

**GRADUATE MANUAL
FOR
THE GEOTECHNICAL PROGRAM
IN
THE DEPARTMENT OF CIVIL ENGINEERING
ARIZONA STATE UNIVERSITY
TEMPE, AZ 85287**

Effective August 2020

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INTRODUCTION

It may be helpful to download and examine the [Graduate Handbook](#) that contains more information on the Civil Environmental and Sustainable Engineering graduate program. This document is intended to answer all the major questions that are specific to the Geotechnical graduate program. The Geotechnical Group faculty is actively involved in teaching, research and public service. The teaching responsibilities include teaching the engineering core courses, the undergraduate and graduate geotechnical courses. The faculty is also involved with sponsored and unsponsored research in different areas of geotechnical engineering, materials and mechanics. In addition, the faculty provides expertise to local and national agencies, organizations and companies in the form of consulting, report writing, committee participation, workshops, invited lectures, conference organization, professional exam reviews, etc.

GRADUATE PROGRAM

The admission policies for the graduate program are designed to encourage all qualified students to apply and be considered for regular admission to the geotechnical graduate program. There are two graduate programs - the Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) programs. Students may also be admitted on a provisional basis (certain deficiencies must be met before the status is changed to regular). Students who cannot meet the minimum admission standards may opt to enroll as an unclassified graduate student so as to take a select number of deficiency courses. They may, upon completion of those courses, request to have their credentials reviewed for possible admission into the graduate program.

Admission decisions are made by the entire tenure-track geotechnical faculty (members of the Geotechnical Group). The Specialty Area Coordinator (SAC) communicates the decision to the Graduate Student Academic Advisor of the department who then communicates the admission decision to the Division of Graduate Studies (DGS). DGS issues the formal letter of admission and supporting documents.

Admission Requirements

The Graduate College requires the applicant to submit a formal application which contains basic personal and educational information, and the official transcript. In addition, the following is also required by the Geotechnical Group.

(i) *Statement of Purpose*. All applicants are required to indicate an area or areas of specialization within the geotechnical research program at ASU. Information of faculty research interests can be found on the geotechnical program web site. The intent of this requirement is to match the student's interests with those of the faculty. The statement of purpose should not only address the specialization area(s) within the geotechnical program but also such issues as applicant's career goals and the reason for pursuing graduate studies.

(ii) *Letters of Recommendation*. All applicants are encouraged to submit three letters of recommendation.

(iii) *TOEFL or IELTS*. The Test of English as Foreign Language or International English Language Test for Students for is required of foreign students for whom English is a second language. A minimum score of 80 (TOEFL) or 7.5 (IELTS) is required for regular admission. However, the requirement for a TOEFL or IELTS exam may be waived at the discretion of the SAC if the student has a degree from a University where courses are taught in English.

(iv) *M.S. Students Continuing for the Ph.D.* Upon completion of the MS program, a student may be admitted directly to the doctoral program if recommended by the student's Graduate Supervisory committee (GSC) and approved by the Geotechnical faculty.

(v) *Graduate Record Examination*. This exam is required of all students applying to graduate school at ASU who are seeking financial aid from the Geotechnical program except those who have a degree from ASU.

For graduates of accredited US institutions, a minimum GPA of 3.0 (B) is a requirement for regular admission to the M.S. program, and 3.2 for the Ph.D. program. For graduates of foreign institutions, GRE scores are used to assess the relative achievement and capabilities of candidates from a variety of institutions and with varying backgrounds. An applicant who does not meet the above GPA requirements may be admitted to the Geotechnical graduate program with regular status with a strong performance on the GRE and an applicant who does meet the minimum GPA requirements who performs poorly on the GRE exam or who has poor letters of recommendation may be denied admission.

If the applicant does not have an undergraduate degree in civil engineering, the following deficiencies constitute the minimum requirement. Additional requirements may be placed based upon the applicant's background.

- (i) Sufficient courses in Mathematics including but not limited to Calculus, Differential Equations
- (ii) CEE210 Statics or equivalent.
- (iii) CEE213 Introduction to Deformable Solids or equivalent.
- (iv) CEE351 Geotechnical Engineering or equivalent..

Advising Procedure

Once admitted to the graduate program, upon arrival on campus the applicant must first meet with the geotechnical group Specialty Area Coordinator (SAC) or the student's Faculty Advisor. The name of the SAC is available from the Graduate Academic Advisor (GAC) working in the School of Sustainable Engineering and the Built Environment (SSEBE) Advisement Office. If the student has been offered a research assistantship, the student must meet with the particular faculty who has offered such assistantship; this same faculty is the student's Faculty Advisor. For students who do not have a research assistantship, the SAC will assign the student a *temporary* advisor by matching the student's interests with the faculty. A permanent advisor, mutually agreed upon by the student and faculty member, must be assigned by the end of the first semester of graduate study.

