Department of Civil and Environmental Engineering

The Department of Civil Engineering offers the Master of Civil Engineering degree and the Master of Science degree in Civil Engineering, as well as the Doctor of Philosophy degree in Environmental Science and Engineering.

- M.S. in Civil Engineering (p. 1)
- Master of Civil Engineering (p. 1)
- Ph.D. in Environmental Science and Engineering (p. 2)

Master of Science Degree in Civil Engineering

The Master of Science degree in Civil Engineering is designed to provide specialized knowledge in selected technical areas of Civil Engineering. The educational objective of this program is to produce graduates who are capable of research and professional practice in a specialized area of Civil Engineering, namely environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. This program involves both coursework and a thesis and it is designed to provide exposure to research that could possibly lead to subsequent doctoral study.

Admission Requirements

For unconditional admission, applicants must satisfy the following requirements, in addition to the University-wide graduate admission requirements (refer to Chapter 1, Admission):

- an undergraduate degree in Civil Engineering or a closely related field from an accredited institution of higher education, or proof of equivalent training at a foreign institution;
- a satisfactory score, as evaluated by the Civil Engineering Graduate Studies Committee, on the Graduate Record Examination (GRE);
- Test of English as a Foreign Language (TOEFL) minimum scores of 79 or 550 for Internet or paper versions, respectively;
- a statement of research/specialization interest; and
- a favorable recommendation by the Civil Engineering Graduate Studies Committee.

Degree Requirements

The minimum number of semester credit hours required for the degree is 30. At least 24 semester credit hours must be taken at UTSA. Elective courses may be chosen from the Department of Civil and Environmental Engineering (CEE) or outside the department, with approval from the CEE Graduate Studies Committee. Any grade lower than “B” in a graduate course cannot be counted toward the coursework requirement. Each candidate is required to pass a comprehensive examination during their thesis defense administered by his or her advisory committee.

Advisory Committee

Students must choose an Advisory Committee consisting of a chair and at least two additional graduate faculty members. Students must submit the names of their Advisory Committee to the CEE Graduate Studies Committee by the end of their first semester of study.

Program of Study

A. Degree Core Curriculum (6 semester credit hours): 6
   - CE 5043 Advanced Civil Engineering Statistics
     or STA 5103 Applied Statistics
     or ES 5023 Environmental Statistics
   - CE 5143 Numerical Methods in Civil Engineering

B. Electives (18 semester credit hours): 18
   - Includes comprehensive examination/thesis defense/seminar presentation
     - CE 5981 Master’s Thesis
     - CE 5982 Master’s Thesis
     - CE 5983 Master’s Thesis

Total Credit Hours: 30

Master of Civil Engineering Degree

The Master of Civil Engineering degree is designed to provide specialized knowledge in selected technical areas of Civil Engineering. The educational objective of this program is to produce graduates who are capable of professional practice in a specialized area of Civil Engineering, namely environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. It involves courses only and a seminar. It does not normally lead to subsequent doctoral study.

Admission Requirements

For unconditional admission, applicants must satisfy the following requirements, in addition to the University-wide graduate admission requirements (refer to Chapter 1, Admission):

- an undergraduate degree in Civil Engineering or a closely related field from an accredited institution of higher education, or proof of equivalent training at a foreign institution;
- a satisfactory score, as evaluated by the Civil Engineering Graduate Studies Committee, on the Graduate Record Examination (GRE);
- Test of English as a Foreign Language (TOEFL) minimum scores of 79 or 550 for Internet or paper versions, respectively;
- a statement of specialization interest; and
- a favorable recommendation by the Civil Engineering Graduate Studies Committee.

Degree Requirements

The minimum number of semester credit hours required for the degree is 34. At least 24 semester credit hours must be taken at UTSA. Elective courses may be chosen from the Department of Civil and Environmental Engineering (CEE) or outside the department, with approval from the CEE Graduate Studies Committee. Any grade lower than “B” in a graduate course cannot be counted toward the coursework requirement.

