

GEOLOGICAL SCIENCES, PHD

Degree: Doctor of Philosophy (PhD)

Field of Study: Geological Sciences

Program Overview

The PhD in Geological Sciences program is flexible so as to meet the needs of the individual student. General areas of study include benthic ecology, biostratigraphy and paleontology, environmental and urban geology, geomorphology, limnology, paleoclimatology, petrology, sedimentary geochemistry, sedimentation and stratigraphy, stable isotope studies, meteoritics, planetary materials, geodynamics of planetary interiors, and planetary geology.

The mission of the doctoral program is to train the coming generations of professional earth, environmental, and planetary scientists. Professional scientists in these disciplines work in a wide range of environments, including, but not limited to, colleges and universities; commercial and nonprofit research laboratories; mining, energy, and environmental consulting industries; local, state, and federal regulatory agencies; federal research laboratories; and museums.

Research opportunities in the graduate program are available in field and observational, experimental, and theoretically based disciplines. These include benthic ecology, surface processes, soil erosion, sediment transport, stratigraphy, geologic sequestration of carbon, geochemistry, meteorites, planetary materials, planetary geology and geophysics, and high-pressure mineral physics and chemistry. Faculty and students conduct field research on five continents, perform experiments at world-class facilities such as the Advanced Photon Source at Argonne National Laboratory, the Cleveland Museum of Natural History, and the NASA Glenn Research Center, and participate in a NASA spacecraft mission.

For students who wish to be admitted to the PhD program, a bachelor's degree in the earth, environmental, or planetary sciences or a related technical field is expected.

The program of research within the Department of Earth, Environmental, and Planetary Sciences addresses state and regional needs by providing students with training in technical research and technical communication skills, promoting an engaged scientific community and fostering a scientifically informed public through outreach and educational activities. Technical skills in the earth, environmental, and planetary sciences are crucial for fostering a workforce capable of addressing needs in natural resource utilization, management, and regulation.

Background Required of Entering Students

The coursework background of all incoming graduate students is evaluated at the time of admission. If deficiencies are deemed to exist in some areas, admission may be contingent upon completion of background courses. After arrival, the coursework background of each incoming graduate student will be reviewed by the student's advisor to determine whether background deficiencies exist for their planned program of study. A student whose background is deemed deficient will, in consultation with their faculty advisor, determine which courses shall be taken to alleviate the deficiencies. Background deficiencies will

normally be made up in the first year of graduate study. Some remedial coursework may not count toward graduate credit.

Advisor

Each incoming graduate student will be assigned an advisor from the faculty of the department. The assignment will be based on the background and interests of the student. The advisor may be changed with the approval of the Graduate Committee. The student should meet with their advisor before registration for the first semester of study in order to outline an initial program of study for the PhD degree. Additional meetings with the advisor should take place before the student registers for subsequent semesters, and from time to time, to review and update this program and discuss the student's progress.

On passing the PhD candidacy examination, the student selects a faculty member who agrees to be their dissertation advisor. Upon notification of the Graduate Committee, the dissertation advisor assumes the advisory responsibilities formerly held by the faculty advisor and, in addition, supervises the student's dissertation research. The dissertation advisor, in consultation with the Graduate Committee, selects two additional faculty to form the student's Advisory Committee.

The Graduate School requires that each student file an official Program of Study with the Office of Graduate Studies before they can receive a degree. Normally this document is submitted during the second semester, subject to later revisions as conditions necessitate.

Graduate Committee Progress Reports

In addition to the regular, continuous contact the student has with the dissertation advisor, the student must call a meeting of the Advisory Committee once each semester to report and discuss their progress on the dissertation. No later than two weeks following this meeting, the Advisory Committee must submit a written report on the student's progress to the Graduate Committee. The Graduate Committee in turn will send a report to the student, evaluating their progress, before the beginning of the next semester. A student who has not yet been admitted to candidacy will be sent a progress report from the Graduate Committee after each fall semester on the basis of their coursework performance and the Graduate Committee's discussion with the faculty advisor.

PhD Candidacy Examination

A student is admitted to candidacy for the PhD degree upon passing the general examination described below. Acceptance as a PhD candidate in the department implies that the student has demonstrated sufficient knowledge of their field and the ability to do independent, original research. The candidacy examination has both oral and written parts, reflecting the necessity for a scientist to disseminate research results both orally and in writing.

Nature of the Examination

The examination consists of one oral and two written parts. All are to be completed within a two-week period. The oral part and one of the written parts focus on a proposition presented by the student. The other written part is comprehensive in nature. The examination normally takes place during the last month of the third semester for students entering without a master's degree and during the last month of the second semester for students entering with a master's degree.

The Proposition

The proposition consists of an original hypothesis identifying a problem or question in the earth, environmental, and planetary sciences and

proposing an answer. In the presentation and defense of the proposition, the student is examined on their ability to identify a scientific problem and to formulate a sound, scientifically defensible solution. It is not the purpose of the examination to assess the logistics and feasibility of a dissertation topic. The student may consult with their faculty advisor and others in choosing the proposition, but the formulation of the proposition should be done by the student. After selecting the proposition topic in the first month of the semester in which the examination is to be taken, the student and the advisor set a timetable for the examination. At that time, the Examination Committee is chosen by the Graduate Committee in consultation with the student's advisor. The Examination Committee consists of four faculty, up to two of whom may be from outside the Earth, Environmental, and Planetary Sciences department. The advisor has supervisory responsibility for administering the various parts of the examination, compiling the results, and reporting them to the Examining Committee.

