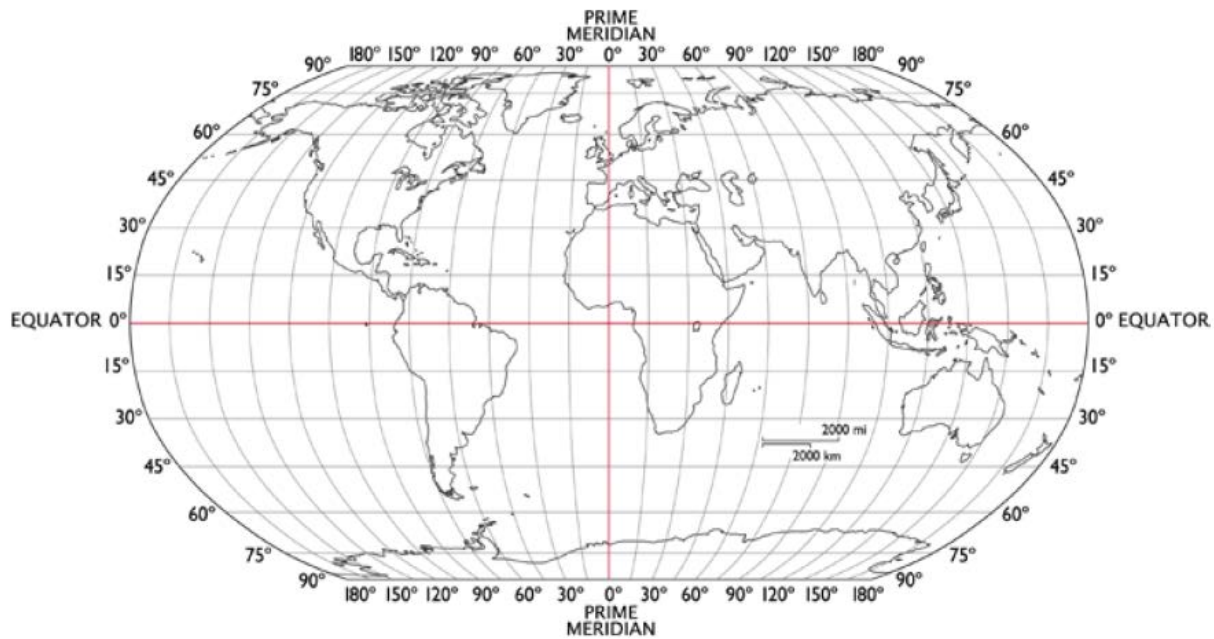


EARTH SCIENCES



GRADUATE STUDENT HANDBOOK

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INTRODUCTION

This handbook provides graduate students in Earth Sciences with policies and procedures that relate to the academic program and facilities of the Earth Sciences Department. The handbook serves as a guide for graduate students toward completion of their degree requirements within the allotted time periods. The policies and procedures contained in the handbook supplement those of the Graduate School as published in the Graduate Catalog (http://www.memphis.edu/gradcatalog/degree_planning/cas/esci.php) and in the University of Memphis Student Handbook (<https://www.memphis.edu/osa/pdfs/csrr.pdf>). The student is responsible for knowing and complying with the published regulations of the Graduate School. The official version of this handbook is on the Earth Sciences website (https://www.memphis.edu/earthsciences/pdfs/graduate_student_handbook_2016.pdf) and available from the Academic Services Associate. All current copies of forms and checklists may be found here (https://www.memphis.edu/earthsciences/student_resources/index.php)

The Earth Sciences Graduate Program Committee oversees the graduate program related to the three broad disciplines of Archaeology, Geography, and Geology within the department. The committee contains one Representative from each discipline. One member of the committee serves as both the committee chair and the Earth Sciences Graduate Coordinator. The primary tasks of the Earth Sciences Graduate Program Committee are overseeing student recruitment, setting standards for admission to the graduate program, recommending teaching assistantships within the appropriate discipline, appointing temporary Masters and Ph.D. advisory committees with the appropriate discipline, and assisting the scheduling of all graduate classes.

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UNIVERSITY POLICIES

Graduate students should refer to the Graduate Catalog (<http://www.memphis.edu/gradcatalog/>) and the University of Memphis Division of Student Affairs (<http://www.memphis.edu/studentaffairs/>).

