INTRODUCTION

The goal of the Master’s program is to help students develop as scientists, teachers, and independent thinkers. Our graduates will have a thorough grounding in the scientific method and solid experience conducting scientific research. Equally important, they should become “lifelong-learners” who will know how to obtain needed skills and apply them to solve any problem. This gives them flexibility that allows them to adapt to the new opportunities and requirements of rapidly evolving global demands for a broad understanding of Earth science. To support this flexibility, we expect our students to be grounded in supporting disciplines (e.g. math, biology, chemistry, physics) as well as having breadth and strength in geosciences.

The requirements for the degree are intended to ensure that progress toward the degree is as efficient as possible and that the quality of graduate work is high. Progress in completing these requirements will be monitored by the student's advisory committee, the Director of Graduate Studies, and the Department as a whole. We emphasize that, although the Department takes advising and monitoring very seriously, a central aspect of graduate education is developing independence and coping with new challenges – including but not limited to facing scientific questions that have no clear cut 'right' answers, and organizing projects on a relatively long time scale.

Note that requirements listed here do not supersede, but rather augment, the requirements of the Graduate School (see the Grad School Bulletin, "Academic Regulations").

GENERAL REQUIREMENTS

The Master's degree requires a total of 24 semester hours of graduate credit. All 300 level EES courses are offered for graduate credit, as are 200-level courses that are not required for the undergraduate major. Required undergraduate 200-level courses (currently Earth materials, Life Through Time, Petrology, Sedimentology, and Structural Geology) may also be taken for credit with approval of the Advisory Committee. Check the Bulletin for the graduate-level status of courses outside the department.

A minimum of 6 hours of graduate credit is required in any combination of courses satisfactory to the student's Committee outside the field of major interest. These courses can be selected from
within the Department in fields outside the area of specialization or from offerings of other departments. Most students will take more than 6 hours of non-specialty credit. Decisions about acquiring appropriate breadth will be made by the student in consultation with her/his Committee.

The thesis must be approved for content and clarity by at least two full-status members of the Department of Earth & Environmental Sciences (the thesis advisor and the second reader). Additional readers from inside or outside the Department can provide input on and sign the thesis if the advisory committee approves them. The Graduate School must approve the format of the final version of the thesis (keep this in mind as you complete the thesis -- be familiar with the regulations!).

MONITORING PROGRESS, RELATED REQUIREMENTS, AND DEADLINES

At the Start

Entrance Examination: A general test will be given to all new grad students during the week before registration for their first semester. This test is aimed at assessing students' general backgrounds and giving them an idea of what will be expected of them as graduate students – and also to encourage them to review what they have learned prior to entry into graduate school. The results of the test will be useful in advising students about course selection, teaching, and research directions, and we also intend it to facilitate the initiation of discussion with faculty and the general practice of asking questions and self-assessment.

Meeting with Faculty Members: Also during the week before the first semester, new students will meet with the Director of Graduate Studies and with all of the faculty. Meeting with the DGS will facilitate planning for the beginning of graduate work. The purpose of visiting each faculty member is for students to get to know all of the faculty and to get an idea of what each offers in the way of teaching and research.

Advisory Committee

The Department Chair and Director of Graduate Studies, in consultation with the student, will appoint an Advisory Committee by early in the first semester. This Committee will have at least three faculty members, at least one of whom will represent a specialty outside of the student's probable field of interest. The student will consult with the committee regarding course selection, research direction, and other academic and research matters. The Committee will meet formally with the student once each semester. Additional meetings may be requested either by the student or a member of the Committee. The Advisory Committee will closely supervise the student's general research and thesis
proposition and will monitor subsequent progress on the thesis. After a thesis topic and supervisor are chosen, the supervisor will be added to the Advisory Committee (if the supervisor is not already on the Committee). The second reader for the thesis should have some expertise and interest in the area of research and need not be part of the Committee; he or she should be selected well before the thesis is complete.

THE THESIS

Students should begin exploring possibilities for thesis research upon arriving at Vanderbilt. They will generally choose an advisor they feel comfortable working with and who works in a field that interests them before defining a thesis topic, in most cases during first semester or early second semester. Each student must select an advisor and a general topic for thesis research before the end of the second semester.