Part 1: The Written Proposition

Two weeks before the oral presentation of the proposition, the student will submit to each member of the Earth, Environmental, and Planetary Sciences faculty, to each member of the Examining Committee, and to the department office (for file) a paper of about 8-10 pages, introducing and discussing the proposition. The format of the written presentation should be similar to that of an article submitted for publication in *Geology* or *Science*. The paper must be graded by each faculty examiner prior to the oral examination.

Part 2: The Comprehensive Examination

One week before the oral examination, the student will take a 3-hour written examination. This consists of four 45-minute sections, one written by each of the four faculty examiners. Each section may consist of one discussion question or a problem to solve and discuss and/or a series of short-answer questions covering a broad range of topics.

Part 3: The Oral Proposition

The oral examination usually will be no longer than 3 hours in length. It is initiated by a 20-minute formal presentation of the proposition by the candidate. Then the candidate is expected to answer questions about the proposition and its relation to the general field(s) in which it lies. Initially, the questions are centered on the proposition. The candidate may expect to be asked questions of an increasingly general nature as questioning proceeds.

Grading

Grades are assigned to the written proposition and the oral proposition by averaging the numerical grades assigned by each member of the Examining Committee. A grade of 85 is a passing grade for each of these two parts of the examination.

The student will have passed the comprehensive examination part if no grades of F are received, and if the average grade for all four sections is 85 or higher.

All three parts of the examination must be passed. If a student does not pass one or more parts of the examination, the Examining Committee will recommend whether the student should retake those parts of the examination which were failed, or should proceed to the MS degree. A student is not required to retake any of the three parts of the examination which they have passed. In the case of the comprehensive examination, no section which has been passed needs to be retaken. Portions of the examination that are retaken will generally be retaken within a month

and in no case later than the end of the semester following the initial examination.

Acceptance as a PhD Candidate

Upon passing the candidacy examination, the department will formally accept the student as a PhD candidate. The student must subsequently register for a minimum of 1 hour of EEPS 701 in each succeeding semester. Prior to admission to candidacy, a student may register for 1 but not more than 3 hours of EEPS 701, and must maintain continuous registration in EEPS 701.

Dissertation Prospectus

The prospectus is a written two-page document, with references, describing the student's proposed dissertation research. It is submitted to the Advisory Committee early in the semester following admission to candidacy. The prospectus is also presented orally as a seminar open to the entire department. Announcement of the seminar and distribution of the written prospectus to all department faculty and graduate students are to take place two weeks ahead of time. The prospectus is not an examination of the student, but rather an examination of the suitability and feasibility of the dissertation project. After the seminar, the Advisory Committee will discuss with the student the suitability of the project and the adequacy of the student's preparation for it.

Dissertation

A dissertation describing original and independent research by the candidate is required for the PhD degree. Not less than one academic year or its equivalent will be devoted to the dissertation research. In preparing the dissertation, the student will have the guidance of one or more advisors, and it will not usually be submitted without their approval. Approval of the format of the dissertation must be obtained from the Office of Graduate Studies at least one month before graduation.

Defense of Dissertation

The dissertation must be successfully defended in an oral examination before a faculty committee. The dissertation defense is open to the public. The examination committee is appointed by the Dean of Graduate Studies on recommendation by the department chair no later than three weeks before the date of the examination. The examining committee consists of not fewer than four university faculty, with at least one member from outside the department. The student must provide each member of the committee a copy of his/her completed dissertation at least 10 days prior to the examination. The defense must be taken at least one week before the granting of the degree. In practice, a longer period of time should be allowed so that the student can incorporate changes required as a result of the defense. Major changes can be required.

Time Requirements

Students who obtain financial assistance from the department must make satisfactory progress toward fulfilling the degree requirements in order to qualify for continued support. Normally, support will not be provided for more than eight semesters of graduate work.

Exceptions

Requests for exceptions must be submitted by petition to the Graduate Committee.

PhD Policies

For PhD policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

The student must satisfy the university requirements stipulated in the General Bulletin as well as the departmental requirements described below. The formal fulfillment of residency requires continuous registration in at least six consecutive academic terms (fall, spring and/or summer). Full-time graduate study consists of 12 credit hours, or 9-10 credit hours if the student has contractual assistantship obligations to the department. It is a university requirement that the PhD be completed within five consecutive calendar years, including leaves of absence, from the initial registration in EEPS 701

A student without a master's degree will devote at least 36 credit hours during the first two years to a program approved by the advisor and submitted to the Graduate Committee. For a student already holding a master's degree, at least 18 credit hours will be devoted to a one-year program approved by the Graduate Committee. The objective of the program is to broaden the student's knowledge at an advanced level in a manner consistent with their interests.

Every graduate student must register once for EEPS 490. As part of EEPS 490 the student will develop skills in preparing a research project and writing a research grant proposal. Registration for this course is typically in the spring of the first year of the program.

All graduate students are expected to regularly attend Earth, Environmental, and Planetary Sciences Seminars.

The university requires a minimum grade-point average of 2.50 after 12 credit hours, 2.75 after 21 credit hours, and 3.00 for graduation; the department requires a 3.0 average for Earth, Environmental, and Planetary Sciences courses. Courses below the 300 level may not be counted for degree credit. With the approval of the Graduate Committee, a maximum of 6 credit hours of graduate-level credit may be transferred from another university. Transfer credit will not be given for courses used for degree credit by the student elsewhere. A student will be terminated for any of the following reasons:

- A grade of F in any Earth, Environmental, and Planetary Sciences course
- More than one grade of C or lower in Earth, Environmental, and Planetary Sciences courses
- More than one grade of F in a non-Earth, Environmental, and Planetary Sciences course
- A grade of I that is not converted within one calendar year.

Any 300-level Earth, Environmental, and Planetary Sciences course in which a grade of C or below is obtained will not be counted toward the degree requirements. No course in which a grade of D or below is earned will be counted toward the degree requirements.