Because some geotechnical engineering graduate courses are only offered every other year, ASU students in the "4+1" program are encouraged to identify an advisor upon entry to the program and no later than the first semester of their senior year. The name of the student's advisor must be on file with the SSEBE Advisement Office. A request for subsequent change of advisor must be in writing with both the current and the new advisor formally informed of the change.

Financial Aid Policy

The Civil Engineering Department offers various forms of financial support to new and continuing graduate students. The most common forms of support are teaching and research assistantships. Teaching assistantships (TAs) are awarded by SSEBE based upon recommendations from the SAC to fill the positions allocated to the geotechnical group. The SAC consults with other geotechnical group faculty members prior to making recommendations for available TA position to SSEBE.

Research assistantships (RAs) are offered to new and continuing students by individual faculty members. Financial support is not a requirement for entry to the graduate program. However, students in the PhD are generally expected to have some type of financial support, either from ASU as a TA or RA or through some other recognized funding source.

Except in rare circumstances, students are not admitted to the Geotechnical PhD program unless they have some recognized source of financial aid.

LIST OF COURSES

The graduate geotechnical courses taught in CEE and some of the recommended courses outside the geotechnical area that may be included in a MS or PhD Program of Study (POS) are listed below. Other courses may be included in a POS with the approval of the student's Graduate Supervisory Committee (GSC).

Graduate Geotechnical Courses

CEE 550	Soil Behavior
CEE 551	Advanced Geotechnical Testing
CEE 552	Soil Improvement**
CEE 553	Advanced Soil Mechanics
CEE 554	Shear Strength and Slope Stability
CEE 555	Advanced Foundations
CEE 557	Geoenvironmental Engineering**
CEE 558	Unsaturated Soil Mechanics**
CEE 559	Geotechnical Earthquake Engineering
CEE 598	Foundations*
CEE 598	Bio-inspired Design**

Note: CEE494/598 Earth Structures cannot be included in a Graduate Program of Study in Geotechnical Engineering

* CEE 598 Foundations meets with CEE 452, Foundations and is only for students who have not has an undergraduate course in Foundation design

** Course offered every other year.

M.S. Program with Thesis

The student's geotechnical advisor, in consultation with the student, will establish a Graduate Supervisory Committee (GSC). The GSC shall be composed of a minimum of three members from the SSEBE graduate faculty. At least two GSC members must be from the Geotechnical Group. The advisor shall serve as the chair of the student's GSC.

As soon as possible, but no later than the middle of the semester following completion of 9 hours of coursework that will count towards their degree, the student, in consultation with the GSC, must file a program of study (POS) with the SSEBE Advisement Office. Changes to the POS must be approved by the advisor and the other members of the GSC.

The POS must be in accordance with university Graduate College and School of Sustainable Engineering and the Built Environment requirements. SSEBE requirements for the Master of Science (M.S.) degree are given in the [Graduate Handbook](#). The candidate must complete at least 30 semester hours of approved course and research work distributed as follows:

- 1) At least eighteen (18) hours of Graduate Geotechnical courses, including:
 - a) nine (9) hours of core courses (CEE554, 553, and 550);
 - b) at least three more geotechnical engineering classes from the list of courses above;
- 2) Not more than three (3) hours of CEE590;
- 3) Not more than 7 hours of 400-level courses from outside of the geotechnical curriculum
- 4) Not more than six (6) hours of research and thesis.

No 700-level graduate courses may be included in the POS for a M.S. degree.

For transferring students, the transfer credits will have to be approved first by the Graduate College and then by the GSC as being equivalent to one or more courses at ASU.

A final defense of the thesis will be administered by the GSC. A student who fails the final defense the first time may be allowed at the discretion of the GSC to retake the exam *once more*.

M.S. Program – No Thesis

The Graduate Supervisory Committee (GSC) shall consist of at least 3 tenure-track SSEBE faculty. At least 2 GSC members must be from the Geotechnical Group. The advisor shall serve as the chair of the GSC. As soon as possible, but no later than the middle of the semester following completion of 9 hours of course work towards the M.S. degree, the student, in consultation with the GSC, must file a program of study (POS) with the School. Changes to the POS must be approved by the advisor and the other members of the GSC.

The POS must be in accordance with university Graduate College and School of Sustainable Engineering and the Built Environment requirements. SSEBE requirements for the Master of Science (M.S.) degree are given in the [Graduate Handbook](#). The candidate must complete at least 30 semester hours of approved course work, including at least nine (9) hours of core courses (CEE554, 553, and 550) and 9 additional hours of Graduate Geotechnical courses. The POS may not contain more than 3 hours of CEE 590 and 3 hours of CEE 592. The POS may contain up to 7 hours of 400-level courses not in the geotechnical curriculum.