Residency Requirement

At present, there is no residency requirement for the MS and MA degrees. Ph.D. candidates must commit to full-time study for a minimum of two successive semesters after admission to the Earth Sciences degree program to fulfill the residency requirement.

Transfer Credit

In order for courses to transfer from other institutions they must 1) not have been used to earn a previously awarded degree, 2) relate to the content of the graduate program, 3) not exceed the time limits set for the masters and doctoral programs. A course will not transfer if the associated grade is below a “B” (3.0). Credits earned at another institution must be presented for evaluation no later than the end of the student’s second semester of enrollment. Approved transfer credit may be accepted for as much as one half of the semester hours required for degree (either 16 or 18) for course credit toward a master’s degree. The student’s advisory committee will determine the number of credit hours that should transfer, based upon the content of the courses taken previously. The committee will write a memo of justification to the Graduate School requesting approval of the transfer credit. The Graduate School makes the final determination.

English Competency

Graduate students will be expected to demonstrate proficiency in verbal communication of scientific information and ideas in formal and informal professional meetings. The important settings in which verbal skills are needed are oral exams, oral presentations at the U of M, scientific meetings, and teaching assignments. We expect spoken English to be of sufficient quality that listeners can concentrate on data and ideas rather than on the form of delivery, and that questions addressed to the student are readily comprehended. We expect oral presentations to be organized in a logical sequence. We also expect students to perform with a uniform standard of quality in writing. Documents should demonstrate correct grammar, spelling, and punctuation. Clear organization, proper paragraph and sentence structure, logical sequences of thought, clarity, and avoidance of jargon and colloquialisms are expected in all formal written documents.

International Students

International students must attend a mandatory set of meetings at the start of the first semester that are presented by the International Student Office. Topics addressed include INS laws, health insurance, social security, tutoring, TB test scheduling, and the SPEAK test. International students for which English is not their native language are required upon arrival by the department to take the SPEAK test offered by the Center for Academic Excellence. Students who have scored 26 or higher on the speaking portion of the TOEFL iBT are not required to take the SPEAK test. The SPEAK test is a verbal examination used to determine English competency. If a student fails the test, a remedial course will be suggested. The student must enroll in this course or use other learning techniques (at his/her own expense) to improve language skills. A Ph.D. student must pass the SPEAK test after one year of residence in order to remain on graduate assistant support. If the test is not passed after one year, the student’s advisory committee may recommend that external support continue, but the SPEAK test must be passed in order to receive the Ph.D. degree. Teaching Assistants must pass the SPEAK test before entering the classroom.

Sexual or Racial Harassment

Earth Sciences faculty and students come from many different backgrounds and work in different regions of the world. This diversity contributes to the advancement of knowledge and, as such, the Earth Sciences faculty is committed to establishing an atmosphere that nurtures and increases diversity. Such an atmosphere must be free from harassment of any kind.

Harassment or discrimination against any member of the University community on the basis of sex or race is against University policy. Such actions are prohibited not only by University policy but also by Title VII of the Civil Rights Act of 1984 as amended, and Title IX Educational Amendments of 1972. Violation of these Acts may subject the University and/or individuals to disciplinary action and may have legal consequences.

Harassment is defined as any person's conduct that unreasonably interferes with a student's status or performance by creating an intimidating, hostile, or offensive working or educational environment. Sexual harassment is defined as unwelcome sexual advances, requests for sexual favors and other verbal or physical conduct of a sexual nature when submission of such conduct is made either explicitly or implicitly a term or condition of an individual's status in a program, course, or activity. Sexual harassment encompasses any sexual attention that is unwanted and can take many forms. For a more explicit definition and more examples please see the University Policy Manual.

(<http://policies.memphis.edu/>)

Harassment on the basis of race, color, or national origin, includes offensive or demeaning treatment of an individual, where such treatment is based typically on prejudiced stereotypes of a group to which that individual may belong. Please see the U of M Policy Manual (<http://policies.memphis.edu/>) for a more detailed explanation.

