

Graduate Student Handbook

**Department of Civil and Environmental
Engineering**

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College of Engineering

**University of Tennessee
325 John D. Tickle Building
Knoxville, TN 37996-2010**

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3. Department Head Welcome Statement

It is my pleasure to welcome you to the graduate program of the Civil and Environmental Engineering (CEE) department. We have outstanding faculty and educational resources that will provide you with a comprehensive educational experience with an outstanding intellectual infrastructure and diverse environment that is conducive to advanced learning. Our unique partnership with the Oak Ridge National Laboratory (ORNL) and strong involvement with the Tennessee Department of Transportation (TDOT) and Tennessee Department of Environment and Conservation (TDEC), Federal funding agencies (NSF, EPA, DOD, DOE), and the Tennessee Valley Authority (TVA) will provide you with practically relevant and advanced engineering knowledge to prepare you for both academic and industrial/consulting careers. We have many on-campus research centers of excellence where CEE faculty are leading next-generation research programs, yet offering very practical and hands-on classes to our graduate students. Our goal is to promote interdisciplinary learning that will serve as a foundation for the long-term continuing education plans of our graduates. We also thrive to provide strong oral and written communication skills to develop our graduates to serve the global needs of the society related to Civil and Environmental Engineering, including the evolving challenges of impacts from climate change and sustainable engineering with comprehensive life-cycle analysis. The department has a close and active relationship with our alumni and various professional societies including a very active American Society of Civil Engineers (ASCE) student chapter. Our graduate students are also provided with unique opportunities to take part in various on-campus student societies, such as unique cultural societies and international student associations.

4. Introduction

4.1 Graduate School Introduction

In order to serve the mission and vision of the Graduate School and preserve the integrity of Graduate Programs at the University of Tennessee, Knoxville, information related to the process of graduate education in each department is to be provided for all graduate students. Based on Best Practices offered by the Council of Graduate Schools, it is important that detailed articulation of the information specific to the graduate degrees offered in each department/program be disseminated.

- The Department Graduate Handbook does not deviate from established Graduate School Policies noted in the Graduate Catalog <http://gradschool.utk.edu>, but rather provides the specific ways in which those policies are carried out.

4.2 Purpose of This Handbook

Graduate students are expected to be aware of and satisfy all regulations governing their work and study at the university. These regulations may be found in the following resources:

- The Graduate School Catalog <http://gradschool.utk.edu>
- *Hilltopics* <http://dos.utk.edu/publications/hilltopics/index.html>
- The Graduate School Appeals Procedure <http://gradschool.utk.edu/GraduateCouncil/AcadPoli/appealprocedure.pdf>
- The Graduate Handbook of the Civil and Environmental Engineering Department (this document)

The purpose of this handbook is to supplement the above University-level documents to describe the specifics of how these policies are implemented within the department. It also serves to provide answers to many of the questions that graduate students commonly have about application procedures, assistantships, degree programs and graduation requirements.

4.3 Departmental Structure for Graduate Administration

4.3.1 Department Head

Dr. Gregory Reed (gdreed@utk.edu) The Department Head has responsibility for the overall administration of the department.

4.3.2 Director of Graduate Studies

Dr. Chris Cox (ccox9@utk.edu) The Director of Graduate Studies is responsible for the administration of the graduate program(s) in the department/unit and also serves as the contact person with the Graduate School. This faculty member oversees the application and admissions process, coordinates assistantship appointments and assignments, oversees office space assignments, and approves graduate committee appointments and admission to candidacy forms.

4.3.3 Graduate Applications Coordinator

Ms. Annette Costar (acostar@utk.edu). The Graduate Applications Coordinator assists students with the application process, assists the Director of Graduate Studies with the administration of the application review process, and assists students with forms and procedures required for graduation.

4.3.4 Assistantship Appointment Coordinator

Ms. Lindsy Whitaker (lwhitak4@utk.edu) The Assistantship Appointment Coordinator administers the appointment of students to assistantship positions.

4.3.5 Graduate Admissions Committee

The graduate admissions committee consists of all of the faculty members with an interest in the area of concentration selected by the student. Each faculty member reviews the application and makes a recommendation whether the student should be admitted and any prerequisite coursework that may be required. Faculty members on the committee may also indicate whether they have an interest in providing financial support to each applicant at the time they review the application.

4.3.6 Graduate Committee

Each student has a graduate committee consisting of other faculty in the department and university selected by the student and his or her major professor. The responsibility of the committee is to assist in mentoring the student in their coursework and research. The committee approves the coursework, administers all examinations, and approves the thesis or dissertation. The chair of the committee is the student's major professor. Additional details related to these issues are provided in this handbook.

5. General Duties and Responsibilities of Faculty and all Graduate Students

The faculty is responsible for maintaining the quality, technical relevance, and rigor of the graduate programs. The major professor serves as both the academic advisor and as the primary research mentor of the student. Faculty members serving on graduate committees ensure that appropriate courses are taken to prepare the student to meet his or her career goals, provide assistance in research mentoring, assess students through comprehensive exams and approve the thesis or dissertation.

It is the responsibility of all students to be aware of degree requirements, university regulations, procedural requirements, and deadlines. A failure to be aware of and comply with these various policies may result in a delay in graduation or even in non-completion of the degree. Degree requirements are described in the Graduate Catalog. Graduation forms and deadlines are available on the web page of the Graduate School (it is essential to consult these the semester before graduation). This handbook describes how various procedures are implemented within the department. Students should also communicate closely with their advisors, who are also responsible for being aware of the degree requirements, procedures and deadlines. In all cases, ultimate responsibility for complying with the necessary procedures and regulations rests with the student.

Graduate students may be classified as part-time, full-time, and full-time students with support. Part-time students are usually working at an outside job and typically take 6 or fewer hours per semester, either on campus or through distance education. Full-time students are typically taking more than 6 hours per semester and are expected to participate in department seminars when possible. Full-time students receiving support are expected to devote 100% of their professional effort (typically 40 or more hours per week) toward academic activities, which may include coursework, research, teaching and assisting with teaching, seminars, internships, etc. In general, outside employment is not compatible with the expectations by the faculty of students receiving departmental support. MS students receiving support are expected to select the thesis option or to work on a Special Problem. All graduate students receiving support should be engaged in the production of scholarly work such as refereed journal publications and conference presentations. Scholarly work is an essential characteristic of a vibrant graduate engineering program and a plays a central role in the development of the professional life of the student.

