

November 20, 2019

MIGUEL JALLER MARTELO, PROGRAM CHAIR
Civil and Environmental Engineering Graduate Program

AMIT KANVINDE, DEPARTMENT CHAIR
Civil and Environmental Engineering Graduate Program

RE: Civil and Environmental Engineering Degree Requirements

Enclosed is a copy of the Civil and Environmental Engineering degree requirements as approved by Graduate Council on November 15, 2019. These degree requirements are now the official requirements for the Civil and Environmental Engineering Graduate Program and will be posted on the Office of Graduate Studies program webpage:

<https://grad.ucdavis.edu/programs/gece>

Thank you for your efforts on behalf of graduate education.

Sincerely,



Carlee Arnett, Chair
Graduate Council

CC: Jasmine Durias, Project/Policy Analyst, Graduate Studies
Lauren Worrell, Graduate Program Coordinator

**CIVIL AND ENVIRONMENTAL ENGINEERING
M.S. AND Ph.D. DEGREE REQUIREMENTS**

Revised: 2016, 2019

Graduate Council Approval: November 15, 2019

MASTER'S PROGRAM

1) Admissions Requirements:

Applicants for admission to Civil and Environmental Engineering (CEE) must meet the University of California minimum GPA requirement for admission (3.0 overall). Other requirements for admission include:

- A Bachelor's degree from an accredited institution;
- Graduate Record Examinations (GRE) – General Test;
- Three letters of recommendation;
- Official Transcripts with translation, if needed;
- TOEFL or IELTS: English proficiency examination for international applicants who have not studied at an institution where the language of instruction was in English. International applicants must meet minimum score requirement in the [Graduate Studies Policy on the Implementation of Admission Requirements and Exceptions](#).

The priority deadline, fellowship deadline, general deadline, and space available deadline are all posted online, and updated each year: <http://cee.engr.ucdavis.edu/graduate/apply/>. Applicants are encouraged to aim for the priority deadline. Applications are submitted online: <https://gradstudies.ucdavis.edu/prospective-students/apply-online>. Admissions decisions are made on a case-by-case basis.

- a) **Prerequisites:** In addition to the admission requirements stated above, applicants admitted without an engineering degree are expected to complete the following UC Davis courses (or the equivalent) during the first academic year following initial enrollment. Equivalent courses taken outside of UC Davis may be used to satisfy all or some of this requirement at the discretion of the students Major Professor or Graduate Advisor.

Select four courses from the following six options:

ECI 100*	Fluid Mechanics	4 units
ENG 104	Mechanics of Materials	4 units
ENG 105**	Thermodynamics	4 units
ECI 140B	Aquatic Chemistry	4 units
ECI 141	Engineering Hydraulics	4 units
ECI 115	Computer Methods	4 units
ECI 114	Probabilistic Systems Analysis	4 units

*ENG 103 may be alternatively taken, with permission

** Or Chem 110C or Chem 107A or Chem 107B

Including at least two of the following four classes:

ECI 100
ENG 104
ENG 105
ECI 140B

In addition to the above courses, students must complete upper division engineering course units (typically 2-3 courses) approved by the student's Major Professor or Area Advisor.

- b) **Deficiencies:** Course work deficiencies must be taken for a letter grade and are expected to be completed by the time the student files for advancement to candidacy. They must submit a completed Prerequisite Completion form (available on the CEE website) to the Graduate Staff Advisor

2) **M.S. Degree, Master's Plan I (Thesis) and Plan II (Project/Examination):**

Plan I. This plan requires 36 units of graduate and upper division coursework, of which at least 23 units must be graduate engineering courses (200 series) with a minimum of 8 research units and a thesis. All courses listed on the program of study must be passed with a grade of at least C.

This Plan requires more units than the UC Davis minimum, which are: 30 units of graduate and upper division courses (the 100 and 200 series only), at least 12 of which must be graduate work in the major field.

Plan II. This plan requires 36 units of graduate and upper division courses and completion of a capstone project (either independently or as part of a capstone course or course series), or written examination. At least 27 units must be graded graduate engineering courses for students completing the capstone project while at least 31 units must be graded graduate engineering courses for students completing the capstone written examination. Up to 4 research units (299 or equivalent) may be used towards the 36 unit requirement; 4 units are required for students completing an Independent Capstone Project. No thesis is required. All courses listed on the program of study must be passed with a grade of at least C.

This Plan requires more units than the UC Davis minimum, which are: 36 units of graduate and upper division courses, of which at least 18 units must be graduate courses in the major field. Not more than 9 units of research (299 or equivalent) may be used to satisfy the 18-unit requirement.

3) **Course Requirements:**

Courses core to the CEE Graduate Program are specific to one of the five areas of specialization within Civil and Environmental Engineering: Environmental, Geotechnical, Structural, Transportation, and Water Resources. Students must complete the core courses in their respective area of specialization as part of their program of study in the CEE Graduate Program. The courses may be taken on the UCD campus, or their equivalent from another accredited academic institution, in accordance with residence and transfer credit policies of the university.

Environmental Engineering (8-10 core units: 36 units total)

- a) Core Courses (8 units): Students must choose either a “Water track” or an “Air track”
- Students pursuing the Water track must complete ECI 243A (4 units) and ECI 243B (4 units) - Water and Waste Treatment
 - Students pursuing the Air track must complete ECI 242 Air Quality (4 units) and ECI 247 Aerosols (4 units)
- b) Elective Courses: In addition to the above required core courses for the Water or Air track, students in the Environmental Engineering track are encouraged to complete as an elective two quarters of Environmental and Water Resources Engineering Seminar: ECI 296 (1 unit each quarter; 2 units), although these units will not count towards the required 36 total units. Students should complete the remainder of their required 36 total units taking courses appropriate for environmental engineering, determined in consultation with their Major Professor or Area Advisor. This may include courses in relevant departments outside of the College of Engineering, including Atmospheric Science, Statistics, and Hydrologic Science, among others.

Geotechnical Engineering (12-18 core units: 36 total units)

- a) Core Courses (12-13 units); Students pursuing the Geotechnical Engineering track must complete the following core course:
- ECI 281A – Advanced Soil Mechanics (4 units) and an additional two core courses from the following list:
 - ECI 259 - Asphalt and Asphalt Mixes (4 units)
 - ECI 280A - Nonlinear Finite Elements for Elastic-Plastic Problems (4 units)
 - ECI 280B - Nonlinear Dynamic Finite Elements (4 units)
 - ECI 281B - Advanced Soil Mechanics (5 units)
 - ECI 282 - Pavement Design and Rehabilitation (4 units)
 - ECI 283 - Physico-Chemical Aspects of Soil Behavior (4 units)
 - ECI 284 - Theoretical Geomechanics (4 units)
 - ECI 286 - Advanced Foundation Design (4 units)
 - ECI 287 -Geotechnical Earthquake Engineering (4 units)
 - ECI 288 - Earth and Rockfill Dams (4 units)
- b) Elective Courses: Students interested in geotechnical engineering practice are encouraged to take ECI 281B - Advanced Soil Mechanics (5 units). Students should complete the remainder of their required 36 total units taking courses appropriate for geotechnical engineering, determined in consultation with their Major Professor or Area Advisor.

