

ENV Qualifying Exam Advice

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Foreword

The following qualifying exam advice was compiled by ENV students for the benefit of their peers. The content contained within does not represent any particular person's views but attempts to represent a breadth of opinions and advice from PhD students who have taken the qualifying exam. This compilation has been reviewed and approved of by the ENV faculty.

Overview of the Qualifying Exam

Purpose of the Qual

The Berkeley Graduate Division [Degrees Policies](#) states that the qualifying exam ("qual") intends to "ascertain the breadth of a student's comprehension in at least three subject areas related to the major field of study, and to determine whether the student has the ability to think incisively and critically about the theoretical and practical aspects of these areas." An exam committee consisting of senate faculty evaluates (1) your knowledge in fundamental subject areas, (2) the clarity of your research questions, and (3) the feasibility of your research goals. The committee does not expect you to be the master of the field. Rather, the committee seeks to assess your ability to explain your ideas clearly, engage with your science critically, and execute your research plans thoroughly.

Composition of the Exam Committee

The UC Berkeley Environmental Engineering [Graduate Requirements page](#) states that the qual is an oral exam given by a committee of four faculty members (not including your research advisor) approved by the Graduate Division. The committee must include at least two senate faculty members from Environmental Engineering and at least one senate faculty from outside of Environmental Engineering.

Scheduling the Qual

The ENV group expects students to take the exam near the end of the student's third year of graduate study (i.e., two years after your MS year). However, the timing of the qual varies based on the student. Consult with your research advisor about when you should take your qual. You should feel prepared to spend a couple months under greater work pressure than normal; consider carefully other work and personal responsibilities you may have during a proposed qual preparation period.

Exam Outcomes

The qual committee delivers one of three verdicts: pass, fail, or partial fail. A partial failure indicates the student passed some topics but failed others, and a second and final examination is therefore required. Similarly, a failure indicates the student must take a second and final examination. The second exam must be scheduled no earlier than three months after the first examination. See the [Degrees Policies](#) for more information on these three possible outcomes.

Components of the Qualifying Exam

The qual consists of two primary elements: (1) preparation of a prospectus of proposed research, and (2) a three-hour oral exam.

Prospectus

The prospectus details the motivation, objectives, preliminary results, and remaining work for your proposed dissertation research. It should be ~10 pages long and be provided to the committee at least one week before your exam.

Oral Exam

The oral exam includes a 15-20 minute summary presentation of the prospectus followed by ~30 minutes of questions per committee members. Similar to the preliminary exam, the qualifying exam will evaluate the student's ability to work effectively in an oral exam setting, including working at the board and communicating clearly, and development of clear, defined, and feasible proposed dissertation work.

Qual Agenda

The general agenda for an exam is:

- **Room and Technology Set-up** (15-30 minutes)
- **Beginning of Exam** (~5 minutes)
 - The committee asks you to leave the room so they can discuss your academic record and review materials.
 - You may be asked to summarize your “graduate story” (i.e. long-term career goals).
 - After the exam begins, your advisor becomes a silent observer, meaning they do not ask questions or partake in discussion.
- **Presentation** (15-20 minutes)
- **Q&A / Discussion** (80-120 minutes)
 - You tell them your preferred faculty member order for Q&A.
 - Each committee member is allotted 20-30 minutes of questioning.
 - Committee members may jump in to ask additional questions or respond directly to other committee members at any point.
 - Your Chair will typically ask if you want a break after the 2nd or 3rd committee member finishes their 30-minute questioning period. If your Chair does not initiate, you may request a short break.
- **Conclusion of Exam** (5-10 minutes)
 - You are asked to leave the room while the committee deliberates and decides a verdict.
 - You’re done!

General Timeline for the Qualifying Exam Period

Here is a (somewhat) chronological list of things to do for the qual. Within this list are links that you can click, which will bring you farther into the document to particular pieces of advice.

