TO: CHRISTOPHER CAPPA, Civil and Environmental Engineering Graduate Group Chair

FROM: KYAW THA PAW U, Graduate Council Chair

RE: Civil and Environmental Engineering Degree Requirements

Enclosed is a copy of the Civil and Environmental Engineering graduate degree requirements as approved by Graduate Council on May 20, 2016. These degree requirements are now the official requirements for the Civil and Environmental Engineering Graduate Group and will be posted on the Office of Graduate Studies program webpage:

https://gradstudies.ucdavis.edu/programs/gece

Thank you for your efforts on behalf of graduate education.

Sincerely,

Kyaw Tha Paw U, Chair
Graduate Council

c: Kyaw Tha Paw U, Graduate Council Chair
Regan Scott-Chin, Graduate Studies Analyst
Lauren Worrell, Program Coordinator
CIVIL AND ENVIRONMENTAL ENGINEERING  
Ph.D. AND M.S. DEGREE REQUIREMENTS  
Revised:  04/04/2016  
Graduate Council Approval: May 20, 2016

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 the Office of Graduate Studies minimum score requirement.

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.

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 Adviser.

Select four courses from the following six categories:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 103</td>
<td>Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>ENG 104</td>
<td>Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td>ENG 105*</td>
<td>Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>ECI 141</td>
<td>Engineering Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>ECI 115</td>
<td>Computer Methods</td>
<td>4</td>
</tr>
<tr>
<td>ECI 114</td>
<td>Probabilistic Systems Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>

Including at least two of the following three classes:

- ENG 103
- ENG 104
- ENG 105
In addition to the above courses, students must complete at least an additional 6 upper division engineering course units (minimum of 2 courses) approved by the students Major Professor or Graduate Adviser.

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.

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), a 1 unit graduate seminar, 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.

**Plan II.** This plan requires 36 units of graduate and upper division courses, of which at least 28 units must be graduate engineering courses, a 1 unit graduate seminar, a minimum of 2 research units and a project/final examination. No thesis is required. All courses listed on the program of study must be passed with a grade of at least C.

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 units)**

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 (2 units)

**Geotechnical Engineering (11-16 units)**

a) **Core Courses (11-12 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)
b) Elective Courses: Students interested in geotechnical engineering practice are encouraged to take ECI 281B - Advanced Soil Mechanics (4 units)

**Structural Engineering and Structural Mechanics (12-16 units)**

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)

**Transportation Engineering (21-22 units)**

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. (6 units)

**Water Resources Engineering (8 units)**

a) Core Courses (8 units): Students pursuing the Water Resources Engineering track must complete two core courses from the following list:

- ECI 240 - Water Quality (4 units)
- ECI 272A - Advanced Hydrogeology (4 units)
- ECI 276 - Watershed Hydrology (4 units)
- ECI 277A - Computational River Mechanics (4 units)
- ECI 279 - Advanced Mechanics of Fluids (4 units)
Summary: A total of 36 units are required for both the Plan I (Thesis) and Plan II (Project/Examination). Students will 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. 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 the 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 is contained in the table below:

<table>
<thead>
<tr>
<th></th>
<th>Plan I MS</th>
<th>Plan II MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum number of graduate engineering course units (exclusive of 290C and 299)</td>
<td>23*</td>
<td>28*</td>
</tr>
<tr>
<td>Minimum number of graduate and undergraduate course units (exclusive of 290C and 299 and courses listed below)</td>
<td>27**</td>
<td>32**</td>
</tr>
<tr>
<td>ECI 290 (Seminar)***</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ECI 299 and ECI 290C (Independent study or research) One unit of ECI 290C must be included each quarter when 299 units are taken.</td>
<td>variable (2 min)</td>
<td>variable (2 min)</td>
</tr>
</tbody>
</table>

** TOTAL MINIMUM UNITS REQUIRED **

36 36

* Students may count only one upper division undergraduate course excluding the prerequisite courses for students without an engineering degree. Exceptions to this policy will be permitted only by the approval of the student’s Major Professor.

** No undergraduate course that was required for a student’s undergraduate degree may be transferred from a student’s undergraduate degree to fulfill any aspect of the graduate degree course work requirement. In addition, any course taken as an undergraduate student may not be retaken as a graduate student to fulfill any aspect of the graduate degree course work requirement. Finally, courses that are are considered core undergraduate courses and may not be taken as a graduate student to fulfill any aspect of the graduate degree course work requirement. These courses are currently: ENG 102, 103, 104, 105; and ECI 132, 135, 141, 171, 171L, and 190. 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.