The University encourages prompt reporting of harassment and prompt resolution through University procedures. All complaints, other than those involving complaints against another student, should be directed immediately to the University Affirmative Action Officer, Administrative Building, Room 156. Complaints against another student can be directed to the Assistant Dean of Students for Judicial Affairs, University Center, Room 359.

GENERAL PROCEDURES

A. Academic Integrity

The community of scholars at the University of Memphis is committed to the development of personal and academic excellence. Graduate students, by virtue of their maturity and experience, are expected to have learned the meaning and value of honesty before entering Graduate School. Each graduate student and faculty member is expected to assume personal responsibility for the encouragement and promotion of the highest ethical and moral academic standards. Each faculty member must establish a collegial environment that will encourage students to strive for these high ideals. Mentoring students in pursuit of graduate degrees is an important function of Earth Sciences faculty. Proper mentoring requires the establishment of a working relationship based upon trust and mutual respect. Specific expectations of students can be found in the University of Memphis Student Handbook.

B. Department Admission Procedure for Degree Programs

Background Requirements for Admission

Our graduate program is very broad in nature and, as such, appropriate student background will vary considerably depending upon the interests of the student and the demands of the associated research concentration. Applicants are expected to have achieved an acceptable score on the GRE and have an undergraduate or Masters GPA indicative of their potential as a Masters or Ph.D. student. For international students, a minimum score of 550 on the paper-based, 210 on the computer-based, or 79 on the internet-based Test of English as a Foreign Language (TOEFL) is required.

Admission Selection Process

As part of the admission application process, students will be asked to submit a statement of research interests and three sealed letters of recommendation to the Earth Sciences departmental office (Room 111, Johnson Hall, University of Memphis, Memphis, TN 38152). Based upon this information, and all other relevant materials, the Earth Sciences faculty members will review completed applications. The Graduate Coordinator, in consultation with the Earth Sciences Graduate Program Committee, will make a decision about admission based upon the faculty review and the willingness of a faculty member to serve as the temporary advisor. Applicants to the Ph.D. program are urged to contact faculty members and discuss specific research interests and projects. Students may not appeal if their application is declined, but may reapply at a later time.

C. Advisors and Committees

Faculty Advisors and Advisory committees

Upon arrival, a student will be assigned a temporary advisory committee consisting of three to five faculty members. The committee will contain a temporary advisor within the discipline selected by the student. The purpose of the temporary advisory committee is to assist the student in selecting appropriate courses for the first semester. This committee will review the student's academic background, prior course work, research experience, and intended area of study (if known). The committee will be available to answer any questions posed by the student. The committee, rather than the temporary advisor alone, has the authority to make decisions regarding the student's selection of courses. The temporary committee will complete a Program Planning & Progress Report form indicating the student's selected courses. This form must be signed by the Graduate Coordinator and will be entered in the official student file. The committee must approve any modifications to the academic program and update and sign the Program Planning & Progress Report form. The signed form must be submitted to the Earth Sciences Academic Services Associate for the student's file in the Earth Sciences main office at 111 Johnson Hall. MS and PhD candidates who have completed all requirements other than the defense are required to contact their respective committees with an update on thesis/dissertation progress and to receive approval from their committees before being permitted to sign up for the hour of thesis or dissertation.

The student is urged to select a major advisor and permanent committee as soon as possible. For students entering the program in the fall semester, the temporary committee will be dissolved at the start of Spring Break and a major advisor and committee must be selected by April 1st. For students entering the program in the spring semester, the temporary committee will be dissolved by the 15th of November and a major advisor and committee must be selected by December 1st. The permanent committee should bring broad perspective to the student's research and curriculum program. MS or MA students must have at least three faculty members on their advisory committee, and Ph.D. students must have at least

five faculty members on their advisory committee. One member of the advisory committee for a Ph.D. student must be external to the student's discipline. Ph.D. students are also encouraged to have one person external to Earth Sciences on their permanent advisory committee.

Choosing an Advisor

A student needs to identify a member of the Earth Sciences faculty within their discipline that will serve as his or her graduate advisor. The student will work closely with the advisor to identify appropriate members for his or her advisory committee. The student's advisor and advisory committee will work with the student to develop a research project, choose appropriate courses to take, and complete a thesis or dissertation.