Structural Engineering and Structural Mechanics (12-16 core units: 36 units total)

- a) Core Courses (12-16 units): Students pursuing the Structural Engineering or Structural Mechanics track are encouraged to complete all four, but must complete a minimum of three of the following core courses:
- ECI 201 - Introduction to Theory of Elasticity (4 units)
 - ECI 211 - Advanced Matrix Structural Analysis (4 units)
 - ECI 212A - The Finite Element Method in Structural Mechanics (4 units)
 - ECI 213 - Analysis of Structures Subjected to Dynamic Loads (4 units)

- b) Elective Courses: Students should complete the remainder of their required 36 total units taking courses appropriate for structural engineering or structural mechanics, determined in consultation with their Major Professor or Area Advisor.

Transportation Engineering (17-18 core units: 36 units total)

- a) Core Courses (17-18 units): Students pursuing the Transportation Engineering track must complete the following core courses:
- ECI 251 – Transportation Demand Analysis (4 units)
 - ECI 256 – Urban Traffic Management and Control (4 units)
 - An economics course such as ECN 100, ECN 145, ECI 268, ARE 275, ARE/ESP 175, ARE 176, or a course similar in spirit as approved by the Transportation Engineering Area Advisor (econometrics courses are normally not considered similar in spirit: they are statistics-oriented, and can have relatively little economics content per se). (3-4 units)
 - TTP 281 – ITS weekly seminar series: must be taken each quarter for at least the first two years. Can be waived due to a conflict with another course, after confirmation with the Transportation Engineering Area Advisor. Note: this course does not count towards the 36 unit requirement. (1 unit each quarter; 6 units)
- b) Elective Courses: Students should complete the remainder of their required 36 total units taking courses appropriate for transportation engineering, determined in consultation with their Major Professor or Area Advisor.

Water Resources Engineering (8 core units: 36 total units)

- a) Core Courses (8 units): Students pursuing the Water Resources Engineering track must complete at least two core courses from the following list:
- ECI 240 - Water Quality (4 units)
 - ECI 260 – Sediment Transport (4 units)
 - ECI 264A - Transport, Mixing and Water Quality in River and Lakes (4 units)
 - ECI 272A - Advanced Hydrogeology (4 units)
 - ECI 272N – Transport through Porous Media (4 units)
 - ECI 273 – Water Resources Systems (4 units)
 - ECI 276 - Watershed Hydrology (4 units)
 - ECI 277A - Computational River Mechanics (4 units)
 - ECI 278 – Hydrodynamics (3 units)
 - ECI 279 - Advanced Mechanics of Fluids (4 units)
 - ECI 289* - Turbulence (4 units)
- b) Elective Courses: Students should complete the remainder of their required 36 total units taking courses appropriate for water resources engineering, determined in consultation with their Major Professor or Area Advisor.

Summary: A total of 36 units are required for both the Plan I (Thesis) and Plan II (Project/Examination). Fulltime students will enroll in a minimum of 12 units per quarter including research and seminar. Coursework used to fulfill degree requirements may not

* This is a temporary course number and will change after approval of this as a regularly offered course.

be taken S/U unless the course is normally graded S/U; seminars, such as ECI 296, cannot be counted towards the unit requirement. Students must maintain a GPA of 3.0 overall. A grade of C or higher is required in all graduate courses that fulfill the M.S. Degree Course Requirements. If the GPA falls below 3.0, the student is placed on academic probation. If a student is on academic probation for more than two quarters, the student is subject to disqualification upon recommendation by the Graduate Advisor to the Dean of Graduate Studies.

A summary of coursework requirements for Plan I and for the three Plan II pathways is contained in the table below:

	Plan I MS	Plan II MS (with Written Exam)	Plan II MS (with Individual Capstone Project)	Plan II MS (with Capstone Project Course)
Minimum number of graded graduate <u>engineering</u> course units (exclusive of 290C and 299)	23	31	27	27
Minimum number of graded graduate and undergraduate * course units (exclusive of 290C and 299 and courses listed below)	27**	35**	31*	31*
Capstone Course				4***
ECI 299 and ECI 290C (Independent study or research) One unit of ECI 290C must be included each quarter when 299 units are taken.	8 required	None required	4 required	None required
TOTAL MINIMUM UNITS REQUIRED	36	36	36	36

* Students may count only one upper division undergraduate course. Exceptions to this policy will be permitted by the approval of the student's Major Professor and confirmed by the Area Advisor or Grad Advisor. No lower-division courses or courses that are considered core undergraduate courses may be used to fulfill any aspect of the graduate degree course work requirement, nor can any courses used to satisfy the program prerequisites. These courses are currently: ENG 102, 103, 104, 105; and ECI 100, 132, 135, 141, 171, 171L, and 190. Finally, HYD 144 may not be taken for credit if ECI 144 is offered in the same calendar year. This list is subject to change without warning as undergraduate curriculum changes occur. The list of courses that cannot be used will be maintained by the Graduate Coordinator.

** No course taken in satisfaction of a student's undergraduate degree may be used or retaken to fulfill any aspect of the graduate degree course work requirement. Up to two graduate-level courses taken at other institutions and/or while in undergraduate standing may be transferred for use towards the graduate degree requirements, subject to the *Residence and Transfer Credit Policy* (GC2011-03).

*** The Capstone Project Course or Course Series (currently listed as ECI 289C) cannot be used towards the 31 unit minimum. The Capstone Project Course or Course Series must be completed near the end of the MS degree, typically after advancement to candidacy. Students not completing the MS II with the Capstone Project Course or Course Series may still enroll in the course, but cannot use it towards the minimum number of graded course units.

4) **Special Requirements:**

- a) Students are required to acquire or demonstrate proficiency in public speaking and technical presentation. Students satisfy this requirement by completing an approved ECI course, by participating and presenting in an appropriate seminar series (e.g. ECI 296), or by giving an oral presentation at a conference and receiving feedback from their Major Professor, or an equivalent approved by the Major Professor and Graduate Advisor. The Graduate Staff Advisor will maintain a list of approved courses.
- b) ECI 390 (Teaching Assistant Training) is required for Teaching Assistants in the Department of Civil and Environmental Engineering during the quarter they are serving as a TA,, but does not count toward degree requirements.
- c) **English Language Requirement:** Students who have not obtained an undergraduate or graduate degree at an approved English-medium institution, or who have not demonstrated strong English language proficiency through the TOEFL or IELTS exam are required to take appropriate English language courses, as described in Graduate Student Course Requirements – English as Second Language (GC-2018-02). Courses taken in satisfaction of this requirement do not count towards the total units required for graduation.

5) **Advising Structure and Mentoring:**

The **Major Professor** is the faculty member who supervises the student’s course work and academic progress. For Plan I students this includes supervision of research and the thesis; this person serves as the Chair of the Thesis Committee. Completion of a Plan I MS requires agreement by the Major Professor. The **GPC Area Advisors**, composed of a member from each of the five research groups (Environmental, Water Resources, Geotechnical, Structural, and Transportation Engineering), serve as temporary advisors to new graduate students until the selection of a Major Professor. The GPC Area Advisor is the default Major Professor for all Plan II students in that area; Plan II students may find a Major Professor other than the GPC Area Advisor. The program **Graduate Advisor** is chair of the Graduate Program Committee (Section 6a) and a resource for information on academic requirements, policies and procedures, and has signature authority on all Office of Graduate Studies forms. The **Graduate Staff Advisor** (Graduate Coordinator) assists students with registration and university deadlines, required forms, and general university policies. The **Mentoring Guidelines** can be found in the graduate student handbook located on the CEE department website, currently available [here](#).

