

# **Civil Engineering Graduate Student Handbook**

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January 2015

## **Welcome to the Graduate Program in Civil Engineering at UC Irvine**

This handbook is designed to help you navigate your way through your graduate career and provides useful resources. The first year of graduate school can seem very difficult at times, but we have a good track record of graduating highly successful students. Most of these students have found additional resources on campus that have helped them throughout their graduate studies. I will remind you that if you feel stressed, there are free campus resources available to you at the Counseling Center (949) 824-6457. You can access the HSSoE Graduate Student Handbook here: <http://www.eng.uci.edu/files/2014-15%20Student%20Handbook.pdf>

### **Farzin Zareian**

Associate Professor of Civil & Environmental Engineering  
CE Program Graduate Advisor

### **Department of Civil & Environmental Engineering (CEE) Key Personnel and Other Useful Information**

Professor Brett Sanders:	Department Chair (E4150 Engineering Gateway)
Professor Amir AghaKouchak:	Graduate Advisor for CE-Hydrology/Water Resources (544C Eng. Tower)
Professor Jay Jayakrishnan:	Graduate Advisor for CE-Transportation Systems (4055 AIRB)
Professor Farzin Zareian:	CE Program Graduate Advisor and Graduate Advisor for CE-Structures (E4141 Engineering Gateway)
April Heath:	Graduate Coordinator (E4142 Engineering Gateway). She can help you with all graduate paperwork, provide answers on rules and regulations.
E B Trevor:	Employment (E4136 Engineering Gateway). She handles funding for TA, Grader, and GSR appointments.
Lorrie Aguirre:	Department Manager (E4146 Engineering Gateway)

It is essential for you to know your graduate program thrust area. The three CE thrust areas for both MS and PhD are: Hydrology/Water Resources (Advisor: Prof. Amir AghaKouchak), Transportation Systems (Advisor: Prof. Jay Jayakrishnan), and Structures (Advisor: Prof. Farzin Zareian).

Mailboxes for graduate students are located in E4128 Engineering Gateway. Desks are provided by research advisors for full time students conducting research. Computer access is provided in various computer labs across the campus, including the Engineering Hall and the Engineering trailers.

## MS Degree General Requirements:

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1. The Plan of Study for both options must be developed in consultation with the graduate student's Faculty Advisor and approved by the CE Program Graduate Advisor by the end of your first quarter.
2. Discuss with your advisor early on whether the Course Work or the Thesis option best suits your interests. Students in the MS/PhD track may select either approach.
3. Advance to Candidacy **one quarter before graduating** (submit form to April Heath).
4. Complete the course requirements (see below under Option 1 and Option 2).

### Option 1: MS Degree with Thesis (original research with an advisor and a written MS thesis)

- The thesis option requires completion of 48 units of study (a maximum of ten of which can be taken for study in conjunction with the thesis research topic).
- Of the 48 units, a minimum of 28 units must be in nonresearch, graduate-level approved engineering or related courses (numbered 200–289<sup>1</sup>) with at least 16 of 28 units from the CEE Department.
- The remaining units may be earned as graduate-level course work, individual research, or upper-division undergraduate units (maximum ten units).
- The committee must be comprised of 3 members (including your advisor) with at least 2 faculty that hold a primary or joint appointment in the CEE Department.
- For final degree paperwork and instructions on submitting the Thesis please visit:  
<http://www.grad.uci.edu/academics/degree-completion/electronic-submission.html>

### Option 2: MS Degree with Course Work

- The course work option requires completion of 48 units of study, at least 40 of which must be in nonresearch graduate-level approved engineering or related courses (numbered 200–289<sup>1</sup>).
- Of the 40 units, a minimum of 28 units must be from the CEE Department.
- The remaining units may be earned as graduate-level course work, individual research, or upper-division undergraduate units (maximum ten units).
- The Department and SoE will resubmit your Advancement/Conferral form to the Graduate Division at the end of your last quarter.