Beginning Logistics	Preparation for the Exam	Qual Time!
Step 1.	<p>Set up a 1-on-1 meeting with your adviser. (>3 months before your exam) Tell them your ideas for your prospectus, proposed dissertation, and general time you'd like to take the qual. Propose faculty you want on your committee, and ask what faculty your advisor recommends for your committee. <i>Remember: you need at least one faculty member outside of the CEE department to serve on your committee, and this is typically a faculty member with whom you have taken a class that constitutes part of one of your minors. You will also need one outside member to serve on your dissertation committee.</i></p>	
Step 2.	<p>Decide on your committee chair. (Before Step 3) Ask one of your committee members to chair your exam. This title doesn't mean much besides that they will pick up your file from the CEE main office, bring it to your exam, and facilitate general discussion. It might make most sense to have your chair be one of your three committee members who eventually will read and sign your dissertation.</p>	
Step 3.	<p>Ask faculty if they will serve on your committee (>3 months before). Ask your chosen four professors if they will serve on your committee. It can help to explain specifically why you are asking them to serve on your committee (e.g., "I took your class and think your expertise complements my other three proposed committee members"). Some students ask in person, some ask via email.</p>	
Step 4.	<p>Schedule your exam date and time. (>3 months before) Find a full month of time for which you'd like to take the qual. First, ask all committee members for dates they will be out of town or unavailable, and also for any recurring conflicts (e.g., classes, seminars, personal events). You may ask over email, or at an in-person meeting with them. Second, send out a When2Meet or WhenIsGood poll to your advisor and the four committee members, pre-blocking off your and your committee members' unavailable times. Third, select a three-hour block of time to hold your qual. Many students would recommend you hold it in the morning (i.e., 9-12) when you and the faculty members are fresh. Finally, email your advisor and four committee members your selected date and time.</p>	

<p>Step 5.</p>	<p>Submit TWO forms AT LEAST ONE MONTH before your exam date: (A) Application to take the Qual, and (B) Program of Study.</p> <p><i>TIP: begin working on these EARLIER than one month before your exam date, because it can take weeks to track down signatures.</i></p> <p>HEADS UP: want to include non-Senate Faculty? If any committee members are non-senate faculty, the process can take 2+ weeks longer than normal. Senate faculty are Professor, Associate Professor, or Assistant Professor. If they are not Senate faculty, you will need to send Shelley the non-senate faculty's CV and their position, which Shelley will submit to Graduate Degrees for approval <u>prior</u> to submitting the online the application. Graduate Degrees will add that person's name to the list of faculty for you to select in your "Higher Degrees Committee Form", and you will need to check the boxes and upload the CV on the non-senate portion of the form. Otherwise, the appointed committee will not be complete and will render the exam invalid. Confused about this section? Talk to Shelley, and do so early! She will help determine if the faculty are in their online database and help you complete this process.</p> <p>(A) Online Form: Apply to your qual by logging into your personal CalCentral webpage. On the "My Dashboard" page, click the "Higher Degrees Committee Form". Then choose "Qualifying Examination" from the dropdown menu. For "Committee Type", click the magnifying glass and choose "Doctoral". Complete the remainder of the application.</p> <p>(B) Printed Form: You also will need to fill out the Program of Study for PhD that details your classes, major field of study, and two minors. You will need to print out the form and obtain signatures from senate faculty members who represent (1) your research advisor, (2) representatives for your two chosen minors (anyone who taught one of the minor courses), and (3) your academic advisor (discuss with AAO or your advisor as to who this would be). Submit the printed form to the AAO in the CEE main office.</p>
<p>Step 6.</p>	<p>Reserve a room. (>2 months before) Email support-ce@berkeley.edu to schedule a room for your qual ASAP. Below is a list of possible conference rooms. Make sure it has a large chalkboard or whiteboard. Depending on your professor, you may also be able to book a room in Sutardja Dai by contacting rooms@citris-uc.org. Schedule the room for four hours; a half hour before and after your actual qual time to give yourself time to set up and clean up the room.</p>
<p>Step 7.</p>	<p>Email Shelley (Academic Affairs Officer). (>1 months before) Once your qual date/time is scheduled and you have a committee chair, email Shelley</p>

