

DEPARTMENT OF EARTH & ENVIRONMENTAL SCIENCE Ph.D. QUALIFYING AND CANDIDACY EXAMINATIONS

These guidelines are intended to ensure that qualifying and candidacy examinations are administered in a timely and consistent fashion, but they are also intended to be flexible and open to adaptation by the various programs within the Department.

I. Introduction

All students intending to pursue a Ph.D. degree in the Department of Earth & Environmental Science are required to take two examinations prior to being accepted as a candidate for the degree. The Qualifying Examination is taken during or before the first semester of Ph.D. course work. The Candidacy Examination will generally be taken at the completion of course work leading to the Ph.D. degree.

II. Qualifying Examinations

A qualifying examination is required for students who are seeking admission to the Department of Earth & Environmental Science doctoral degree program, to determine if they have any serious weaknesses and to determine if they are qualified to undertake a doctoral program.

The examination will consist of two parts:

Part 1 will be a three-hour written examination. The exam will test the student's basic skills in English, math, physics, chemistry, and general knowledge of Geoscience in which she/he would be expected to show a broad understanding of earth sciences. A greater degree of knowledge will be expected in the student's field of specialization. On acceptance into the graduate program, the student will be advised in writing as to the nature of the exam and general subject areas for which she/he will be held responsible.

Part 2 will be an interview and oral examination to question apparent weaknesses exposed in the written examination, to review the student's academic record, experience, and professional goals, and to evaluate the student's ability to undertake Ph.D.-level research in the appropriate field of specialization.

The written examination will be given by a standing committee of four, consisting of one representative from geophysics, hydrology, geology, and geochemistry. The interview will be conducted by the standing committee plus the student's advisor, if the advisor is not already a member of the standing committee. At least two members of the committee should be in the student's field of specialization. The permanent committee member representing the student's field of specialization will act as chairperson for the examination.

New students planning a Ph.D. program must take the examination during their first semester of residence (normally in the first week of the semester); students already enrolled at NMIMT can take the examination prior to their first semester of Ph.D. coursework.

Concurrence of a majority of the committee is required to pass the examination. If appropriate, the committee will require remedial measures and also may recommend courses to be taken. Remedial work will be necessary for the student who does not meet the entrance requirements for admission into the appropriate master's degree program in the Department of Earth & Environmental Science, and/or whose performance on the qualifying exam indicates remedial action is necessary. A minimum grade of B will be required in remedial courses. The student will generally be required to complete remedial courses during the first three semesters and in all cases before the Ph.D. candidacy exam is taken.

If the student's performance on the qualifying exam is deemed unsatisfactory, the student will be required to take, by the end of their second semester of registration, a second written and oral examination administered by their major program. The nature and scope of the second exam will be decided by the faculty of the student's program. At least one member of the second Ph.D. examination committee must be both from the original qualifying examination committee and from a different program than the student, to ensure the examination conforms to departmental standards and fairness.

Failing the second examination will result in removal of the student from the Ph.D. program.

Formal notification of required and recommended courses and/or other actions will be sent to the student by the department chairman with a copy to the student's advisor and to the graduate school. Each semester during performance evaluation of graduate students, each Ph.D. student's progress in meeting the requirements set forth by the qualifying exam committee will also be evaluated.

The Ph.D. qualifying exam includes both a written and an oral exam and interview. The written exam will include three parts:

- 1) Examination of basic skills in English, mathematics, physics, and chemistry. Students will be expected to communicate well in written English on this exam. They will also be expected to be familiar with math through calculus and beginning inorganic chemistry.
- 2) Examination of general knowledge in the Geosciences. In this part of the exam the student will be expected to be familiar with the basic principles of physical and historical geology including plate tectonics, and also with some very elementary concepts in geochemistry, geophysics, and hydrology.
- 3) Examination in the specialty area of the student (geology, geophysics, hydrology,

geochemistry). In this part of the exam, the student will be expected to be familiar with information and concepts in the specialty field at a level representative of undergraduate courses in the field.

In the oral exam and interview, we will follow up on apparent weaknesses identified in the written exam, review the student's academic record, experience, and professional goals, and evaluate the student's ability to undertake Ph.D.-level research in the appropriate field of specialization

III. **Candidacy Examination**

The purpose of the candidacy exam is to evaluate the student's readiness to undertake dissertation research in Geoscience. The student is expected to show an in-depth knowledge of the chosen field and to demonstrate an ability to think through a research problem.