6) **Committees:**

a) **Admissions Committee**

Once the completed application, all supporting material, and the application fee have been received, the application will be submitted to the Admissions Committee. The Admissions Committee consists of five faculty members of the Graduate Program Committee (GPC) and the GPC Admissions Chair. Based on a review of the entire application, a recommendation is made to accept or decline an applicant’s request for admission. Applicants who apply by the Space Available Deadline (but after the General Deadline) are not guaranteed to have their application reviewed by the graduate program. Their application will be reviewed only if the graduate program determines that they have additional space available. The recommendation to accept

or decline an applicant's request for admission is forwarded to the Dean of Graduate Studies for final approval of admission. Notification of admissions decisions will be sent by Graduate Studies. Applications are accepted until the space available deadline, but optimum submission is by the priority deadline for the next Fall entering class.

b) Course Guidance

The Major Professor, or the GPC Area Advisor for students who have not yet selected a Major Professor, advises the student on course selection each quarter. Students are required to submit a Study List which lists that quarter's registration plan (must include 12 units per quarter, and may include research and seminar units). The Major Professor or Area Advisor is required to review and sign the Study List each quarter. The forms are filed in each student's record in the Graduate Staff Advisor's office. Any changes to the Study List must be approved by the Major Professor or Area Advisor. Students are strongly encouraged to complete a comprehensive study list that details the entirety of their coursework and to have this reviewed and approved by their Major Professor.

c) Thesis Committee (Plan I)

The student, in consultation with the Major Professor and the Graduate Advisor, nominates three faculty to serve on the thesis committee. The Major Professor serves as the Chair of the thesis committee and must be a member of the CEE graduate program. The Graduate Advisor nominates the committee to the Office of Graduate Studies for formal appointment in accordance with Graduate Council policy.

Only members of the Academic Senate or the CEE Graduate Program have automatic eligibility to serve as members of advanced degree committees. Only members of the CEE Graduate Program have automatic eligibility to serve as Chairs of advanced degree committees. Members of the Academic Senate who are not members of the CEE Graduate Program can seek exception to serve as Chair of an advanced degree committee; the petition can be obtained from the Graduate Staff Advisor. Individuals who are not members of the Academic Senate or the CEE Graduate Program can serve on advanced degree committees with written recommendation from the student and approval by the Graduate Advisor and Graduate Studies; petition forms can be obtained from the Graduate Staff Advisor. All advanced degree committee members must also be approved by Graduate Studies in accordance with the Graduate Council [Policy on Service on Advanced Degree Committees](#). Nomination of an individual who is not a member of the Academic Senate or the CEE Graduate Program to serve as the chairperson of an advanced degree committee is approved by the GPC only in the most exceptional circumstances.

d) Comprehensive Examination Committee (Plan II)

The pathway by which a student completes the Comprehensive Examination requirement differs between Areas, as does the corresponding committee makeup.

1. For Areas in which the comprehensive exam requirement is completed as a timed, written exam, a committee of three members will be formed annually from faculty members in that Area who will be responsible for preparing the questions for the exam and assessing the outcome. The Area Advisor will oversee the formation of

the committee. This is the default pathway for students completing the Structural Engineering track.

2. For Areas in which a student completes a capstone project through a capstone project course or courses series, the instructor of the course will serve as the Chair of the examination committee; a secondary reviewer for the capstone projects will be selected from the relevant Area faculty. This is the default pathway for students completing the Environmental, Geotechnical, Transportation, and Water Resources tracks.
3. For students completing a capstone project through an independent project under the supervision of their Major Professor, the student, in consultation with their Major Professor and the Graduate Advisor, selects at least one additional faculty member to review the capstone project and serve on the minimum two-person review committee. The Major Professor serves as Chair of the review committee and must be a member of the CEE Graduate Program. The Major Professor assists the student in finding an additional committee member willing to serve. This pathway is open to all students, with the agreement of a Major Professor.

7) Advancement to Candidacy:

Every student must file an official application for Candidacy for the Degree of Master of Science after completing one-half of their course requirements and no later than the start of the quarter in which the student will complete all degree requirements; the application is generally submitted Spring quarter of the student's first year of entering the graduate program for both Plan I and Plan II students. The Candidacy for the Degree of Master form can be found online at <http://www.gradstudies.ucdavis.edu/forms/>. A completed form includes a list of courses the student will take to complete degree requirements, including research and seminar. If changes must be made to the student's course plan after they have advanced to candidacy, the Graduate Advisor must recommend these changes to Graduate Studies. For Plan I (thesis), students will list their three committee members for the Office of Graduate Studies approval.

Students must have the committee Chair and the Graduate Advisor sign the candidacy form before it can be submitted to Graduate Studies. If the candidacy is approved, the Office of Graduate Studies will send a copy to the Thesis Committee Chair, the appropriate graduate staff person, and the student. For Plan II (project/exam), students do not need to provide names of the exam committee members.

If the Office of Graduate Studies determines that a student is not eligible for advancement, the department and the student will be told the reasons for the application's deferral. Some reasons for deferring an application include: grade point average below 3.0, outstanding "I" grades in required courses, or insufficient units.

8) Thesis and Comprehensive Examination Requirements:

a) Thesis Requirements (Plan I):

Thesis committee meetings: The candidate and Major Professor will meet at least once a year with the other members of the thesis committee to discuss progress and any changes in research objectives. The candidate is encouraged to meet more frequently with their thesis committee, as often as is appropriate to keep the committee apprised of progress and receive interim feedback.

Thesis: Research for the Master's thesis is carried out under the supervision of a faculty member of the program and must represent an original contribution to knowledge in the field. The thesis research must be conducted while the student is enrolled in the program. The thesis is submitted to the thesis committee at least one month before the student plans to make requested revisions. All committee members must approve the thesis and sign the title page before the thesis is submitted to Graduate Studies for final approval.

Should the student fall short of making satisfactory progress on the thesis at any point in time, the Major Professor or the Graduate Advisor should submit an annual assessment, or one or more interim assessments, to Graduate Studies that describes the marginal or unsatisfactory assessment of the student's progress. Should the committee determine that the students' progress, including the submitted thesis, is unacceptable for continuation in the program, even with substantial revisions, the program may recommend the student for disqualification from the program to the Dean of Graduate Studies.

The thesis must be filed in a quarter in which the student is registered or on filing fee status. Instructions on preparation and format of the thesis and a schedule of dates for filing the thesis in final form are available from Graduate Studies (<https://grad.ucdavis.edu/>); the deadlines are also printed in the Class Schedule and Registration Guide issued each quarter. The length of the thesis will vary by student, although will typically have a length similar to a journal article in the student's respective Area. A student must have a GPA of at least 3.0 for the M.S. degree to be awarded.

b) Capstone Project and Comprehensive Examination (Plan II):

Fulfillment of the Comprehensive Examination is the last requirement of the M.S. Plan II. A student may take the comprehensive examination once they have advanced to candidacy. Students typically complete the comprehensive examination during the final quarter of graduate study, after advancement to candidacy. There are three, Area-specific pathways by which a student may complete the comprehensive examination requirement.

1. **Timed, written exam:** Students may complete the comprehensive exam requirement by passing a timed, written exam that is taken near the end of their last quarter of study. This is the default pathway for students completing the Structural Engineering track. The written exam will be offered at least twice a year (dates will be announced at the start of each academic year). Students will have 2 hours to complete the exam and may bring only two sheets (8.5 x 11 inch letter size) of typed or handwritten notes with them. The exam shall consist of questions that form the theoretical background material in the relevant core courses. During Fall Orientation, the Area Advisor will provide students with a prospectus containing information on the specific content and format of the exam, including up to two sample exams.

