additional funds requested in the management of this certificate.

10. Endorsements. Dr. Janis K. Bush has reviewed, accepted, and provided a letter of support for this proposal (Appendix A).

11. Evaluation/Reviews. Evaluation of the certificate program will be conducted annually (see Table 2). Student portfolios will be used for formative and summative assessment. Student progress will be evaluated formatively based on success in the Certificate coursework. Upon completion of each semester of coursework, students will submit portfolios for review of work completed to date. The portfolio will include items demonstrating mastery of coursework and the application of environmental science skills as well as a student self-assessment of progress. At the end of their coursework, all students will present their final environmental assessment project and their portfolio to the Certificate faculty who will review the application and portfolio using the final review rubric. The summative evaluation will include student GPA of 3.0 or better in the certificate area coursework and a final portfolio (including a culminating project of an environmental assessment). We will also include attrition rates and completion rates in the general certificate evaluation.

The final portfolio must include:

1. A self-evaluation statement in the form of a cover letter stating progress and development, summary of activities related to environmental science concepts, communication, law, and assessment.
2. Transcripts
3. A written comprehensive environmental assessment illustrating competency in environmental concepts, communication, law, and assessment.
4. Final Review Rubric (by Certificate faculty)
5. A current CV or resume.

Outcome	Evaluation Measure
<p>Critically assess multi-disciplinary approaches to the interaction of scientific and socio-legal factors related to environmental science</p>	<p>A rubric measuring various dimensions of written communication focusing on content will be used to evaluate a research paper in graduate courses on environmental topics such as conservation/ restoration ecology, application of federal law at the state level, and environmental impact statements for a representative sample of students. At least 80% of students will demonstrate a proficiency (3) or higher on a scale of 1-4 (4=Excellent, 1= Poor) on the rubric dimension for content.</p>
<p>Perform an environmental assessment</p>	<p>A rubric measuring various dimensions of written communication to include organization, content and mechanics will be used to evaluate an Environmental Assessment research paper in ES 6103, Environmental Assessment, for a representative sample of students. At least 80% of students will demonstrate a proficiency (3) or higher on a scale of 1 to 4 (4= Capstone, 1=Benchmark) on each criteria of the written communication rubric.</p>
<p>Demonstrate proficiency in oral and written communication for an environmental science audience</p>	<p>Rubrics measuring various criteria of written communication to include organization, content, syntax, and oral communication to include organization, delivery, and preparation will be used to evaluate a written self-evaluation statement and oral portfolio defense for certificate – seeking graduate students by the certification review committee. At least 80% of students will demonstrate a proficiency (3) or higher on a scale of 1-4 (4=Excellent, 1= Poor) on each rubric dimension of both the oral and written communication rubrics.</p>

Demonstrate proficiency in teamwork skills needed for environmental science assessment teams	A rubric that measures various criteria of effective teamwork to include facilitating the team process, communicating, timeliness including keeping on task and meeting deadlines, and problem solving to produce a group presentation in graduate courses. At least 80% of students will score a 3 or higher on a scale of 1-4 (4=Excellent, 1= Poor) on each rubric dimension.
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References

1. Bureau of Labor Statistics. 2014. Occupational Outlook Handbook, 2014-15 Edition, Environmental Scientists and Specialists, . U. S. Department of Labor
2. Development IFE. 2014. *Economic impact of oil and gas activities in the west Texas energy consortium region*, University of Texas at San Antonio, Institute for Economic Development