A change of major advisor can occur for many reasons. Sometimes the research topic becomes unmanageable, leads to a dead end, or becomes undesirable. Students should be aware of other research projects available to them and should feel free to switch topics and advisors within their discipline. In other cases, a student and advisor simply do not get along. In this case, discuss the matter with a member of the Earth Sciences Graduate Committee. This person will act as the student's advocate and discuss the problem with his or her advisor. Often, these problems can be worked out to the benefit of all, but sometimes a change in advisor may be recommended. A change in the advisor and/or permanent committee members requires the written recommendation of the Graduate Coordinator and the approval of the Earth Sciences Chair.

A change of major advisor may also result in a change in Earth Sciences discipline. Because a change in discipline within Earth Sciences may involve a change in the source of financial support, students wishing to switch disciplines should discuss this option with both the Earth Sciences Chair and the Earth Sciences Graduate Committee representative of the new discipline that they wish to enter. Such discussions in advance of a change in discipline will help ensure a smooth transition of financial support, if available, at the start of the appropriate semester when the switch to a new advisor is made.

Adjunct Professor Advisors

A strength of Earth Sciences is that a number of resident research scientists have adjunct status and hold full graduate-faculty appointments. Individuals holding these appointments are expected and encouraged to participate actively in the graduate program, serve on academic committees, and interact with students and faculty. As such, they may serve on doctoral and masters committees and teach courses authorized by the Earth Sciences. Generally, only full graduate faculty members can chair Ph.D. committees, full and associate graduate faculty members may chair M.A. and M.S. committees. Consult the Graduate Faculty directory (https://www.memphis.edu/gradschool/resources/graduate_faculty/cas/ersc.php) to determine the current membership status of given faculty when determining the members of your permanent committee. Adjunct research co-mentor members of the graduate faculty may serve as co-chairs on M.S., M.A., and Ph.D. committees. Only one adjunct or affiliated graduate-faculty member may serve on a student's committee.

D. Course Loads and Expectations

Course Schedule Planning and Program Progress

Each student will meet with his/her Masters or Ph.D. advisory committee to determine a course schedule for the following semester and discuss the student's progress in their degree program. Committee members and the student will discuss appropriate coursework for their degree program and indicate the course schedule for the following semester on the Program Planning and Progress Report form. After

discussion between the student and committee members, the advisor will summarize on the Program Planning and Progress Report form the progress that the student is making in their degree program. The student and the committee members must sign the form, which will then be submitted to the Academic Services Associate in Johnson room 111 for inclusion in the student's academic file. The committee and the Graduate Coordinator must approve any modifications to the academic program. An updated Program Planning and Progress Report form, signed and dated, must be submitted to the Academic Services Associate.

Credit Loads

Earth Sciences graduate assistants supported by Earth Sciences teaching/research assistantships at the normal half-time level (20 hours/week) are required by the University to register for 9 credit hours per semester. A student supported by external funds or by a fellowship may register for 9 credits per semester if their advisory committee determines that this is acceptable. Graduate students registered for 9 or more credit hours are considered to be full-time students. University-supported graduate students who have completed their course work and are registered for 6 thesis or dissertation credit hours are also considered to be full-time students.

E. Academic Review and Records

Review of Academic Progress

Each student will discuss progress in their degree program with his or her Masters or Ph.D. advisory committee when the committee meets to determine a course schedule for the following semester. The progress summary, which is to be completed by the advisor after discussion with the student and committee, will be included on the Program Planning and Progress Report form. The progress summary is an evaluation of the student's progress and serves as a basis for the student's request for assistantship appointment or reappointment. In order to be making satisfactory progress, a student must maintain at least a 3.0 GPA in all graduate courses completed and must be completing tasks according to the timeline specified in the Graduate Student handbook. The Graduate Coordinator will review the Program Planning and Progress Report forms and make a determination of whether a student is making acceptable or unacceptable progress. If the student's progress is deemed unacceptable, the Graduate Coordinator will meet with the student's advisor and advisory committee to recommend whether the student's financial support or academic program, or both, will be terminated. Termination of a student from the Earth Sciences academic program can only be done with the written recommendation of the Graduate Coordinator and the written approval of the Earth Sciences Chair. The student will be informed of the results of the evaluation, and a copy will be placed in the student's academic file. The student may have the right to appeal to the Graduate School if the reason for termination is for other than insufficient GPA.