The exam will be graded by the Comprehensive Exam Committee; students must receive a unanimous decision of "pass." If a student does not pass in their first attempt, they may retake the exam twice. The Chair of the Committee will provide feedback to the student regarding deficiencies that led to the "not pass"

decision. Typically, the student will retake the exam the following quarter; if a student does not pass the exam in the spring quarter, an option to re-take the exam in the summer may be provided, or they may have to wait until fall for another retake opportunity. Upon completion of any attempt at passing the Comprehensive Examination, the Chair of the Committee must notify the Graduate Coordinator, indicating the following:

- a) When the student took the exam,
- b) The recommendation to pass or not pass.
- c) The expected retake date, in cases of a not pass.

If a student, upon taking the exam for a third time, receives a “not pass”, the student will be recommended to the Dean of Graduate Studies for disqualification from further graduate work in the program.

2. **Capstone Project Course:** Students may complete their capstone project by taking an approved ECI 2XX course in their final quarter or course series that concludes in their final quarter. The list of approved courses will be maintained by the Graduate Staff Advisor. Completion of a single Capstone Course is the default pathway for students completing the Environmental, Transportation, or Water Resources tracks and completion of a Capstone Course Series is the default pathway for students in the Geotechnical track. The capstone projects in a project course will be carried out individually. They will be of similar scope and quality as the Individual Capstone Projects, with the specific topic and content determined in coordination with the ECI 2XX instructor or after consultation with another CEE faculty member. Typical capstone projects completed through the project course will include both a written report and oral presentation component. The instructor of record for the course must be a CEE Graduate Program member, and will provide primary review of the capstone projects and make an initial assessment of the quality of the projects. A second faculty member from the relevant Area will serve as a secondary reviewer for the capstone projects. The capstone course instructor and secondary reviewer will determine whether a student's performance on both the oral and written reports constitute a pass; both must agree for a student to pass. Satisfactory completion of the capstone project will be indicated by the student receiving either an “S” grade (when the capstone course is graded S/U) or a B or higher (when the capstone course is letter graded). In cases where a student receives a not pass, they may revise their report one time based on feedback received from the instructor and secondary reviewer; the revised report must be turned by the end of the summer following the capstone course, except in exceptional circumstances.

If a pass is indicated by the student's grade in the capstone course, the Master's Report Form is signed by the Program Graduate Advisor and then forwarded to the Office of Graduate Studies. The deadlines for completing this requirement are available from Graduate Studies; the dates are also printed in the Class Schedule and Registration Guide issued each quarter. A candidate must be a registered student or in filing fee status at the time the program submits the form, with the exception of the summer period between the end of the Spring Quarter and the beginning of Fall Quarter. The program must file the report with Graduate Studies within one week of the end of the quarter in which the student's degree will be conferred.

If a not pass is indicated, the student may be recommended to the Dean of Graduate Studies for disqualification from further graduate work in the program.

3. **Individual Capstone Project Report:** The written capstone project report, written by the student, is generally expected to have the scope and quality of a refereed journal paper, without the need to be a novel contribution of knowledge to the field. The student must have the report read by their Comprehensive Examination Committee; the report constitutes the written portion of the examination and approval by the Comprehensive Examination Committee constitutes a pass on this portion of the exam. The written capstone project report is typically developed with feedback/guidance from the Chair of the Comprehensive Exam Committee, typically the Major Professor; if the written capstone project report is not approved by the entire Comprehensive Examination Committee upon the first submission to the entire committee, the student may resubmit a revised report once to the entire committee. In addition to the written capstone project report, an oral presentation and/or exam may be required at the discretion of the Chair of the Comprehensive Examination Committee. The format of the presentation and/or oral exam is established by the Chair of the Comprehensive Examination Committee and communicated to the student at least one month prior to the exam; typically the members of the Comprehensive Examination Committee meet with the student for a minimum of one hour and ask questions related to the report and/or to any courses the student completed to fulfill the M.S. Degree Course Requirements; the Comprehensive Examination Committee decides whether the students' performance on the oral presentation/exam constitutes a pass. If the student does not pass the oral presentation/exam, the committee may recommend that the student be reexamined one time.

Upon completion of the Comprehensive Examination, the Chair of the Committee must notify the Graduate Coordinator, indicating the following:

- a) When the student took the exam,
- b) The members on the committee, and
- c) The recommendation to pass or not pass.

If a pass is indicated, the Master's Report Form is signed by the Program Graduate Advisor and then forwarded to the Office of Graduate Studies. The deadlines for completing this requirement are available from Graduate Studies; the dates are also printed in the Class Schedule and Registration Guide issued each quarter. A candidate must be a registered student or in filing fee status at the time the program submits the form, with the exception of the summer period between the end of the Spring Quarter and the beginning of Fall Quarter. The program must file the report with Graduate Studies within one week of the end of the quarter in which the student's degree will be conferred.

If a not pass is indicated, the student may be recommended to the Dean of Graduate Studies for disqualification from further graduate work in the program.

9) Normative Time to Degree:

Students pursuing an M.S. Plan II can complete their degree in nine months (three quarters) of full-time study, although for students who opt for an Individual Capstone Report experience generally at least 12 months of full-time study is necessary. Students pursuing an M.S. Plan I typically require 18-24 months of full-time study to complete the program.

10) Typical Time Line and Sequence of Events:

The expectation is that full-time students in the master’s program will broadly adhere to the following timeline:

Action Item	Quarter	
	M.S. Plan I	M.S. Plan II
Select a Major Professor	1	1*
Select a M.S. Thesis Committee	2	n/a
Select a second M.S. Capstone Project reader (for students completing Independent Capstone Projects only)	1	2
Complete Graduate Study List	1, 2, 3	1, 2, 3
Complete Program Checklist	2	2
Complete Graduate Annual Progress Report	3, 6	3
Complete coursework	3	3
Complete M.S. Capstone Course or timed Comprehensive Exam**		3
Complete thesis or independent capstone report***	4-6	3-4
Complete Application for Candidacy	3-5	2-3*

*Students completing the Independent Capstone Project. Students completing the timed Comprehensive Exam or Capstone Project Course may have the Area Advisor as their Major Professor.

**For students fulfilling the Capstone Course or timed Comprehensive Exam requirement

***The timeline for students entering the CEE graduate program without a BS in engineering and who must complete prerequisite courses will likely be extended by 1-2 quarters, depending on the extent to which their previous coursework fulfills the prerequisite requirements.

11) Sources of Funding:

Sources of funding in the CEE Graduate Program include: Graduate Student Researchers funded on faculty research grants, Teaching Assistantships, Readerships, and fellowships. Sources of funding are subject to availability and generally there are more students in the CEE graduate program than available funding. Funding decisions related to Teaching Assistantships and Readerships are made by the Graduate Program Chair generally during the Spring Quarter prior to the academic year of the appointment; decisions are based, in part, on a graduate student’s educational background, grade point average, length of time

in the graduate program, degree objective, contributions to the program, and recruitment status at the time of entering the graduate program, and input from the GPC Area Advisor. Funding decisions related to fellowships are generally made by either the Graduate Program Committee or Graduate Studies, depending on the source of funding for the fellowship.

Students are strongly encouraged to work with their Major Professor to apply for fellowship opportunities external to the University, such as from the US Environmental Protection Agency, National Science Foundation, National Institutes of Health, foundations, and a range of other agencies and organizations, including discipline-specific organizations. Graduate Studies maintains a list of many external fellowships online.