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<sup>1</sup> Students need to submit a General Petition to count CEE 290, 291 or 298 toward the degree. Please see April Heath for more information.

## PhD Degree General Requirements:

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All CEE faculty will describe their research during Welcome Week, and you will have a chance to meet with the faculty and discuss your interests. All students must take a minimum of 12 units per quarter (Fall, Winter and Spring) to be considered a *full time* student. The following bulletpoints describe the basic information pertaining to our PhD program.

- The detailed program of study for each PhD student is formulated in consultation with a faculty advisor (a.k.a. the research advisor) who takes into consideration the objectives and preparation of the candidate.
- There are no specific course requirements. The School maintains specific guidelines that outline the milestones of a typical doctoral program.
- The PhD Preliminary Exam is the first general exam on your path to a PhD degree (see below).
- The PhD Qualifying Exam is the second general exam on your path to a PhD degree (advancement to candidacy) and is usually completed by the end of year 3 (see below).
- Written dissertation with Oral Defense is the final exam on your path to a PhD degree (see below).

### **Preliminary Exam**

- All PhD students are required to take the Preliminary Exam before the start of the 4<sup>th</sup> quarter of study.
- Passage of the Preliminary Exam is required to remain in good standing and to be eligible for the Qualifying Exam.
- Students must register at least 4 weeks prior to the examination date. You may obtain the Registration form from the Graduate Coordinator (April Heath) or online at: <http://www.eng.uci.edu/node/3085>
- The Preliminary Exam is an oral or written exam where the student will be examined on a specified set of CEE graduate level courses or topics.

### **Qualifying Exam**

- The Qualifying Exam covers dissertation ideas and results of preliminary research.
- The committee must be comprised of 5 members with at least 3 faculty that hold a primary or joint appointment in the CEE Department, and at least 1 faculty member not affiliated with the CEE Department (outside member). Your research advisor will be on your exam committee.
- The Qualifying Exam is taken after passing the Preliminary Exam, no earlier than the end of the 1st year, and no later than the end of the 3rd year in the MS/PhD program.
- A written research proposal must be submitted to the committee members at least one week prior to the exam.
- The exam will take approximately 90 minutes – your research presentation should be 40-50 minutes and reviewed by your advisor before your exam.

- Students must register at least 2 weeks prior to the examination date. You may obtain the Registration form from the Graduate Coordinator (April Heath) or online at: <http://www.eng.uci.edu/node/3085>
- Submit PhD Form I after successful completion of the exam.

### **Oral Defense**

- An oral presentation at the completion of your PhD dissertation is required.
- The committee must be comprised of 3 members with at least 2 faculty that hold a primary or joint appointment in the CEE Department. Your research advisor will be on your exam committee.
- Committee members for the PhD dissertation are invited as well as the entire department faculty and students. Visitors are welcome.
- A 45-minute presentation should summarize your major research findings.
- The oral exam will involve questions from the committee. The committee may request a closed session for their questions.
- It will be best if the written dissertation has been approved by the committee prior to the exam.
- Please check with the Graduate Coordinator (April Heath) prior to your exam to confirm your committee has not changed.
- Submit PhD Form II after successful completion of your exam.

### **Dissertation**

- Copies of past dissertations are available in the UCI library. Format guidelines are available at: <http://www.grad.uci.edu/academics/degree-completion/electronic-submission.html>
- Students must submit one electronic copy and one hard copy to the Department.

### **Advisors**

MS students taking the Course Work option do not need an advisor other than the thrust area graduate advisor (Prof. AghaKouchak for Water Resources, Prof. Jayakrishnan for Transportation Systems, and Prof. Zareian for Structures). MS students selecting the Thesis option should select an advisor as soon as possible. PhD and MS/PhD students should match with a research advisor during the first quarter of study to remain in good standing in the program. A list of CEE faculty can be found at: <http://www.eng.uci.edu/dept/cee/faculty>