6. Admission Requirements and Application Procedure

A graduate program leading to the degree of Master of Science in Civil Engineering, Master of Science in Environmental Engineering, or the Ph.D. in Civil Engineering is offered to graduates of recognized undergraduate curricula.

6.1 Application to the Program

The application can be considered in two parts: essential documents and supporting material.

6.1.1 Essential Documents

Application to the program is made through the Graduate School using the electronic application as described on the Graduate Admissions webpage <http://graduateadmissions.utk.edu/>. Essential documents that are uploaded at the time of application include transcripts from all previous institutions, GRE scores (required for PhD applicants and all international applicants), and TOEFL or IELTS scores (required if the student's native tongue is not English).

6.1.2 Supporting Material

Supporting material is required of all students seeking assistantships and may be beneficial for students who are self-funded. Supporting material includes:

- A statement of purpose indicating the reasons for seeking an advanced degree, the goals the student hopes to achieve while in graduate school and how graduate education will benefit their future career plans.
- A resume or curriculum vita.
- Three letters of recommendation, at least two of which should be from former teachers.

Supporting material may be uploaded through the electronic application system at the time of application.

6.2 General Admission Guidelines

General admission guidelines are a minimum GPA of 3.0/4.0. PhD students and MS students successfully competing for funding generally have stronger records. Admission to the M.S. program is evaluated on a case-by-case basis for students falling below these guidelines. The evaluation will consider FE and PE test performance, professional experience, letters of recommendation, and other pertinent information. The GRE is required for PhD applicants and all international students. Mean quantitative and verbal GRE performance for students admitted in recent years is 85% and 55%, respectively. In addition, international students must take the Test of English as a Foreign Language examination.

6.3 Previous Degrees and Prerequisite Courses

6.3.1 Prerequisites for Applicants with Degrees in Engineering

In some cases applicants for graduate degrees in the department may hold Bachelor's degrees in engineering fields other than Civil Engineering. In some cases prerequisite undergraduate courses may be specified, and in general these must be completed before courses for graduate credit can be taken. For a graduate degree in Civil Engineering, the faculty requires a proficiency level in math, basic engineering, and basic analysis and design courses in the area of interest equivalent to that required at the B.S. level in Civil Engineering. For a degree in Environmental Engineering, the faculty generally requires a proficiency level in math, chemistry, basic engineering, environmental engineering, fluids/hydraulics, hydrology, and statistics equivalent to that required at the B.S. level in Civil Engineering.

6.3.2 Prerequisites for Applicants with Degrees in Science or Other Technical Fields*

For students with degrees in technical fields other than engineering, prerequisite coursework is required prior to beginning the graduate level work. These must be completed with a "B" or better average before the student will be accepted as a graduate student in Civil Engineering. Students with greater than 1 semester of prerequisites are encouraged to take these as an undergraduate student. Students are generally admitted as graduate students when they have less than one semester of prerequisite courses. Once these courses are completed with a composite 3.0 average, students are admitted to degree status. Minimum prerequisites for each are of study are as follows:

Structural and Geotechnical Engineering: MATH 141, 142, 231, 241; EF 151, 152; ME202; CE 262; 331; 371; 430; 461 or equivalent.

Transportation Engineering: MATH 141, 142, 231, 241; EF 151, 152; CE 355, 455; or equivalent.

Environmental Engineering and Water Resources: MATH 141, 142, 231, 241; CHEM 120, 130; STAT 251; EF 151, 152; CE 381, 391; or equivalent.

6.3.3 Prerequisites for Applicants with Degrees in Engineering Technology*

Applicants will be evaluated on an equivalency basis and prerequisites may be required.

6.3.4 Applicants From Non-technical Fields*

Applicants from non-technical fields will be evaluated on a case-by-case basis. As a minimum, students will be expected to complete the prerequisite courses listed in section 6.4.2. In many cases, it may be recommended that students earn a second undergraduate degree in Civil Engineering before embarking on graduate work. Applicants in this category should contact the graduate program director prior to applying.

6.4 Application to Distance Education Programs

The department offers several non-thesis MS degree programs via distance education, including Public Works, Environmental Engineering, Water Resources Engineering and General Civil Engineering (through the TDOT program). These programs are described in section 9. Application to these programs is through the Graduate School through the normal application process. Courses are delivered via live video teleconferencing and may also be attended asynchronously. In general prerequisite courses are not available via distance education; therefore, they must be taken on campus or at another institution that is convenient to where the student lives.

* A non-engineering student who wants to pursue possible registration as a professional engineer should discuss the current requirements of the Tennessee State Board of Registration, with his/her advisor, or the graduate program director.

7. Financial Support

7.1 Departmental Graduate Assistantships

The Civil and Environmental Engineering Program offers both research and teaching assistantships. Generally, decisions about assistantships are not made until after a student has applied and been accepted into our program. Assistantships are awarded on a competitive basis to qualified students as funds are available. Both research and teaching assistantship appointments are most often made by individual faculty members. Applicants are encouraged to contact individual faculty members in their area of interest to inquire about the availability of assistantships for the semester of desired admission. All students on assistantships receive a complete tuition waiver, a basic health care plan, and a stipend. The tuition waiver does **not** include the student activities fee, the technology fee, and the College of Engineering differential tuition costs, which are applicable to all engineering courses. The stipend amount depends on several factors including the qualifications of the student, the percent effort, and whether the student is enrolled in an M.S. or Ph.D. program. Applications for assistantships are evaluated on a semester basis or as funds become available.

Initial GRA and GA appointments are generally made for one year, while GTA appointments are generally made for one academic year (Fall and Spring semester). Renewal of assistantship appointments is dependent upon performance in the position, adequate progress toward the degree, and availability of funds.