A. Introduction

The candidacy examination for the Ph.D. in the Department of Earth & Environmental Science consists of three parts:

- 1) A detailed written proposal describing the intended dissertation research.
- 2) An in-depth written examination in the student's major field of specialization and in one or more minor fields.
- 3) An oral examination of the proposal and of material covered in the written examination.

The candidacy examination is designed to:

- a. Test the candidate's general and specific knowledge in his/her chosen field.
- b. Test the candidate's preparedness for pursuing the selected dissertation topic.
- c. Test the candidate's ability to: i) problem solve; ii) articulate scientific hypotheses and suggest approaches to test the hypotheses; and iii) synthesize information and concepts from various fields within an earth science context.
- d. Test the candidate's ability to engage in intellectual discussions about scientific issues related to his/her chosen field of dissertation.
- e. Test the candidate's ability to communicate orally and in writing.

B. Implementation

The dissertation proposal should be prepared along lines similar to that expected for a proposal to NSF. The proposal should be a detailed statement of the work to be undertaken and should include the objectives and expected significance of the research and its relation to the present state of knowledge in the field. It should outline the general plan of work,

including both the broad design of experiments to be undertaken and an adequate description of experimental methods and procedures. Excluding references, tables and figures, the proposal should not exceed 15 double-spaced pages.

The student shall take a written examination consisting of questions from the candidate's committee, with possible supplementary questions from other Department faculty, as decided by the candidate's committee. Subject material must be in-depth and cover at least the student's major field. Each examiner will advise the student of the material to be covered by the examination. The candidate will have up to one day to address each committee member's task, up to a total of five days.

An oral defense of the proposed dissertation research will follow the grading of the written examination. Deficiencies apparent in the written examination may be reevaluated during the oral exam.

The first part of the oral exam will include a brief (20 minute) presentation by the candidate on the dissertation proposal. Following questions on the dissertation, the committee will meet briefly in executive session. Afterwards the committee will question the candidate on issues of relevance to the candidate's field and, in particular, to the dissertation topic. The total exam should require 2½ to 3 hours.

C) Calendar

The student will not be permitted to take the candidacy exam until all requirements set forth by both the admissions committee and the Ph.D. qualifying exam committee are satisfactorily completed.

The candidacy exam will be given no earlier than the spring semester of the first year in residence as a Ph.D. student, and no later than the spring semester of the second year in residence. The spring semester written exam will normally be scheduled for the last week of March or first two weeks of April. If a fall semester exam is needed, it will normally be scheduled for the last two weeks of October or first week of November. All students will take the exam concurrently. Oral exams will be held within two weeks of the completion of the written examination.

Requests to take the candidacy exam later than two years after the qualifying exam must be made to the Earth & Environmental Science faculty in writing by the student.

The dissertation research proposal must be submitted to the committee no less than two weeks prior to the written examination.

A student who does not complete the candidacy examination within the prescribed time will be making unsatisfactory progress and may be subject to dismissal from the program.

D) Committee Make-up

The examining committee will consist of five members, including the student's advisor. The selection of three members of the committee is left to the discretion of the student and his/her advisor. The fifth member of the committee must be from a department other than the Department of Earth & Environmental Science. This fifth member will be nominated by the Dean of Graduate Studies and will act as an independent observer to ensure that the examination is conducted in a fair and reasonable manner. The four remaining members of the committee will be responsible for administering the written and oral examinations.

E) Evaluation

A majority of the committee is required to determine the result of the examination. Successful completion satisfies one of the requirements for admission to Ph.D. candidacy; pass or fail are the only outcomes. If a student fails the first candidacy exam, the student has two weeks to petition for a *new* exam, to be administered before the end of the semester immediately succeeding the unsatisfactory performance. If the petition is granted and if the student fails the second exam, the student will be dropped from the Ph.D. program. A student may petition only once for re-examination. It is the responsibility of the advisor to inform the student of the results of examination(s).

Students are expected to start dissertation research prior to the candidacy examination, however, dissertation credit (Earth & Environmental courses numbered 595) may not be taken until admitted as a candidate to the Ph.D. program.