### **Means of Support**

- All support is given competitively, and based on continuous good standing.
- Fellowships (usually awarded to new students for recruitment).
- GSR – Research Assistantships, funded from faculty research grants.
- Hours worked are in ADDITION to units earned for research credit.
- All U.S. citizens & Permanent Residents must fill out the FAFSA each year, due June 30, <http://www.fafsa.ed.gov/> in order to be eligible for certain financial awards such as Work Study awards and fellowships.
- Additional funding information can be found at: <http://www.grad.uci.edu/funding/index.html>

### ***What do Teaching Assistants and Graders Do?***

- TAs grade homework and tests, run demonstrations, hold office hours, lead discussions, maintain class websites, maintain records of grades, and run labs.
- Graders grade homework and tests and can also hold office hours.
- Students are selected based on faculty nominations, match with course material, past experience, etc.
- All students who want to be a TA must complete the TA Professional Development Program (training session in early September).
- Additional information on TA Academic Qualifications can be found at: <http://www.ap.uci.edu/ase/definitions.html#TA>

### ***What are the Language requirements for international students who want to serve as a TA?***

- International and U.S. Permanent Resident graduate students who are not citizens of countries where English is either the primary or dominant language, as approved by the UCI Graduate Council, must pass one of the following English Proficiency exams in order to qualify to serve as a TA:
  - A TOEFL iBT score of 26 or higher on the speaking component, **or** a score of 8 in the speaking component of the IELTS.
  - SPEAK: Minimum score of 50 for passing:  
<http://www.humanities.uci.edu/hirc/speak/>
  - TOEP: Minimum score of 5 for passing:  
<http://www.humanities.uci.edu/esl/toep.php>
- Classes offered through ESL can help prepare graduate students for these exams and improve communication skills. Please visit the following link for more information: <http://www.humanities.uci.edu/esl/graduate/index.php>

### ***What grades do I need to have to maintain good standing?***

Students must have a 3.0 GPA minimum with no grades below a B to remain in good standing. MS/PhD and PhD students are generally expected to achieve GPAs greater than 3.5. A “C” grade is considered failing and will not count for any course requirements. Only one grade of B– **in an elective course** can be counted by petition. You need to have a GPA higher than 3.2 for certain types of fellowships, and a GPA higher than 3.1 for any TA position.

**P/NP Grade Option** – no courses graded “Pass” are to be included as part of the advanced degree program, nor are they to be considered as satisfying academic criteria for fellowships and academic appointments/employment.

**Satisfactory/Unsatisfactory (S/U)** - A grade of Satisfactory (S) is equivalent to a grade of B (3.0) or better. No credit is given for a course in which a grade of Unsatisfactory (U) was assigned. You cannot self-elect S/U grading. The S/U grading is assigned by the instructor and may be assigned to all participants in a graduate course. Similarly, with the consent of the academic unit involved, individual study

and research or other individual graduate work may be evaluated by means of the grades Satisfactory or Unsatisfactory.

**NOTE:** When registering, your options listed include "grade" or "P/NP" only. Students taking graduate courses that offer an S/U option, and who wish to elect the S/U option, should select the "grade" option, and then make the necessary arrangements with the instructor. It is at the discretion of each individual faculty member to choose whether to utilize the letter scale (A, B, etc.) or the Satisfactory/Unsatisfactory (S, U) system when assigning grades for research classes.

It is very important that you discuss this option with your instructor. Do not assume the instructor will remember this option at the end of the quarter. Please make arrangements for S/U grading well before grades are to be assigned. Moreover, grading is at the discretion of the adviser, including whether or not to approve your request for S/U grading.

**Course Repetition** - Courses in which a grade below a B, or a grade of U, was received may be repeated only once. Only the most recently earned grades will be used in computing the student's grade point average for the first eight (8) units of repeated graduate course work. Thereafter, both the earlier and later grades are averaged.