Appointments are generally made at the 25% (10 hours per week) and 50% (20 hours per week) level. GTA appointments generally do not carry assigned responsibilities outside of the Fall and Spring semesters; however, the student's stipend together with tuition-waiver and health-care benefits are generally extended over the summer months. Students must receive permission from the Graduate School for assistantship appointments that exceed 50% during the Fall and Spring semesters; typically these are approved only when extenuating circumstances exist. Students holding assistantship appointments are expected to be fully engaged in academic pursuits and not hold outside employment.

It is the policy of the department that MS students supported by university-related financial aid complete an integrated project, which is defined as a Thesis (Civil Engineering/Environmental Engineering 500) or Special Problem (Civil Engineering/Environmental Engineering 590). The appointment letter may specify which of the two options must be selected.

Applicants for research assistantships should

1. Submit a [graduate application form](#) to the Graduate School and be accepted into the program to be considered for an award.
2. . Provide the names and contact information for three references as part of the electronic graduate application process.
3. Provide additional supporting material, such as a statement of purpose and a resume, submitted as part of the electronic graduate application process.

Upon acceptance into the Civil and Environmental Engineering graduate program, students may wish to contact faculty members in their area of study to discuss opportunities for an assistantship.

Students who hold a graduate assistantship are required to check out from the University upon completion of their degree and/or the end of their assistantship position. The checkout procedure is coordinated by the office staff and includes, but is not limited to turning in keys, check out approval from the lab supervisor, and payment of fines and fees.

7.2 Fellowships

The Graduate School offers a number of university-level fellowships for exceptionally qualified students. Interested applicants should refer to the Graduate School Web site for application requirements. Applications are submitted to the department's Graduate Program Coordinator with support from a potential faculty advisor.

7.3 Loans

Students may apply for loans at the University Office of Financial Aid.

7.4 Travel Awards

Presentations at national and international meetings are an important method of communicating research results to the academic and professional community. The University and Department encourage and support this activity. Students are encouraged to apply for funding from the Graduate Student Travel Fund, administered by the Graduate Student Senate, to support their travel. The forms may be found on the Graduate Student Senate's web page (<http://gss.utk.edu/>). Additional support may be available from the student's faculty advisor through research accounts or professional development funds.

8. Registration and Advising

8.1 Registration

Graduate students should register for courses during the prior semester. Most graduate courses have adequate capacity to meet demand. However, courses with low enrollments are subject to cancellation; therefore, early registration is recommended. Graduate students do not have to be cleared by their major professor to enroll for courses. However, since the courses that count toward satisfying degree requirements must be approved by the graduate committee, it is essential that students consult with their major professor when selecting courses.

8.2 MS Thesis Research: CE500 and ENV500

MS-thesis students should be enrolled in the appropriate 500 course during each semester they are actively working on thesis research, including a minimum of 3 credit hours during the semester that the graduate school accepts their dissertation. A minimum of 6 credit hours of 500 is required for graduation; however, a student may accumulate more if work on his or her thesis research spans several semesters.

8.3 PhD Dissertation Research: CE600

PhD students should be enrolled in a minimum of 3 credit hours of CE600 beginning the first semester they are actively working on dissertation research and continuing every semester until graduation, including summer semesters. Continuous enrollment in CE600 is essential. A minimum of 24 credit hours of CE600 is required for graduation, assuming the student takes 48 hours of coursework. However, if the student only takes the minimum number of credit hours of coursework (36 hours) then the minimum number of credit hours for CE600 increases to 36 hours.

8.4 Course Loads

Student course loads in the department vary widely. A student supported on an assistantship might typically take 9 hours of course work and 3 hours of thesis or dissertation research each semester. A full-time self-supported non-thesis student might typically take 12 to 15 hours of courses in a given semester. A part-time distance education student that works a 40-hour job may typically only take a single 3-hour course in a given semester. Students are encouraged to consult with his or her advisor about course load recommendations.

8.5 Seminars

The department offers three seminar series, CE 539 Geotechnology Seminar, CE 550 Transportation Seminar, and ENV 508 Environmental Seminar. Full-time graduate students may be required to register for the appropriate seminar and

attend. Part time students are encouraged to register and attend the seminar. Seminar hours may not be applied towards degree requirements.

8.6 Advisor/Major Professor

Every graduate student must have an advisor. This professor advises the student about courses, supervises the student's research, and facilitates communication within the major department. The advisor must approve the student's program of study each semester. A temporary advisor is assigned to direct the entering student's work during the period in which the student is becoming acquainted with the institution and determining the focus of research interests. As early as appropriate, the student requests a professor in the major department to serve as his or her permanent advisor. This major professor and the student together select a graduate committee. The student is expected to maintain close consultation with the major professor and other members of the graduate committee with regard to progress in the program.

Co-major Professors must be approved by the graduate school through a request to the graduate program coordinator.

9. Degree Requirements Specific to the Department or Program

9.1 Master of Science: Civil Engineering

9.1.1 Degree Options

The Department of Civil and Environmental Engineering offers both thesis and non-thesis options for the Master of Science with a major in civil engineering. Either option must be approved by the student's major professor.

9.1.1.1 Thesis Option

A minimum of 30 semester hours of approved graduate courses, including 6 hours of thesis and 24 hours of coursework. A minimum of 15 semester hours of approved civil engineering coursework is required. A minor may be selected but is not required.

9.1.1.2 Non-Thesis Option

A minimum of 30 semester hours of approved graduate courses is required, which may include a 3-hour special problems course (CE590) to be completed under the direction of the student's major professor. A minor may be selected but is not required. All Non-thesis M.S. students are required to take a culminating written examination. The non-thesis option is available both on campus and through distance education.

9.1.2 Civil Engineering Concentrations

Concentrations are offered within the Civil Engineering MS degree in the following areas: Construction, Geotechnical/Materials, Public Works, Structures, and Transportation. The Public Works concentrations are generally offered as Non-Thesis Option only. Both Thesis and Non-Thesis options are available for the Construction, Geotechnical/Materials, Structural, and Transportation areas.

9.1.2.1 Construction Engineering

Primary contact: Dr. Islam El-Adaway

Construction of major Civil Engineering projects requires coordination between owners, design engineers, building inspectors, and construction workers as well as management of legal, contractual, scheduling, financial, and labor issues.

