

G. THE QUALIFYING EXAMINATION

The qualifying examination (QE) is the means by which students advance to candidacy for the Ph.D. The exam can be taken after five quarters of residency, but must be taken before the end of your seventh quarter of graduate study (the first official quarter of graduate study being in September of the first year, even if the student works in a lab the summer before the first year). Students who enter Northwestern with a Master's Degree, or with credit for at least three quarters of graduate study from another Institution that is accredited by The Graduate School, may take the examination after completing three quarters of study at Northwestern, but again must complete the requirement before the end of the seventh quarter of study.

You must prepare a written document, as detailed below, and take an oral examination that covers the material in your document as well as general chemistry topics. The purpose of the QE written document and oral exam is to assess: (i) whether the student is progressing as rapidly as can be expected on their research problem(s), (ii) the student's general knowledge of Chemistry, particularly in the field of Chemistry relevant to the student's research, (iii) the student's ability to put their research project in the context of their greater field within Chemistry, and their familiarity with the relevant literature, (iv) the student's ability to articulate plans for the near-term (next 1-2 years) for their project, and (v) whether the student is likely to produce an acceptable thesis within the next 2 – 3 years.

The student will write his/her QE document in *the format of a research proposal*, where the topic is their own thesis research, and where the Preliminary Results section is a summary of the work they have accomplished so far. The Preliminary Results Section will occupy a significantly higher fraction this document than it would in a typical original research proposal.

I. Format of the Written QE Document. The QE written document will have 7 sections (total maximum of 13 pages, double-spaced, one-inch margins, including abstract, figures and tables, but excluding references):

- (1) Title and abstract (1 page) The title and abstract should be descriptive of the total document.
 - a. In more detail: the portion of the work that has been accomplished, and the portion of the work that is proposed for the next 1 – 2 years of research.
- (2) Introduction, Background, and Significance of the Research
 - a. Should include the “intellectual merit” of the project: what it will do to move the field forward and further fundamental understanding. It should also demonstrate the student's mastery of the literature in their field
- (3) Scientific Objectives (“Specific Aims”)
- (4) Preliminary Results (no fewer than 5 full pages, including figures and tables)
 - a. A summary of progress on the research problem thus far
- (5) Proposed Research (no fewer than 2 full pages, including figures and tables). This section should include:
 - a. A research plan for the next 1 – 2 years, including general objectives and specific experimental or theoretical plans.

- b. A brief description of contingency plans
- (6) Summary and Conclusions
- (7) References (as many as are appropriate; not included in the page count) - references should be the following format:
- a. Journal articles: Kramer, I.J.; Levina, L.; Debnath, R.; Zhitomirsky, D.; Sargent, E.H. Solar cells using quantum funnels *Nano Lett.* **2011**, *11*, 3701-3705.
 - b. Books: Odian, G. Principles of Polymerization; 4 ed.; John Wiley and Sons: Hoboken, NJ, 2004.

The student decides how to partition the document between text and figures, but should note that figures should not be seen as a replacement for text (i.e., the text must be a complete narrative). **All text must be 12-point, Times New Roman, double spaced, and type justified.** Pages must be numbered starting with the title/abstract page.

II. The Qualifying Exam (QE) Committee. In the beginning of February of the student's 2nd year, the chair of the department's Graduate Curriculum Committee will assign each student's committee members based on suggestions from the student's adviser. Students must turn in the printed and filled out online form "QE Committee Selection Form" listing these suggestions to the Graduate Assistant within the first two weeks of the fall quarter for students with Master's degrees, and within the first two weeks of winter quarter for students with a bachelor's degree. The student's research adviser will be a member of the QE committee and will be present during the examination. Upon completion of this examination, the QE committee becomes the student's PhD committee with the advisor as chair.

III. Scheduling the Qualifying Oral Exam (Deadline Before the end of your seventh quarter of graduate study)

The department will arrange for you to meet with the administrative assistants of your committee members to schedule a QE exam date and reserve a conference room. This meeting room must have a projector screen and a chalkboard or whiteboard. Please contact gradasst@northwestern.edu with questions about QE scheduling.

****The QE document must be turned in to committee members at least one week before your examination date.**** If two or more committee members believe that the QE document is not satisfactory to move on with the oral exam portion, then the Chair of the committee must inform the student – *no later than 48 hours before the scheduled exam time* – that the exam will be postponed. The committee should give the student a general idea about why the written document was rejected, but is not required to provide detailed feedback to the student. It is then the student's responsibility to revise the document and reschedule the exam. The student is advised to consult with the Graduate Program Assistant about a timeline for this process. It is desirable to reschedule within the same quarter, but the student can petition the Director of Graduate Studies for an extension.

IV. Other Information about the QE. On the day of the scheduled QE, the student will make a 25-30 minute presentation and defense of the QE to their committee, in an exam that typically lasts ~1.5 to 2 hours.

Students are expected to present a slide deck outlining their QE document. It is advisable that additional backup slides be included so that they may be used to address likely science questions. The student should bring research notebooks and other similar research related materials to the examination so that any specific information or data that the committee may request can be provided.

The QE committee will first ask the student to leave the room and will discuss the student's record and hear a brief summary by the advisor of the student's progress and standing in the group. Then the student will be called in and the committee will decide whether the student should present the slide deck in full followed by the question and answer section, or if the committee reserves the right to interrupt and ask questions during the presentation.

When there are no more questions, the student is again asked to leave the room so that the committee may discuss the student's exam performance and make suggestions for improvements. The committee will also fill out the evaluation form, which provides written feedback and forms the basis for the Lambert Award in Research Excellence that is administered by PLU.

Students who do not demonstrate satisfactory research aptitude and research progress will be excluded from the doctoral program.