## How to Reach the Graduate Advisor

- If your question involves paperwork or other administrative issues, please consult the CEE Graduate Coordinator April Heath (or Nadia Ortiz in the HSSoE's Graduate Student Affairs office).
- The Thrust Area Graduate Advisor (Prof. AghaKouchak for Hydrology/Water Resources, Prof. Jayakrishnan for Transportation Systems, and Prof. Zareian for Structures) handles academic and research matters. The CEE Graduate Coordinator handles administrative issues.
- If you have an academic issue to discuss, contact your Graduate Advisor of your thrust area first via email to describe the issue and arrange for an appointment.

## *What should I do if I want to change my research advisor?*

- Inform the graduate advisor of your thrust area (Prof. AghaKouchak for Hydrology/Water Resources, Prof. Jayakrishnan for Transportation Systems, and Prof. Zareian for Structures).
- Meet with your research advisor – if unable to do so, ask the graduate advisor of your thrust area to speak with your advisor.
- Discuss with other faculty in the department about research projects.
- If you have been fully supported financially by your research advisor on a GSR, you can be required to finish up a project component (requiring no more than one extra quarter), before you can switch advisors.
- PhD and MS/PhD students who want to change their research advisor must find and successfully match with a new advisor at the latest one quarter (Summer quarter not included) after they stop working with their previous advisor, or will no longer remain in good standing in the program.

## *Can I switch to another degree program at UCI if I find my interests are better matched by another degree program?*

Yes, you can apply to other degree programs at UCI. However, if you are accepted and decide to change your degree program, you cannot apply for readmission to the CE program after the start of the next academic quarter in your new degree program. All financial support from the department will be terminated if you change degree programs in midyear.

### **Any Questions?**

#### Graduate Coordinator

Ms. April Heath

[a.heath@uci.edu](mailto:a.heath@uci.edu)

949-824-0584

E4142 Engineering Gateway

#### CE Graduate Advisor

Prof. Farzin Zareian

[zareian@uci.edu](mailto:zareian@uci.edu)

949-824-9866



## **Requirements Specific to Structures Thrust Area:**

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### **Course Selection (Schedule of Classes Online)**

You should become familiar with the online Schedule of Classes at UC Irvine. Each quarter check our department and other related disciplines to see if there are new courses that interest you.

The following CEE core courses are REQUIRED for all MS students. The PhD preliminary exams are based, in part, on material covered in these required core classes.

### **Core Courses Required for all CE-Structures Graduate Students**

CEE 247 Structural Dynamics, Fall

CEE 249 Earthquake Engineering, Winter

CEE 250 Finite Element Method in Structural Engineering, Fall

CEE 258 Earthquake Resistant Structural Design, Spring

CEE 247 Structural Reliability, Fall

CEE 283 Mathematical Methods in Engineering Analysis, Fall

3 units of CEE 295 Structures Seminar (Fall, Winter and Spring) [NOT A CORE COURSE]

### **Elective Courses for CE-Structures Graduate Students**

MS degree students taking the Course Work option are required to take 4 additional graduate courses as electives from the following list:

CEE231 Foundation Engineering

CEE242 Advanced Strength of Materials

CEE243 Mechanics of Composite Materials

CEE245 Experimental Modal Analysis

CEE254 Advanced Reinforced Concrete Behavior and Design

CEE255 Advanced Behavior and Design of Steel Structures

CEE259 Structural StabilityCEE284 Engineering Decision and Risk Analysis

CEE285 Reliability of Engineering Systems I

CEE287 Random Vibrations

MAE241 Dynamics

MAE206 Nonlinear Optimization Methods

MAE270B Linear Systems II

Please DISCUSS WITH AND GET APPROVAL FROM THE THRUST AREA GRADUATE ADVISOR (Prof. Zareian) if you wish to take elective courses that deviate from the official elective course requirements.

Modern research is increasingly multi- and inter-disciplinary. Your effectiveness as a scholar will improve if you are able to conceptualize and integrate principles from other fields into your own research. Examine closely the course offerings in Electrical Engineering and Computer Science, Mechanical and Aerospace Engineering, Statistics, Chemistry, Physics, and Mathematics for

additional electives. You are encouraged to consider elective graduate classes outside the department, particularly if they are relevant to your research interests.