Course requirements: The Construction Engineering concentration is offered primarily as a Non-Thesis degree program. Students are required to take CE 540, 541, and 543. The student will normally take supporting coursework within the department in the structural and geotechnical engineering areas. Courses in Engineering Management are also supportive of this concentration. All courses must be approved by the student's graduate committee. All Non-thesis M.S.

students are required to take a culminating written examination. The written exam is offered twice a year - Fall and Spring Terms.

9.1.2.2 Geotechnical/Materials Engineering

Primary contact: Dr. Khalid Alshibli (alshibli@utk.edu, 865-974-7728)

The Geotechnical/Materials Engineering curriculum deals with geo-mechanics, pavement mechanics and materials, and the analysis, design, and behavior of geotechnical and pavement systems. Several of the courses are offered regularly through distance education.

Course Requirements: In general, students are expected to take at least three of the following courses for Pavement Materials track: 521, 522, 525, 538, 530; and at least three of the following for Geotechnical track: 521, 530, 531, 532, 533, 535, 538, 565, 631. These courses are routinely approved. Courses in the Engineering Mechanics, Structures, and in the Construction area are encouraged. . All Non-thesis M.S. students are required to take a culminating written examination. The written exam is offered twice a year - Fall and Spring Terms. All full-time graduate students are required to register for the CE 539, a one credit seminar class, for a minimum of three semesters.

9.1.2.3 Public Works Engineering (Available by Distance Education)

Primary contact: Dr. Baoshan Huang (bhuang@utk.edu, 865-974-7713).

National attention is being focused on the deterioration of the civil engineering infrastructure, such as bridges, roads, waterlines, and public buildings. Urban areas are undergoing continual growth, requiring innovative responses to air pollution, disposal of waste products, flood control, and suburban traffic growth. A public works engineer is trained as a broad-based civil engineer able to confront the diversity of public issues facing the modern American city. The Public Works graduate program is tailored to students in a traditional academic setting as well as to practicing professionals interested in continuing education. Practicing engineers may have access to academic courses through distance education offerings.

Course requirements: There are three components in the Public Works program: 1. Core Course Requirements; 2. Technical Focus; and 3. General Focus. The core course requirements provide the student with the basic tools needed by the public works engineer. The technical focus affords the student the opportunity to tailor the course content to an area of specialized technical interest. The general focus allows the student to broaden their program by providing six semester hours of additional instruction in areas outside of Civil and Environmental Engineering. All courses should be selected in consultation with and have the

approval of the student's graduate committee. All Non-thesis M.S. students are required to take a culminating written examination. The written exam is offered twice a year - Fall and Spring Terms.

Core Requirements:

- Transportation Engineering (3 courses). Select from CE [521](#), [551](#), [552](#), [553](#), [558](#)
- Construction Engineering (1 course). Select from CE [540](#), [543](#)
- Environmental Engineering (2 courses). Select from ENV [520](#), [525](#), [530](#), or [558](#)

Technical Focus: Six semester hours of courses are required in Structural Engineering, Geotechnical and Materials Engineering, Construction Engineering, Transportation Engineering, or Environmental Engineering.

General Focus: Typical courses include, but are not limited to, Engineering Management 533, 534, 535, 536, 537, 543 and Industrial Engineering 518.

9.1.2.4 Structural Engineering

Primary contact: Dr. Ed Burdette (eburdett@utk.edu, 865-974-7704).

The Structural Engineering curriculum deals with the analysis, design, and behavior of structural components and structural systems. Several of the structural courses are offered regularly through distance education.

Course Requirements: The structures concentration is offered in three different options: thesis, non-thesis with a special problem, and non-thesis coursework only. While there are no courses listed as definitely "required," all coursework must be approved by the student's graduate committee. In general, students are expected to take at least three of the following courses: 561, 562, 565, 571, 573, 574. These courses are routinely approved. Courses in the Geotechnical/Materials area and in the Construction area are encouraged. All Non-thesis M.S. students are required to take a culminating written examination. The written exam is offered twice a year - Fall and Spring Terms.

9.1.2.5 Transportation Engineering

Primary contact: Dr. Asad Khattak (akhattak@utk.edu, 865-974-7792).

Transportation engineering is the application of scientific principles to the safe and efficient movement of people and goods. The importance of transportation engineering in Civil Engineering is illustrated by the number of divisions in ASCE (American Society of Civil Engineers). Six divisions (Aerospace; Air Transportation; Highway; Pipeline; Waterway, Port, Coastal and Ocean; and Urban Transportation) represent one-third of the 18 technical divisions within the

ASCE.

Transportation engineering involves planning, design, construction, maintenance, and operation of transportation facilities. The facilities support air, roadway, railroad, pipeline, water, non-motorized and even space transportation. Almost all aspects of transportation include a component of human interaction—estimating the behavior of human participants in the transportation system. The design aspects of transportation engineering include the developing appropriate capacity (how many lanes or how much capacity the facility has), appropriate pavement designing, and safe geometry (vertical and horizontal alignment) of the roadway (or track). Operations and management involve traffic engineering, so that people and goods move efficiently on the infrastructure. The techniques include signs, signals, markings, tolling, all the way to intelligent transportation systems (ITS) such as advanced traveler information systems, advanced traffic control systems, and vehicle infrastructure integration. Human factors are an aspect of transport engineering, particularly concerning driver-vehicle interface and user interface of road signs, signals, and markings. Transportation engineering is closely related to global economics, world energy issues, national security, environmental sustainability, as well as many contemporary topics. Transportation engineering is for engineers with a global perspective and long-term views.

Course requirements: The Transportation Engineering concentration is offered in both thesis and non-thesis options. Students are required to take CE 551, 552, 553, and 558. A seminar course of CE 550 should be taken each semester also. Several advanced courses in Transportation Engineering including CE 547, 554, 556, 651, and 652 are also offered. In addition special topic courses including intermodal operations, international transportation systems, safety, and sustainability are also periodically offered as CE 595 based on demand. Many courses outside the department are encouraged, including but not limited to, courses from statistics, industrial engineering, geography, and mechanical engineering departments. All courses must be approved by the student's graduate committee. An oral defense exam is required for the thesis option. All Non-thesis M.S. students are required to take a culminating written examination. The written exam is offered twice a year - Fall and Spring Terms.

