

Geological Sciences Requirements for Admission

Admission to the graduate program in the Department of Geological Sciences is evaluated on the basis of the applicant's GRE scores, undergraduate record, three letters of recommendation and research interests. Applicants should have a combined verbal and quantitative GRE scores of at least 1050. A minimum TOEFL score of 600 is required for foreign applicants for whom English is not the first language. Admission to the graduate program in the Department of Geological Sciences is selective and competitive based on the number of qualified applicants and the availability of faculty and facilities. Students who meet the minimum academic requirements are not guaranteed admission.

Degree Requirements

All students are responsible for fulfilling University requirements as discussed in the graduate catalog.

1. Master's Degree

M.S. students must complete 24 semester hours of course work, plus 6 hours of thesis (GEOL 869). They must have at least a 3.0 cumulative index in order to receive degree clearance. M.S. students must write and successfully defend a thesis. There is no foreign language requirement for the M.S. degree.

All full-time M.S. students are expected to complete the degree requirements in two years. Some of the deadlines are a matter of Department policy and others are more flexible. M.S. students:

- 1) Must select a faculty advisor by the end of his/her first semester.
- 2) Must submit his/her thesis proposal by the beginning of the second semester.
- 3) Must defend his/her thesis proposal by the end of the second week of the second semester.
- 4) Should complete most of the thesis research by the end of the first summer.
- 5) Should complete all course work by the end of the third semester.
- 6) Should defend the thesis by the end of the fourth semester.

Failure to follow this timetable may result in the loss of financial aid from the Department.

2. Ph.D. Degree

All Ph.D. students are expected to have completed a M.S. degree in geology or related sciences. Course work must be approved by each student's Dissertation Committee. Each Ph.D. student must pass a qualifying exam that consists of written and oral portions. Some Ph.D. students may be required to demonstrate reading knowledge of a modern foreign language. A dissertation embodying the results of independent **research in the geological sciences** is required of all Ph.D. students.

Course Work

All graduate students must take GEOL 601 (Geological Sciences at Delaware) their first year and GEOL 605 (Stratigraphy).

For the Master's degree, the Geological Sciences Department requires 30 credit hours in Geological Sciences and approved related fields. This includes 24 credit hours of course work and a minimum of 6 credits of thesis work (GEOL 869). The course program must be approved by the student's Thesis Committee. A maximum of 9 credits obtained by students registered through CEND (Continuing Education) may be applied to the 30 credits required for the M.S. degree.

For the Ph.D. degree, course work is determined by consultation of the student with his/her Dissertation Committee.

Registration for courses constitutes firm and formal commitment to pursuing and completing those courses. If a student starts the program without an advisor, then the Department Chairperson acts as the student's advisor. It is imperative that the student maintains close contact with the Department Chairperson in course selection for the first term in attendance. After establishment of a Thesis or Dissertation Committee, the student develops a course program, in consultation with his/her advisor, which is then submitted (as part of the thesis/dissertation proposal) for approval by the committee. No course may be dropped or added without formal approval of the student's thesis/dissertation advisor. This includes all types of courses and registration status.

All graduate students receiving financial aid who are not teaching or research assistants are expected to register for the full-time student course load of 9 to 12 credits per semester. All graduate students holding teaching and research assistantships are expected to register for at least 6 credits per semester.

Students wishing to pursue non-thesis/dissertation research projects should register for GEOL 666 or GEOL 866 (as appropriate). The credit hours to be earned should be decided in consultation with the student's advisor or project supervisor. These credit hours are not counted toward the 30 credits for the M.S. degree. Ph.D. students must be admitted to candidacy for the Ph.D. before they may register for GEOL 969 (Ph.D. Dissertation Research).

Students leaving the University prior to completion of degree requirements must register for UNIV 899 (Master's Sustaining, zero credit) or UNIV 999 (Ph.D. Sustaining, zero credit) for each semester until the requirements are completed and the thesis/dissertation is accepted; and they must pay the appropriate fees. See the most recent graduate catalog.

Students must maintain a 3.0 average in graduate courses. No grade below C is counted toward the degree.

In view of the limited number of faculty and the diverse interests of graduate students, it is clear that graduate course offerings in any one semester must be limited and that courses suiting

individual students may not be available. Students should continually check with their thesis-dissertation advisor about their course programs to ensure that they are completing their courses according to schedule.

Graduate students are not charged a fee for use of the University's facilities during Winter Session. However, tuition fees for graduate students taking Winter Session courses are not covered by fellowship, assistantship, or other contracts and must be paid by the student from his/her own resources.

Thesis and Dissertation Committees

The Thesis/Dissertation Committee guides the student's progress toward the degree and assumes full and final responsibility for research direction and progress, evaluation of degree examinations, and completion of degree requirements. It is an academic committee; it may recommend but does not control or apportion financial aid to the student.

