

## **Preliminary Examination Guidelines Environmental Engineering**

The Preliminary Examination is an important milestone for the PhD program and will be administered in November and May of each academic year. Students must register for the Preliminary Examination by completing and submitting the required form attached at the end of this document to the graduate coordinator (April Heath) at least 5 weeks prior to the examination date.

### **Purpose:**

The Preliminary Examination establishes whether the Ph.D. Candidate understands sufficiently well (1) the major elements of Environmental Engineering (Water Quality and Treatment, Water Resources, or Air Quality and Energy), and (2) important fundamental material and concepts necessary to conduct scholarly research in Environmental Engineering. In addition, the candidate must show the ability to synthesize different elements of knowledge to solve open-ended problems and exhibit a capability for sound scientific scrutiny and judgment. The Preliminary Examination cannot be taken before the student has clearly established a mutual agreement with a research advisor for the candidate's doctoral work and the candidate has demonstrated proficiency in oral English (required for students who are not native English speakers).

### **Format:**

The Preliminary Examination has two parts. Part I is a 90-minute comprehensive written (45-minutes) and oral (45-minutes) examination that addresses the major elements of Environmental Engineering: Water Quality and Treatment, Water Resources, or Air Quality and Energy. Part II is a 60-minute oral examination that addresses the critical review of an archival publication provided to the student three weeks before the examination.

### **Registration:**

The student, together with the research advisor, must petition to the Director of the Environmental Engineering Program for the Preliminary Examination at least five weeks prior to the start of the Examination period. Students who are not native English speakers must meet the requirements for "Demonstration of Oral English Proficiency for Teaching Assistant Employment" as described in the UCI catalogue before petitioning for the Preliminary Examination. Petition forms are available at the end of this document.

### **Examination Committee:**

The Environmental Engineering Program Director appoints the Examination Committee, comprised of three core examiners and one backup examiner, including the Committee chair, for a term of one academic year. Of the three core examiners, one examiner will be appointed for each of the three major elements of Environmental Engineering: Water Quality and Treatment, Water Resources, or Air Quality and Energy. The faculty advisor of the candidate shall **not** be present at the examination.

### **Grading:**

Each part of the exam will receive a separate "**pass**" or "**not pass**" grade from Examination Committee. Any portion not passed in the first taking must be retaken. If any portion is failed twice, the student has failed the Preliminary Examination and may not continue for the Ph.D. degree. To pass the preliminary examination, the student must have the unanimous passing vote of the Examination Committee.

**Dates:**

The Preliminary Examination is offered in November and May each year. For those that do not pass one or both parts of the examination, the examination can be taken the second time within one year period.

## **Part I: Comprehensive Examination**

### **OBJECTIVE:**

To test the ability of the candidate to understand and relate the fundamental scientific and engineering concepts and issues associated with Water Quality and Treatment, Water Resources, or Air Quality and Energy.

### **FORMAT:**

**Duration:** 90 minutes encompassing a 45-minute written examination followed by 45-minute oral examination

**Number of examiners:** A total of three, not including the faculty advisor, and representing each of the three major elements of Environmental Engineering: Water Quality and Treatment, Water Resources, or Air Quality and Energy.

### **GUIDELINES FOR EXAMINERS AND STUDENTS:**

For the written portion of the Part I examination, the student should be prepared to provide detailed written answers to questions posed in the three major elements of Environmental Engineering. For the oral portion of the Part I examination, the candidate should be prepared to stand before the examination committee and use as needed a write board to answer the questions posed by members of the committee. The candidate will be evaluated on: effective communication, ability to think critically “on the spot”, and overall problem solving skills. The candidate is expected to understand the derivations and assumptions of all the fundamental science and engineering associated with the three areas, with particular competency in the area of specialization. **The textbook “Environmental Engineering Science” by Nazaroff, William W., Alvarez-Cohen, Lisa, ISBN-13: 9780471144946 can be used as a reference book for guidance.**

**Evaluation:** The candidate passes Part I of the Preliminary Exam by a unanimous vote of the Examination Committee.

## **Part II: Publication Review**

### **OBJECTIVE:**

To test the ability of the candidate to critically understand and analyze a major scholarly publication in Environmental Engineering.

### **FORMAT:**

**Duration:** 60 minute oral exam

**Number of examiners:** A total of three, not including the faculty advisor, and representing each of the three major elements of Environmental Engineering: Water Quality and Treatment, Water Resources, or Air Quality and Energy.

### **GUIDELINES FOR EXAMINERS AND STUDENTS:**

The faculty advisor, in consultation with the examiners, will provide an archival journal publication to the student at least three weeks prior to the examination. The publication should be carefully selected to meet the objective stated above. It should have at least 25 formal citations in the archival literature and is less than 5 years old at the time examination. Exception to the citations number can be made to a recent publication of 1-2 year old. In addition, none of the authors of the publication should be current or former members of the candidate's research group. The student is required to begin the examination with a short presentation, using up to 15 slides to present his /her understanding of the selected paper. The majority of the exam time will be spent in an interactive mode with the examiners.

The candidate should describe the research objective, why it is important, why it is novel with respect to previous research, the precise formulation of the problem being addressed, the solution approach, the results, and the conclusions. The student should **critically** evaluate the research and suggest possible improvements and extensions of the work. The performance will be evaluated on the ability to understand, synthesize and integrate the ideas of the publication. In addition, the candidate will be evaluated on: effective communication, ability to think critically "on the spot", and overall problem solving skills. The candidate is expected to understand the derivations and assumptions of all the fundamental science and engineering supporting the publication and in addition to have some familiarity with the key references associated with the publication.

**Evaluation:** The candidate passes Part II of the Preliminary Exam by unanimous vote of the Examination Committee.

**Ph.D. Preliminary Examination Registration Form**  
**Environmental Engineering**  
The Henry Samueli School of Engineering  
University of California, Irvine

Submit this form to April Heath at least 5 weeks prior to the examination date.

To be Filled by the Student

Last name:	First name:	Faculty Advisor:
Address:		
Home phone:	Office phone:	Email:
Overall GPA (attach transcript):	GPA in non-research courses:	
<i>For non-native English speakers (Foreign students only):</i> Have you met the requirements for “Demonstration of Oral English Proficiency for Teaching Assistant Employment” as described in the UCI catalogue? <input type="checkbox"/> Yes <input type="checkbox"/> No N/A If yes, please explain how and if applicable, please provide the date you passed the UCI TA language exam.		

To be Filled by the Advisor

In your opinion, is the student’s breath of knowledge and command of oral English sufficient to undergo the Preliminary Examination? <input type="checkbox"/> Yes <input type="checkbox"/> No
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Signature of the Candidate \_\_\_\_\_ Date: \_\_\_\_\_

Faculty Advisor Signature \_\_\_\_\_ Date: \_\_\_\_\_