The Student File

A file is maintained in the Earth Sciences office (room 111, Johnson Hall) for each student that contains application materials, assistantship appointment papers, transcripts and grade sheets, progress reports, thesis proposals, results of candidacy examinations, all official communications to the student, copies of fellowship applications, and communications with the Graduate School. Faculty comments written on comprehensive and qualifying examination papers and on fellowship applications will be preserved in this file. A student has the right to review material in his/her file. When the degree is awarded, all material other than application materials, assistantship appointment papers, transcripts and grade sheets will be removed and any unofficial copies of the file used by the advisor or committee members will be destroyed.

Length of Time and Support for a Degree

Graduate programs should be planned to require no more than two years for the Masters degrees and three additional years, or a total of five years, for the Ph.D. degree. The five-year period also applies to those who bypass the Master's degree. For students entering the department with the M.S., acquiring the Ph.D. degree should take no more than four years. Earth Sciences departmental support for M.S. students is generally only four semesters and that for PhD students is only for 6 semesters. Requests for support beyond the above limits from a departmental source must be submitted in writing by the student's advisor to the Graduate Coordinator. Each request should include a concise statement explaining why the student was unable to complete the degree program in the allotted time and the need for further departmental support. A request should be submitted for each subsequent semester if aid is needed. Decisions on support beyond the normal limits will be based on criteria to include: availability of funds, number of semesters over the limit, student expertise, research institute/center and/or departmental needs, scholarship, and financial need.

F. Financial Support and Assistantships

Financial Support for Graduate Students: Basis of Support

Earth Sciences and affiliated research centers/institutes are committed to providing financial support for graduate students who are admitted with support and are making satisfactory progress toward completion of their degree. Those commitments are contingent upon availability of funding from three main support mechanisms within the department: (1) Earth Sciences teaching assistantships; (2) research center/institute assistantships; and (3) internships and other funding from external sources. It is the expectation of Earth Sciences that Ph.D. students will spend no more than 6 semesters on departmental or research center/institute assistantships with the rest of their support coming from external research assistantships or fellowships.

Admission to the Earth Sciences graduate program will not guarantee financial support. Support will be awarded on a competitive basis. Students admitted without support may later apply for support and such decisions are normally made in conjunction with decisions to award support to new applicants to the graduate program. Occasionally, support may be given in a temporary (semester) basis as particular needs in a research project arise. P.I.s of projects may also pay hourly wages to students without support as needs arise.

Teaching Assistantships: Earth Sciences teaching assistantship funding is normally available for 4 semesters for M.S., and 6 semesters for Ph.D. students. Teaching assistantships typically are used to support laboratory-instruction for general education courses. Ph.D. students may be assigned to teach lecture sections of these courses.

Research Assistantships: Research center/institute assistantships are intended to support faculty, research facilities, and operations within that research entity; thus, students with research center/institute assistantships must have an advisor affiliated with that facility. Faculty members may also provide research assistantships to students in Earth Sciences or other graduate programs using funds derived from external sources. Normally the faculty member providing support will serve as the major advisor.

Duties of Graduate Assistants

Graduate students supported by Earth Sciences teaching assistantships are required to teach as many as three undergraduate laboratory sections each semester. Teaching assistants may also be requested to assist with other duties, such as helping with departmental events, grading or proctoring of exams. Each teaching assistant is required to attend the Teaching Assistant Orientation Workshop, which is sponsored by the Graduate School, prior to the start of their first teaching assignment. A copy of the workshop schedule will be provided and specific responsibilities of teaching assistants will be further elucidated in the initial meeting of teaching assistants held each fall or spring semester during or before the first week of classes.

Research assistantship duties require 20 hours per week at the half-time support level. Assistantships are made for the periods September 1 – December 31, January 1 – May 31, and June 1 – August 31. Students who are supported on assistantships are expected to be available for assignments during the entire employment period; permission must be obtained from the thesis advisor or the person providing support to be unavailable on days other than official U of M holidays. Note that the entire break between Fall and Spring semesters is not designated as an official holiday.