For students entering the CEE graduate program without a BS in engineering, none of the following courses taken to fulfill required background courses may be used to fulfill any aspect of the graduate degree course work requirement: ENG 103, ENG 104, ENG 105, Chem 110C, Chem 107A, Chem 107B, ECI 141 and 141L, ECI 115, ECI 114, and 6 additional upper division course units.

*** MS students are required to take ECI 290. However, waivers may be granted by the Graduate Advisor to students with equivalent public speaking and presentation experience.
4) **Special requirements:** ECI 390 (Teaching Assistant Training) is required for Teaching Assistants in the Department of Civil and Environmental Engineering, but does not count toward degree requirements. International students may need to take LIN 25 or LIN 26.

5) **Committees:**

a) **Admission 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 that 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 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.

c) **Thesis Committee (Plan I)**

The student, in consultation with the Major Professor and the Graduate Adviser, 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 Adviser 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 Adviser and Graduate Studies; petition forms can be obtained from the Graduate
Staff Advisor. 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 student, in consultation with their Major Professor and the Graduate Adviser, selects three faculty to review the capstone project and serve on the examination committee. The Major Professor serves as Chair of the examination committee and must be a member of the CEE Graduate Program.

6) **Advising Structure and Mentoring:**

The **Major Professor** is the faculty member who supervises the student’s course work, research and thesis (Plan I) or capstone project/comprehensive examination (Plan II); this person serves as the Chair of the Thesis or Capstone Project/Comprehensive Examination Committee. The **GPC Area Adviser** serves as the temporary adviser for incoming students and assists students with course selection until a Major Professor is selected. The **Graduate Adviser** 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.

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. 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 Adviser 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 Adviser 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.

Thesis: Research for the Master's thesis is to be 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 committee determine that the thesis is unacceptable, 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 of the thesis and a schedule of dates for filing the thesis in final form are available from Graduate Studies; the deadlines are also printed in the Class Schedule and Registration Guide issued each quarter. 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 complete the capstone written project report and comprehensive examination during the final quarter of graduate study.

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 an original contribution to the field. The student must have the report read by the Comprehensive Examination Committee that is constituted by the student and approved by the Graduate Adviser; 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; 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; typically the three members of the Comprehensive Examination Committee meet with the student for 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 Adviser 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:

Although work for the Master of Science degree can be completed in three quarters of full-time study, generally at least 12 months of full-time study are required to complete a M.S. Plan II and 18-24 months of full-time study are required to complete the M.S. Plan I.

10) Typical Time Line and Sequence of Events:

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

<table>
<thead>
<tr>
<th>Action Item</th>
<th>M.S. Plan I</th>
<th>M.S. Plan II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a Major Professor</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Select a M.S. Thesis Committee</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Complete Graduate Study List</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Complete Program Checklist</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Complete Graduate Annual Progress Report</td>
<td>3, 6</td>
<td>3</td>
</tr>
<tr>
<td>Complete coursework</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Complete thesis or report</td>
<td>4-6</td>
<td>3-5</td>
</tr>
<tr>
<td>Complete Application for Candidacy</td>
<td>3-5</td>
<td>2-4*</td>
</tr>
</tbody>
</table>

*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 perquisite requirements.
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. Not all fellowship funding decisions are made by either the Graduate Program Committee or Graduate Studies; as examples, graduate students often seek fellowship funding directly from the US Environmental Protection Agency, National Science Foundation, National Institutes of Health, foundations, and a range of other agencies and organizations. Funding decisions related to Graduate Student Researchers are made by the Principal Investigator of the source of funding.

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

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;
- A faculty member in the CEE Graduate Program who is willing to serve as the Major Professor.
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 Adviser.

Select four courses from the following six categories:

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<td>ENG 104</td>
<td>Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td>ENG 105*</td>
<td>Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(* or Chem 110C or Chem 107A or Chem 107B)</td>
<td></td>
</tr>
<tr>
<td>ECI 141</td>
<td>Engineering Hydraulics</td>
<td>3</td>
</tr>
<tr>
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</tr>
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<td>ECI 114</td>
<td>Probabilistic Systems Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>

Including at least two of the following three classes:

- ENG 103
- ENG 104
- ENG 105

In addition to the above courses, students must complete at least an additional 6 upper division engineering course units (minimum of 2 courses) approved by the students Major Professor or Graduate Adviser.

b) **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.

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 (54 units minimum)**

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.