### **The MS PLAN OF STUDY Form**

This form codifies the courses that you plan to take to satisfy the requirements of your degree. You can obtain this form from the Graduate Coordinator (April Heath) or online at: <http://www.eng.uci.edu/node/3085>. Completion of this form is required for ALL MS students by the end of the first quarter. You should submit your completed form to the Graduate Coordinator for approval by the CE Graduate Advisor (Prof. Zareian). You can modify/re-file the form later if your course interests change. It is most important to have the required core courses listed. You can view the tentative Teaching Plan for the entire year at: <http://casa.eng.uci.edu/teaching-plan>

### **CE-Structures PhD Preliminary Exam Additional Information**

1. The preliminary exam is an oral exam that can be taken during any quarter.
2. Students can obtain the Prelim Exam Nomination form from the Graduate Coordinator (April Heath) or online at: <http://www.eng.uci.edu/node/3085>
3. Students need to select three CEE graduate courses and will be tested by three professors who taught/mentored those courses.

### **CE-Structures PhD Qualifying Examination**

The purpose of the qualifying examination is to demonstrate that the student is capable of conducting PhD research and has a viable research plan for the doctoral dissertation. Feedback from the qualifying examination committee is very helpful in developing a viable dissertation topic and appropriate experiments.

The CE-Structures PhD qualifying exam committees follow the rules set by the Graduate Council. The student selects the qualifying exam committee consisting of 5 members. At least 1 member must be from outside the Department, and at least 2 members in addition to the Chair must have a primary or joint appointment in the Department. While your thesis advisor will likely serve as the chair of the examination committee the expectation is that s/he will largely remain silent during the oral exam itself; thereby allowing a full and thorough evaluation of your research dossier by the other committee members. The committee should primarily be composed of faculty familiar with your area of interest, insofar as that is possible. Students can obtain the Qualifying Exam Committee Nomination form from the Graduate Coordinator (April Heath) or online at: <http://www.eng.uci.edu/node/3085>

The PhD Qualifying Examination should be scheduled between the end of the 1<sup>st</sup> year and the end of the 3<sup>rd</sup> year of your PhD studies.

There are two required parts of the qualifying examination:

#### **I. Research Dossier**

The Research Dossier must be reviewed and signed off by your research advisor before it is distributed to the other committee members. The Research Dossier must be distributed to the faculty at least one week prior to the scheduled Oral Presentation. The Dossier should use Times New Roman 11/12 point font or equivalent, and be 1.5 line or double-spaced. A suggested outline follows.

1 page	1) <u>Title Page</u> –	Title, Name of Student, Degree Program, Date, Advisor's Name and Advisor's Signature.
1/2 -1 page	2) <u>Abstract Page</u> –	200 word Summary – include the <u>new</u> information/ <u>new</u> understanding that the dissertation will provide.
1-3 pages	3) <u>Introduction</u> –	Rationale for this research, engineering context, why important, what <u>key</u> questions will be answered.
1 page	4) <u>Specific Aims</u> –	List of the major research accomplishments to be completed during the course of the dissertation research. Typically 3-5 in number.
3-6 pages	5) <u>Background</u> –	Summaries of prior published research key and relevant papers should be discussed to demonstrate a knowledge of the current state of the field.
7-15 pages	6) <u>Preliminary Results</u> –	Summary work to date, including interpretation of data obtained by the PhD candidate. Include figures, graphs, and tables and the development of any models.
5-10 pages	7) <u>Proposed Research</u> –	Thorough exposition of the experiments/modeling/theory/computation the student plans to complete and how these will provide critical information for the dissertation and be an original, significant contribution to the research field.
1 page	8) <u>Timeline</u> –	Provide an estimated timeline of when different experimental tasks will be completed.
1-2 pages	9) <u>Summary</u> –	of fundamental contributions expected from this research.
	10) <u>References</u> –	Authors name, full title of articles, journal name, volume, page, year.