G. Other Student Issues

Graduate-Student Representatives at Earth Sciences Faculty Meetings

Two graduate students, if duly elected by their peers, may attend open Earth Sciences faculty meetings in order to express student opinions and concerns and to ensure that graduate students are kept informed of decisions made or considered which might affect them. Unless specifically invited, the student representatives will not attend closed faculty meeting sessions such as those devoted to new graduate student selection, discussion of specific faculty members for tenure and promotion, etc. The graduate student representatives should be selected by a majority vote of the graduate students at the meeting at the start of the fall semester each year.

Conflict Resolution

Situations that are stressful can arise in any work environment. Conflicts other than sexual or racial harassment can be discussed with other students, faculty, staff, a member of the Earth Sciences Graduate Program Committee, or the Earth Sciences Chair. Occasionally, it may be a more appropriate avenue for conflict resolution to follow the procedure given in Appendix A.

Health Insurance

All international students and their dependents are required to have health insurance coverage and are responsible for purchasing health insurance upon arrival at the University. The University of Memphis has partnered with Church Health Center to offer Memphis Plan health coverage to all domestic graduate assistants. Please consult the Graduate School websites for pertinent information on eligibility and costs (http://www.memphis.edu/gradschool/current_students/ga.php). This policy will provide adequate coverage at a low rate. International students who do not purchase the preferred policy must demonstrate that the policy they have chosen is comparable in coverage to the Memphis Plan preferred policy.

Presentation of Student Research

Masters and Ph.D. students are encouraged to present their research at professional meetings of their discipline. The University sponsors an annual event, the Student Research Forum, which provides a

multidisciplinary showcase for graduate student research. Awards are presented for the best posters and talks. Masters and Ph.D. students are encouraged to participate at least once.

H. Graduate Programs

GIS Certificate Program

- Requires completion of 12 hours of approved GIS-related course work. May be done concurrently with a graduate degree program. The graduate student's advisory committee will determine if some or all of the certificate hours can overlap with the student's degree requirements.

Graduate Degree Program Options

Several graduate programs are offered in the Department of Earth Sciences:

- **Master of Arts in Earth Sciences:** Non-thesis degree track that requires completion of 36 credit hours and a research project or internship
- **Master of Science in Earth Sciences:** Requires completion of a thesis and 32 credit hours. Concentrations in Archaeology, Geography, Geology, and Interdisciplinary Studies are offered.
- **Doctor of Philosophy in Earth Sciences:** Requires completion of a dissertation, submission of two manuscripts for publication in peer-reviewed journals, and 72 total post-Baccalaureate credit hours.

The specific requirements of each program of study are detailed in the section below for that degree. Aspects of the graduation application and final document preparation are described below.

Application for Graduation

Do this before the start of the semester in which you intend to graduate (check exact deadlines at http://www.memphis.edu/gradschool/current_students/graduation_information/graduation_deadlines.php). Two forms must be filled out by Masters and Ph.D. candidates: 1) Candidacy Form and 2) the Intent to Graduate Card. These forms are available on-line at the Graduate School website.

Writing a Thesis or Dissertation (M.S. or Ph.D. in Earth Sciences)

Writing a thesis or dissertation usually takes much more time than a student anticipates. Some of the additional time is imposed by corrections to drafts. However, most of the additional time is taken up by unexpected problems that arise as the writing progresses. For example, students often discover a problem in their analysis and must begin a new round of analysis or computations. This is normal and happens to most scientists when they think a project is complete. The correct approach to completing a thesis or dissertation by the expected defense date is to begin writing as early as possible. For a Masters student completing a thesis by the end of the spring semester, writing should begin no later than the previous fall semester. For a Ph.D. student completing a dissertation by the end of the spring semester, writing should begin 6 months to a year before the start of the spring semester.

Thesis or Dissertations with Separate Research Chapters

Thesis or dissertations consisting of chapters representing separate research papers that are or will be published in journals are becoming increasingly common. This differs from the traditional thesis or dissertation that is monograph-like and is rewritten for publication. The main criterion for deciding whether a published (or about-to-be-published) manuscript may appear in the thesis or dissertation, in part or in its entirety, depends upon whether the thesis or dissertation is considered the primary source for the journal articles. This ensures that all work is a product of the Masters or Ph.D. study.

