

MS and PhD Degree Requirements: Civil

This document details the requirements for completing your graduate degree in Civil Engineering program within the CEE department. Information specific to the different terminal degrees* are summarized in the following subsections:

Requirement	MS (non-thesis)	MS (thesis)	PhD
Coursework	X	X	X
Advisor and Committee Determination	X	X	X
Comprehensive Exam			X
Qualifying Exam			X
Report/Thesis	X	X	X
Timelines	X	X	X

*terminal degrees refer to the highest academic degree being pursued within the department.

Coursework

The following number of credit hours are required:

1. MS has two options:
 - a. Non-thesis: 30 hours of graduate-level coursework, or
 - b. Thesis: 24 hours of didactic graduate-level coursework and 6 hours of research work towards the completion of MS thesis
2. PhD:
 - a. A total of 72 hours (including both coursework and research hours)
 - b. A minimum of 36 hours of formal coursework

There are two concentration areas for MS and PhD students in the Civil Engineering program: 1) Structural Engineering and 2) Transportation Engineering. A number of MS and PhD students focus on research outside these concentration areas. Regardless of the track being pursued, all students must meet with their advisor and DGS to develop a set of courses as required to fulfill their degree requirements consistent with their research objective. The specific course requirements are as follows:

1. Structural Engineering - All students are required to enroll and pass all five courses listed below:
 - a. CE 6200 - Advanced Mechanics of Solids I (3)
 - b. CE 6205 - Advanced Mechanics of Solids II (3)
 - c. CE 6210 - Finite Element Analysis (3)
 - d. CE 6215 - Structural Dynamics (3)
 - e. CE 6300 - Probabilistic Methods in Engineering Design (3)
2. Transportation Engineering – All students are required to take five courses from the list below. The selected courses must be approved by both the student's research advisor and the DGS:

- a. CE 5100 - Geographic Information Systems (3)
 - b. CE 5300 - Reliability and Risk Case Studies (3)
 - c. CE 5500 - Transportation System Design (3)
 - d. CE 5505 - Urban Transportation Planning (3)
 - e. CE 5510 - Traffic Engineering (3)
 - f. CE 6300 - Probabilistic Methods in Engineering Design (3)
 - g. CE 6310 - Uncertainty Quantification (3)
 - h. CE 6351 - Public Transportation Systems (3)
 - i. CE 6353 - Airport Planning and Design (3)CE 6355 - Advanced Transportation Design (3)
 - j. CE 6356 - Advanced Transportation Planning (3)
 - k. CE 6357 - Theory of Traffic Flow (3)
 - l. CE 6359 - Emerging Information Systems Applications (3)
 - m. ENVE 5305 - Enterprise Risk Management (3)
3. Other Concentration Areas - All students are required to take five didactic courses identified and approved by the student's research advisor and the DGS. Independent study courses do not count towards this requirement.

Transfer credit:

- MS: Up to six hours of graduate level coursework in pursuit of a MS degree may be transferred to Vanderbilt.
- PhD: For students in pursuit of a PhD, up to 24 hours of graduate level coursework may be transferred. Note that regardless of the number of credit hours transferred, 24 hours of formal didactic coursework must be completed at Vanderbilt.

Courses transferred may be transferred as didactic or research hours; only didactic courses with an A or B grade may be transferred. Students may not repeat courses, or take equivalent courses, for graduate credit. Requests for transfer of course credits should be made in writing to the DGS. The DGS will review the request, and forward the student request to the Graduate School once it has been determined that the credit hours are equivalent to a graduate level course offered by Vanderbilt. The course transfer requests are subject to approval of the Dean of the Graduate School. A spreadsheet for transfer credit request is available on [Graduate School website](#).