12) PELP, In Absentia and Filing Fee Status:

Information about PELP (Planned Educational Leave Program), In Absentia (reduced fees when researching out of state), and Filing Fee status can be found in the Graduate Student Guide: <http://www.gradstudies.ucdavis.edu/publications/>

PHD PROGRAM

1) Admissions Requirements:

Applicants for admission to Civil and Environmental Engineering (CEE) must meet the University of California minimum GPA requirement for admission (3.0 overall). Other requirements for admission include:

- A Bachelor's degree from an accredited institution;
- Graduate Record Examinations (GRE) – General Test;
- Three letters of recommendation;
- Official Transcripts with translation, if needed;
- TOEFL or IELTS: English proficiency examination for international applicants who have not studied at an institution where the language of instruction was in English. International applicants must meet the Office of Graduate Studies minimum score requirement;

While not formally required, applicants are strongly encouraged to communicate with potential research advisors (major professors) prior to admission to the program. It is essential that prospective students contact faculty in the CEE Program whose laboratories are conducting research in areas of CEE that the student wishes to pursue, in order to introduce themselves and inquire about faculty willingness to accept a new student in this degree program. This process of communicating with potential major professors should begin in the Fall and prior to the relevant applications deadline. Applicants should take the initiative to inquire about future research directions of laboratories, exchange research ideas with potential major professors, and make every effort to identify viable possibilities. While formal acceptance into a research group cannot occur prior to admission, contacts should be sufficiently developed such that at least tentative identification of a research advisor can be made as soon after the time of admission as possible.

Application deadlines are updated yearly, and available online:

<http://cee.engr.ucdavis.edu/graduate/apply/>. Applicants should aim for the priority deadline. Applications are submitted online through the Office of Graduate Studies: <https://gradstudies.ucdavis.edu/prospective-students/apply-online>.

- a) **Prerequisites:** In addition to the admission requirements stated above, applicants admitted without an engineering degree are expected to complete the following UC Davis courses (or the equivalent) during the first academic year following initial enrollment. Equivalent courses taken outside of UC Davis may be used to satisfy all or some of this requirement at the discretion of the students Major Professor or Graduate Advisor.

Select four courses from the following six options:

ECI 100*	Fluid Mechanics	4 units
ENG 104	Mechanics of Materials	4 units
ENG 105**	Thermodynamics	4 units
ECI 140B	Aquatic Chemistry	4 units

ECI 141	Engineering Hydraulics	4 units
ECI 115	Computer Methods	4 units
ECI 114	Probabilistic Systems Analysis	4 units

*ENG 103 may be alternatively taken, with permission

** Or Chem 110C or Chem 107A or Chem 107B

Including at least two of the following four classes:

ECI 100

ENG 104

ENG 105

ECI 140B

In addition to the above courses, students must complete additional upper division engineering course units (typically 2-3 courses) approved by the student's Major Professor or Area Advisor. Students must complete the prerequisite courses prior to advancing to candidacy, and must submit a Prerequisite Completion form (available on the CEE website) to the Graduate Staff Advisor.

- a) **Deficiencies:** Course work deficiencies are expected to be completed by the end of the first academic year following initial enrollment and must be taken for a letter-grade. They must submit a completed Prerequisite Completion form (available on the CEE website) to the Graduate Staff Advisor.

2) **Dissertation Plan B:**

Plan B. A three-member (minimum) dissertation committee, an optional final oral examination (made on an individual student basis by the dissertation committee), and an exit seminar.

3) **Course Requirements (46 units minimum; 46-60 units typical)**

Courses core to the CEE Graduate Program are specific to one of the five areas of specialization within Civil and Environmental Engineering: Environmental, Geotechnical, Structural, Transportation, and Water Resources. Students must complete the core courses in their respective area of specialization as part of their program of study in the CEE Graduate Program. The courses may be taken on the UCD campus, or their equivalent from another accredited academic institution. Students will often take additional courses beyond the 46 unit minimum as part of their individualized Program of Study, determined in consultation with the students Program of Study Committee.

Environmental Engineering

- a) **Core Courses (8 units):** Students must choose either a "Water track" or an "Air track"
- Students pursuing the Water track must complete ECI 243A (4 units) and ECI 243B (4 units) - Water and Waste Treatment
 - Students pursuing the Air track must complete ECI 242 Air Quality (4 units) and ECI 247 Aerosols (4 units)
- b) **Elective Courses (38 units minimum):** In addition to the above required core courses for the Water or Air track, students in the Environmental Engineering track are encouraged to complete as an elective two quarters of Environmental and Water Resources Engineering Seminar: ECI 296 (1 unit each quarter; 2 units), although these units will not count towards the minimum unit requirement. Students should complete

the remainder of their required units taking courses appropriate for environmental engineering, determined in consultation with their Major Professor and Program of Study Committee. This may include courses in relevant departments outside of the College of Engineering, including Atmospheric Science, Statistics, Hydrologic Science, among others.

Geotechnical Engineering

- a) Core Courses (12-13 units); Students pursuing the Geotechnical Engineering track must complete the following core course:
- ECI 281A – Advanced Soil Mechanics (4 units) and an additional two core courses from the following list:
 - ECI 259 - Asphalt and Asphalt Mixes (4 units)
 - ECI 280A - Nonlinear Finite Elements for Elastic-Plastic Problems (4 units)
 - ECI 280B - Nonlinear Dynamic Finite Elements (4 units)
 - ECI 281B - Advanced Soil Mechanics (5 units)
 - ECI 282 - Pavement Design and Rehabilitation (4 units)
 - ECI 283 - Physico-Chemical Aspects of Soil Behavior (4 units)
 - ECI 284 - Theoretical Geomechanics (4 units)
 - ECI 286 - Advanced Foundation Design (4 units)
 - ECI 287 -Geotechnical Earthquake Engineering (4 units)
 - ECI 288 - Earth and Rockfill Dams (4 units)
- b) Elective Courses (33-34 units minimum): Students interested in geotechnical engineering practice are encouraged to take ECI 281B - Advanced Soil Mechanics (5 units). Students should complete the remainder of their required units taking courses appropriate for geotechnical engineering, determined in consultation with their Major Professor and Program of Study Committee.

Structural Engineering and Structural Mechanics

- a) Core Courses (12-16 units): Students pursuing the Structural Engineering or Structural Mechanics track are encouraged to complete all four, but must complete a minimum of three of the following core courses:
- ECI 201 - Introduction to Theory of Elasticity (4 units)
 - ECI 211 - Advanced Matrix Structural Analysis (4 units)
 - ECI 212A - The Finite Element Method in Structural Mechanics (4 units)
 - ECI 213 - Analysis of Structures Subjected to Dynamic Loads (4 units)
- b) Elective Courses (30-34 units minimum): Students should complete courses appropriate for structural engineering or structural mechanics, determined in consultation with their Major Professor and Program of Study Committee.

Transportation Engineering

- a) Core Courses (17-18 units): Students pursuing the Transportation Engineering track must complete the following core courses:
- ECI 251 – Transportation Demand Analysis (4 units)
 - ECI 256 – Urban Traffic Management and Control (4 units)

- An economics course such as ECN 100, ECN 145, ECI 268, ARE 275, ARE/ESP 175, ARE 176, or a course similar in spirit as approved by the Transportation Engineering Area Advisor (econometrics courses are normally not considered similar in spirit: they are statistics-oriented, and can have relatively little economics content per se). (3-4 units)
 - TTP 281 – ITS weekly seminar series: must be taken each quarter for at least the first two years. Can be waived due to a conflict with another course, after confirmation with the Transportation Engineering Area Advisor. Note: this course does not count towards the minimum unit requirement. (1 unit each quarter; 6 units total)
- b) Elective Courses (28-29 units minimum): Students should complete the remainder of their required units taking courses appropriate for transportation engineering, determined in consultation with their Major Professor and Program of Study Committee.