No 700-level graduate courses may be included in the POS for the M.S. degree.

A final comprehensive exam will be developed and administered by the GSC. The exam is generally administered at the end of the semester in which the candidate has completed the POS. The exam is usually an 8-hour exam administered over a 2-day period (4-hours per day) in which each member of the GSC submits one or two questions to the candidate that are based upon courses the candidate took as part of the POS. The GSC decision on whether to pass or fail the student will be based on the results from the comprehensive exam. A student who fails the comprehensive exam the first time can retake the exam *once more*.

Ph.D. Program

The Doctor of Philosophy (Ph.D.) program is for students conducting original research. The student must write and defend a dissertation which describes an original contribution within the chosen discipline.

If an applicant has an exceptional record, the Geotechnical Group may admit the student directly to the doctoral program without a MS degree. Applicants are generally not admitted to the Ph.D. program unless a geotechnical faculty member has agreed to serve as the student's Ph.D. advisor.

Dissertation and Program Committee

Upon admission to the Ph.D. program, the student will be assigned an advisor from among the geotechnical faculty members of the SSEBE graduate faculty. The advisor is generally the faculty member funding the student or who sponsored the student's

application. The advisor, in consultation with the student, will establish a Graduate Supervisory Committee (GSC), the purposes of which are to:

- 1) Approve the POS.
- 2) Provide guidance for the student's research.
- 3) Administer the qualifying exam
- 4) Administer the comprehensive exam.
- 5) Administer the dissertation defense.

The GSC shall consist of at least three members. The advisor and one other member of the GSC must be tenure track ASU Geotechnical group faculty as follows:

The third member of the GSC may be any graduate faculty member from any ASU academic program or a tenured faculty member from a Research 1 University. Other suitably qualified persons may be included on the committee at the discretion of the GSC and with approval from the Graduate Division in accordance with ASU requirements. The GSC may have more than three members provided all members meet the above criteria. A change in the GSC requires the change be in writing with both the current and the new advisor formally informed of the change.

Qualifying Examination

The purposes of the qualifying examination are to assess if the student is qualified to continue in a Geotechnical doctoral program. With this understanding, the qualifying examination is to be taken by a student admitted to the Ph.D. program early in his or her residence, but no later than the second semester of residence. The qualifying exam will include a written component and an oral component. A M.S. thesis from ASU or successful completion of the M.S. comprehensive exam may be considered as written components of the qualifying exams at the discretion of the student's GSC. A written summary and critique of a series of refereed journal papers related to the candidates proposed area of research, a series of papers published in reputable refereed journals authored or co-authored by the candidate, or a research proposal on a topic approved by the GSC may also be considered as written components of the qualifying exam, at the discretion of the GSC. The oral exam will generally consist of a 30-45 minute presentation by the candidate focusing on the written component of the qualifying exam or the students proposed research. However, the GSC may question the candidate on any geotechnically-related issue during the exam.

Program of Study

The student in consultation with his/her advisor and the GSC must file a POS. The POS must be in accordance with university Graduate College and School of Sustainable Engineering and the Built Environment requirements. SSEBE requirements for the PhD degree are given in the [Graduate Handbook](#). A preliminary POS shall be completed during the candidates first semester after admission to the Ph.D. program. The final POS must be filed upon completion of 18 hours of course work towards the Ph.D. degree.

Comprehensive Exam

The comprehensive exam is not the same as the qualifying exam. The comprehensive exam shall consist of two parts:

- 1) An examination of the student's competency in his/her area of research.
- 2) A written and oral report on the student's proposed research. [**Prospectus**]

The format of the comprehensive exam is established by the GSC and will include both written and oral components. At a minimum, the student will be required to present to the GSC a written description of the proposed research, anticipated approaches, expected results and projected research contributions. The candidate will also be required to give an oral presentation of the proposed research and to defend the research proposal to the GSC. If the student fails the exam, he/she may retake the exam one more time. The comprehensive examination is generally taken by a student no later than the third semester following satisfactory completion of the qualifying exam.

Final Oral Exam

The dissertation defense is an oral exam administered by the GSC in accordance with the Graduate College guidelines. The purpose of the exam is to evaluate the student's research efforts and written presentation (dissertation), and to determine if the candidate is worthy of conference of a Ph.D. degree. The major area of emphasis of this examination is the student's research dissertation and the general areas of study related thereto. If the student fails the exam, he/she may retake the exam once more.