

# Ph.D. in Civil Engineering

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## Educational Objectives

- Students will demonstrate an ability to apply advanced science and engineering concepts to the solution of complex engineering problems
- Students will demonstrate an ability to communicate effectively orally and in written form
- Students will demonstrate an ability to research, analyze, and/or design complex engineering systems to meet a desired need

Graduates from the program will have the technical background to contribute to improvements in the reliability, maintenance, and management of infrastructure systems. Graduates will be able to undertake integrated programs of research, education, and technology transfer to produce new knowledge that will enhance the performance of transportation, environmental, and urban infrastructures.

## Admission Requirements

Applicants must have completed a bachelor's or master's degree in Civil Engineering or a closely related discipline. The admissions committee evaluates the preparation of non-Civil Engineering applicants and recommends leveling courses as appropriate. These courses are in addition to the PhD degree plan. Applicants whose degrees are from non-English speaking institutions are required to demonstrate English proficiency. Please consult the Graduate School (<https://www.utep.edu/graduate/future-students/applicant-timelines.html>) website for required scores..

Recommendations for admission are made on the basis of the following:

- Grade point average in upper-division or graduate work as appropriate
- Submission of GRE scores is required for applicants who do not have an earned degree in a closely related discipline from a U.S. university
- Research and professional commitment, and interest as demonstrated by a Statement of Purpose, and other materials as available
- Two letters of recommendation
- Alignment of the applicant's research interest with the research needs of the faculty.

Students admitted with a bachelor's degree can elect to complete a master's degree in Civil Engineering, but will be required to complete all of the requirements of the master's degree as indicated in this catalog.

## Degree Requirements

The Ph.D. in Civil Engineering degree requires every student to complete at least 72 Semester-Credit-Hours (SCHs) of work accumulated through courses, doctoral research, and dissertation. In addition, each student must sign a Milestones Agreement, and successfully pass three examinations: the Qualifying Examination, the Dissertation Proposal Examination, and the Dissertation Defense Examination. The following sections explain the degree requirements in approximately the order of a student's progress toward the completion of the Ph.D. in Civil Engineering degree.

## Advising

Every newly admitted student will be assigned an Academic Advisor and given a Degree Plan Form. The student must meet with the Academic Advisor at least once per semester to update the Degree Plan Form, review the progress, selection of courses, etc. Additional advice will be provided by the Ph.D. Advisory Committee and the Dissertation Committee as the student progresses in his/her study.

## Milestones Agreement

In the first semester of study, the student must sign a Milestones Agreement with the Academic Advisor. This Milestones Agreement states the milestones of the Ph.D. in Civil Engineering program, and the expected timelines to reach the milestones.

## Coursework

Each student must accumulate at least 42 SCHs through coursework. The coursework credits may be earned by taking any graduate or Ph.D. level course (except CE 5394 Graduate Research, CE 5396 Graduate Projects, CE 5397 Graduate Projects, CE 5398 Thesis, CE 5399 Thesis, CE 6393 Dissertation Proposal, CE 6396 Doctoral Research, CE 6398 Dissertation, CE 6399 Dissertation) taught by the Civil Engineering Department. Students may also take graduate or Ph.D. level courses taught by other departments at UTEP, as long as they are approved by the Academic Advisor or the Ph.D. Advisory Committee.

A student who is admitted with a recognized master's degree may, at the recommendation of the Academic Advisor or the Ph.D. Advisory Committee, and the Program Director, transfer up to 24 SCHs from the courses taken during the master's degree into the Ph.D. degree plan. Only taught courses with earned grades of B or better may be transferred. Research and thesis courses cannot be transferred. Graduate courses taken at UTEP as part of the fast-track program, or dual master's degrees may be transferred. All the courses recommended for the transfer must be approved by the Graduate School.

## Qualifying Examinations

Every Ph.D. in Civil Engineering student must take the Qualifying Examination before the third semester. The Qualifying Examination is administered by the student's Ph.D. Advisory Committee. The Ph.D. Advisory Committee will be appointed by the Graduate Program Director and will consist of three Civil Engineering faculty members. The chair of the Ph.D. Advisory Committee is the Academic Advisor. The Qualifying Examination assesses the student's general competency in all areas of civil engineering, and in-depth competency in the student's chosen sub-discipline (e.g., construction, environmental, geotechnical, structural, or transportation). Based on the student's performance in the Qualifying Examination, the Committee may prescribe specific courses for the student to take with the minimum earned grades to rectify the weakness, or to prepare the student to take on the anticipated research work. These courses may be part of the 42 SCHs of coursework in the degree plan, on in addition to the 42 SCHs in the degree plan. The Committee may prescribe additional non-coursework requirements as it sees fit. A student must register for CE 6091 Qualifying Exam in the same semester when he/she takes the Qualifying Examination. A student has up to two attempts to pass the Qualifying Examination, in two different semesters.