If a journal-ready style is chosen for the thesis or dissertation, a memo or letter, signed by the student's committee chair noting the style must be prepared and submitted to the Graduation Analyst in the Graduate School. A hardcopy or electronic file of the chosen style guide must be provided, if the Graduate School style guide is not chosen. If pre-published work is included in the thesis or dissertation, it must be consistent with the rest of the document, so that the result is a cohesive document with an introduction that provides a framework for linking the chapters and conclusions. Thus, the thesis or dissertation provides a source for those who want to study the research in greater detail than can be found in a journal article.

Multi-Authored Papers Submitted as Portions of a Thesis or Dissertation

The student must be first author on all published or about-to-be-published manuscripts that form a portion or portions of the thesis or dissertation. Additional precautions apply. The department accepts multi-authored material in a thesis or dissertation if the candidate is first author of the material and if the candidate's contributions are clearly and fully indicated in a preface or introduction. In particular, the contributions of each author in each chapter to data acquisition and data analysis should be properly attributed. Advisory committees should specifically address such contributions and reach a consensus that the candidate's contributions represent independent work in data acquisition, data analysis, and writing (subject to normal review by the advisor, committee, and colleagues).

Submission of Two Manuscripts for Publication in Peer-Reviewed Journals

The student must submit two manuscripts for publication in peer-reviewed journals to complete their Ph.D. program. The student must either be the sole or lead author on each manuscript. The manuscripts may be on work unrelated to the student's dissertation research; however, publication of the student's dissertation research is encouraged. Although the manuscripts should be of sufficient quality to warrant publication, acceptance for publication in a peer-reviewed journal is not required for completion of the degree.

The State of the Thesis or Dissertation at the Time of Defense

The expectation by the Earth Sciences faculty is that the thesis or dissertation draft presented to the student's advisory committee will be a final draft version. To ensure this goal, the advisor may have to

read several drafts of the work prior to submission to the committee. The advisor must determine that the thesis or dissertation is grammatically correct as well as scientifically correct before it is presented to the committee. Scientific ideas in a thesis or dissertation must be clearly stated in correct grammar. Unless unanticipated problems arise during the defense, the defense copy and the final submitted copy should be substantially the same. The defense copy should contain appropriate notes, bibliography, tables, figures, etc. Both the advisor and student are responsible for ensuring that all committee members receive a copy of the draft, and that there has been adequate consultation with committee members well in advance of the thesis or dissertation defense. If a copy of the thesis or dissertation submitted to a committee member is not in suitable form, the member should return it to the student and, if necessary, the defense should be rescheduled. If a previous draft was read and comments were submitted to the student, then the student should have either incorporated the comments into the thesis or dissertation or should have supplied justification as to why the comments were not incorporated.

Committees have considerable latitude on the issue of scientific content of a thesis or dissertation (as opposed to the clear statement of scientific ideas). Some committees will want to settle questions or disagreements about scientific approaches and conclusions before the defense. Others may prefer to defer some or all such questions to the defense. The advisor, committee and student should agree on the proper venue for discussion of such questions but should adhere to the standard that the defense copy and the final submitted copy should be essentially the same. Clearly, if there is a major disagreement among committee members regarding scientific content, then the material in question should be resolved prior to the thesis or dissertation defense.

Submission of the Thesis or Dissertation to the Advisory committee

The student must provide a copy of the draft to each member of the committee as least 14 days prior to the date of the examination. The copy of the thesis or dissertation presented must be complete in every detail and in suitable form for presentation to the Graduate School. Very few changes should need to be made in style or content of the thesis or dissertation after the defense. The student will be asked to sign a Defense Authorization form at least 30 days prior to the scheduled defense, acknowledging that he or she is familiar with the standard expected for thesis/papers at the Department (as indicated on the form). The advisor will poll the student's advisory committee members and assess whether a majority of the committee agrees that the thesis or dissertation is in defensible form. If a majority do not support defense of the thesis or dissertation, the student and advisor must meet with the advisory committee to determine what changes need to be made to achieve a defensible thesis or dissertation.