	(okimoto@berkeley.edu) and CC your committee chair.
Step 8.	Write your prospectus. (start ~2-4 months before) Write your prospectus <u>early</u> so that you can send it to your adviser, lab mates, and other students who attend your practices. Advisers are totally welcome to help with all stages of your qual preparation, but some advisers are more involved with prospectus writing than others. Don't start with your presentation until your prospectus is finished, because your prospectus may undergo many iterations before it is finalized. See tips for writing your prospectus below in this guide.
Step 9.	Create your presentation. (Before your first qual practice) Once your prospectus is finalized, begin creating your presentation. Here are suggestions for how to create your presentation .
Step 10.	Set up practice presentations and board work sessions. (>1 month before) Schedule 2-4 qual exam practices with lab mates and peers, and get as many people involved as possible. The first practice is often shorter and focuses on receiving feedback on the content and style of your presentation. These practices will guide what and how you study . Below are general study tips , resources , and general advice for presenting and answering questions , as well as a mini-guide to your practice quals .
Step 11.	Study, study, study--but also take breaks and SLEEP! Again, below are general study tips and resources . Get a lot of SLEEP : students trying to learn a lot of new material perform best with 8-9 hours of sleep during active study periods.
Step 12.	(OPTIONAL) Meet with your committee members. Schedule 1-on-1 meetings with your committee members. Email a draft of your prospectus beforehand and bring a hard copy to your meeting. Explain your research project so that they can ask clarifying questions. They may ask what you think your 3-4 journal articles will be. Ask them how you can best prepare for the exam. In many cases, they may tell you the subject areas you should study and even give you very specific example questions. Some faculty may decline to meet with you, and that is OK.
Step 13.	Email out final prospectus to your committee. Email the committee >1 week before the exam, and also the day immediately before your exam. Send your final prospectus and remind them of the day/time and room of the qual. Also remind your chair they are chairing your exam!
Step 15.	Center yourself on the exam day. Confidence is very important to your exam! You know yourself best -- determine a routine before your exam that will help you feel centered and ready. Below is a list of day-of tips .

Step 16.	Take notes post-qual and debrief with your advisor. Although you probably won't feel like it, write down questions that were asked and general notes from your exam. You may want to hold a meeting with your advisor after, too, to debrief on how it all went. Your committee members may have raised some interesting or challenging ideas that could be integrated into your remaining research.
Step 17.	Submit the Application for Advancement to Doctoral Candidacy. After you see on CalCentral that the report of your Qualifying Exam has been recorded, log into your personal CalCentral webpage . On the "My Dashboard" page, click the "Higher Degrees Committee Form". Then choose "Advancement to Candidacy" from the dropdown menu. For "Committee Type", click the magnifying glass and choose "Doctoral". Complete the remainder of the application. FEE: You will need to pay a ~\$90 fee. If you are on tenure for the NSF fellowship, then the NSF will pay for it; if you are on NSF reserve, you likely will need to pay for it.

Exam Logistics

Conference Rooms

- McLaughlin CR- 217
- Davis CR- 305
- Davis CR- 539
- Davis CR- 542
- Davis CR- 615 (common testing room, good sized chalkboard)
- Davis CR- 745 (common room, recommended)
- Davis CR- 786 - Carlson Room (would not recommend; small chalkboard)

Resources

- You can borrow [presentation kits](#) from the Engineering Library front desk. These kits include adapters and a laser pointer/clicker.
- You can book a [study room](#) in the Engineering Library to practice your presentation on your own. These rooms have whiteboards and dry-erase markers for you to practice boardwork.

Preparing for Your Exam

Writing your Prospectus

- Begin writing your prospectus ASAP. Students start anywhere 2-4 months before their exam date. Writing the prospectus will identify knowledge gaps you have and will guide much of your studying. In turn, information gained from studying will help develop your prospectus.
- The prospectus should be ~10 pages long, including an Introduction/Motivation, Objectives, and sections breaking down the preliminary results and remaining work for each of your objectives and sub-objectives.
- Request edits and feedback from many different people inside and outside of your lab.
- Review example prospectuses on the the Peer Resources sub-page of the ENV website and ask older/former members of lab to share theirs too.
- Send at least one draft of your prospectus to your advisor for review before finalizing it. Iterate until they approve of your prospectus.

Studying

This exam, as stated above, focuses on your understanding of scientific fundamentals related to your specific research project. It also assesses your communication skills (written + blackboard + oral), reasoning skills, confidence, and ability to think and work in a dynamic academic environment. Here are a few ideas for how to guide your studying to focus on these various areas.