The typical Research Dossier is 25-50 pages, including Figures and Tables. Document length does not necessarily correlate with quality. While it is likely that the research plan will

evolve as the research progresses, the proposed research plan presented in the Qualifying Examination should be comprehensive and commensurate with the general expectations for the PhD. This document will serve as the basis for the PhD dissertation, and will save time later when writing the dissertation.

## **II. Oral Examination (40-50 minutes)**

The oral examination should summarize the written document in a presentation approximately 40-50 minutes in length. The exam will be no longer than 2 hours in length and 2 hours should be scheduled in order to allow adequate time for questions. At this exam, examiners may return the Research Dossier with written suggestions in the text. The purpose of the oral exam is to evaluate the student's understanding of their research area and the proposed research.

## **Requirements Specific to Hydrology/Water Resources Thrust Area:**

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### **CE-Hydrology/Water Resources Courses**

CEE 271 Flow in Unsaturated Porous Media  
CEE 272 Groundwater Hydrology  
CEE 273 Watershed Modeling  
CEE 274 Climate Data Analysis  
CEE 276 Hydrology  
CEE 277 Hydrologic Transport Fundamentals  
CEE 278 Fluid Mechanics of Open Channels  
CEE 279 Hydrologic Computational Modeling  
CEE 283 Mathematical Methods in Engineering Analysis  
CEE 289 Analysis of Hydrologic Systems  
CEE 290 Merging Models and Data  
CEE 291 Hydrologic Remote Sensing  
CEE 295 Seminar in Engineering  
CEE 298 Sustainable Urban Water Systems

Please DISCUSS WITH AND GET APPROVAL FROM THE THRUST AREA GRADUATE ADVISOR (Prof. AghaKouchak) if you wish to take elective courses that deviate from the official elective course requirements.

Modern research is increasingly multi- and inter-disciplinary. Your effectiveness as a scholar will improve if you are able to conceptualize and integrate principles from other fields into your own research. Examine closely the course offerings in Earth System Science, Computer Science, Mechanical and Aerospace Engineering, Statistics, Chemistry, Physics, and Mathematics for additional electives. You are encouraged to consider elective graduate classes outside the department, particularly if they are relevant to your research interests.

### **The MS PLAN OF STUDY Form**

This form codifies the courses that you plan to take to satisfy the requirements of your degree. This form also includes details of the required units for thesis and non-thesis MS tracks. You can obtain this form from the Graduate Coordinator (April Heath) or online at:

<http://www.eng.uci.edu/node/3085>. Completion of this form is required for ALL MS students by the end of the first quarter. You should submit your completed form to the Graduate Coordinator for approval by the CE Graduate Advisor (Prof. AghaKouchak). You can modify/re-file the form later if your course interests change. It is most important to have the required core courses listed.

### **CE-Hydrology/Water Resources PhD Preliminary Exam Information**

1. The preliminary exam is an oral exam that can be scheduled in any quarter.

2. Students can obtain the Prelim Exam Nomination form from the Graduate Coordinator (April Heath) or online at: <http://www.eng.uci.edu/node/3085>
3. Students need to select three CEE graduate courses and will be tested by three professors who taught/mentored those courses.

## **CE- Hydrology/Water Resources PhD Qualifying Examination**

The purpose of the qualifying examination is to demonstrate that the student is capable of conducting PhD research and has a viable research plan for the doctoral dissertation. Feedback from the qualifying examination committee is very helpful in developing a viable dissertation topic and appropriate experiments.

The CE-Hydrology/Water Resources PhD qualifying exam committees follow the rules set by the Graduate Council. The student selects the qualifying exam committee consisting of 5 members. At least 1 member must be from outside the Department, and at least 2 members must have a primary or joint appointment in the Department. While your thesis advisor will likely serve as the chair of the examination committee the expectation is that s/he will let the student answer all questions; thereby allowing a full and thorough evaluation of student's research dossier by the other committee members. The committee should primarily be composed of faculty familiar with your area of interest, insofar as that is possible. Students can obtain the Qualifying Exam Committee Nomination form from the Graduate Coordinator (April Heath) or online at: <http://www.eng.uci.edu/node/3085>.

