UCDAVIS
DEPARTMENT OF EARTH AND PLANETARY SCIENCES

Qualifying Exam:
Purpose, Requirements, Preparation and Guidance

University of California, Davis | Earth and Planetary Science Graduate Program

The purpose of this document is to: summarize the purpose and requirements of the proposal and qualifying exam (QE), provide guidance on writing the proposal, describe what happens in a qualifying exam (including possible outcomes), and provide guidance on how to prepare and plan for the ~6 months leading up to the qualifying exam date. You should read this document not later than the first week of the quarter **before** you plan to take the QE.

Resource Links

- Graduate Studies page on the Doctoral Qualifying Exam
- EPS Graduate Degree Requirements

Purpose of the Proposal and Qualifying Exam

According to Graduate Studies page on the Doctoral Qualifying Exam, "All UC Davis doctoral students must take a Qualifying Examination (QE) to demonstrate they are prepared to advance to candidacy, undertake independent research, and begin the dissertation."

In the Earth and Planetary Sciences (EPS) Graduate program, these are assessed by asking the student to both write a proposal for their dissertation research, and then to answer questions related to that proposal, in an oral format, that probe:

1. the student's academic preparation in their field to determine if the student has sufficient understanding of areas related to the dissertation research,
2. ability to recall and use knowledge and understanding from literature in the field, and the ability to evaluate and integrate those concepts,
3. understanding of relevant research methods and applications,
4. the viability and originality of the research proposal and ability to communicate those topics.

The proposal and qualifying exam are used together to make this assessment. In general, the proposal is used to get an overview of the student's preparation in all four areas, while the qualifying exam probes more deeply into a small number of specific topics that allow the depth of preparation in each category to be better assessed.

Requirements for the Proposal and Qualifying Exam

To take the qualifying exam, the graduate student must complete the required coursework (can be finished in same quarter as taking QE), have a GPA of 3.0 or better, have submitted the completed proposal to the qualifying exam committee, submitted the QE application form, and have the QE application form approved by Graduate Studies. The EPS Graduate Degree Requirements describe the required coursework and the format of the proposal. While the Graduate Studies page on the Doctoral Qualifying Exam page has links to the QE application.

QE Application

The QE application asks the student to list three areas that will be examined during the qualifying exam. These areas should be broad enough "umbrella topics" that with the three listed, all components of your research (including its broader significance) fall under these three umbrellas. They should not be so broad as to include an entire discipline, and they should be so narrow that they preclude, for example, examining related/alternative methods or models.

The QE Application also asks the student to list the members of the qualifying committee. The choice of members is determined by the student with their thesis advisor: it is first approved by the Graduate Chair, and then it is reviewed and approved by Graduate Studies. There are 5 members of the QE committee:

- the chair of your committee is not your dissertation advisor
- you need at least one person who is not a member of our graduate program, (but can have up to 2)
- 3 committee members must also be members of the EPS Graduate program

Who can serve on a committee is sometimes complicated, and it is not the same for all graduate programs/groups. For example, in the EPS graduate program, emeritus faculty can serve on the qualifying exam (they are still part of our graduate program), this is not true in some other programs/groups. Here is some guidance for the QE committee in the EPS Graduate program – if you are unsure whether a potential committee member is eligible, please check with the graduate program coordinator or a graduate advisor:

- Any non-emeritus UC faculty (i.e., professor regardless of rank) can serve on a QE committee
- EPS emeritus faculty can serve on a QE committee
- A non-UC faculty may serve but must be approved (using the External Membership form; their CV is required as an attachment).
- A non-faculty research scientist (must have a PhD) may serve but must be approved (there is a form, and a CV is submitted – this is needed even if they are at UC Davis; if at UC Davis, they will also need to hold an Instructor without salary appointment for the quarter of the QE, so you'll need to get this figure out the quarter before your QE).
- There are a few other "special" circumstances that are allowed: e.g., emeritus researcher scientist, but check with the graduate program chair.