Each student has to take a comprehensive examination during his or her seminar presentation at the end of his or her program. He/she is also expected to attend the seminars offered by other students. These seminars are administered by the Graduate Committee of the CEE Department.
Program of Study

A. Degree Core Curriculum (6 semester credit hours):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 5043</td>
<td>Advanced Civil Engineering Statistics</td>
</tr>
<tr>
<td>or STA 5103</td>
<td>Applied Statistics</td>
</tr>
<tr>
<td>or ES 5023</td>
<td>Environmental Statistics</td>
</tr>
<tr>
<td>CE 5143</td>
<td>Numerical Methods in Civil Engineering</td>
</tr>
</tbody>
</table>

B. Electives (27 semester credit hours): 27

C. Graduate Seminar (1 semester credit hour): 1

Includes comprehensive examination

CE 5991 Graduate Seminar

Total Credit Hours 34

Doctor of Philosophy Degree in Environmental Science and Engineering

The Civil and Environmental Engineering (CEE) Department offers the opportunity for advanced study and research leading to the Doctor of Philosophy degree in Environmental Science and Engineering. The educational objective of this program is to produce graduates who are capable of conducting original research in industry or academia as well as assuming a leadership role in their chosen employment field. This is a multidisciplinary program administered by the CEE Department. It encompasses faculty and facilities from the College of Sciences and the CEE Department, as well as individual faculty from other UTSA departments. The program has three separate tracks, namely Environmental Science, Environmental Engineering, and Civil Engineering. The Ph.D. degree in Environmental Science and Engineering is awarded to candidates who display an in-depth understanding of the subject matter and demonstrate the ability to make an original contribution to knowledge in their field of specialty.

The regulations for this degree comply with the general University regulations (refer to Chapter 2, General Academic Regulations, and Chapter 5, Doctoral Degree Regulations).

Admission Requirements

Applicants must satisfy the following requirements, in addition to satisfying the University-wide graduate admission requirements (refer to Chapter 1, Admission):

- a Bachelor of Science degree and a Master of Science degree from an accredited university, and a minimum grade point average of 3.0 in upper-division and graduate courses. The degrees should be in biology, ecology, environmental science, chemistry, geology, geography, environmental engineering, civil engineering or other related scientific or engineering discipline. Exceptional applicants without a Master of Science degree may be considered for admission to the program on a case-by-case basis;
- three letters of recommendation from persons familiar with the applicant’s academic potential;
- official Graduate Record Examination (GRE) scores;
- a letter of research/specialization interest; and
- a résumé/curriculum vita.

Applications must be submitted to the UTSA Graduate School online at http://graduateschool.utsa.edu/. Incomplete applications will not be considered. Acceptance to the program is decided by the Doctoral Studies Committee (DSC), comprised of graduate faculty members selected from the CEE Department and the College of Sciences. Full-time students accepted for the program are eligible to apply for financial support in the form of competitive teaching assistantships, research assistantships, or research fellowships.

Degree Requirements

The Doctoral program in Environmental Science and Engineering requires that students complete a minimum of 60 semester credit hours beyond the Master’s degree. This coursework includes courses that have been designed to provide advanced instruction in areas considered to form the foundation for the disciplines of environmental science and engineering. Enrollment in the Graduate Seminar is required for a minimum of 2 semester credit hours. A minimum of 15 semester credit hours of Doctoral Research and 15 semester credit hours minimum of Doctoral Dissertation must be completed prior to graduation. Any grade lower than “B” in graduate or remedial coursework at the undergraduate level does not count toward the 60 semester credit hours. Students can apply, with the approval from the chair of their Dissertation Committee, up to 12 semester credit hours of graduate coursework to elective courses (see below), if not applied toward their Master’s degree. Students with only a baccalaureate degree are required to have a minimum of 90 semester credit hours to graduate.

21 semester credit hours of required elective courses must be selected by each student according to his/her selected track of study, as defined below. These need to be approved by the Chair of the DSC and the student’s Dissertation Committee. These elective courses may be offered by departments in the College of Sciences, the College of Engineering or by other departments at UTSA.

Students that have obtained a Master’s degree are required to complete the following courses:

A. Degree Core Curriculum (10 semester credit hours):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 5001</td>
<td>Process and Ethics in Thesis/Dissertation</td>
</tr>
<tr>
<td></td>
<td>Research Development</td>
</tr>
<tr>
<td>CE 5043</td>
<td>Advanced Civil Engineering Statistics</td>
</tr>
<tr>
<td>or ES 5023</td>
<td>Environmental Statistics</td>
</tr>
<tr>
<td>or STA 5103</td>
<td>Applied Statistics</td>
</tr>
<tr>
<td>CE 5013</td>
<td>Civil Engineering Systems Analysis</td>
</tr>
<tr>
<td>or ES 5233</td>
<td>Experimental Design and Analysis</td>
</tr>
<tr>
<td>or EGR 5213</td>
<td>Topics in Systems Modeling</td>
</tr>
</tbody>
</table>

Select one of the following:

CE 6113 Global Change
ES 5043 Global Change
GEO 5043 Global Change

B. Track Electives (12 semester credit hours):

These can be selected from 5000–7000 level courses offered in Civil and Environmental Engineering or other departments, with the approval of the Environmental Science and Engineering Doctoral Studies Committee.