Water Resources Engineering

- a) Core Courses (8 units): Students pursuing the Water Resources Engineering track must complete at least two core courses from the following list:
- ECI 240 - Water Quality (4 units)
 - ECI 260 – Sediment Transport (4 units)
 - ECI 264A - Transport, Mixing and Water Quality in River and Lakes (4 units)
 - ECI 272A - Advanced Hydrogeology (4 units)
 - ECI 272N – Transport through Porous Media (4 units)
 - ECI 273 – Water Resources Systems (4 units)
 - ECI 276 - Watershed Hydrology (4 units)
 - ECI 277A - Computational River Mechanics (4 units)
 - ECI 278 - Hydrodynamics
 - ECI 279 - Advanced Mechanics of Fluids (4 units)
 - ECI 289[†] - Turbulence (4 units)
- b) Elective Courses (36 units minimum): Students should complete the remainder of their required units taking courses appropriate for water resources engineering, determined in consultation with their Major Professor and Program of Study Committee.

Summary: A minimum of 46 units of coursework beyond the baccalaureate degree are required. A minimum of 24 units must be taken at the UC Davis campus. Research units are also required and are not counted toward the course work requirements.

Students must enroll in a minimum of 12 units per quarter, including research and seminar. Coursework used to fulfill degree requirements may not be taken S/U unless the course is normally graded S/U; seminars, such as ECI 296, cannot be counted towards the unit requirement. Once course requirements are completed, students can take additional classes as needed, although the 12 units per quarter are generally fulfilled with research units (290C and 299).

Students must maintain a UCD cumulative GPA of at least 3.25 to advance to candidacy.

[†] This is a temporary course number and will change after approval of this as a regularly offered course.

A grade of C or higher is required in all courses that fulfill the Ph.D Degree Course Requirements. During any given quarter, if a student's GPA falls below 3.0, the student is placed on academic probation. If a student is on academic probation for more than two quarters, the student is subject to disqualification upon recommendation by the Graduate Advisor to the Dean of Graduate Studies.

4) **Special Requirements**

- a) Students are required to acquire or demonstrate proficiency in public speaking and technical presentation. Students satisfy this requirement by completing an approved ECI course, by participating and presenting in an appropriate seminar series (e.g. ECI 296), or by giving an oral presentation at a conference and receiving feedback from their Major Professor, or an equivalent approved by the Major Professor and Graduate Advisor. The Graduate Staff Advisor will maintain a list of approved courses.
- b) ECI 390 (Teaching Assistant Training) is required for Teaching Assistants in the Department of Civil and Environmental Engineering during the quarter they are serving as a TA, but does not count toward degree requirements.
- c) At the discretion of the Major Professor, students who are not required to produce a written prospectus for their Qualifying Exam must produce a document of similar scope and quality in their 2nd or 3rd year.
- d) English Language Requirement: Students who have not obtained an undergraduate or graduate degree at an approved English-medium institution, or who have not demonstrated strong English language proficiency through the TOEFL or IELTS exam are required to take appropriate English language courses, as described in Graduate Student Course Requirements – English as Second Language (GC-2018-02). Courses taken in satisfaction of this requirement do not count towards the total units required for graduation.

5) **Advising Structure and Mentoring**

The **Major Professor** is the faculty member who supervises the student's course work, research and dissertation; this person serves as the Chair of the Dissertation Reading Committee. The **GPC Area Advisors**, composed of a member from each of the five research groups (Environmental, Water Resources, Geotechnical, Structural, and Transportation Engineering), serve as temporary advisors to new graduate students until the selection of a Major Professor and also approve the doctoral Programs of Study. The **Graduate Advisor** is a resource for information on academic requirements, policies and procedures, and has signature authority on all Office of Graduate Studies forms. The **Graduate Staff Advisor** (Graduate Coordinator) assists students with registration and university deadlines, required forms, and general university policies. The **Mentoring Guidelines** can be found in the graduate student handbook located on the CEE department website, currently available [here](#).

6) **Committees**

a) **Admissions Committee**

Once the completed application, all supporting material, and the application fee have been received, the application will be submitted to the Admissions Committee. The Admissions Committee consists of five faculty members of the Graduate Program Committee (GPC) and the GPC Admissions Chair. Based on a review of the entire application, a recommendation is made to accept or decline an applicant's request for admission. Applicants who apply by the Space Available Deadline (but after the General Deadline) are not guaranteed to have their application reviewed by the graduate program. Their application will be reviewed only if the graduate program determines that they have additional space available. The recommendation to accept or decline an applicant's request for admission is forwarded to the Dean of Graduate Studies for final approval of admission. Notification of admissions decisions will be sent by Graduate Studies. Applications are accepted until May 31 but the optimum submission deadline is December 15 for the next Fall entering class.

b) **Course Guidance/Program of Study Committee**

The Major Professor advises the student on course selection each quarter. Students consult with the Major Professor (or GPC Area Advisor if a student does not have a Major Professor) to identify a Program of Study Committee as soon as possible, but no later than the end of the first quarter of study. The doctoral Program of Study Committee, composed of three faculty members and chaired by the Major Professor, serves as the Guidance Committee and have the responsibility to guide the student in formulating the Program of Study.

c) **Qualifying Examination Committee**

The student, in consultation with the Major Professor and the Graduate Advisor, nominates four individuals to serve on the Qualifying Examination Committee. An optional fifth member may serve on the QE Committee. The committee shall be constituted subject to the following constraints:

- The Chair of a student's Dissertation Committee cannot be the Chair of the student's Qualifying Examination Committee.
- At least three members of the Qualifying Examination Committee must be members of the CEE Graduate Program.
- At least one person on each Qualifying Examination Committee shall not be a member of the CEE Graduate Program.

Only members of the Academic Senate or the CEE Graduate Program have automatic eligibility to serve as members of the QE committee in this program. Only members of the CEE Graduate Program have automatic eligibility to serve as Chairs of the QE committee. Members of the Academic Senate who are not members of the CEE Graduate Program can seek exception to serve as Chair of a QE committee; the petition can be obtained from the Graduate Staff Advisor. Individuals who are not members of the Academic Senate or the CEE Graduate Program can serve on a QE committee with written recommendation from the student and approval by the Graduate Advisor and Graduate Studies; petition forms can be obtained from the Graduate Staff Advisor. All QE committee members must also be approved by

Graduate Studies in accordance with the Graduate Council Doctoral [QE Policy](#) and the eligibility categories in the Graduate Council [Policy on Service on Advanced Degree Committees](#). Nomination of an individual who is not a member of the Academic Senate or the CEE Graduate Program to serve as the chairperson of the QE committee is approved by the GPC only in the most exceptional circumstances.

These nominations are submitted to the Office of Graduate Studies for formal appointment in accordance with Graduate Council policy. The QE Committee conducts the exam and submits results to the Office of Graduate Studies within 72 hours.

d) Dissertation Reading Committee

The Dissertation Committee is a three-member committee nominated by the student, in consultation with the Major Professor and the Graduate Advisor, and approved by the Dean of Graduate Studies. The role of the Dissertation Committee is to advise the doctoral student on the research topic and methods, provide guidance to the student in formulating and carrying out a doctoral research project and then to review the final completed dissertation for acceptance. The Major Professor usually serves as the Dissertation Committee Chairperson and should ascertain the level of interest from the other committee members regarding their direct participation in the research.