- One member is allowed to be remote (not the chair), and must be approved using the QE Remote Participation Request form.

TIP: Note, repeated participation of the same non-UC people on qualifying exams is not supported by Graduate Studies: a second request for membership of an outside collaborator on a QE is likely to be declined.

Typically, for the EPS graduate program, QE committees include 3-4 members of the EPS graduate program and 1-2 non-EPS members. You should meet with each member of your committee and talk with them about your research when you asked them to serve on your committee. Ask them what they find most interesting about the project and where they see the project overlapping with their expertise. This will both broaden your understanding of your project and give you insight into what the committee member is likely to pay attention to in the proposal and during the exam.

TIP: student often try to guess what committee members might ask – sometimes this works, often it doesn't. A better approach is to think about why you asked the person to be on the committee – what is their area of expertise – and what parts of your research link with that expertise. Then step back think about the fundamental related concepts that you should know confidently.

The Proposal

In the EPS Graduate program, the proposal format and style follow that of a National Science Foundation (NSF) proposal. It is 15 pages long, single-spaced, with text and figures, but not including references (the reference list can be as many pages as needed and starts on page 16). The degree requirements list exact section headings, but you have the flexibility to organize the sections, section headings, etc..., however you (and your advisor) see fit: the important point is that you write a proposal that covers the same information.

TIP: It is strongly recommended to ask more advanced graduate students to share their proposals with you, so you can get an idea of what you are aiming for: try to get at least two examples.

Below is a suggestion for how to order your proposal with some description of the purpose of each section (page lengths are illustrative; adjust for your purpose). Please review a detailed outline of your proposal with your advisor before you start writing.

- Describe previous research that is relevant to the proposed research. The purpose of this section is to establish an understanding of where the field stands in addressing the proposed research question, provide definitions of jargon/terminology that you will use throughout your proposal, and to describe key research that leads to your research question. Choice of what to write about here should be driven by the desire to construct a clear argument that the research you are proposing is significant and timely. (1-2 pages)

- Describe the intellectual merit of the proposed work: that is, what new knowledge will be gained if the proposed work is successful (or maybe even if it is not), and why that knowledge is useful and important. For this last point, the usefulness or important might be stated in terms of outstanding questions in the discipline, meeting a societal need, or other context that establishes the significance of the proposed project. This section may or may not include statements of the specific hypothesis to be tested (not all proposals need to be articulated in terms of testing a hypothesis). (0.5 – 1 page)
- Describe the overall research approach and methods that will be used to address the research questions. This should be a concise summary that specifically links what you will do (experiments, models, data collections) to the research question(s) you are proposing to address. (0.5 – 1 page)

If the above three sections are included in the order presented above, then by the end page 2-3 the reader should have a complete picture of the proposed research and be prepared to read more on the specifics of how this will be done.

- Describe in more detail relevant previous research or methods, why these are relevant to the proposed research and the proposed work that you will do to address your research question (this is the bulk of your proposal on the order of 8-10 pages).

  There are two main ways to approach this part of the proposal:
  1. first present all the previous work, then the describe the methods, then describe the proposed work you will do.
  2. for each component of the proposed work, describe the previous work, related methods and what you will do, each in its own subsection.

  Which of these approaches to use depends on your project: the second approach can work better for multicomponent projects because the reader gets all relevant information for that component together, instead of needing to go back to a previous section or be expected to remember the previous information.

- Describe the work plan (timing, order, where parts of the project will be brought together) and address contingencies, and back-up plans that address possible points of failure in the project. This work plan should include learning of techniques or methods that you know you will need but have not yet had the chance to learn completely. This information is important for the QE committee to understand the level to which you have engaged with each of the components of your project. Learning is an expected continuing component of what you will be doing while you conduct your dissertation research. It is also important for this to be transparent so that the committee's expectations of your knowledge with each component, technique, etc.… aligns with where you actually are in the development of that skill. (1-2 pages)
- Conclusions are not required but depending on how you have crafted your proposal it might make sense to restate/ summarize the proposed research and significance at the end. If you project has a significant outreach, collaboration, or other component, it is also appropriate to address that specifically (0-1 page).