**Environmental Engineering (8-10 units)**

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)

c) 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 (2 units)

**Geotechnical Engineering (11-16 units)**

c) Core Courses (11-12 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 (4 units)
- ECI 282 - Pavement Design and Rehabilitation (4 units)
- ECI 283 - Physico-Chemical Aspects of Soil Behavior (3 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)

d) Elective Courses: Students interested in geotechnical engineering practice are encouraged to take ECI 281B - Advanced Soil Mechanics (4 units)

**Structural Engineering and Structural Mechanics (12-16 units)**

b) 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)
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**Transportation Engineering (21-22 units)**

b) Core Courses (17-18 units): Students pursuing the Transportation Engineering track must complete the following core courses:
- ECI 251 – Transportation Demand Analysis (4 units)
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- 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. (6 units)

**Water Resources Engineering (8 units)**

b) Core Courses (8 units): Students pursuing the Water Resources Engineering track must complete two core courses from the following list:
• ECI 240 - Water Quality (4 units)
• ECI 272A - Advanced Hydrogeology (4 units)
• ECI 276 - Watershed Hydrology (4 units)
• ECI 277A - Computational River Mechanics (4 units)
• ECI 279 - Advanced Mechanics of Fluids (4 units)

**Summary:** A total of 54 units of coursework beyond the baccalaureate degree are required. A minimum of 30 units must be taken at the UC Davis campus. A 1 unit seminar (290) and 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 (taken once). Coursework used to fulfill degree requirements may not be taken S/U unless the course is normally graded S/U. 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. 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:** ECI 390 (Teaching Assistant Training) is required for Teaching Assistants in the Department of Civil and Environmental Engineering, but does not count toward degree requirements. International students may need to take LIN 25 or LIN 26.

5) **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 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 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. Students consult with the 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, 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 Adviser, nominates five individuals to serve on the Qualifying Examination Committee. A five-person committee composed of three or four people knowledgeable in the candidate's major, and one or two persons knowledgeable in the minor(s), 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 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 Adviser and Graduate Studies; petition forms can be obtained from the Graduate Staff Advisor. 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.

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.
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 Adviser, 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 Adviser. 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 Adviser 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. 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.

6) **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 Advisers, composed of a member from each of the five research groups (Environmental, Water Resources, Geotechnical, Structural, and Transportation Engineering), serve as temporary advisers to new graduate students until the selection of a Major Professor and also approve the doctoral Programs of Study. The Graduate Adviser 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.
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 (9\textsuperscript{th} 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 Council website for additional details regarding the Doctoral Qualifying Examination at [http://gradstudies.ucdavis.edu/gradcouncil/policiesall.html](http://gradstudies.ucdavis.edu/gradcouncil/policiesall.html).

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:**

      The Program of Study form serves as the formal written plan of courses to be reviewed and approved by the Graduate Program Committee (GPC). The form is filed twice, once as a preliminary Program of Study, and subsequently as a final Program of Study.

      1. **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. The preliminary Program of Study must be reviewed and approved by the GPC within the first three quarters of entering the Ph.D. program. Early submission will allow Ph.D. students to adjust their Programs before investing time and energy in courses that may not be approved by the GPC. If a student decides to make any changes to the preliminary Program of Study after it has been approved by the GPC, the student must submit a revised preliminary Program of Study for a second review by the GPC. Upon completion of the coursework, and in order to request Graduate Studies’ approval of the Qualifying Examination committee, the student files the final Program of Study, including grades, with the GPC (student must check the “final” box on the form) for review and approval. GPC approval of the final version is a requisite step toward assignment of the Qualifying Examination committee.

The Program of Study can be based on 1 major with 1 minor, or 1 major with 2 minors. In either case, a minimum of 54 units of graded course work
beyond the baccalaureate degree, and exclusive of seminars and research, are required. A minimum of 30 units must be taken at the UC Davis campus. Total program must contain at least 40 units of graduate courses (not including seminars and research units). Programs of Study with one minor must contain at least 30 units in the major (at least 24 units at the graduate level) and at least 15 units in the minor (at least 9 units at the graduate level). Programs of Study with two minors must contain at least 27 units in the major (at least 21 units at the graduate level) and at least 12 units in each minor (at least 9 units in each minor at the graduate level). 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 GPC approval.

It is strongly recommended that students consult with faculty members in the minor areas, as well as their Program of Study Committee and Major Professor, to develop coherent minor(s). Examples of minors include mathematics, numerical analysis, statistics, chemistry, microbiology, and economics.

Acceptable Programs of Study must satisfy the following qualitative criteria:

- **Breadth**: two or three broad fields of study inclusive of a major and one or two minors;
- **Depth**: knowledge of theoretical and practical aspects of the field usually, but not always, satisfied by a minimum of 30 units in the major;
- **Coherence**: the courses in the minors should broaden and complement the stated major. The requirement of coherence expressly precludes taking a large number of single courses in unrelated areas.