Advisor and Committee Determination

1. MS: Students pursuing MS degree (both non-thesis and thesis options) must have a research advisor. The DGS will advise the students until a research advisor is chosen. Each student is encouraged to meet with graduate faculty members in the area of interest to discuss research opportunities. Research advisors should be determined by the end of the Fall semester of the first year in residence.
2. PhD:
 - a. Research Advisor: Each student is encouraged to meet with graduate faculty members in the area of interest to discuss research opportunities. The DGS of the program will act as an academic advisor to the students until a research advisor is determined. Research

advisors and general research areas must be determined within the second semester of the first year in residence at the latest.

- b. Dissertation committee: The Dissertation Committee oversees each PhD candidate's research progress. The Dissertation Committee has the following functions:
 - i. To read and approve the dissertation subject
 - ii. To administer the Qualifying Exam
 - iii. To aid and monitor the progress of the dissertation
 - iv. To approve the dissertation and administer the Final Oral Exam

The Dissertation Committee members are selected by the student's research advisor in consultation with the student. The Committee should be chosen by the end of the student's third semester in residence. It consists of a minimum of four (4) members from the Vanderbilt University Graduate Faculty. Additional members may be added under special circumstances, with approval from the Graduate School (please refer to the [Graduate Catalog](#) for information on appointment of non-Vanderbilt faculty members to their committee). Once the committee members are selected, the student should complete the appropriate paperwork on the [Graduate School website](#) to appoint the committee. Students are encouraged to meet with their committee members at least once each semester.

Comprehensive Exam

Those students who plan to pursue doctoral work are required to pass a departmental Comprehensive Examination. The examination for civil engineering PhD students are typically administered at the end of Spring semester (late May) of each year, after students complete two semesters of coursework at Vanderbilt University; in exceptional circumstances, the Comprehensive exam may be given at a different time. The DGS will communicate the comprehensive exam schedule and process to the students. Typically, the comprehensive exam committee consists of four to five professors. The examination is administered by the Civil Engineering faculty in the student's discipline and consists of three (3) sections:

1. Fundamental knowledge. Demonstration of basic level of competency in fundamentals relevant to specified program
2. Integrated problems. Demonstration of ability to carry out research by (i) seeking out new information related to open ended questions; (ii) critically evaluating work by others; (iii) developing and presenting logical arguments and responses to technical questions; and (iv) providing creative approaches to problem solving.
3. Written and oral presentation. Demonstration of fluency in professional written and oral communications skills (in English)

The comprehensive exam covers the material from the five required courses. The students are also expected to have mastery of the fundamental knowledge of subjects relevant and critical to their research.

Students will be informed in writing of their exam results by the DGS within two weeks of the completion of all sections of the exam. The possible outcomes of the Comprehensive Exam are as follows:

1. Pass (student passes all three sections)
2. Conditional pass (recommended action to be determined; e.g., additional coursework)
3. Fail (student fails two or more sections)

Students failing the Comprehensive Exam may be at risk of losing financial support and termination of degree candidacy. At the option of the faculty, a failing student may be given another opportunity to retake the exam.

Qualifying Exam

Once the student has completed the comprehensive exam and at least 24 hours of graduate work, they are eligible to complete the qualifying exam. While the [graduate catalog](#) establishes a deadline of four years, the Civil Qualifying Examination should be taken no later than the beginning of the third academic year.

Each student's Dissertation Committee administers this exam, which consists of a presentation and discussion of the student's written PhD dissertation proposal and related background material. The purpose of the Qualifying Exam is:

1. To test the student's knowledge in the field of specialization
2. To assess familiarity with published research in the field
3. To determine if the student possesses critical and analytical skills needed for a scholarly career
4. To confirm that the research topic and scope is consistent with the scholarly expectations of doctoral work

Students should consult with their advisor for guidance throughout the proposal development stage, including the content, length, and formatting of the document. In preparation for the exam, the student is encouraged to visit each member of the committee by the end of the fourth semester in residence in order to discuss the basis and goals of their dissertation. The completed proposal should be submitted to the Dissertation Committee at least two weeks before the date of the Qualifying Examination. To schedule a Qualifying Examination, fill out the [appropriate paperwork from the Graduate School](#) (including obtaining necessary approvals and signatures). The Qualifying Examination may not be taken more than twice. The Chairman of the Dissertation Committee will advise the student in writing of the examination results as soon as possible after its completion.