For figures in the proposal, you do not need to spend your time making a perfect figure. It is appropriate to use published figures, so long as you give proper attribution. However, if synthesizing existing data was part of the learning/preparation for the proposal, then presentations of that data in your figures makes more sense.

Collection of data, model results, etc.…, is not required for the proposal. Depending on your project you may have preliminary data, results or models that were used to help you learn what you needed to write your proposal. If that's the case, then of course, include them as you wish to support the proposal.

Proper referencing of relevant literature should be used throughout the proposal.

TIP: If you are unsure about when and what to references (e.g., when to site multiple versus just one, just the "important" ones – which are those, how many is enough?), talk to your advisor, peers, and other researchers in the department, and pay attention to how this is being done in the papers you are reading.

Format of the Qualifying Exam

The basic format for the QE is established by the UC Davis Grad Council: the QE must be an oral exam, is 2-3 hours long and may include a written component covering both breadth and depth of knowledge (in the EPS Graduate Program this written component is the proposal). In addition, it is expected to be an interactive, group activity and to be broadly structured, meaning that it is not narrowly focused only on the dissertation topic.

In the EPS Graduate program, the QE is usually about 3 hours long (including a 5–10-minute break after the first hour):

- First everyone gathers in the meeting room, A/V equipment is set up with the student's computer.
- The student steps outside the room and, under the guidance of the committee Chair, the committee reviews the student's academic record together, discusses the level of feedback between the advisor and student in the proposal writing process, and discusses any other issues relevant to the student's preparation for the QE. At this time the committee will also agree on questioning will progress (order of committee members, time per committee member, allowing for follow-up questions from other committee members, etc.…).
- The student is asked back into the room and gives a 5–10-minute presentation on the proposed research. The purpose of this presentation is to focus everyone's attention on the proposal question. It should be a concise overview of the motivation and significance of the research, the proposed work, and the key methods approaches that will be used. The presentation should be allowed to move forward without

interruption, except for clarifying questions. This will allow the student to relax and settle into the exam.

- Following the presentation, the committee will begin asking questions. It is common for students to use a whiteboard to answer questions (e.g., for drawing, deriving, explaining), but may not be needed for all questions. Students may also refer to slides in their presentation. The question-and-answer part of the exam may take 1.5-2.0 hours. The student can ask for a break at any time during the exam: you do not need to wait for the committee chair to offer this. If you get frazzled by a question and need to take a break, ask for it.

  TIP: a committee member will often have a series of questions in mind and start with a simple question to get you going in the right direction – don't over interpret and jump to the most complicated interpretation of the question.
  TIP: if you are unclear about what the committee member is asking, try to rephrase it ("are you asking X…") or explain your confusion ("I'm not sure what you are asking, can you rephrase it?").

- The committee Chair will bring the questioning to an end (usually after asking if the committee has any other burning questions. The student will be asked to step outside the room as the committee discusses the exam. During this time the student can use restroom, but then should return to wait nearby to the exam room so they are easily located when the committee discussion is complete.
- Finally, the committee will call the student back into the room and discuss the committee's decision.

Possible Outcomes for the Qualifying Exam

Possible outcomes for the exam are "pass", "no pass", "fail", "split": these are defined on Graduate Studies page on the Doctoral Qualifying Exam. In the EPS Graduate program "fail" or "split" exams are rare (1-2 in 10 years), while "no pass" exams will occur more often (1 in 2 years). A "no pass" means that the student is allowed to retake all or part of the QE after addressing deficiencies identified in the exam.

