

**ENVIRONMENTAL ENGINEERING AND SCIENCE PROGRAM
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

DESCRIPTION OF QUALIFYING EXAMINATION

A qualifying examination is required of all students interested in pursuing a PhD in the Environmental Engineering and Science (EES) Program. This exam serves as a screening device for selecting qualified students. Just as importantly, the examination permits early identification of deficiencies of otherwise qualified candidates so that remedial action can be taken.

Students who wish to pursue a doctoral degree should demonstrate the ability to think critically and communicate within a scientific field. Skills tested throughout this exam include: demonstrating facility with a core body of knowledge including and beyond the student's research; communicating technical concepts orally and in writing; synthesizing literature; and identifying and pursuing promising research questions. The examination consists of two parts: a take home written exam, and an oral examination.

Eligibility Requirements for the Qualifying Examination:

The student must have passed a sufficient number of courses to form the foundation of their PhD program. Much of the qualifying examination will cover the knowledge gained in these courses or equivalent. This coursework foundation consists of three or more core courses chosen from the list below, or the equivalent. The student should **discuss core course selection with the faculty advisor, who must approve three courses to be tested** and indicated on the examination application form (see attachment). The advisor's signature on the application form indicates a willingness to serve as the doctoral advisor in addition to chairing the examination committee.

1. CEE 442: Physical Principles
2. CEE 443: Chemical Principles
3. CEE 444: Biological Principles
4. CEE 441: Air Pollution Sources Transport and Control
5. CEE 447: Atmospheric chemistry
6. CEE 545: Aerosol Sampling and Analysis
7. CEE 492: Data Science or CEE498MLC Machine Learning
8. CEE 493: Sustainable Design Engr Tech
9. CEE 592: Sustainable Urban Systems
10. CEE 435: Public Health Engineering
11. CEE 544: Advanced Surface Science

When Can the Examination Be Taken?

The Qualifying Examination should be taken upon completion of the appropriate core and specialty courses *before the completion of 40 credit hours* of post-bachelor's courses. Students who transfer into the environmental engineering program with a master's degree should take the qualifying examination *before completion of one year* in the program, and are required to take it no later than the beginning of their fourth semester in the program. The examination will be offered one to two weeks prior to the beginning of courses in the fall and spring semester.

Applying for the Examination

It is the student's responsibility, in consultation with the research advisor, to apply for the examination at the appropriate time. The current schedule is available in the EES Office 3230. Prior to the examination, the

student must select a minimum of three faculty members to serve on the qualification exam committee. The recommendations should be made with care, in consultation with the student's advisor and the faculty members being nominated. The student needs to meet with the committee in advance to agree on the materials and knowledge required for the examination. The faculty members selected should have areas of interest relevant to the student's specialty. As a general rule, the student's advisor will serve as the chair of the committee and should be a member of the EES faculty. Additional committee members who are qualified professionals in the student's field may be selected from outside the EES faculty, with the approval of the advisor.

The student is responsible for completing the examination application form (see attachment) by obtaining endorsement signatures from each committee member. *The completed form must be submitted to the Office Manager in Room 3230 NCEL at least 45 days before the first day of the qualifying written exam.* The Office Manager is responsible for confirming faculty participation at least 30 days before the qualifying exam begins.

Qualifying Examination Content and Structure

The qualifying examination consists of two parts:

Take Home Written Exam: The objective of this part is to determine the student's command of environmental engineering fundamentals and their application, competence to undertake original research, and to identify strengths and weaknesses in their research area. The student has a *72-hour period* agreed upon by the student and the committee for the take home portion of the examination. The specific structure of the exam will be decided by the student, advisor and committee. There are three steps of this take home exam:

Step 1: The committee provides the student with written questions (and papers if applicable) at the start of the take home exam. These questions could be based on the classes listed above. The questions could also be based on two peer-reviewed articles assigned to the students.

Step 2: The student prepares and submits a response to the questions as a written document. The committee will grade the response no later than one week after the student submits the response.

