

CIVIL AND ENVIRONMENTAL ENGINEERING, PH.D.

The mission of the civil and environmental engineering program is to develop leaders in education, industry, and government who can use their acquired skills to improve society. The academic program provides a comprehensive framework of courses in the broad area of civil and environmental engineering with opportunities to develop specialized expertise. It also emphasizes the development of integrated teamwork abilities, communication, leadership, entrepreneurship, and creative research skills. Graduate study in the department offers an opportunity to undertake advanced study and research in various areas of specialization. Areas include:

- *Construction engineering and management:* construction labor productivity management, integrated lean project delivery systems, risk management, advanced computer applications to construction, and change management
- *Environmental engineering:* water supply, water quality, water treatment, wastewater treatment, solid and hazardous waste management, air pollution, biotechnology, and alternative energy
- *Geo and pavement engineering:* geotechnical and geological engineering, pavement materials and design, asphalt binders and mixtures, geosynthetics, in-situ testing and engineering geophysics, recycled materials in sustainable construction
- *Structural engineering:* behavior, analysis and design of reinforced/prestressed concrete, steel, and wood structures; design for earthquake and wind loading; seismic rehabilitation
- *Transportation engineering:* highway and traffic engineering, intelligent transportation systems, connected and automated vehicles, transportation planning, freight, and infrastructure management, transportation safety, user comprehension and behavior, advanced driving- and micro-simulation, big data
- *Water resources/environmental fluid mechanics:* analysis, measurement, modeling of currents, flows, and waves in natural and constructed systems; surface and groundwater hydrology; hydraulic engineering; coastal engineering; sedimentation and transport processes; infrastructure impacts of extreme weather events, hydroecology and stream restoration

Students may also pursue studies in the broad fields of environmental engineering/science and systems analysis. Areas of specialization are organized into a constructed facilities division (including transportation engineering, structural engineering, construction engineering and management, pavement engineering, materials for constructed facilities, and geotechnical engineering) and an environmental engineering division (including geoenvironmental engineering, environmental fluid mechanics and water resources engineering, environmental science and technology, and environmental and water chemistry).

Degrees require a coordinated core program of courses, selected from CEE and other department/program offerings. Graduate degree programs closely associated with the department include engineering mechanics, human factors, environmental chemistry and technology, water resources management, geological engineering, land resources, and limnology and marine science.

In support of the instructional and research programs are laboratory facilities for structural engineering; highway materials; transportation

systems; driving simulation and human factors; soil mechanics, geotechnical and geoenvironmental engineering; coastal and hydraulic engineering; environmental fluid mechanics; environmental engineering processes and engineering chemistry. Water resources engineering, environmental engineering, and water chemistry have additional research facilities in the Water Science and Engineering Laboratory on the shore of Lake Mendota. The Environmental Engineering Field Laboratory is located at the Nine-Springs Madison Metropolitan Wastewater Treatment Plant.

ADMISSIONS

GRADUATE SCHOOL ADMISSIONS

Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Once you have researched the graduate program(s) you are interested in, apply online (<https://grad.wisc.edu/admissions>).

Requirements	Detail
Fall Deadline	December 15
Spring Deadline	October 1
Summer Deadline	December 15
GRE (Graduate Record Examinations)	Required.
English Proficiency Test	Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (https://grad.wisc.edu/apply/requirements/#english-proficiency).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

All applicants must meet the Graduate School's admission requirements (<http://grad.wisc.edu/admissions/requirements>) to be considered for admission. The application deadline is December 15 for the fall term and October 1 for the spring term. Late applications may not be reviewed for funding opportunities.

In addition, applicants must also meet the department's more stringent admission requirements listed below to be considered for admission:

- **Grades:** A minimum undergraduate grade point average (GPA) of 3.00 (on a 4.00 scale) on the equivalent of the last 60 semester hours (approximately two years of work) is required for domestic applicants. A strong academic performance comparable to an average of B or above grades for all undergraduate course work is required for international applicants.
- **Degree:** A bachelor's degree from an ABET-accredited engineering program or from a recognized international institution is required.