Advisor

The thesis advisor will be chosen from among the members of the graduate school faculty within the department. An external faculty or staff member cannot be a primary thesis advisor, but may play a secondary, advisory role. Students should keep in mind that Vanderbilt does not require faculty members to accept the role of thesis advisor. A faculty member may choose not to for many reasons, including proximity to retirement, insufficient research funds, sabbatical leave, too many current students, or lack of interest or expertise in the proposed project.

Topic

After choosing an advisor, students choose a thesis project in close consultation with that advisor. Formulating a successful thesis project is an important challenge. Most Master’s students develop a thesis project in close consultation with a faculty member. Using the experience and savvy of a faculty member helps students to formulate successful thesis topics and avoid time-consuming dead-ends. However, most faculty members are open to the possibility of advising a student-conceived thesis if it interests them and they feel qualified to do so and it appears that necessary resources are available. Students who choose to develop their own thesis topic should do so only with the active involvement of an advisor.

The thesis project gives students the opportunity to do original research in their field of choice. The following Table should help clarify what a thesis project should and should not be:
Students use many criteria to choose their thesis projects. Some criteria are better than others because they have a higher probability of producing exciting, quality research and excellent experience within a two-year period. A project should be chosen that:

- can be done with the advisor of choice.
- is interesting to both student and advisor.
- can be completed within two years.
- can be accomplished with existing resources (funds and facilities), or with resources that can realistically be expected in the requisite time frame
- tests an interesting scientific hypothesis or answers an important scientific question.

Finally, students should not take a narrow view of potential thesis topics or rush to choose one without considering all of the options. Every student should take the time to talk to all faculty members about possible projects.

The end-result of the thesis work should be a self-contained study that contains new results or data and conclusions that are well supported and significant to the Earth sciences. Thesis work should involve formulating and conducting tests of working hypotheses, the results of which should lead to conclusions on the validity of the hypotheses. Students should always keep the goal of the study in mind to avoid wasting time and to ensure a successful completion of the project. Theses should aim for results that will be publishable in a scientific journal.

**Proposal**

The Thesis Proposal is a clear plan-of-attack on a thesis problem. The proposal need not be long -- 3 or 4 pages of text plus necessary maps and/or figures and a brief bibliography is sufficient, and it should not exceed 7 double-spaced text pages -- and it should not be a progress report on a thesis already well underway. It should demonstrate that the student is familiar with the significance of the problem and with the relevant literature and methods, and that she/he is aware of pitfalls and is...
realistic about the scope of the project. It should be written to communicate well to geoscientists in general (think of yourself before you entered grad school, or your graduate colleagues, or faculty with very different expertise) - this is both to ensure that you understand your approach and the significance of your research well, and to provide practice for the most important ways in which you will communicate in the future. The proposal must also make clear how the research is of interest and importance to the broader geoscience community (and ideally to non-scientists), not just to the student and advisor.

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****Don’t put your proposal off until your thesis is well under way – it is a plan that will help you to carry out the project and help the faculty to advise you, not a report to show what a great thesis you are doing. If you are establishing your thesis direction early - say, during Fall semester or early Spring semester - write your proposal then!****

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The student should use the Advisory Committee as a major resource in writing the Proposal. The Committee will carefully evaluate the Proposal. Final approval will be by the full faculty. The deadline for submission of the proposal to the Committee is June 1 of the first academic year in the program. We urge those who settle on a topic early to submit their proposals earlier!

Presentation of the Thesis

A formal presentation of the methods and findings of the thesis, similar to a GSA or AGU presentation but longer (about 30 minutes) and keeping in mind the diversity of the audience (all faculty and grad students and some undergrads and others), is made when the thesis is at the first-draft stage. The Presentation should be scheduled well in advance (preferably at least a week), at a time convenient to faculty and students, and a brief abstract must be given to the faculty at least one day before the presentation. The student should present results smoothly, clearly, and thoroughly, but be prepared for constructive criticism which will lead to improvement of the final thesis.

CRITERIA FOR ADEQUATE PROGRESS

Students must complete their course work with satisfactory grades (a 3.0 - straight B - average is required by the Graduate School), meet proposal deadlines, and make progress on the thesis that keeps them on track for timely completion. Furthermore, they must fulfill their duties as teaching and research assistants effectively and responsibly – this is both an obligation in connection with their financial support and an essential part of their graduate education. The Chair, Director of Graduate
Studies, and the Advisory Committee will all monitor progress – but a critical part of graduate education is also self-monitoring. Inadequate performance and/or insufficient progress could result in termination of support or, in extreme cases, in termination as a graduate student.