Advisors and the QE committee is there to help guide the student to a successful QE outcome: if you, your advisor, or a committee member is expressing reservations about whether you are prepared to take the exam, you should talk frankly about what you need to do to remedy the situation and talk with your graduate advisor or the Graduate program chair about the situation.

Prepare and Plan for the Qualifying Exam

The qualifying exam is taken in the 6th quarter of residence (end of second year; except for student's subject to COVID pandemic policy for extension of time). Preparation and planning

should work backwards starting from the desired date of the QE. The figure below illustrates this backward planning approach.

Step 1: Determine tentative date for QE exam

For a typical spring quarter exam, this means first determining which 1-2 weeks in the quarter you would like to take the exam, then forming a tentative committee and finally checking with this committee about their availability for a 3-hour meeting time (when2meet.com poll for the two weeks is usually best way to do this). This process should be complete in the quarter before your plan to take your exam.

Step 2: Determine proposal writing schedule

Your proposal needs to be submitted to your committee 4 weeks before the QE date to allow your committee time to read the proposal and prepare questions for the QE. This means that you need to plan your writing schedule ahead of this date to consider the time to write multiple drafts and wait for feedback from your advisor between drafts.

TIP: Each advisor does this differently, so it's very important that you talk with your advisor ahead of time to ask how they usually go through this with their students. For example, do they expect to work on a detailed outline first, do they typically go through multiple revisions, or just one, when do they want to see figures in the proposal, and how much time do they need between drafts to read and give your feedback (the university says they have 4 weeks… but they might only need 1 week)?

TIP: Talk to your advisor about whether they will be away or busily engaged in something else during this writing period, so you know how to plan around these events.

Step 3: Prepare forms and submit early

The QE application form and all related documents (e.g., forms for non-UC Faculty members) needs to be submitted no later than 30 days before the QE date (this is a strict deadline). However, you do not need to wait until that time to submit the application. As soon as members of your committee are known, the date and time of your exam is determined (and a room is reserved) and you have completed all your coursework, you can submit the QE application to the Graduate Program Chair. One exception to this is if you are completing required coursework in the quarter that you will be taking the QE, then you need to wait until that quarter has started so that you are enrolled in the required course.

Step 4: Plan your Writing schedule and Milestones

Writing a 15-page proposal is a big task, it is likely the biggest writing project that you have taken on in your academic career. A useful approach to this kind of big task is to break it down into smaller tasks that allow you to focus your attention, make progress and remain efficient.

- Use a calendar to track task deadlines (e.g., figure X for methods, description of previous work related to Y) and milestones (e.g., draft 1 to advisor).
- Build in time for breaks (recovery from the mental exertion of writing, reading, thinking, etc.…).
- Be realistic (not optimistic) when making this plan and to consider all the other activities you are doing (courses, TA'ing, etc.…).
- Be realistic about the number of hours you must work during the day, and the number of effective hours you can work in a day.
- Include time to catch up if task deadlines have slipped.
- Identify easy tasks that can help you get going at the start of the day.
- Don't let yourself go down rabbit holes (e.g., making the perfect figure) – use a timer… you have 20 minutes to do X, and that will be good enough (and maybe you can go back and make better if there's time later).
- Ask your peers to read parts of the proposal as you are writing it and give you feedback (before you send draft 1 to your advisor).

While the proposal and the QE is the culmination of your learning preparation thus far, it is not something that you have to, or should, approach it as a solo endeavor. Instead, your advisor, the faculty in the EPS Graduate program and your peers in the graduate program are there to engage in scientific discussion, give you advice and feedback, point you to resources, and give you moral support. *Ask for this engagement and provide it to your peers.*

Illustration of Backward Planning and Summary

The diagram illustrates the idea of backward planning your QE preparation schedule, deadlines for tasks and proposal preparation milestones. Note that the overall process can take about 6 months from start to finish, so start planning early. Once you have discussed the process with your advisor, you'll be able to turn this into a schedule with specific dates between events.