A complete graduate application is required before an application will be reviewed by the faculty. A complete graduate application contains the following:

- **Graduate School Application Form and application fee:** Applicants must submit an online application to the UW–Madison Graduate School. See Graduate School Admissions (<https://grad.wisc.edu/admissions>) to apply.
- **Statement of purpose:** A statement of purpose for graduate study must be submitted through an applicant's online UW–Madison Graduate School application. Please limit this important document to 1,000 words.
- **Letters of recommendation:** Three letters of recommendation must be submitted through an applicant's online UW–Madison Graduate School application.
- **Transcripts:** Upload the most recent copies of your transcripts to the electronic application, from each institution attended. Study abroad transcripts are not required if coursework is reflected on the degree granting university's transcript. If the application is recommended for admission then we will follow-up with instructions for official transcript submission.
- **Graduate Record Examination (GRE) Scores:** Graduate Record Examination (GRE) General Test scores are required for most applicants.
- **English proficiency scores:** Applicants whose native language is not English, or whose undergraduate instruction was not in English, must provide an English proficiency test score. Scores are accepted if they are within two years of the start of the admission term. See Graduate School Admission Requirements (<http://grad.wisc.edu/admissions/requirements>) for more information on the English proficiency requirement.
 - GRE and TOEFL scores may be sent to institution code 1846 from ETS

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (<https://grad.wisc.edu/funding>) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

PROGRAM RESOURCES

Financial support is available through fellowships, project/program assistantships (PA), research assistantships (RA), and teaching assistantships (TA). Faculty will contact successful applicants directly regarding funding opportunities. Admission is not a guarantee of funding.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (<http://guide.wisc.edu/graduate/#policiesandrequirements>), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Evening/Weekend: These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

Online: These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

Hybrid: These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

Accelerated: These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

CURRICULAR REQUIREMENTS

Requirements Detail

Minimum
Credit
Requirement 51 credits

Minimum
Residence
Credit
Requirement 32 credits

Minimum
Graduate
Coursework
Requirement Half of degree coursework (26 credits out of 51 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide.

Overall
Graduate GPA
Requirement 3.00 GPA required.

Other Grade
Requirements The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.

Assessments
and
Examinations Doctoral students are required to take a comprehensive preliminary/oral examination after they have cleared their record of all Incomplete and Progress grades (other than research and thesis). Deposit of the doctoral dissertation in the Graduate School is required.

Language
Requirements Contact the program for information on any language requirements.

Doctoral Minor/ Breadth Requirements	Doctoral students must complete a doctoral minor. Students will discuss minor options with the faculty advisor. Course must be approved before, or by the time, the student has completed 6 of the total credits for the minor.
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REQUIRED COURSES

Basic requirements for a Ph.D. degree in Civil and Environmental Engineering include: (1) Ph.D. major coursework; (2) qualifying examination; (3) Ph.D. minor coursework; (4) preliminary examination; (5) dissertation research; and (6) final oral examination. Advanced coursework in a major area of civil and environmental engineering is required. The academic program for each doctoral student is planned on an individual basis with their advisor. 32 credits and minor coursework must be completed prior to achieving dissertator status (for students who have earned an M.S. degree, credits accumulated for the M.S. can be applied toward this requirement). All graduate students must register for a 1-credit seminar course; students will discuss seminar options with faculty advisors.

Seminar course options; must discuss seminar options with faculty advisor.

Code	Title	Credits
CIV ENGR 579	Seminar-Transportation Engineering	1
CIV ENGR/ENVIR ST/ URB R PL 717	Water Resources Management Practicum Planning Seminar I	1
CIV ENGR/ENVIR ST/ URB R PL 718	Water Resources Management Practicum Planning Seminar II	2
CIV ENGR 909	Graduate Seminar - Environmental Chemistry & Technology	1
CIV ENGR/ ATM OCN/BOTANY/ ENVIR ST/GEOSCI/ ZOOLOGY 911	Limnology and Marine Science Seminar	1
CIV ENGR 919	Seminar-Hydraulic Engineering and Fluid Mechanics	1
CIV ENGR 929	Seminar-Environmental Engineering	1
CIV ENGR 939	Geotechnical Engineering Seminar	1
CIV ENGR 949	Seminar-Structural Engineering	1

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (<https://grad.wisc.edu/acadpolicy>) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

GRADUATE PROGRAM HANDBOOK

The Graduate Program Handbook (<https://www.engr.wisc.edu/departments/civil-environmental-engineering/academics/ms-phd-civil-and-environmental-engineering>) is the repository for all of the program's policies and requirements.