- Start studying at least two months before your qual date (varies by person).
- Pinpoint topics related to your research. Class notes are all-encompassing and you don't need to study ALL related course material in order to be prepared to answer questions related to your research
- Prepare for experimental design questions, including set-up and statistical analyses. Understand how the methods you are proposing work.
 - How would you set up an experiment, collect the data, and assess?
 - How would you set up a model, test it, run it, and analyze output?
- Consider explaining your research (methodologies and concepts) to someone unfamiliar with your work, because they people may ask very fundamental questions you are unused to answering day-to-day. It can help you see the bigger picture of your work from different angles.
- Read or reread many research articles relevant to your own research (at least 10). Also, you should identify relevant literature in the fields for your committee member(s) from outside the department to study.
 - Writing short summaries in a literature review file (which can go into your prospectus). Better yet, write out a good draft of the intro chapter of your dissertation! You will be happy you did this later.
 - Another potentially helpful way to refresh the content of dozens of papers is to write down their primary methods and conclusions on index cards, and review those cards a few days before the exam.

Creating Your Presentation

- *General style.* Although you want your presentation to be attractive, cohesive, and informative, focus more on studying your research and less on making perfect figures in the presentation.
- *Slide Numbers.* Add larger, bold slide numbers so that individual slides are easier to reference during Q&A.
- *Progress Bar.* Add a progress bar to your slides so that the audience will know what section of your presentation you are on.
- *Research Questions.* Make your research question(s) very clear near the beginning of your presentation before you get into the details of your objectives.
- *Hypotheses.* Write your hypotheses out on your slides with your objectives. Not every project is very conducive to traditional hypotheses -- talk with your advisor about this.

- *Graphs.* Whenever you have a graph, make sure all axes are clearly labeled (large font) and that you verbally explain the axes and what the data is showing when you present.
- *Appendix.* Don't rely too heavily on your appendices for Q&A, as you may not reference back to your presentation slides during Q&A. However, it's recommended to include complicated graphs in your appendices that would be difficult to recreate on the chalk/whiteboard by hand.

Presenting and Answering Questions

- Although we refer to post-presentation as "Q&A", it's helpful to instead consider it a dialogue between you and your committee to improve your research.
- Your committee members will create questions based on both your prospectus and your presentation. You can take advantage of their line of thinking by priming them to ask further questions you want them to ask or by leading them away from the areas you don't feel too comfortable answering.
- If you really don't know the answer to a question, say you don't know, but ask them if they'd like you to walk them through how you would think about such a problem based on what you know.
- Only answer questions you are asked! That seems straightforward, but is a very common mistake: you have spent so many hours combing through some cutting edge method and when someone asks a question, you might have the urge to explain everything you know. Don't intentionally give super short answers, but answer prudently and be cautious about where the line of questioning may be leading.
 - Anything that shows up on your slides or is mentioned in passing is fair game.
- Give eye contact to the person asking a question. Explain slowly and follow their reaction closely. If they are lost, then pause and ask what they don't understand.
 - Related: don't talk directly at the board while you're writing.
- Take your time. Don't just try to quickly verbally answer their questions -- they will always have more questions for you. If you can illustrate your response on the board, do it. This takes more time and oftentimes is a more effective way of communicating your points. But also don't over do it! Answer directly and succinctly when a direct response is appropriate and more effective.
- Consider repeating questions back to the professors when you are doing board work. Rephrasing their question will give them the opportunity to correct you if you are misinterpreting what they are asking you.

Getting Ready for the Day of Your Exam

- Dress for success and act confidently! You are ready for today.
- Arrive early (~30 minutes before) to set up your computer, test the connection of your computer to the room's screen/projector, and calm down.
 - If you need technical help, contact CEE [Computer Support](#). As of December 2018, this is Yoon Lee (yoonee@ce.berkeley.edu).
 - Bring your own set of whiteboard markers / chalk.

- Consider using a presentation clicker so you do not need to use your computer to advance your presentation slides.
- Remember to thank your committee members. It's appropriate to acknowledge this during your exam, often at the start of your presentation.
- You are permitted to ask the committee to please hold their questions until the end of your presentation so they don't interrupt and distract you.
- Most of all... GOOD LUCK, from all the qual alumni! :)

Authorship and Thanks

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