## Doctoral Research

Each student must accumulate at least 21 SCHs of doctoral research credits. These 21 SCHs are earned by registering CE 6396 Doctoral Research multiple times. A student who registers for CE 6396 Doctoral Research will conduct doctoral level research under the direction of his/her Academic Advisor on a topic that is expected to be developed into the student's dissertation topic.

## Dissertation Committee

After the student has progressed toward the end of the doctoral research and has decided on a dissertation topic, he/she should, in consultation with the Academic Advisor, form a dissertation Committee. The Dissertation Committee appointed by the Department of Civil Engineering, should have at least four graduate faculty members; the Committee Chair (who is the Academic Advisor), two faculty members in the Department of Civil Engineering, and one outside member. The outside member must be from another department at UTEP, from other universities, or from the industry. The outside member must be approved by the Graduate School as a Temporary Graduate Faculty before he/she can serve in the Dissertation Committee. The role of the Dissertation Committee is to advise the student in his/her dissertation work, and to administer the Dissertation Proposal Examination and the Dissertation Defense Examination.

## Dissertation Research

The dissertation is a scholarly document that reports the student's original, independent, and scientific research on a civil engineering topic. The technical content of the dissertation must be of high quality, and publishable in at least a high-impact, peer reviewed journal. Every student must complete at least 9 SCHs of dissertation work, by taking the following dissertation research courses toward the end of the study program:

- CE 6393 Dissertation Proposal
- CE 6398 Dissertation
- CE 6399 Dissertation

These three courses must be taken in a series, starting with CE 6393 Dissertation Proposal, followed by CE 6398 Dissertation, and then CE 6399 Dissertation at one course per semester. When a student registers for CE 6393 Dissertation Proposal, he/she is expected to develop and write a dissertation proposal as the deliverable. He/she must take the Dissertation Proposal Examination as part of the CE 6393 Dissertation Proposal requirement. Only after he/she has passed the Dissertation Proposal Examination, he/she is permitted to register for CE 6398 Dissertation in the following semester to continue with the proposed research. In the subsequent semester, the student will register for CE 6399 Dissertation when he/she will finish the dissertation research and take the Dissertation Defense Examination.

## Dissertation Proposal Examination

After a student has passed the Qualifying Examination, he/she will be encouraged to start his/her doctoral research by registering for CE 6396 Doctoral Research. From the third semester onwards, the student will begin to transition from registering for mostly coursework credits to mostly research credits. A student who has been admitted with a master's degree is expected to register for CE 6393 Dissertation Proposal and take the Dissertation Proposal Examination before the fifth semester. A student who has been admitted without a master's degree is expected to register for CE 6393 Dissertation Proposal and take the Dissertation Proposal Examination before the seventh semester. The Dissertation Proposal Examination is a public examination administered by the Dissertation Committee. The purpose of the Dissertation Proposal Examination is to assess the student's ability to (1) identify a civil engineering problem; (2) review the past and existing solutions; (3) formulate an original solution approach; (4) design and conduct experiments to gather data; and (5) explain how the data will be analyzed. The Dissertation Committee may advise the student on the remaining parts of the dissertation work, and/or specific requirements that must be completed before the Dissertation Examination. Each Ph.D. student has a maximum of two attempts to pass the Dissertation Proposal Examination.

## Ph.D. Candidacy

A student who has passed the Dissertation Proposal Examination and has completed at least 42 SCHs of coursework (plus additional courses prescribed by the Ph.D. Advisory Committee after the Qualifying Examination, if any) may apply to the Graduate School to elevate his/her status to a Ph.D. Candidate. The Ph.D. candidate may register for CE 6398 Dissertation followed by CE 6399 Dissertation in two separate semesters. He/she is expected to take the Dissertation Defense Examination in the second semester after passing the Dissertation Proposal Examination.

## Dissertation Defense Examination

The Dissertation Defense Examination is the last and final examination. The candidate will defend his dissertation work in front of the Dissertation Committee. The Dissertation Defense Examination is open to the public. The candidate must register for CE 6399 Dissertation and take the Dissertation Defense Examination not later than the end of the sixth semester, if he/she was admitted with a master's degree, or not later than the end of the eighth semester if he/she was admitted without a master's degree. Each Ph.D. candidate has a maximum of two attempts to pass the Dissertation Defense Examination.