PRIOR COURSEWORK

Graduate Work from Other Institutions

With program approval, students are allowed to count credits of graduate coursework from other institutions. Approved credits will be allowed to count toward the minimum graduate degree credit requirement and the minimum graduate coursework requirement, but will not count toward the minimum graduate residence credit requirement. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

UW-Madison Undergraduate

With program approval, no more than 7 credits of coursework numbered 300 or higher from a UW-Madison undergraduate degree are allowed to count only toward the minimum graduate degree credit requirement. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

UW-Madison University Special

With program approval, students are allowed to count up to 15 credits of coursework numbered 300 or above taken as a UW-Madison special student toward the Minimum Graduate Residence Credit Requirement, and the Minimum Graduate Degree Credit Requirement; those courses numbered 700 or above may be applied toward the Minimum Graduate Coursework (50%) Requirement. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

PROBATION

The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

ADVISOR / COMMITTEE

Every graduate student is required to have an advisor. An advisor is a faculty member, or sometimes a committee, from the major department responsible for providing advice regarding graduate studies. An advisor generally serves as the thesis advisor. In many cases, an advisor is assigned to incoming students. Students can be suspended from the Graduate School if they do not have an advisor.

To ensure that students are making satisfactory progress toward a degree, the Graduate School expects them to meet with their advisor on a regular basis.

A committee often accomplishes advising for the students in the early stages of their studies.

CREDITS PER TERM ALLOWED

15 credits

TIME CONSTRAINTS

Doctoral degree students who have been absent for ten or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements;

that coursework may not count toward Graduate School credit requirements.

A candidate for a doctoral degree who fails to take the final oral examination and deposit the dissertation within 5 years after passing the preliminary examination may be required to take another preliminary examination and to be admitted to candidacy a second time.

OTHER

Faculty will contact successful applicants directly regarding funding opportunities. Admission is not a guarantee of funding.

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (<https://grad.wisc.edu/pd>) to build skills, thrive academically, and launch your career.

LEARNING OUTCOMES

1. Demonstrate an extraordinary, deep understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.
3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to address these problems.
4. Recognize and apply principles of ethical and professional conduct.
5. Demonstrate an ability to synthesize knowledge from a subset of the biological, physical, and/or social sciences to help frame problems critical to the future of their discipline.
6. Demonstrate an ability to conduct original research and communicate it to their peers.

PEOPLE

Civil and Environmental Engineering Faculty: Professors Noyce (chair), Adams, Bahia, Cramer, Hanna, Harrington, Hurley, Likos, Loheide, McMahon, Noguera, Park, Parra-Montesinos, Ran, Russell, Schauer, Wu; Associate Professors Ahn, Block, Fratta, Pincheira, Remucal, Tinjum; Assistant Professors Blum, Gadikota, Ginder-Vogel, Hampton, Hicks, Prabhakar, Pujara, Sone, Wang, Wright, Zhu. M.Eng Program Director Carlson. See also CEE faculty (<http://directory.engr.wisc.edu/cee/faculty>).

Geological Engineering Faculty: Professors Likos (director) (Civil and Environmental Engineering), Feigl (Geoscience), Goodwin (Geoscience), Holloway (Nelson Institute), Loheide (Civil and Environmental Engineering), Thurber (Geoscience), Tikoff (Geoscience), Wu (Civil and Environmental Engineering); Associate Professors Cardiff (Geoscience), Fratta (Civil and Environmental Engineering), Tinjum (Civil and Environmental Engineering); Assistant Professors Gadikota (Civil and Environmental Engineering), Ginder-Vogel (Civil and Environmental Engineering), Hampton (Civil and Environmental Engineering), Hicks (Civil and Environmental Engineering), Sone (Civil and Environmental Engineering), Zoet (Geoscience); Professor of Practice Pakes (Grainger).

See also GLE faculty (<https://www.engr.wisc.edu/geological-engineering/people>).

Environmental Chemistry and Technology: Professors Hurley (director) (Civil and Environmental Engineering), Bleam (Soil Science), Harrington (Civil and Environmental Engineering), Karthikeyan (Biological Systems Engineering), McMahon (Civil and Environmental Engineering/Bacteriology), Pedersen (Soil Science), Roden (Geoscience), Root (Chemical and Biological Engineering), Schauer (Civil and Environmental Engineering), Thompson (Biological Systems Engineering); Associate Professors Bertram (Chemistry), Remucal (Civil and Environmental Engineering); Assistant Professors Anantharaman (Bacteriology), Ginder-Vogel (Civil and Environmental Engineering), Gadikota (Civil and Environmental Engineering), Whitman (Soil Science). See also ECT Faculty (<https://www.engr.wisc.edu/academics/graduate-academics/environmental-chemistry-technology>).