The Dissertation Committee shall be composed of at least two members of the CEE Graduate Program; the third member can be either a member of the CEE Graduate Program or the Academic Senate. If the third member of the Committee is not a member of the CEE Graduate Program or the Academic Senate, a request for an external committee membership must be completed and approved by the Graduate Advisor. If the student wishes to have two people outside the CEE Graduate Group on their Committee, a four-person committee may be established. Exceptions to Committee membership laid out above will be reviewed and approved by the Graduate Advisor on a case-by-case basis. The composition of the Dissertation Committee is entered on the Advancement to Candidacy Form.

Students are expected to meet with the Chair of their Dissertation Committee regularly, at least quarterly if not more frequently. The student and Chair should endeavor to meet with the entire committee annually. A dissertation must be reviewed and approved (via signatures) by all members of this committee. Dissertation Committee members are expected to read and comment on a dissertation within four weeks from its submission. This time limit policy does not apply to summer periods for faculty holding nine-month appointments. The student and faculty will coordinate a timeline for the student to present the thesis to the dissertation committee. This timeline must allow all dissertation committee members enough time to fulfill their responsibilities within the four-week deadline.

7) Advancement to Candidacy

The student is eligible for advancing to candidacy for the doctoral degree after successful completion of all graduate program degree requirements and passing the Qualifying Examination. A student entering with a baccalaureate is expected to advance to candidacy before the end of their third year (9th quarter). Students entering with a master's are expected to advance before the end of their second year. Passing the Qualifying

Examination makes the student eligible for advancement to candidacy. The student must file the appropriate paperwork with the Office of Graduate Studies and pay the candidacy fee in order to be officially promoted to Ph.D. Candidacy. Refer to the Graduate Studies website for additional details regarding the Doctoral Qualifying Examination at <https://grad.ucdavis.edu/policies>.

8) **Qualifying Examination and Dissertation Requirements**

Before advancing to candidacy for a doctoral degree, a student must have satisfied all requirements set by the graduate program and passed the Qualifying Examination before a committee appointed to administer that examination. Students must have a cumulative UCD GPA of at least 3.25 to be eligible to take the Qualifying Examination.

a) **Preliminary Examination**

The doctoral program does not have a preliminary examination.

b) **Program of Study**

i. **Overview**

The Program of Study form serves as the formal written plan of courses to be taken by the student. The form is filed with the Graduate Staff Advisor twice, once as a preliminary Program of Study, and subsequently as a final Program of Study. The Program of Study is developed in consultation with the student's individualized Program of Study committee, who also approve the Program of Study. Typically, the student should meet in person with their committee members, either as a group or individually, to discuss the Program of Study. The Program of Study must include a minimum of 46 units of graded coursework beyond the baccalaureate degree. The Program of Study committee may, and often will, require more than the minimum 46 units of graded coursework be included as necessary to ensure appropriate academic preparation; typical programs of study range from 46-60 units. Courses taken should generally be at the graduate level and should collectively develop both depth and breadth of knowledge. A minimum of 24 units must be taken at the UC Davis campus. No courses used to satisfy prerequisites may be used. Courses taken more than eight years prior to the Qualifying Examination may be counted toward satisfaction of the Program of Study as an exception to policy only after approval of the Program of Study Committee. The Graduate Staff Advisor and Graduate Program Advisor are responsible for ensuring that Programs of Study conform to the above requirements.

Acceptable Programs of Study must satisfy the following qualitative criteria:

- **Depth:** knowledge of theoretical and practical aspects of the field usually, but not always;
- **Breadth:** should expand foundational knowledge;
- **Coherence:** courses taken should be complementary and intentionally chosen. The requirement of coherence expressly precludes taking a large number of single courses in unrelated areas.

ii. Preliminary Program of Study

The preliminary Program of Study lists the courses planned to be used to satisfy the curriculum requirement of the Ph.D. degree, and should be filed with the Graduate Staff Advisor **before the end of the second quarter of entering the Ph.D. program**. Students changing from the M.S. to Ph.D. degree must include an approved preliminary Program of Study with the Change of Degree Objective form. All changes to a student's approved preliminary Program of Study must be discussed and agreed upon by the Program of Study Committee. Any time the preliminary Program of Study is revised, an updated version should be filed with the Graduate Staff Advisor.

When submitting the preliminary and final Program of Study for review and approval, the following supplemental information should be provided in writing:

- For any course outside of CEE, provide either a syllabus for the course or description of the topics covered in the course;
- For students including courses on the Program of Study from institutions that assign numeric grades, a description of the basis for converting the numeric grades into letter grades should be provided. Both the numeric and letter grade should be provided on the Program of Study form.
- For students including courses on the Program of Study from institutions that are not on a quarter system, a description of the basis for converting course units into quarterly units should be provided.

iii. Final Program of Study

Upon completion of the coursework, and in order to request approval from Graduate Studies to constitute the Qualifying Examination committee and take the QE, the student files the final Program of Study, including grades, with their Program of Study Committee for review and approval. The student must submit to the Graduate Coordinator a final, approved Program of Study with their application to take the Qualifying Examination. The Graduate Staff Advisor and Graduate Program Advisor are responsible for ensuring that Programs of Study conform to the above requirements.

Typically, students will begin to work to schedule their Qualifying Exam in their 5th quarter since entering the PhD program for students entering with a previous relevant M.S. degree and in their 7th quarter for students entering without a relevant M.S. degree. Examples of factors that may influence a desired deadline for scheduling the Qualifying Examination include, but are not limited to: (1) advancement to candidacy to receive an exemption from Nonresident Tuition, or (2) advancement to candidacy to be eligible for a higher GSR Step salary rate following the Civil and Environmental Engineering Department's approved GSR compensation plan, (3) availability of relevant courses.

c) Qualifying Examination

1. General Information

Students must complete the course requirements and have an approved final Program of Study before taking their Qualifying Examination (QE). Passing this exam makes the student eligible for advancement to candidacy. The QE should normally be taken by the 6th quarter for students who enter with a relevant M.S. and

no later than the end of the 9th quarter after admission to the doctoral program. According to university policy graduate students cannot hold an academic title (e.g. GSR, TA) for more than nine quarters before passing their QE.

2. Description of the Exam

The purpose of the qualifying examination is to determine if the student has the ability and academic preparation necessary to successfully conduct independent research and complete a doctoral dissertation. Students are encouraged to meet individually with the members of their QE committee prior to the exam to discuss expectations. Students should consult with their Major Professor, Program of Study Committee, and Area Advisor when developing a list of suggested QE committee members. The format of the QE is specific to a students' area of specialization.

A. Exam format for Environmental, Transportation, and Water Resources Engineering students

The Qualifying Examination will consist of a written research prospectus and an oral examination, which includes a presentation by the student.

i. Written Portion of the Exam – Dissertation Prospectus

The written portion of the exam consists of a research proposal called the Dissertation Prospectus. The Prospectus should be provided to members of the qualifying examination committee at least two weeks before the qualifying exam.

The Prospectus is an independently prepared proposal typically 10-15 pages in length describing the student's dissertation-specific research motivation, aims, hypotheses, progress to date, and research approach. The exact scope should be discussed with the QE committee chair. Concepts within the research proposal can be discussed with others (such as the student's Major Professor and peers), but the writing of the proposal should reflect the student's work as the proposal will serve as evidence of the student's proficiency in scientific writing.