1. Master's Degree Thesis Committee

A Thesis Committee consists of the thesis advisor and two faculty in fields related to the research problem. Students should discuss (without obligation) potential thesis problems with the faculty members in their first semester. Before the end of the first semester, the student should have chosen a faculty member to serve as thesis advisor. This is accomplished by discussion with both the potential advisor and with the Department Chairperson (who acts as advisor to all new students until this stage is reached). Student and potential advisor then discuss with other faculty members their serving on the student's Thesis Committee. The names of the committee members, along with the title or general area of thesis research, must be submitted, in writing, to the Department Chairperson for approval. Approval of the Thesis Committee by the Department Chairperson then constitutes formal establishment of the student's Thesis Committee. It is required that this be accomplished before the beginning of the student's second semester because the courses to be taken after that semester may depend on the thesis topic and advisor selected.

2. Ph.D. Dissertation Committee

A Ph.D. Dissertation Committee consists of the Chairperson (dissertation advisor, a minimum of two and maximum of four Department faculty in fields related to the research problem, and one faculty or other person outside the Geological Sciences Department. No Ph.D. student should be admitted without a faculty member agreeing to be his/her advisor. However, if this is not the case, then the student should discuss potential dissertation problems with various faculty members. The student then selects a faculty member (with his/her agreement) to serve as Chairperson of the dissertation (or advisory) committee. The student and potential advisor then discuss who else should serve on the committee. After obtaining their agreement, the advisor should submit the names of the potential committee and Chairperson, along with a title or general area of research for the dissertation, to the Department Chairperson. The committee must then be presented to the faculty for approval.

Thesis and Dissertation Research

A thesis or dissertation embodying the results of independent geological science research is required for the Master's Degree and the Ph.D. Degree, respectively. The dissertation is expected to reflect the results of original and significant research written in a scholarly and competent manner worthy of publication. The student may conduct supervised research in any one of the following areas:

- Mineralogy and Crystallography
- Igneous and/or Metamorphic Petrology
- Geophysics
- Sedimentary Petrology
- Stratigraphy
- Sedimentation
- Geomorphology
- Coastal Geology
- Paleontology
- Micropaleontology
- Marine Geology
- Geochemistry
- Structural Geology
- Planetology

Experience has shown that research that is pursued concurrently with course work is usually more productive and more likely to become a habit than research reserved for the latter parts of degree programs. Furthermore, the initial stages of the research invariably involve literature searches, background reading, setting up laboratory equipment and routines, sample gathering and treatment, etc. All of these can provide welcome relief from long hours of sustained concentration on course work. Combining course and research work has the added advantage of leaving the student who has completed most course work well into his research and that much closer to receiving his/her degree. A booklet containing the regulations governing theses and dissertations ("University of Delaware Thesis/Dissertation Manual") may be found at the Graduate Office website.

1. Thesis Proposal

A thesis problem needs to be selected at the same time that the student's committee is established. The research problem should be outlined as early as possible in the student's degree work so that progress may begin and the degree may be achieved in a reasonable length of time. The Master's degree should normally be completed in two academic years and intervening (not following) summer. The thesis problem should be set forth in a well-researched and coherent manner in a thesis proposal, submitted to and accepted by the student's committee. It should contain a statement of the problem, previous work, methods to be used, significance of the proposed research, a bibliography, a proposed course program, and a budget. This proposal serves as a general guide and timetable for the thesis research. The committee Chairperson will indicate the source of funds or feasibility of funds (funding proposal) and report to the Department Chairperson prior to the formal approval of the proposal by the committee. The

thesis proposal is placed on file with the Department Chairperson after approval by the student's Thesis Committee. Approval of the thesis proposal must be accomplished by the end of the second week of the student's second semester in attendance. Any revisions to the thesis and course program must be approved by the committee and placed on file with the Department Chairperson.

Compliance with the above procedures and schedule is expected and is necessary for good standing within the Department. Failure to make adequate progress in the first semester will result in a negative evaluation by the faculty. Evaluations play an important role in decisions on financial aid and eventual recommendations.

2. Dissertation Proposal

It is the responsibility of the student to put together a dissertation proposal which discusses the problem to be solved, previous work, methods to be used, significance of the proposed research, a proposed timetable, course program, and cost-of-project (in detail). The committee Chairperson should indicate the source of funds or feasibility of funds (funding proposed) and report to the Department Chairperson prior to formal approval of the proposal by the committee. The dissertation proposal must be approved by the students committee by the end of the second week of the student's second semester. After the student's committee approves the proposal, it is sent to the Department Chairperson. The decision as to expenditure of Department funds for the proposed dissertation or thesis rests with the Department Chairperson.