9.1.2.6 TDOT Distance Education Program

Primary contact: Dr. Chris Cox (ccox9@utk.edu, 865-974-7729). The Tennessee Department of Transportation has contracted with the University of Tennessee to provide certain degree courses via distance education. These course offerings are available to all students. This non-thesis program consists of six core courses (CE 522, CE 540, CE 551, CE 553, CE 574, and ENV 525) and four elective

courses. The coursework provides advanced training in areas pertinent to transportation planning, roadway and bridge-related projects and construction oversight; however, the breadth and flexibility of the program can be tailored to a wide range of civil engineering applications. All Non-thesis M.S. students are required to take a culminating written examination. The written exam is offered twice a year - Fall and Spring Terms and is administered on the Knoxville campus.

9.2 Master of Science: Environmental Engineering

9.2.1 Degree Options

The Department of Civil and Environmental Engineering offers both thesis and non-thesis options for the Master of Science with a major in environmental engineering. Either option must be approved by the student's major professor. Students must complete the following two core courses: 511 and 512. In addition, students must complete one of the following two sequences: 513, 550, 558, 574 (environmental engineering) or 520, 535 (water resources).

9.2.1.1 Thesis Option

A minimum of 30 semester hours of approved graduate courses, including 6 hours of thesis and 24 hours of coursework. A minor may be selected but is not required.

9.2.1.2 Non-Thesis Option

A minimum of 30 semester hours of approved graduate courses is required, which may include a 3-hour special problems course to be completed under the direction of the student's major professor. The major includes a minimum of 24 semester hours of approved environmental engineering course work. A minor may be selected but is not required. All Non-thesis M.S. students are required to take a culminating written examination. The written exam is offered twice a year - Fall and Spring Terms. The non-thesis option is available both on campus and through distance education.

9.2.2 Environmental Engineering Concentrations

The MS degree without a concentration focuses on pollution control and pollution impact aspects of Environmental Engineering. In addition, a concentration in water resources, which focuses on the abundance, management, and quality of water resources is available.

9.2.2.1 Environmental Engineering (No Concentration, Available by Distance Education)

Primary contact: Dr. Chris Cox (ccox9@utk.edu, 865-974-7729)

Environmental engineers work in areas of water and wastewater treatment, air pollution control and management, solid and hazardous waste management, pollutant fate and transport, risk assessment, and environmental sustainability. The Environmental Engineering core curriculum provides training in the physical, chemical, and biological fundamentals that form the technical underpinning of these areas together with applications across these areas.

Course requirements: The following core courses are required: 511, 512, 513, 550, 558, 574. Students are encouraged to take additional course work in the environmental engineering or water resources areas. Additional courses may be offered periodically depending on demand, including 576, 577, 650, 653, 655, 671, and 672.

9.2.2.2 Water Resources Engineering (Available by Distance Education)

Primary contact: Dr. Thanos Papanicolaou (tpapanic@utk.edu, 865-974-7836)

Water resources engineers manage surface water and groundwater resources to benefit humankind and the natural environment. They may work in areas such as water supply, stormwater management and green infrastructure, ecosystem services, impacts of land use on water quality, and contaminant transport in streams.

Course requirements: the following core courses are required: 511, 512, 520, and 535. Students may select from additional courses including: 515, 516, 525, 527, 530, 545, 615, and 620.

9.3 Doctor of Philosophy: Civil Engineering (Includes Environmental)

A graduate program leading to the Doctor of Philosophy is offered with a major in civil engineering in the following concentrations: Environmental Engineering, Geotechnical/Materials Engineering, Structural Engineering, Transportation Engineering, and Water Resources Engineering. Descriptions of the concentrations can be found in sections 9.1 and 9.2. In general, candidates for the PhD must complete the specific course requirements listed in the corresponding MS concentrations.

9.3.1 Degree Requirements

Specific departmental requirements for the PhD include:

- A minimum of 72 semester hours beyond the bachelor's degree, exclusive of credit for the MS thesis. Of this number, a minimum of 24 semester hours in 600 Doctoral Research and Dissertation will be required. It is expected that the research work will be in journal publication form prior to approval of the dissertation.

- A minimum of 18 semester hours of graduate courses in civil engineering or environmental engineering, exclusive of thesis or dissertation credit, at least 6 hours of which must be 600-level courses.
- Additional coursework in civil engineering, environmental engineering, or related scientific and engineering fields, amounting to a minimum of 18 semester hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 6 semester hours of mathematics will be required beyond the civil engineering undergraduate requirements.
- At the discretion of the student's dissertation committee and depending on the student's background, more than 36 hours of courses may be required.
- A maximum of 24 course credits from the master's degree may be used to satisfy the course requirements for the PhD.
- One foreign language may be required if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.
- Upon completion of at least one-half of all coursework, each student must pass a comprehensive examination. After completion of the dissertation, prior to graduation, each student must pass a dissertation defense examination administered by a faculty committee.

9.3.2 Residency Requirement

Candidates for the PhD degree are required to satisfy a one-year residency period. This requirement can be satisfied by a period of not less than two consecutive semesters during which the student is on-campus and engaged full time in academic activities (coursework and/or research). The doctoral committee must certify that the residency requirement has been satisfied.

9.3.3 Concurrent MS Degree

Students admitted directly to the PhD program are eligible to earn concurrent MS degrees upon successful completion of all MS degree requirements, including the comprehensive exam. A form available from the graduate school must be completed by the student and signed by the graduate coordinator to apply for the degree once all requirements have been satisfied.

9.4 Minors

MS or PhD students may elect at their option to earn a minor. Satisfying the requirements for the minor may require the student to earn additional course credit hours beyond those required for the degree. Applicable minors include but are not limited to the Watershed Minor, Environmental Policy, Statistics, and

Computational Science. Students interested in a minor should consult with the applicable department and his or her major professor. One of the members serving on the student's graduate committee must come from the department that hosts the graduate minor.