The Prospectus will provide information that may be discussed during the oral exam.

ii. Oral Portion of the Exam

The oral portion of the QE is intended to be a broad examination of topics related to the student's proposed research area, academic preparation, and readiness to produce a Ph.D. dissertation. The oral portion of the qualifying exam will be 2-3 hours in length and is intended to demonstrate the student's critical and creative thinking abilities, ability to synthesize, and depth and breadth of knowledge of the field of study.

Students should prepare a presentation that builds on their Dissertation Prospectus, which they will present during the exam. The target presentation length should typically be 15-25 minutes, although the exact scope should be discussed with the QE Committee Chair.

The outcome of the exam will be based on:

- Relevant portions of the student's previous academic record as reflected

in the student's Program of Study;

- Overall evaluation of the student's performance and potential for scholarly research as indicated during the oral examination and through the Dissertation Prospectus.

B. Exam format for Geotechnical and Structural Engineering students

The Qualifying Examination will consist of an oral examination, which includes a presentation by the student.

i. Oral Portion of the Exam

The QE is an oral examination that will be 2-3 hours in length and is intended to evaluate the student's command of the field, ensuring that the student has both breadth and depth of knowledge, and to assess the student's ability to conceptualize a research topic and successfully produce the dissertation required for a doctoral degree.

Students should prepare a presentation, which they will present during the exam. The format, focus, and scope of the presentation will be determined in consultation with the QE Committee chair. The exam questions are designed to evaluate the student's understanding of the fundamentals of the student's field of study, often related to academic coursework, and the ability to synthesize and communicate a solution to general or open-ended problems related to their primary field of research.

The outcome of the exam will be based on:

- Relevant portions of the student's previous academic record as reflected in the student's Program of Study;
- Overall evaluation of the student's performance and potential for scholarly research as indicated during the oral examination.

3. Outcome of the Exam

The committee will reach a decision on the student's performance immediately after the oral exam. The committee, having reached a unanimous decision, shall inform the student of its decision to:

- "Pass" (no conditions may be appended to this decision),
- "Not Pass" (the QE Chair's report should specify whether the student is required to retake all or part of the examination, list any additional requirements, and state the exact timeline for completion of requirements to achieve a "Pass"), or
- "Fail".

Whether or not a unanimous decision is reached, the Chair shall submit the QE report to Graduate Studies within 72 hours. If a unanimous decision takes the form of "Not Pass" or "Fail", the Chair of the QE committee must include in their report a specific statement, agreed to by all members of the committee, explaining their decision. The Chair of the QE committee must inform the student of the committee's decision. Having received a "Not Pass" the student may attempt the QE one additional time; the QE report must list the specific conditions and timing for the second exam. After a second examination, a vote of "Not Pass" is unacceptable; only "Pass" or "Fail" is recognized. Only one

retake of the qualifying examination is allowed. Should the student receive a “Fail” on the first or second attempt at the exam, the student will be recommended for disqualification from the program to the Dean of Graduate Studies.

d) The Dissertation

i. Exit Seminar

The dissertation follows Plan B with a required exit seminar. Satisfaction of the Exit Seminar requirement must be verified by the Dissertation Committee Chair. The Exit Seminar is a formal public presentation of the student’s research before the program faculty and students. It is recommended that this presentation take place during the final quarter of the program. Adequate scheduling of the exit seminar is the responsibility of the student and the Major Professor. The student will provide the Major Professor with the seminar title, date, time, and location of the seminar. An abstract of the seminar is to be widely advertised, and circulated via all appropriate email lists, and must be submitted for inclusion on the CEE department online calendar. Announcement shall be made at least two weeks before the seminar.

ii. General Requirements

Filing of a Ph.D. dissertation with the Office of Graduate Studies is normally the last requirement satisfied by the candidate. Instructions on preparation of the dissertation and a schedule of dates for filing it in the final form are available from Graduate Studies; the deadlines are also printed in the Class Schedule and Registration Guide issued each quarter. A candidate must be a registered student or in Filing Fee status at the time of filing a dissertation, with the exception of the summer period between the end of the Spring Quarter and the beginning of Fall Quarter. The Ph.D. Dissertation will be prepared, submitted and filed according to Graduate Studies regulations <http://gradstudies.ucdavis.edu/students/filing.html>. Satisfaction of this requirement must be verified by the Dissertation Committee Chair.

iii. Dissertation

The research conducted by the student must be of such character as to show ability to pursue independent research. The dissertation reports a scholarly piece of work of publishable quality that solves a significant scientific problem in the field and is carried out under the supervision of a member of program while the student is enrolled in the program. The chair of the dissertation committee must be a member of the program and must be immediately involved with the planning and execution of the research work done to formulate the dissertation.

Students should meet regularly with their dissertation committee. The dissertation must be submitted to each member of the dissertation committee at least one month before the student expects to make requested revisions; committee members are expected to respond within 4 weeks, not including summer months for nine-month faculty. Informing committee members of progress as writing proceeds helps the members to plan to read the dissertation and provide feedback within this time frame. The dissertation must be approved and signed by the dissertation committee before it is submitted to Graduate Studies for final approval.

9) Normative Time to Degree

Measured from the time a student begins graduate study, with no prior graduate experience, the normative time to degree is approximately 5.3 years.

10) Typical Time Line and Sequence of Events

The expectation is that full-time students in the doctoral program will broadly adhere to the following timeline:

Action Item	Quarter
Select a Major Professor	1
Submit Graduate Student Study List	1, 2, 3
Select Program of Study Committee	1
Submit Graduate Student Annual Progress Report	3, 6, 9, 12, 15
Submit preliminary Program of Study	2
Establish Dissertation Committee	3
Submit final Program of Study*	5-7
Submit Application for Qualifying Exam *	6-8
Take initial Qualifying Exam*	6-8
Retake Qualifying Exam (if necessary)	9
Submit Application for Advancement to Candidacy	6, 8
File Dissertation and Present Exit Seminar	15

*The timing will depend on whether the student entered already having a relevant M.S. degree

11) Sources of Funding

Sources of funding in the CEE Graduate Program include: Graduate Student Researchers funded on faculty research grants, Teaching Assistantships, Readerships, and fellowships. Sources of funding are subject to availability and generally there are more students in the CEE graduate program than available funding. Funding decisions related to Teaching Assistantships and Readerships are made by the Graduate Program Chair generally during the Spring Quarter prior to the academic year of the appointment; decisions are based, in part, on a graduate student's educational background, grade point average, length of time in the graduate program, degree objective, and recruitment status at the time of entering the graduate program, and input from the GPC Area Advisor. Funding decisions related to fellowships are generally made by either the Graduate Program Committee or Graduate Studies, depending on the source of funding for the fellowship. Funding decisions related to Graduate Student Researchers are made by the Principal Investigator of the source of funding.

Students are strongly encouraged to work with their Major Professor to apply for fellowship opportunities external to the University, such as from the US Environmental Protection Agency, National Science Foundation, National Institutes of Health, foundations, and a range of other agencies and organizations, including discipline-specific organizations. Graduate Studies maintains a list of many external fellowships online.

12) PELP, In Absentia and Filing Fee Status

Information about PELP (Planned Educational Leave Program), In Absentia (reduced fees when researching out of state), and Filing Fee status can be found in the Graduate Student Guide: <http://www.gradstudies.ucdavis.edu/publications/>

13) Leaving the Program Prior to Completion of the PhD Requirements

Should a student leave the program prior to completing the requirements for the PhD, they may still be eligible to receive the master's if they have fulfilled all the requirements (see master's section). Students can use the Change of Degree Objective form available from the Registrar's Office: http://registrar.ucdavis.edu/local_resources/forms/D065-graduate-major-degree-change.pdf.