Degree Examinations

1. Master's Degree

a. Presentation of the Thesis Proposal

After preparation of the thesis proposal, the student will arrange a committee meeting for the purpose of approving the proposal. The student will give an oral presentation summarizing the proposal (problem, methods, etc.). The committee members will then question the student to make sure that the student understands the problem and to evaluate the methods proposed to solve the problem. They will also make sure that the student has the proper background to do the proposed research. As a result of this meeting the student may be asked to revise the proposal and/or take additional course work and/or special problem(s).

b. Thesis Defense and Examination

Upon completion of thesis and with the approval of the Thesis Committee, the student then sets up a defense date in consultation with the Advisor (thesis committee chairperson) and Thesis Committee members. Each member of the Thesis Committee must be given a complete copy of the thesis at one week prior to the defense. The student must send an announcement indicating the date, time, and place of the defense to all the faculty. At least one week prior to the defense, a copy of the thesis must be placed on display in the Department office for review by any interested person. At the defense, the student will be asked to briefly summarize the thesis. The

thesis presentation may include visitors. After the presentation, the Advisor may then call for questions from the guests. The guests are then excused from the defense, and the committee then continues with the questioning. The defense will also include an examination of the student's knowledge in his/her areas of specialization. After the defense, the student will be asked to leave the room, and the committee will then discuss the defense and vote as to whether or not the student adequately defended the thesis. The student will be called back into the room and the student's Advisor will inform him/her of the committee's decision. Note that even if the defense is successful, the student may be required to make time-consuming changes. Before the thesis is sent to the Graduate office, the Department Chairperson must sign it. The Department Chairperson's responsibility is to make sure that the thesis meets all the guidelines established by the Graduate Office. The Department Chairperson may also make suggestions for improving the thesis. Thus, after the defense, time should be allowed for making appropriate changes in time to meet the deadline for turning the thesis in to the Graduate Office.

2. Ph.D. Examinations

a. Qualifying Exam

The qualifying examination for the Ph.D. Degree consists of written and oral portions and will be given as early in the degree program as both student and committee agree that the student is ready. Generally, the student will take the exam during his or her third semester. The Ph.D. written exam will be held the third week of the semester. The oral exam will be taken during the third week after the written exam. A student's intention to take the examination must be given in writing to the Department Chairperson and to the Examination Committee by the middle of the preceding semester after consulting with his/her Dissertation Committee.

The Ph.D. examination will normally be given once every term. The scheduling of the exam for a given term is arranged during the previous term by the Examination Committee in consultation with the students involved and with the Dissertation Committee.

The written portion of the examination consists of answering questions in three (3) of the subject areas listed below:

1. Coastal Geology
2. Geochemistry
3. Geomorphology
4. Geophysics
5. History and Evolution of Earth Systems
6. Quaternary Geology
7. Sediment Dynamics
8. Stratigraphy

The student must select one primary subject and two secondary subjects and notify the Dissertation Committee and the Examination Committee in writing of the 3 selections when the student notifies the Chairperson of the Examination Committee of his/her intent to take the exam. The written examination in the primary subject will require a

maximum of 4 hours; those in each of the secondary subjects will require a maximum of two hours each. The examination will be given on two consecutive days.

Certain fields of Ph.D. specialization require knowledge obtained outside of the Geology Department. This may embrace subjects related to the dissertation research and therefore may be included in the qualifying examination. Some of these fields could include chemistry, biology, statistics, physics, mathematics, numerical methods, fluid mechanics, or soil mechanics. Other fields may also be included in the examination if they are an integral part of the student's research.

The subject areas described above are necessarily broad. Candidates will be expected to display detailed and comprehensive knowledge in their area of specialization, and a generalized familiarity (such might be obtained from a graduate level survey course in a particular topic) in other areas. The student is encouraged to discuss strategies for studying for the examination with the Examination Committee and with his or her Dissertation Committee.

The written portion of the examination will be administered by the Chair of the Examination Committee, who will solicit questions in the relevant fields from the faculty. Questions from outside committee members will be solicited by the student's major advisor. The written examination will therefore be made up of questions solicited from all faculty members and from all members of the Dissertation Committee. If more questions are submitted than can be answered within the time allowed, then the Examination Committee will select the questions for the tests. The Chairperson of the Dissertation Committee will review the written test before it is given and may make suggestions.

After the written examinations have been returned to the student, the student is encouraged to discuss the graded questions with the faculty members, prior to the oral exam, who wrote and graded specific questions. These discussions should help to clarify any deficiencies in the student's answers.