Copies of previously approved acceptable programs of study that can be used as guidance can be obtained from the Graduate Staff Adviser.

When submitting the preliminary and final Program of Study for GPC 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;
- One, or more, paragraphs describing how the minor(s) complement the major and meet the criteria of breadth, depth, and coherence.
- 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.

2. **Final Program of Study**
Upon completion of the coursework, and in order to request approval from Graduate Studies of the Qualifying Examination committee, the student files the final Program of Study, including grades, with the GPC for review and approval. GPC approval of the final version is a requisite step toward assignment of the Qualifying Examination committee. Because this involves both GPC and Graduate Studies approval, the student is strongly encouraged to work closely with their Major Professor to determine the proper time for submission of the final version in order to schedule the Qualifying Examination to meet a desired deadline, although it is expected that the final Program of Study be submitted for approval no later than the 5th quarter of entering the PhD program. 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 the GSR Step IV salary rate following the Civil and Environmental Engineering Department’s approved GSR compensation plan.

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). The Qualifying Examination will consist of a written research proposal and an oral examination. Passing this exam makes the student eligible for advancement to candidacy. The QE should normally be taken by the sixth quarter for students who enter with a master’s and no later than the end of the ninth 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. 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 three weeks before the qualifying exam.

   The Prospectus is an independently prepared proposal typically 5-20 pages in length describing the student's dissertation-specific research aims, hypotheses, progress to date, and research approach. 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.

3. Oral Portion 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.

The exam is intended to be a broad examination of topics related to the student’s research. The Qualifying Exam is an oral exam. The exam shall include the following elements:

- A presentation of the above research plan during the oral examination. The purpose of the presentation is to provide a background of the student’s research to the committee members.
- Roughly half of the exam period dedicated to the evaluation of the student’s proposed research, and roughly half of the exam period dedicated to the evaluation of the student’s understanding of academic coursework.

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 examination.

The oral portion of the qualifying exam will be 2-3 hours in length and is intended to demonstrate the student's critical thinking ability, powers of imagination and synthesis, and broad knowledge of the field of study.

The committee will evaluate the student's general qualifications for a respected position as an educator or leader as well as the student's preparation in a special area of study based upon relevant portions of the student's previous academic record, performance on specific parts of the examination, and the student's potential for scholarly research as indicated during the examination.

4. 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”.

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

1. Exit Seminar
The dissertation follows Plan B with a required exit seminar. Satisfaction of this 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. Announcement shall be made at least one week before the seminar.

2. 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 PhD. Dissertation will be prepared, submitted and filed according to regulations instituted by the Office of Graduate Studies http://gradstudies.ucdavis.edu/students/filing.html. Satisfaction of this requirement must be verified by the Dissertation Committee Chair.

3. 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.

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 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:

<table>
<thead>
<tr>
<th>Action Item</th>
<th>Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a Major Professor</td>
<td>1</td>
</tr>
<tr>
<td>Submit Graduate Student Study List</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Select Program of Study Committee</td>
<td>1</td>
</tr>
<tr>
<td>Submit Graduate Student Annual Progress Report</td>
<td>3, 6, 9, 12, 15</td>
</tr>
<tr>
<td>Submit preliminary Program of Study</td>
<td>2</td>
</tr>
<tr>
<td>Establish Dissertation Committee</td>
<td>3</td>
</tr>
<tr>
<td>Submit final Program of Study</td>
<td>6</td>
</tr>
<tr>
<td>Submit Application for Qualifying Exam</td>
<td>6</td>
</tr>
<tr>
<td>Take initial Qualifying Exam</td>
<td>6</td>
</tr>
<tr>
<td>Retake Qualifying Exam (if necessary)</td>
<td>9</td>
</tr>
<tr>
<td>Submit Application for Advancement to Candidacy</td>
<td>6, 9</td>
</tr>
<tr>
<td>File Dissertation and Present Exit Seminar</td>
<td>15</td>
</tr>
</tbody>
</table>

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. Not all fellowship funding decisions are made by either the Graduate Program Committee or Graduate Studies; as examples, graduate students often seek fellowship funding directly from the US Environmental Protection Agency, National Science Foundation, National Institutes of Health, foundations, and a range of other agencies and organizations. Funding decisions related to Graduate Student Researchers are made by the Principal Investigator of the source of funding.

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/](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](http://registrar.ucdavis.edu/local_resources/forms/D065-graduate-major-degree-change.pdf).