1. Environmental Science Track Electives
The objective of this track is to train students in conducting research in the various aspects of environmental science with a focus on the application of physical and biological sciences in solving environmental problems. These elective courses can be selected from the graduate courses offered by the College of Sciences, the CEE Department or other UTSA departments. The overall program of study for this track may differ by no more than 12 semester credit hours from the program of study for the Ph.D. degree in Environmental Science and Engineering and must be approved by the student’s Dissertation Advisor and the Doctoral Studies Committee.

2. Environmental Engineering Track Electives

The objective of this track is to train students in conducting research in the various aspects of environmental engineering with an emphasis on the application of civil engineering principles in sustaining the natural environment (i.e., air, water and land). Elective courses can be selected from the graduate courses offered by the College of Sciences, the CEE Department or other departments. The overall program of study for this track may differ by no more than 12 semester credit hours from the program of study for the Ph.D. degree in Environmental Science and Engineering and must be approved by the student’s Dissertation Advisor and the Doctoral Studies Committee.

C. Other Electives (6 semester credit hours):

These can be selected from 5000–7000 level courses offered in Civil and Environmental Engineering or other departments, with the approval of the Environmental Science and Engineering Doctoral Studies Committee.

D. Seminars (2 semester credit hours):

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 6221</td>
<td>Graduate Seminar in Environmental Science and Engineering</td>
</tr>
<tr>
<td>or ES 5981</td>
<td>Graduate Seminar in Environmental Science and Engineering</td>
</tr>
</tbody>
</table>

E. Doctoral Research and Dissertation (30 semester credit hours):

Select one of the following options (15 semester credit hours required of Doctoral Research and 15 semester credit hours required of Doctoral Dissertation):

Option I:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 7213</td>
<td>Doctoral Research</td>
</tr>
<tr>
<td>or CE 7212</td>
<td>Doctoral Research</td>
</tr>
<tr>
<td>or CE 7211</td>
<td>Doctoral Research</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 7313</td>
<td>Doctoral Dissertation</td>
</tr>
<tr>
<td>or CE 7312</td>
<td>Doctoral Dissertation</td>
</tr>
<tr>
<td>or CE 7311</td>
<td>Doctoral Dissertation</td>
</tr>
</tbody>
</table>

Option II:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 7213</td>
<td>Doctoral Research</td>
</tr>
<tr>
<td>or CE 7212</td>
<td>Doctoral Research</td>
</tr>
<tr>
<td>or CE 7211</td>
<td>Doctoral Research</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 7313</td>
<td>Doctoral Dissertation</td>
</tr>
<tr>
<td>or CE 7312</td>
<td>Doctoral Dissertation</td>
</tr>
<tr>
<td>or CE 7311</td>
<td>Doctoral Dissertation</td>
</tr>
</tbody>
</table>

Total Credit Hours 60

Students that have obtained a Bachelor's degree are required to complete the following courses:

A. Degree Core Curriculum (semester credit hours):

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 5001</td>
<td>Process and Ethics in Thesis/Dissertation Research Development</td>
</tr>
<tr>
<td>CE 5043</td>
<td>Advanced Civil Engineering Statistics</td>
</tr>
</tbody>
</table>

or ES 5023 Environmental Statistics

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 5013</td>
<td>Civil Engineering Systems Analysis</td>
</tr>
</tbody>
</table>

or ES 5233 Experimental Design and Analysis

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 6113</td>
<td>Global Change</td>
</tr>
<tr>
<td>ES 5043</td>
<td>Global Change</td>
</tr>
<tr>
<td>GEO 5043</td>
<td>Global Change</td>
</tr>
</tbody>
</table>

B. Track Electives (21 semester credit hours):

These can be selected from 5000–7000 level courses offered in Civil and Environmental Engineering or other departments, with the approval of the Environmental Science and Engineering Doctoral Studies Committee.

1. Environmental Science Track Electives

The objective of this track is to train students in conducting research in the various aspects of environmental science with a focus on the application of physical and biological sciences in solving environmental problems. These elective courses can be selected from the graduate courses offered by the College of Sciences, the CEE Department or other UTSA departments. The overall program of study for this track may differ by no more than 12 semester credit hours from the program of study for the Ph.D. degree in Environmental Science and Engineering and must be approved by the student’s Dissertation Advisor and the Doctoral Studies Committee.