The oral portion of the examination will be given the third week after the written exam. The oral exam will be administered by the student's Dissertation Committee with the Chair of the Examination Committee in attendance. The oral portion may contain questions from any area of geologic knowledge and will be confined to evaluating the student's intellectual capabilities; discussion of other business and/or matters related to progress on the thesis is out of order. The oral examination will generally last a maximum of three hours, although longer exams may be necessary in exceptional cases.

Each student's performance on the examination will be evaluated by his/her Dissertation Committee. Performance on written and oral portions will be weighed equally. The entire examination, both written and oral portions, will be assigned a single grade, either pass or fail. Prompt formal notification of the examination results will be provided by the Dissertation Committee. Students passing the examination have qualified to continue in the Ph.D. Program. Students failing the examination may, upon written request to the Department Chairperson within two weeks of notification of failure, take the entire examination a second time the next time the examination is offered. A second failure requires dismissal from the Ph.D. program.

Regardless of the outcome, upon completion of the examination, the student will be informed in writing of the Dissertation Committee's frank opinion of his/her performance on the examination, and strengths and weaknesses in both written and oral portions, with the clear intention to encourage better and more positive development in the future.

b. Dissertation Defense

The final examination for the Ph.D. degree consists of an oral defense of the candidate's dissertation. It is the student's responsibility to publicly announce the defense at least three (3) weeks in advance and to invite (in writing) his committee and all other faculty members to the defense. A copy of the dissertation to be defended must be placed in the Department office at that time for public inspection. After the defense corrections are made and the dissertation is submitted to the student's advisor (and sometimes the committee members) for final approval. The dissertation must be submitted to the Arts and Science Dean's office on week before the Graduate Office deadline.

Speaking Experience

In order to gain speaking experience, each Ph.D. student must: (1) be a T.A. for at least one lab section or teach one of the Department's service courses (this does not constitute a financial commitment on the part of the Department), (2) give a 15-minute presentation during their second semester in residence on a topic of geologic interest (may not necessarily be related to dissertation research) (could be scheduled as part of the Department Seminar), (3) give a 45-minute talk on their dissertation research (could be scheduled as part of the Department Seminar) or a paper at a national or international professional meeting.

Admission to PH.D. Candidacy

A student who has: (1) passed the qualifying examination, (2) completed one full year of graduate work, (3) passed his/her foreign language examination if required, (4) shown ability in carrying on research, (5) had a research project approved by his/her Dissertation Committee, and (6) had a program of study approved by his/her Dissertation Committee is admitted to candidacy for the Ph.D. degree. Admission to candidacy must be achieved one full semester prior to granting of the degree. Students admitted to candidacy may then register for GEOL 969 – Ph.D. Dissertation Research. The Graduate Office must be notified of admission to candidacy by submission of a "Recommendation for Candidacy for Doctoral Degree" form. Submission of this form may result in increased stipend for a graduate student on financial aid.

Procedure used by master's degree students to apply to the PH.D. program

After, or in some cases prior to, completion of a Master's degree, candidates desiring to pursue Ph.D. studies at the University of Delaware are evaluated for admission to the Ph.D. Program. This evaluation is made by all faculty. Master's degree students wishing to be admitted to the Ph.D. Program should notify their Thesis Committee. The Thesis Committee will then submit a recommendation to the Chairperson in writing. The recommendation is then brought to the

entire faculty for vote. Criteria important for admission include grades in course work, the quality and progress of the Master's degree Program, evidence of ability to carry out highest-quality independent research and thinking, results of other evaluations mentioned above, and evidence of research. Students are advised of admission to the Ph.D. Program by the Department Chairperson.

Part-time graduate students

A part-time graduate student is one who, because of other commitments (e.g., full-time job), cannot take a full course load of nine to twelve hours each semester.

The degree requirements for part-time graduate students are the same as for full-time students. Part-time students must have an approved graduate Advisory Committee by the beginning of their fourth semester. In some cases, the Department Chairperson may delegate a faculty member, who is a potential advisor, to advise a student until the student has a formally accepted Advisory Committee established. In any case, the part-time student is responsible for meeting with the Department Chairperson at least once a semester to discuss the student's progress, until the student has an approved graduate Advisory Committee. If a part-time student does not have an accepted Advisory Committee and an approved thesis/dissertation proposal by the end of his/her fifth semester, he/she will be dropped from the Graduate Program. Part-time graduate students are expected to finish their program within five years; the Department will, however grant extensions in exceptional cases. Ph.D. students will be expected to take a least a one year leave of absence from employment in order to satisfy the University one-year residency requirement.

As most courses offered by the Department are scheduled during the day, it is incumbent upon part-time students to schedule their classes accordingly. Because most part-time students are employed by nearby environmental consulting firms, which normally encourage their employees to further their education, the Department faculty does not believe this to be a problem. The Department may, however, in some instances, schedule courses in late afternoon or early evening hours (according to instructor preference) in order to accommodate part-time students.