Students are acknowledged as a PhD candidate *only* after they pass the PhD Qualifying Examination. After passing the qualifying exam and completion of at least 42 hours of graduate study, students without a MS degree may obtain a *Master's in passing* from the Graduate School by filling out the appropriate [Intent to Graduate form](#) on the Graduate school website. Be sure to indicate that you are continuing in a PhD program!

Report/Thesis

1. MS with non-thesis option: apart from 30 credit hours of coursework, it is necessary to submit a final project report.
2. MS with thesis option: The work for the thesis is conducted under the direction of student's research advisor. The MS thesis must adhere to the guidelines and standards set by the [Graduate School](#) and requires the signed approval of at least two graduate faculty members in the Civil and Environmental Engineering Department. Once the presentation of the MS has been scheduled in conjunction with the student's research advisor, please notify [Charity Backs](#) so that the event can be added to the department calendar.
3. PhD: Once the student has completed the required course work, passed the Comprehensive and Qualifying Exams, completed the research to the satisfaction of the advisor, and satisfied the publication requirement (per the expectations established in consultation with the advisor and DGS), a Final Oral Exam will be administered. Per graduate school policy, the dissertation must be completed within four years after a student has been admitted to candidacy for the degree. The Final Oral Examination is a public presentation and defense of the written dissertation. The Dissertation Committee conducts the examination. Passing the examination is a requirement for the PhD degree. The students should refer to the requirements posted on the [Graduate School website](#) for information regarding the paperwork required and associated timelines. Once the defense date has been scheduled, please notify [Charity Backs](#) so that the event can be added to the department calendar.

Please refer to the Graduate School website for information regarding thesis format and structure templates as well as [registration and binding information](#). Students are also encouraged to visit the Vanderbilt library for examples of previous dissertations in the department. In the case of hardcopy submission, in addition to student's personal copies and Graduate school copies, students must also furnish, at their expense, two hardbound copies of the thesis/dissertation to their DGS - one for their advisor and one for the thesis library in the conference room.

Timelines

The following are some typical plans of study for Civil MS and PhD graduate students in the CEE Department. It is to be noted that individual plans of study may differ, and will be prepared for each student based on consultation with their DGS and research advisor.

CCH - Course credit hours RCH - Research credit hours

Students pursuing MS (non-thesis)

Semester/Year	CCH	RCH	Activity
1/1	9	-	Select project advisor & project report
2/1	9	-	Begin literature search and research
Summer/1	3	-	Work on project report. Be sure to enroll for 0 hours if staying at Vanderbilt.
1/2	6	-	Complete and submit project report.

Students pursuing MS (thesis)

Semester/Year	CCH	RCH	Activity
1/1	9	-	Select thesis advisor & thesis topic
2/1	9	-	Begin literature search and research
Summer/1	-	0	Continue research. Be sure to enroll for 0 hours if staying at Vanderbilt.
1/2	6	-	Finalize thesis
2/2	-	-	Finish thesis and make oral presentation

Students pursuing PhD degree (with BS degree)*

Semester/Year	CCH	RCH	Activity
1/1	9	-	Select thesis advisor & dissertation topic; begin literature search
2/1	9	-	Comprehensive Exam
Summer/1	-	0	Continue dissertation research/Internship
1/2	6	3	Select dissertation committee
2/2	6	3	Qualifying Exam
Summer/2	-	0	Continue dissertation research
1/3	3	6	Meet with dissertation committee
2/3	3	6	Dissertation research
Summer/3	-	0	Dissertation research
1/4	-	9	Meet with dissertation committee
2/4	-	9	Dissertation research
Summer/4	-	0	Dissertation research
1/5	-	0	Meet with dissertation committee; complete writing dissertation
2/5	-	0	Final oral exam

*Students transferring credit hours would pursue an accelerated track, specifically compacting the milestones for years 2 and 3.