## Degree Plan

Required Credits: 72

| Code   | Title                          | Hours     |
|--|--------------------------------|-----------|
| <b>PhD in Civil Engineering Program (All courses require a grade of C or better)</b> |                                |           |
| <b>Required Courses:</b>   |                                | <b>42</b> |
| Select forty-two hours of the following:   |                                |           |
| CE 6301  | Infrastructure Management      |           |
| CE 6302  | Grndwtr Hydro & Polltn         |           |
| CE 6303  | Engineering Analysis           |           |
| CE 6304  | Adv Design of Struct Systms    |           |
| CE 6305  | Advanced Structural Analysis   |           |
| CE 6306  | Infrastructure Engineering     |           |
| CE 6307  | Finite Element Method          |           |
| CE 6310  | Risk/Reliability Anal-Engr Sys |           |
| CE 6312  | Environmental Processes        |           |
| CE 6313  | Water Resources Mgmt           |           |
| CE 6317  | Stats Methods for Civil Eng    |           |
| CE 6318  | Bridge Engineering             |           |
| CE 6320  | Advanced Geotechnical Eng.     |           |
| CE 6323  | Prestressed Concrete           |           |
| CE 6324  | Construction Management        |           |
| CE 6325  | Design for Dynamic Loads       |           |
| CE 6326  | Air Pollution Control          |           |
| CE 6332  | Mod Methods/Engr Computation   |           |
| CE 6340  | Surface Water Hydrology        |           |
| CE 6341  | Hydraulic Computer Application |           |
| CE 6344  | Biol Unit Operations/Processes |           |
| CE 6345  | Adv Phy-Chem Water Treat       |           |
| CE 6349  | Design-Filtrat'n/Membrane Proc |           |
| CE 6351  | Mech Pavement Design/Analysis  |           |
| CE 6352  | Foundation Design II           |           |
| CE 6353  | Geotech. Site Investigation    |           |
| CE 6355  | Advanced Civil Eng. Materials  |           |
| CE 6356  | Sustainable Engr Design        |           |
| CE 6357  | Structural Loads Models        |           |
| CE 6358  | Traffic Engineering            |           |
| CE 6359  | Foundation Design I            |           |
| CE 6360  | Highway Geometric Design       |           |
| CE 6361  | Traffic Flow/Simulat Modeling  |           |
| CE 6362  | Urban Transportation Planning  |           |
| CE 6365  | Infrastrct Syst Design & Eval  |           |
| CE 6371  | Construction Dispute Resolutn  |           |
| CE 6382  | Adv Constr Cost Analysis & Bid |           |
| CE 6386  | Adv Construction Law & Ethics  |           |
| CE 6387  | Adv Construction Scheduling    |           |

|           |                                |
|-----------|--------------------------------|
| CE 6388   | Advanced Construction Safety   |
| CE 6389   | Adv Constr Methods & Materials |
| CE 6390   | Special Topics Civil Engr      |
| CE 6391   | Individual Studies             |
| CE 6392   | Earth Construction             |
| CE 6395   | Construction Claims            |
| CE 6409   | Environmental Eng Chemistry    |
| SC 5301   | Fundamentals of Smart Cities   |
| SC 5302   | Smart Cities Design            |
| CIS 5313  | Strategic Information Systems  |
| ESE 6301  | Environmental Law and Policy   |
| FIN 6311  | Financial Management           |
| GEOP 5352 | Geophysical Inverse Theory     |
| GEOP 5354 | Seismology                     |
| GEOP 5460 | Geop App-Digital Signal Proces |
| MATH 6311 | Topics in Applied Mathematics  |
| MATH 6343 | Numer Solution Part Diff Equat |
| MECH 5318 | Analytical Dynamics            |
| MECH 6312 | Solid Mechanics II             |
| POLS 5364 | Seminar-Public Policy Analysis |

Any graduate or Ph.D. courses approved by the Academic Advisor or the Ph.D. Advisory Committee

#### Doctoral Research:

Take twenty-one hours of the following: 21

|         |                   |  |
|---------|-------------------|--|
| CE 6396 | Doctoral Research |  |
|---------|-------------------|--|

#### Qualifying Exam

|         |                 |   |
|---------|-----------------|---|
| CE 6091 | Qualifying Exam | 0 |
|---------|-----------------|---|

#### Dissertation

Take the following sequence of courses at one course per semester:

|         |                       |   |
|---------|-----------------------|---|
| CE 6393 | Dissertation Proposal | 3 |
| CE 6398 | Dissertation          | 3 |
| CE 6399 | Dissertation          | 3 |

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**Total Hours** 72