9.5 Research Expectations

Research is central to the educational mission of the University, College, and Department. Students working on theses or dissertations are often supported by graduate research assistantships and are key participants in this research mission. Publication of research in peer-reviewed journals serves the dual purposes of disseminating the results of the research to others and assuring the rigor and quality of the research. It is expected that graduate student research will be of sufficient quality to warrant publication in an archival peer-reviewed journal. This is especially true for dissertation research: it is expected that the research work will be in journal publication form prior to approval of the dissertation.

Graduate research assistants are required to work on their research a minimum of 10 hours per week for a ¼-time GRA appointment and 20 hours per week for a ½-time appointment. Often times the need to finish the thesis or dissertation in a timely manner may require a level of effort above these minimum time requirements.

9.6 Seminars

The department offers three seminar series, CE 539 Geotechnology Seminar and CE 550 Transportation seminar and ENV 508 Environmental Seminar. Full-time graduate students may be required to register for the appropriate seminar and attend. Part time students are encouraged to register and attend the seminar. Seminar hours may not be applied towards degree requirements.

9.7 Graduate Committees

The major professor (see section 8.6) serves as the chair of the student's graduate committee. The student selects and invites faculty members to serve on his or her committee with consultation and approval from the major professor. The formation of the committee is formalized through completion of the form on the Graduate School's web page and subsequent approval of the Graduate Program Director and the Graduate School.

9.7.1 Master's Committee

The Master's committee is composed of the major professor and at least two other faculty members, all at the rank of assistant professor or above. The majority of the committee must be tenured and tenure-track members of the department. If the student has a minor, one member of the committee must be

from the minor department. The committee should be formed as early as possible in a student's program, and must be formed by the time a student applies for admission to candidacy. The responsibility of this committee is to assist the student in planning a program of study and to assure fulfillment of the degree requirements. Each committee member gives his or her approval of the course work upon signing of the admission to candidacy form. It is the responsibility of the student to keep the committee informed of the program of study.

9.7.1.1 Responsibilities of Master's Thesis Committees

In addition to approving the student's coursework plan, the committee guides and provides advice regarding the student's research. It is the responsibility of the student to keep committee members informed of his or her research plans and progress. The committee reads the thesis, conducts the oral defense of the thesis, and approves the final document.

9.7.1.2 Responsibilities of Master's Non-Thesis Committees

In addition to approving the student's coursework plan, the committee is responsible for the written comprehensive examination. For the Environmental Engineering major (including the Water Resources concentration) the entire Environmental Engineering Faculty participates in the formulation and grading of the exam; the committee certifies the result. In other concentrations, the committee is responsible for formulating and grading the exam. In cases of borderline performance on the written exam (scores of 70 to 75), the committee will hold an oral exam of the candidate to determine whether the student passes or not.

9.7.2 Doctoral Committee

The major professor directs the student's dissertation research and chairs the dissertation committee. The student and the major professor identify a doctoral committee composed of at least four faculty members holding the rank of assistant professor or above, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. The majority of the committee must be tenured and tenure-track members of the department. At least one member must be from an academic unit other than that of the student's major field. If the student has a minor, one member of the committee must be from the minor department. A doctoral student should form the committee during the first year of study. The responsibility of this committee is to assist the student in planning a program of study, to provide assistance in guiding the research, and to assure fulfillment of the degree requirements. Each committee member gives his or her approval of the course work upon signing of the admission to candidacy form. The committee also conducts the written and oral comprehensive exam. It is the responsibility of the student to keep the committee

informed of the program of study and of his or her research plans and progress. The committee reads the dissertation, conducts the oral defense of the dissertation, and approves the final document.

9.8 Transfer Credits

Coursework taken at another institution may be eligible to meet degree requirements of the department subject to the policies in the Graduate Catalog. All transfer coursework must be approved by the graduate committee. A maximum of 24 hours of applicable coursework from an MS degree may be applied toward satisfying the coursework requirements of the PhD.

9.9 Professional Licensure

Licensure as a Professional Engineer is a key milestone in the career path of many practicing engineers and opens many new avenues for advancement. Graduate coursework can greatly aid in preparation for the Principals and Practices Exam and a graduate degree may in some instances substitute for one year of professional practice.

Graduate candidates coming from non-engineering backgrounds should be aware that the most direct path to licensure as a Professional Engineer in Tennessee and many other jurisdictions begins with earning a BS degree in engineering from an ABET accredited institution. In many jurisdictions, a graduate degree does not substitute for the requirement of a BS degree. Graduate degree candidates from non-engineering backgrounds should carefully consider the potential need for licensure and investigate the regulations governing eligibility requirements in jurisdictions of interest.

9.10 Timelines for Graduation

9.10.1 MS Non-thesis Timeline (Typically 1 to 1-1/2 years)

Upon admission:

- Contact your advisor to ensure you do not miss any key opportunities to complete core classes in a timely fashion

First semester:

- Select a permanent advisor.
- To the extent possible, plan your full program of study.

Semester before graduation

- Form your committee and have it approved.
- Submit your Admission to Candidacy form before the last day of classes.
- Apply to graduate before the last day of classes.
- Make plans to have any grades of “Incomplete” removed.

- Note key deadlines for graduation as listed on the graduate school web page.

Semester of graduation

- Early in the semester, schedule your written comprehensive exam.
- Take comprehensive examination and submit results by graduate school deadlines.
- Double check that you have met all graduation requirements as outlined on graduate school web page.

9.10.2 MS Thesis Timeline (Typically 1-1/2 to 2 years)

Upon admission:

- Contact your advisor to ensure you do not miss any key opportunities to complete core classes in a timely fashion
- Attend new graduate student orientation, new graduate teaching assistant orientation, schedule SPEAK test as appropriate. Consult your advisor and the graduate school web page for details.

First semester:

- To the extent possible, plan your full program of study.
- Identify your research topic and organize your work plan.
- Form your committee and keep them informed of your research progress.

Semester before graduation

- Submit your Admission to Candidacy form before the last day of classes.
- Apply to graduate before the last day of classes.
- Make plans to have any grades of “Incomplete” removed.
- Attend thesis and dissertation workshop held by the graduate school.
- Consult graduate school web page to note key deadlines for graduation.