2. Environmental Engineering Track Electives

The objective of this track is to train students in conducting research in the various aspects of environmental engineering with a focus on the application of science and engineering principles in sustaining the natural environment (i.e., air, water and land). Elective courses can be selected from the graduate courses offered by the College of Sciences, the CEE Department or other departments. The overall program of study for this track may differ by no more than 12 semester credit hours from the program of study for the Ph.D. degree in Environmental Science and Engineering and must be approved by the student’s Dissertation Advisor and the Doctoral Studies Committee.

3. Civil Engineering Track Electives
The objective of this track is to train students in conducting research in the various aspects of civil engineering with an emphasis on the application of civil engineering principles in the design, construction, and maintenance of the physical and naturally built environment. Elective courses can be selected from the graduate courses offered by the CEE Department or other College of Engineering departments. The overall program of study for this track may differ by no more than 12 semester credit hours from the program of study for the Ph.D. degree in Environmental Science and Engineering and must be approved by the student's Dissertation Advisor and the Doctoral Studies Committee.

C. Other Electives (12 semester credit hours):

These can be selected from 5000–7000 level courses offered in Civil and Environmental Engineering or other departments, with the approval of the Environmental Science and Engineering Doctoral Studies Committee.

D. Seminars (2 semester credit hours):

CE 6221 Graduate Seminar in Environmental Science and Engineering
or ES 5981 Graduate Seminar in Environmental Science and Engineering

E. Doctoral Research and Dissertation (45 semester credit hours):

Select one of the following options:

Option I:

CE 7213 Doctoral Research
or CE 7212 Doctoral Research
or CE 7211 Doctoral Research

CE 7313 Doctoral Dissertation
or CE 7312 Doctoral Dissertation
or CE 7311 Doctoral Dissertation

Option II:

ES 7213 Doctoral Research
or ES 7212 Doctoral Research
or ES 7211 Doctoral Research

ES 7313 Doctoral Dissertation
or ES 7312 Doctoral Dissertation
or ES 7311 Doctoral Dissertation

Total Credit Hours 90

Dissertation Committee

Students must choose a Dissertation Committee consisting of a chair and at least four additional graduate faculty members. This committee must include a minimum of one faculty member from the CEE Department and one from the College of Sciences. Students must submit the names of their Dissertation Committee to the DSC Chair by the end of their second semester of study.

Advancement to Candidacy

Ph.D. students advance to candidacy after completing their written and oral qualifying examinations. First, students must complete the core curriculum courses and then take the written qualifying examination. Full-time students must take the written qualifying examination by the end of their second semester of study. Part-time students need to take the written qualifying examination at a time dictated by the DSC. The written qualifying examination may include questions on six core areas, including statistics, hydrogeology, biology, chemistry, environmental engineering and civil engineering. Students are expected to show in-depth knowledge of the topics pertaining to their track of study. This examination is administered by the DSC with input from the faculty participating in the program. The written qualifying examination tests the student’s undergraduate background, their degree of understanding of the material presented in graduate courses, as well as their critical thinking and written communication skills. No more than two attempts to pass the written qualifying examination are permitted. Students who fail the written qualifying examination twice are terminated from the program.

Upon successful completion of the written qualifying examination, students are allowed to take Doctoral Research credit hours. Students must take their oral qualifying examination within two semesters after passing their written qualifying examination. The oral qualifying examination is a dissertation proposal defense. The dissertation proposal should describe the topic, the literature review, the proposed methodology and experimental approach, as well as highlight the novelty and potential contribution of the topic to the scientific field. The student’s Dissertation Committee chair must approve the student’s research proposal before scheduling the oral examination. Upon successful completion of the oral qualifying examination, students advance to Ph.D. candidacy and are allowed to take Doctoral Dissertation credit hours. No more than two attempts to pass the oral qualifying examination are permitted. Students who fail the oral qualifying examination twice are terminated from the program.

Results of the written and oral examinations must be reported to the DSC and the Dean of the Graduate School. Admission into the Doctoral program does not guarantee advancement to candidacy. After advancement to candidacy, the student’s Dissertation Committee can be changed at the student’s request and with the approval of the chair of the DSC.

Dissertation

Candidates must demonstrate their ability to conduct independent research by completing an original dissertation. The Dissertation Committee guides, critiques and finally approves the candidate’s dissertation. The format of the dissertation must follow the doctoral degree regulations of the Graduate School as documented under Chapter 5 of this catalog.

Final Oral Dissertation Defense

The student must notify the Graduate School in writing two weeks prior to the final scheduled oral defense. The final oral defense consists of a public presentation of the dissertation, followed by a closed oral defense. Results of the oral defense must be reported to the Dean of the Graduate School. Awarding of the degree is based on the approval of the Dissertation Committee and the Dean of the Graduate School. The Dean of the Graduate School certifies the completion of all University-wide requirements.