There are two required parts of the qualifying examination:

### **I. Research Dossier**

The Research Dossier must be reviewed and signed off by your research advisor before it is distributed to the other committee members. The Research Dossier must be distributed to the faculty at least one week prior to the scheduled Oral Presentation. The Dossier should use Times New Roman 11/12 point font or equivalent, and be 1.5 line or double-spaced. A suggested outline follows.

1 page	1) <u>Title Page</u> –	Title, Name of Student, Degree Program, Date, Advisor's Name and Advisor's Signature.
1/2 -1 page	2) <u>Abstract Page</u> –	200 word Summary – include the <u>new</u> information/ <u>new</u> understanding that the dissertation will provide.
1-3 pages	3) <u>Introduction</u> –	Rationale for this research, engineering context, why important, what <u>key</u> questions will be answered.
1 page	4) <u>Specific Aims</u> –	List of the major research accomplishments to be completed during the course of the dissertation research.

3-6 pages	5) <u>Background</u> –	Summaries of prior published research key and relevant papers should be discussed to demonstrate a knowledge of the current state of the field.
7-15 pages	6) <u>Preliminary Results</u> –	Summary work to date, including interpretation of data obtained by the PhD candidate. Include figures, graphs, and tables and the development of any models.
5-10 pages	7) <u>Proposed Research</u> –	Thorough exposition of the experiments/modeling/theory/computation the student plans to complete and how these will provide critical information for the dissertation and be an original, significant contribution to the research field.
1 page	8) <u>Timeline</u> –	Provide an estimated timeline of when different experimental tasks will be completed.
1-2 pages	9) <u>Summary</u> –	of fundamental contributions expected from this research.
	10) <u>References</u> –	Authors name, full title of articles, journal name, volume, page, year.

The typical Research Dossier is 25-50 pages, including Figures and Tables. Document length does not necessarily correlate with quality. While it is likely that the research plan will evolve as the research progresses, the proposed research plan presented in the Qualifying Examination should be comprehensive and commensurate with the general expectations for the PhD. This document will serve as the basis for the PhD dissertation, and will save time later when writing the dissertation.

## **II. Oral Examination (40-50 minutes)**

The oral examination should summarize the written document in a presentation approximately 40-50 minutes in length. The exam will be no longer than 2 hours in length and 2 hours should be scheduled in order to allow adequate time for questions. At this exam, examiners may return the Research Dossier with written suggestions in the text. The purpose of the oral exam is to evaluate the student's understanding of their research area and the proposed research.

## **CE - Transportation Systems Engineering (TSE) Preliminary Exam:**

### **Requirement**

Satisfactory completion prior to the seventh quarter of enrollment of a PhD Preliminary Examination designed to assess mastery of core competencies is required. The examination assesses the student's mastery of subject matter and understanding of their inter-relationships.

In order to take the PhD Preliminary Examination the student must have first successfully completed the below-specified GPA requirements in six (6) courses: CEE220A Transportation Demand Analysis, CEE221A Transportation Systems Analysis, CEE224A Transportation Data Analysis, CEE228A Transportation Network Analysis, CEE283 Mathematical methods in Engineering Analysis, and one of either CEE 226A or CEE 229A. The faculty reserves the right replace any of these courses prior to the quarter when they are normally scheduled and inform the PhD students of the replacement course.

A combined GPA of 3.7 or greater with no grade less than B is required in the 6 core courses, for the student to be eligible for the PhD Preliminary Examination. The cases of exception are:

- Students are allowed to substitute a course in the list with an advanced course on the same topic, subject to approval of the TSE graduate advisor before the start of such a course.
- Students who had taken a course in the list at UCI before they had entered the PhD program are allowed to either use the grade in the course, or enroll for a special studies course administered by the faculty in charge of that particular course in the year preceding the preliminary examination, and report the grade, provided the faculty has conducted an examination for the special studies course.