Semester of graduation

- A student must register for a minimum of three hours of CE500 or ENV500 the semester in which the graduate school accepts his or her thesis.
- Early in the semester, schedule your oral defense.
- Schedule a meeting with the thesis consultant.
- Defend your thesis, submit results of defense, and submit your thesis (see below.)
- Double check that you have met all graduation requirements as outlined on graduate school web page.
- Follow department check out procedures before you leave.
- All degree requirements must be completed within 6 calendar years of the beginning of the first semester in which they begin taking courses.

9.10.3 PhD Timeline (Typically 3 to 4 years)

Upon admission:

- Contact your advisor to ensure you do not miss any key opportunities to complete core classes in a timely fashion.
- Attend new graduate student orientation, new graduate teaching assistant orientation, schedule SPEAK test as appropriate. Consult your advisor and the graduate school web page for details.

First semester:

- To the extent possible, plan your full program of study.
- Identify your research topic and organize your work plan.
- Form your committee and keep them informed of your research progress.

Every semester:

- You must enroll in 3 credit hours of CE600 once you begin actively working on your dissertation research and every semester thereafter (including summer semesters) until the degree is awarded.

When you are near completion of your coursework:

- Schedule your comprehensive examination in consultation with your major professor. This exam must be scheduled no later than five years after beginning the doctoral program.

Semester before graduation

- Submit your Admission to Candidacy form before the last day of classes.
- Apply to graduate before the last day of classes.
- Make plans to have any grades of “Incomplete” removed.
- Attend thesis and dissertation workshop held by the graduate school.
- Consult graduate school web page to note key deadlines for graduation.

Semester of graduation

- Early in the semester, schedule your oral defense.
- Schedule a meeting with the thesis consultant.
- Defend your thesis, submit results of defense, and submit your thesis (see below.)
- Double check that you have met all graduation requirements as outlined on graduate school web page.
- Follow department check out procedures before you leave.
- All degree requirements must be completed within 8 years of beginning the program.

9.10.4 Thesis and Dissertation Submission Timeline

The graduate school publishes two sets of dates each semester for defense and submission of the thesis or dissertation. In order to graduate the same semester as the defense, the student must meet the earlier set of deadlines. If the student is unable to meet the earlier deadlines but can meet the later deadlines, he/she will graduate the following semester but will not be required to register for dissertation or thesis credit hours.

10. Examinations

All graduate degree programs in the department have one or more mandatory examinations as follows:

- MS non-thesis students take a comprehensive exam that tests higher-level thinking skills related to the students' coursework as well as written and oral communication skills in the discipline.
- MS thesis students must defend their theses. The defense serves as a comprehensive oral exam.
- PhD students must pass a written and oral comprehensive exam and must in addition defend their dissertations.

10.1 MS Non-thesis Comprehensive Exam

The exam is administered at a predetermined time once each Spring and Fall semester by a designated faculty member. The time of the exam is normally announced by the second or third week of the semester. Distance education students must travel to the Knoxville campus to take the exam. It is the student's responsibility to notify the CEE office of his or her intent to take the exam and to complete the registration form for the exam.

The exam consists of three parts:

- An open-book problem oriented exam four (4) hours in duration. Students will select five graduate courses in the curriculum that will constitute the scope of the exam at the time of registration for the exam. Two problems will be provided from each course. Students will be required to work six of the ten problems. Each problem will be graded on a 10-point scale by the faculty member who formulated the problem. A grade of 75% is required to pass this portion of the exam.
- A written essay prepared before the exam. Two weeks before the exam date, students will be assigned a short paper from the current engineering literature. Students will be required to write a short (2-page) answer to a question regarding the practical application of the material in the paper. The essay will be evaluated on summary content, application content, organization, use of citations, and effective use of grammar, style, and syntax. A passing score is an average evaluation of "Meets Expectations" in each of the evaluated areas.

- An eight-minute oral presentation prepared before the exam and delivered on the day of the exam. The oral presentation will summarize the content of the written essay. The presentation will be evaluated by a committee of two or more faculty members on summary content, application content, organization, proper use of citations, visual aids, use of language, ability to answer questions and delivery skill. A passing score is an average evaluation of “Meets Expectations” in each of the evaluated areas.

The oral and written communication aspects of the exam can be alternatively completed using the CE590 Special Problem as the subject matter. The same evaluation criteria are applied to the written report and oral presentation, however the length of both are likely to be longer. **Note that the CE590 problem must be completed before the exam date if the student is to graduate that semester. In some cases, students may wish to select to complete the normal oral and written communication aspects of the exam if their CE590 problem will not be completed by then.**

The exam is normally graded within two weeks of the examination date. After the exam results are known, the Civil Engineering office will prepare the pass/fail form and collect the required signatures. It is the responsibility of the student to check the schedule of the faculty members to ensure that they will be available to sign the forms by the graduate school deadlines. In the event of a failing grade, the student must wait until the following semester to take the exam again. Students are not required to repeat any part of the exam that they successfully completed (problems, written communication or oral communication). The result of the second examination is final.

10.2 PhD Comprehensive Exam

The Comprehensive Examination will be given after the student has completed approximately three-fourths of his/her graduate course work and prior to admission to candidacy. This timing is late enough in a student's academic program to permit most of his/her graduate work to be covered on the exam, and early enough to permit modification of the student's program based on the results of the exam.

A written Dissertation proposal, approved by the major professor, must be submitted to each of the members of the student's Doctoral Committee two weeks prior to the written exam,

The Comprehensive Examination will consist of two parts:

1. A one-day to two-day open-book written examination will be given at an agreed upon date. This exam will be made up by the members of the Doctoral Committee at the request of the student's major professor, and the exam will be administered by the major professor.
2. Approximately one to three weeks after the written examination, an oral examination will be given. On this exam, the student will be quizzed on subject matter similar to that covered on the written exam, and, in addition, the student will be required to defend his/her proposed dissertation research. The student should present a 20-minute formal presentation outlining the proposed research. It is recommended that the oral exam be no longer than three hours duration.

Once the Comprehensive Examination is passed, the student should file for and be admitted to candidacy. At the discretion of the Doctoral committee, supplemental reexaminations for the Comprehensive Examination and/or proposed dissertation research may be required. In case of failure, the candidate may not apply for reexamination until the following semester. The result of the second examination is final.