Step 3: The student should prepare to discuss the response with the committee during the oral exam (see below). Other topics related to the student's coursework or research may also be discussed during the oral exam at the committee's discretion.

Oral Exam: The objective of this portion is to evaluate the candidate further based on the results of the written examination in an oral session. The student may be asked to summarize the main points of the written essay. The committee may ask open-ended questions to probe the student's depth of knowledge, including:

- Further details of or expansion on the student's response in the take home exam.
- Exploration of and expansion on the engineering principles, particularly those relevant to the written exam.
- Discussion of gaps remaining in scientific understanding.
- Requests for the student to describe experiments or investigations that would resolve one or more of the gaps.
- Discussion of engineering principles not directly relevant to the written exam material, with the distinction that while students should demonstrate an awareness of such principles and their implementation, they are not expected to have a full command of using them during the oral exam.

The oral examination should be administered in a timely manner (suggested within 14 days) after the written portion. However, coordinating the committee schedules can be a challenge. **Advise the Office Manger when the oral exam is to take place.** The student is responsible for scheduling the oral exam and for scheduling a room where it can be held.

Results of Examination and Notification

The following outcomes are possible:

Pass. The student is admitted to the PhD program and is allowed to pursue his/her doctoral studies.

Provisional Pass. If a student demonstrates that they would benefit from improvements in one or more area(s), additional course work or other kinds of work may be required. An oral and/or written examination may be given over this subject area, administered by an appropriate faculty member(s) to test a student's competency in the area(s). Upon satisfactory completion of that examination, the student is admitted to the PhD program.

Fail. The student is denied admission to the PhD program. If a student fails the examination, the environmental engineering and science faculty of the Department of Civil and Environmental Engineering may, at their collective discretion, review the case individually to determine whether a student will be allowed to take the examination again.

After private discussion among the committee members immediately following the oral portion of the examination, the student will be notified of the outcome. The committee chair is responsible for communicating the results of the oral exam to the EES faculty.

Preparing for the Qualifying Exam

Because the qualifying exam has some open-ended components, students often wonder how to prepare for this important step in their doctoral process. Below are some suggestions of some studying mechanisms that students may find helpful.

- Review core and specialty course materials. Ensure that you have sufficient command of the knowledge and content to quickly identify and re-master principles that are relevant to a research question.
- Study in groups and create questions for each other to answer based on course material. Try to challenge each other with your questions and discussions.
- Practice reading and critiquing journal papers in research group meetings or in student-led groups.
- Remind yourself of the qualities of a well-written critique. You may wish to review the criteria used for the writing portion of the GRE:
<https://www.ets.org/gre/test-takers/general-test/prepare/content/analytical-writing/scoring.html>
- Visit UIUC Writer's Workshop to obtain tips for improving your writing.
- Seek opportunities for answering technical questions in front of a group and while writing on a chalkboard or white board.

QUALIFYING EXAMINATION APPLICATION

Environmental Engineering and Science in Civil Engineering

**This form must be submitted to the Program Coordinator in Room 3230 NCEL
at least 45 days before beginning the qualifying exam.**

Student's Name and UIN: _____ Application Date: _____

Telephone: _____ E-mail Address: _____

Specialty Area: _____

Proposed Doctoral Advisor: _____

The undersigned agrees to serve as the Advisor for this student and approves the core exam composition and specialty committee below:

Advisors Signature

Provide the list of three courses that will be included in the core exam:

Proposed Faculty for Specialty Committee:

1) _____

3) _____

Signature

Signature

2) _____

4) _____

Signature

Signature

QUALIFYING EXAMINATION RESULTS
Environmental Engineering and Science in Civil Engineering

Student Name and UIN: _____

Exam Results: _____
(date)

<i>Comments and Recommendations:</i>

_____ Pass

_____ Provisional Pass

_____ Fail

Faculty Advisor Signature

Date signed

Upon completion of exam, please return this form to the EES Office Manager after the faculty advisor has signed. The original will be forwarded to the departmental graduate records office with a copy to "Completed Exam" file.

Original sent to Departmental Records Office