GEological Engineering, M.S.

The graduate program offers training leading to the master of science and the doctor of philosophy degrees in geological engineering. Geological engineering is a rapidly growing field of study that integrates the two disciplines of geology and engineering. Geological engineers help find the best ways to use the earth's resources for solving technical problems while protecting the environment. The need for graduate education in geological engineering has been brought about by modern developments and activities in science and industry that have an impact on earth materials including soil, rock, water, and air. The area of study combines research and application methodologies of geology and of several engineering disciplines to address engineering problems in which the geologic nature of a site or geologic processes constitute major design objectives or constraints.

Emphasis in the program is on development of the student's ability to originate and perform analytical, numerical, and/or laboratory analysis techniques to address new and challenging earth-related problems associated with modern land-use practices, earthen construction, energy and mineral extraction, and environmental pollution control and remediation. The program is expected to be of interest to students in engineering (particularly mining, civil, environmental, and mechanical) and physical sciences (particularly geology, geophysics, and geography). Students select their research topics from such areas as geotechnical and geo-environmental engineering, applied geophysics, hydrology and hydrogeology, numerical modeling of rock masses, remote sensing, rock mechanics, and soil and rock engineering.

Modern facilities include soil and rock mechanics laboratories; drilling equipment and instrumentation for rock and soil mechanics field testing; and soils, geosynthetics, and geo-environmental laboratories. Research assistantships, teaching assistantships, and fellowships are available to qualified applicants either upon admission or one to two semesters after entering the program.

ADMISSIONS

All applicants must meet the Graduate School's admission requirements (http://grad.wisc.edu/admissions/requirements) to be considered for admission. 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 preferred or bachelor's degree in physical sciences. Admission to the program requires approval of the admissions committee.
- 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 (http://grad.wisc.edu/admissions/requirements) 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 all 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.

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).

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/
# Curricular Requirements

In addition to the program requirements listed below.

## Major Requirements

### Mode of Instruction Definitions

**Face to Face**

These programs are offered in an on-campus 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

### Minimum Credit Requirement

- **Face to Face**
  - Minimum: 30 credits
- **Online**
  - Minimum: 16 credits
- **Hybrid**
  - Minimum: Half of degree coursework (15 credits out of 30 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 (https://registrar.wisc.edu/course-guide/).
- **Accelerated**
  - Minimum: Half of degree coursework (15 credits out of 30 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 (https://registrar.wisc.edu/course-guide/).

### Overall Graduate GPA Requirement

- **Face to Face**
  - 3.00 GPA required.
- **Online**
  - 3.00 GPA required.
- **Hybrid**
  - 3.00 GPA required.
- **Accelerated**
  - 3.00 GPA required.

### Other Grade Requirements

- **Face to Face**
  - 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.
- **Online**
  - 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.
- **Hybrid**
  - 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.
- **Accelerated**
  - 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

Contact the program for information on required assessments and examinations.

### Language Requirements

Contact the program for information on any language requirements.

### Required Courses

All graduate students must register for G L E 900 Seminar each spring semester. M.S. degree candidates may choose from two options for their program of study.

#### Thesis Option

This option requires at least 16 credits of graduate-level coursework (300-level and higher) and at least 6 credits of G L E 790 Master's Research or Thesis.

1. These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

#### Independent Study Option

This option requires at least 21 credits of graduate-level coursework (300-level and higher) and 3 credits of G L E 999 Independent Work. A written report must be prepared based on the independent study project.

1. These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

### 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

The Graduate Program Handbook (https://www.engr.wisc.edu/app/uploads/2017/02/gle_graduate_student_handbook2016-2017.pdf) 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 graduate coursework from other institutions toward the minimum graduate degree credit requirement and the minimum graduate coursework (50%) requirement. No credits from other institutions can be counted toward the minimum graduate residence credit requirement. coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

#### UW–Madison Undergraduate

Up to 7 credits numbered 300 or above can be counted toward the minimum graduate degree credit requirement, if those 7 credits are from courses numbered 700 or above, they may be counted toward the minimum graduate coursework (50%) requirement. No credits can be counted toward the minimum graduate residence credit requirement. Coursework earned
five or more years prior to admission to a master’s 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; if those credits are from courses numbered 700 or above, they may be counted toward the minimum graduate coursework (50%) requirement. Coursework earned five or more years prior to admission to a master’s 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. 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.

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. An advisor is a faculty member, or sometimes a committee, from the major department responsible for providing advice regarding graduate studies.

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

**CREDITS PER TERM ALLOWED**

15 credits

**TIME CONSTRAINTS**

Master’s degree students who have been absent for five 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.

**OTHER**

n/a

**LEARNING OUTCOMES**

1. Demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.

2. Demonstrate an ability to formulate, analyze, and solve advanced engineering problems.

3. Demonstrate creative, independent problem solving skills.

4. Apply the latest scientific and technological advancements, advanced techniques, and modern engineering tools to these problems.

5. Recognize and apply principles of ethical and professional conduct.

**PEOPLE**

**Civil and Environmental Engineering Faculty:** Professors Noyce (chair), Adams, Bahia, Cramer, Feigl, Hanna, Harrington, Holloway, Hurley, Karthikeyan, Lee, Likos, Long, McMahon, Noguera, Park, Parra-Montesinos (director), Pedersen, Potter, Ran, Russell, Schauer, Wu; Associate Professors Ahn, Fratta, Hurley, Loheide, Pincheira, Tinjum; Assistant Professors Block, Gadikota, Ginder-Vogel, Hedegaard, Hicks, Prabhatkar, Remucal, Sone, Wang, Wright. See also CEE faculty (http://directory. engr.wisc.edu/cee/faculty).

**Geological Engineering Faculty:** Professors Likos (director) (Civil and Environmental Engineering), Anderson (Geoscience), Bahr (Geoscience), Feigl (Geoscience), Goodwin (Geoscience), Holloway (Nelson Institute), Thurber (Geoscience), Tikoff (Geoscience), Tobin (Geoscience), Wang (Geoscience), Wu (Civil and Environmental Engineering); Associate Professors Fratta (Civil and Environmental Engineering), Loheide (Civil and Environmental Engineering), Tinjum (Engineering Professional Development); Assistant Professors Cardiff (Geoscience), Ginder-Vogel (Civil and Environmental Engineering), Hicks (Civil and Environmental Engineering), Sone (Civil and Environmental Engineering), Zoet (Geoscience); Affiliate Professors Kung (Soil Science), Lowery (Soil Science), Plesha (Engineering Physics), Potter (Civil and Environmental Engineering). See also GLE faculty (https://www.engr.wisc.edu/geological-engineering/people).

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

**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.