10.3 MS Thesis and PhD Dissertation Oral Defense

The defense of the thesis or dissertation serves as a final oral examination for the MS thesis option or the PhD degree. The student's committee resides over the exam. The defense must be scheduled with the committee and in the CEE office at least two weeks prior to the exam date. In addition, the PhD dissertation defense must be scheduled with the graduate school. The committee must receive the completed thesis or dissertation draft at least two weeks prior to the defense. Typically, the student will summarize the findings of his/her research in a formal presentation. The typical length of the presentation should be 20 to 40 minutes for an MS thesis and 30 to 60 minutes for a PhD dissertation. Following the formal presentation, the committee will question the student about the thesis and/or coursework. Following the defense, the committee will meet in a closed-door session and vote whether the student has passed his/her defense. A majority vote is required for a passing grade. All committee members will sign the pass/fail form at this time. In the event of a failing grade, the student must wait until the following semester to defend his or her thesis or dissertation again. The result of the second examination is final.

The committee members may specify necessary or suggested changes to the thesis or at this time. Committee members may elect to sign the thesis at the defense or to wait until the modifications to the thesis or dissertation have been

completed. It is the student's responsibility to gather all the necessary signatures prior to the submission deadline.

11. Standards, Problems, and Appeals

Admission to the graduate program is selective in order to ensure that admitted students are qualified to succeed in a rigorous program of advanced training in Civil and Environmental Engineering. Students supported on assistantships are privileged to benefit from significant investment of public funds from state and US taxpayers and the private sector. As such, students are expected to maintain high levels of academic performance and impeccable academic honesty and integrity.

11.1 Academic Good Standing

To remain in good academic standing, students must maintain a minimum cumulative graduate GPA 3.0. Grades below B are considered unsatisfactory performance in graduate school. Students are placed on academic probation if their cumulative graduate GPA drops below 3.0. Once a student is on probation, he or she must maintain a minimum semester GPA of 3.0 or greater as long as they are on probation. Failure to do so will result in expulsion from the program. A cumulative graduate GPA of at least 3.0 is required to graduate from the program.

Grades of D or F may have serious consequences for graduate students, beyond those associated with GPA outlined above. Graduate courses may not be repeated and courses in which a grade of D or F is received may not be used to satisfy degree requirements. Therefore, a grade of D or F in a required class may require a student to change concentrations within the department. Grades of D or F occur most often when a student quits coming to class without taking the necessary measures of dropping the class.

11.2 Academic Dishonesty

The University of Tennessee Honor statement reads as follows:

An essential feature of the University of Tennessee, Knoxville, is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.

The department takes acts of academic dishonesty very seriously. Plagiarism or cheating will likely result in a failing grade in the course or dismissal from the program.

11.3 Grades of Incomplete

A grade of incomplete is a temporary grade indicating that the student has performed satisfactorily in the course but, due to unforeseen circumstances, has been unable to finish all requirements. An I is not given to enable a student to do additional work to raise a deficient grade. The instructor, in consultation with the student, decides the terms for the removal of the I, including the time limit for removal. If the I is not removed within one calendar year, the grade will be changed to an F. The course will not be counted in the cumulative grade point average until a final grade is assigned. No student may graduate with an I on the record.

11.4 Appeals Procedure

The department follows the standard university appeals procedure found on the graduate school web page (<http://gradschool.utk.edu/>).

11.5 Compliance with Institution Review Boards

The University is responsible for complying with various Federal laws that ensure that research is conducted in an ethical, safe, and responsible manner. Policies govern the following areas:

- Animal Care and Use
- Biosafety
- Export Control
- Human Subjects
- Radiation Safety
- Responsible Conduct of Research

These topics are discussed on the webpage of the Office of Research (<http://research.utk.edu/index.shtml>). Your major professor should make you familiar with the provisions in these policies that are applicable to your research. Please see your major professor or the Director of Graduate Studies if you have questions.

12. Appendices:

Pertinent Graduate Student Web Pages:

- Best Practices in Teaching
http://gradschool.utk.edu/files/2009-10_BPIT-Flyer.pdf
- Center for International Education
<http://web.utk.edu/~globe/index.php>
- Counseling Center
www.utk.edu/counselingcenter
- Department
<http://www.engr.utk.edu/civil/>
- College
<http://www.engr.utk.edu/>
- Funding, Fellowships, Assistantships for Graduate Students
<http://gradschool.utk.edu>
- Graduate School
<http://gradschool.utk.edu>
- Graduate Catalog
<http://gradschool.utk.edu>
- Graduate Student Appeals Procedure
<http://gradschool.utk.edu/GradAppealHbook.pdf>
- Graduate Student Senate
<http://web.utk.edu/~gss>
- Graduate and International Admissions
<http://admissions.utk.edu/graduate/>
- International House
<http://web.utk.edu/~ihouse>
- Judicial Affairs
<http://web.utk.edu/~osja/>
- Office of Equity and Diversity
<http://oed.utk.edu>

- Office of Minority Student Affairs/Black Cultural Center
<http://omsa.utk.edu>
- Research Compliance/Research with Human Subjects
<http://research.utk.edu/compliance/>
- SPEAK Testing Program
<http://gradschool.utk.edu/speaktest.shtml>
- Thesis/Dissertation Website
<http://web.utk.edu/~thesis/>
- VolAware
<http://volaware.utk.edu>
- Library Website for Graduate Students
<http://www.lib.utk.edu/refs/gradservices.html>
- OIT
<http://oit.utk.edu/>
- Housing
<http://uthousing.utk.edu/sutherland/sutherlandresources.htm>

Forms and Additional Resources

The following forms are available on the Graduate School Website (<http://gradschool.utk.edu>).

- Graduate Student Deadline Dates
- Admission to Candidacy Application – Master’s Degree
- Doctoral Committee Appointment Form
- Admission to Candidacy Application – Doctoral Degree
- Scheduling Defense of Dissertation Form
- Graduate Student Travel Award Forms (specific to department, college, and university (Graduate Student Senate Website))