The students shall submit the transcript with the grades along with the list of courses approved by the TSE graduate advisor to the CEE department graduate coordinator, who needs to approve the eligibility at least a week prior to the preliminary examination. Not satisfying the GPA requirement is normally grounds for dismissal from the program.

The students will be informed of the results of the preliminary examination in the form of a PASS or FAIL within one week from the submission deadline of Part (II) below. The students are allowed to attempt the examination twice, and a FAIL in the second examination results in automatic dismissal from the program.

### **Format of the PhD Preliminary Examination**

The PhD Preliminary Examination has two parts – Part (I) a written examination to test core topics proficiency and Part (II) a written examination to test the ability to develop a research proposal. A pass in each of the 4 areas of Part (I) as well as a pass in Part (II) is required for a student to pass the examination.

#### **Part (I) Written examination on core topics proficiency**

The written examination is for demonstration of competency in **each** of the following areas:

- a) traffic engineering, traffic flow theory, operations and control
- b) travel demand, transport economics, transportation planning



- c) transportation systems analysis, networks
- d) mathematics and statistics

For each area, 18 questions will be asked, of which 15 should be selected by each student (with the other 3 crossed out). Out of 15 points, a minimum of 9 points (60%) is required for a pass in each area.

Each area will be allotted 90 minutes in the examination. The questions are expected to be of the kind that does not require any subjective grading by the faculty.

### **Part (II) Written demonstration of ability to develop research proposal**

The format of the second part is as below.

**Main Task:** Each student will develop and submit a research proposal related to the issue described to them. The proposal is not for the student's own PhD research later. It is rather a proposal that demonstrates the student's ability to develop one. For each examination cycle, all students may be given the same issue on which to develop their proposal.

**The Issue:** The students will be given a description of the issue/ topic/ problem on which a proposal is to be made. The selected issue will be different in each examination cycle, but will be sufficiently broad and general to be appropriate for students of varying backgrounds and interests to be able to take to the directions they would like to take it to.

**General Guidelines:** The proposal needs to show the student's originality, creativity, and ability to think of solution schemes (algorithmic, computational, etc.). The student may feel free to include in the research plan any topic/scheme of relevance that can be used to tackle the specified problem issue or any component of it. The focus can be in some aspects of the given issue, and does not need to be in solving every item of concern therein. This implies that the student may focus on certain aspects of the issue that their own backgrounds and interests may dictate. The budget for the research is not a concern, but the student is not expected to propose plans that would be considered absolutely impractical financially.

#### **Specific Guidelines:**

- 1) Originality and creativity are the most important qualities expected in the proposal.
- 2) The proposal should be of a maximum length of 10 pages (double-spaced) in 12 points Times New Roman font. The proposal can be as short as the student wants, as long as it clearly shows the student's creativity and ability to tackle the research process. It should be made as concise as possible, avoiding unnecessary writing.
- 3) The proposal should include an "Analysis Methodology" section. Complete mathematical formulations would be welcome, but are not necessary and may not be easy to put together quickly. Some plans should, however, be laid out for analytical work. If it is based on "quasi-analytical models/tools" such as simulation, computational schemes, it should be pointed out how those schemes/tools would fit within a conceptual analysis framework. Abstract notations and figures are acceptable to explain the methodology.
- 4) A long literature review connected to the issue is neither expected nor desired, but any important past research related to the proposed ideas should be referred to, to demonstrate the ability to find important literature.

- 5) The student shall not consult with anyone but is free to access any material online or in printed form. There should be absolutely no plagiarism in the proposal, as that will be grounds for failure. The student shall not cut and paste any published material into the document, unless appropriate reference is given with quotes. The proposal is to be written in the student's own words.
- 6) No name or other identifying material should be in the submitted document, as the evaluation will be based on blind-reviews by the faculty. A person will be specified for the students to submit the material to, by email by a given deadline, typically within no longer than 2 days after the topic is given.