GRADUATE CURRICULA

All graduate students are expected to attain minimum levels of proficiency in basic science and mathematics disciplines before completing their Ph.D. qualifying exams in their second Ph.D. year. To satisfy this requirement for the Ph.D. program, students must have completed any combination of FOUR from the following SIX options before qualifying for candidacy.

A) One year of Calculus through calculus of several variables, equivalent to MATH 220, MATH 224, and MATH 230;

B) Elementary Differential Equations, equivalent to MATH 250; OR Statistics through multivariate methods, equivalent to a course sequence such as STAT 320-1 plus ANTHRO 362.

C) One year of calculus-based Physics, equivalent to PHYSICS 135-1, 135-2, and 135-3 with labs.

D) One year of Chemistry, equivalent to CHEM 110, 131 and 132, with labs.

E) Thermodynamics and/or kinetics (advanced physical chemistry), equivalent to CHEM 342-1, EARTH 302, MAT SCI 314, CHEM 303, CHEM 329, or CHEM 342-3.

F) One year of Biology, equivalent to BIOL SCI 215, 217, 219, with labs.

All students are encouraged to gain literacy in scientific computer programming (e.g., FORTRAN or a comparable language); note that some courses require programming knowledge (e.g., EARTH 323). First-year graduate students may take a maximum of half of their total credits in any given quarter as EARTH 499 - Independent Study.

ADVANCED COURSE REQUIREMENTS FOR THE PH.D. DEGREE

The department's specific Ph.D. requirements complement the more general **Graduate School's degree requirements**. The aim of these requirements, in addition to providing the training necessary for your graduate research, is to develop professional breadth through exposure to different areas of faculty expertise, to provide a deeper knowledge of other scientific and/or engineering disciplines, and to encourage acquisition of complementary knowledge and research skills.

The Ph.D. requires a total of 16 courses that should be taken within the first eight quarters of residence. These courses are grouped into three categories as follows:

Group A. Six 300- level courses in Earth and Planetary Sciences, taken with regular letter grades;

Group B. Two 300- or 400-level courses in mathematics, statistics, natural sciences or engineering, taken with regular letter grades;

Group C. Eight other courses bearing graduate credit in science or engineering, including Independent Study courses (499's), and other courses in Earth and Planetary Sciences. Other courses may be considered towards fulfillment of group C by written application to the Director of Graduate Studies. A maximum of two courses outside of EPS may be taken in this group with a P/N (pass/no pass) option.

Some graduate level courses completed to fulfill "General Requirements" may also be counted towards Group A, B, or C requirements upon approval of the Director of Graduate Studies.

Master's Degree Requirements

Students who pass the Ph.D. Qualifying Examination may apply to receive a Master's Degree from the Graduate School. Students who do not achieve Ph.D. candidacy by passing this exam may also earn the Master's Degree pending approval of the faculty. In each case, the student must meet requirements for the Master's Degree established by The Graduate School and EPS. The Graduate School requirements are summarized here. Departmental requirements for the M.S. in Earth and Planetary Sciences are the following:

• **Twelve courses** from among those bearing graduate credit in science or engineering.

• **A Master's thesis** approved by the student's Advisory Committee. The thesis is ordinarily the result of Independent Study course work (EARTH 499) taken by the student within the 12-course total and should be formulated as a manuscript of publishable quality, submitted or ready for submission to a geoscience journal.

Note: The Graduate School stipulates that no more than one-third of the courses qualifying for credit can be Independent Study (EARTH 499). Registration for EARTH 590 - Research may be approved by the Director of Graduate Studies and the primary faculty advisor, and is the only course for which the Pass/No Pass option is acceptable.

TEACHING REQUIREMENTS

Teaching experience is a crucial aspect of graduate student training and is generally required of Ph.D. students in each year in residence (exceptions apply to most first year students, students in the final stages of dissertation writing, or students with externally funded fellowships). Graduate students lead discussion or lab sections, grade homework and exams, and occasionally present class lectures. Our students have found teaching experience to be a valuable asset, and potential employers, especially in academia, commonly inquire about the quality of teaching performed by job applicants.

GRADES

Not more than two courses outside Earth and Planetary Sciences among those of group “C” above may be taken for a P/N (Pass/No Pass) grade. All other courses, including Independent Study courses (499's), are to be taken for letter grades (A, B, C, or F). The Graduate School requires that students maintain a B average; that is, any C grade must be balanced by an A. If a student receives an F or fails to make up an incomplete grade (X or Y) within one year, the student will need to register in the future for an additional course at his or her own expense.

TRANSFER CREDIT

Important rules concerning the transfer of credit for graduate work completed elsewhere are listed in The Graduate School's General Degree Requirements and Policy and Course Catalog. Transfer credit assigned by the Graduate School for Master's degree work completed at another institution is viewed only as residency credit toward the nine quarter residency requirement. Generally, a student with a Master's degree needs to complete six quarters of full-tuition registrations. The department reserves the right to require students with transfer credit to complete the full 16 courses required for Ph.D. students.

The student may petition the department for a waiver of up to three courses, which will be counted toward the requirements of course group “C” for the Ph.D. In some circumstances, the student may also petition for the transfer of credit to be counted toward some of the six-courses in group “A.” The total number of credits that may be approved against the courses in group “C” and /or “A” will not be greater than 3 courses. In such a case, the student will need to successfully complete a total of 13, not 16, courses before the Qualifying Examination.

COURSE CREDIT

Only the courses listed in the Graduate School Bulletin bear graduate credit. In sciences and engineering these are ordinarily 400-level and most 300-level courses, although not all 300-level courses bear graduate credit. Students taking courses that do not bear graduate credit (e.g., courses to obtain the minimum proficiency levels in mathematics

and science given above) must take at least three graduate courses each quarter to maintain eligibility for financial support.

EXAMINATIONS FOR THE PH.D. DEGREE

A **qualifying exam**, taken near the end of the first two years of study, determines admission to Ph.D. candidacy. A Ph.D. candidate earns the degree through successful completion of a dissertation under the direction of a faculty advisor(s). The degree is awarded following a successful **defense** of the dissertation before a dissertation committee, appointed by the Director of Graduate Studies.