Electronic Submission of the Thesis or Dissertation

When submitting the thesis or dissertation to the Graduate School, the student must also submit to the Graduation Analyst:

- a. A memo or letter, signed by the student's advisory committee chair noting the style chosen (if one is not provided, the Graduate School style guide will be used).
- b. Hardcopy or electronic file of the chosen style guide if the Graduate School style guide is not chosen.
- c. A completed thesis/dissertation checklist.
- d. A completed thesis/dissertation committee form.

Dissertation and thesis documents only will be submitted by the student to the Graduate School via this email address: gsgraduateanalyst@memphis.edu

In addition, Master's students must submit an unnumbered abstract of not more than 150 words; Ph.D. students must submit an unnumbered abstract of 350 words or less. The University will publish the Ph.D. abstract. The following information must be provided to the Departmental Administrator for inclusion in the GeoRef Information System: a copy of the title page and abstract, the number of pages, references, plates and the number, type and scale of fold-out-maps. One copy of the thesis or dissertation will be placed in the Earth Sciences archives.

Costs of Thesis or Dissertation Preparation

The student will bear all costs (i.e. word processing, illustrations, binding) for the preparation of the document for the Graduate School. The Department will pay for one copy for the student, one copy for the Earth Sciences archive. Additional copies, if required by the advisor of the research project, will be paid for by the advisor.

I. Student Progress through the Graduate Program

The following charts are provided to assist students in meeting important deadlines. The M.A. is similar to that of the M.S, except that the student must complete either a research project or internship. The M.S. and Ph.D. Checklists contain more specific information and additional requirements (see Appendix B).

Master's Degree Deadlines

Task	Student entered program in the Fall semester	Student entered program in the Spring semester
SPEAK test (if English is not native language).	August	January
Meet with the temporary committee.	August	January
Enroll in and complete ESCI 7000, Art of Earth Science.	Second semester	Second semester or first available offering
Select major advisor and permanent advisory committee; meet with committee to discuss research interests.	April 1, second semester	December 1, second semester
Write thesis proposal; present to the student's advisory committee for approval (thesis option only).	End of first Spring semester or after completion of 18 graduate credit hours	End of first Fall semester or after completion of 18 graduate credit hours
Submit thesis proposal and Proposal Defense form, signed by your committee to the Graduate Coordinator.	End of first Spring semester	End of first Fall semester
Remove all undergraduate deficiencies.	End of first Spring semester	End of first Fall semester

Present Thesis Proposal orally to Earth Sciences Department and public.	During the second Fall semester	During the second Spring semester
Take Comprehensive Exam.	Before the end of the second Fall semester, but after completion of 18 graduate credit hours	Before the end of the second Spring semester, but after completion of 18 graduate credit hours
Fill out Intent to Graduate and Candidacy forms.	Beginning of second Spring semester or after completion of 24 graduate credit hours (M.S.) or 28 credit hours (M.A.)	Beginning of second Fall semester or after completion of 24 graduate credit hours (M.S.) or 28 credit hours (M.A.)
(M.S. only) Present research at a professional meeting or the U of M Student Research Forum.	During second spring semester	During second Fall semester
Complete all graduate course work.	End of second Spring semester	End of second Fall semester
Defend thesis or complete research project or internship.	Before the end of second Spring semester	Before the end of second Fall semester

Note: a student must be registered during the semester containing the thesis defense.

Ph.D. Degree Deadlines

Task	Student entered program in the Fall semester	Student entered program in the Spring semester
SPEAK test (if English is not native language).	August	January
Meet with the temporary committee	August	January
Complete Master's degree if admission to the Ph.D. program was contingent upon this.	End of first Fall semester	End of first Spring semester
Select major advisor and permanent advisory committee; meet with committee to discuss research interests.	April 1, second semester	December 1, second semester
Remove all undergraduate deficiencies.	End of first Spring semester	End of first Fall semester
Take Comprehensive Exam.	Just before start of second Fall semester	Just before start of the second Spring semester
Write Dissertation Proposal; present to the student's advisory committee for approval.	End of second Fall semester	End of second Spring semester
Submit approved proposal and Proposal Defense Form signed by all members of the permanent advisory committee, to the Graduate Coordinator and the Earth Sciences Chair for their approval.	End of second Fall semester	End of second Spring semester
Present Dissertation Proposal orally	After the second Fall semester	After the second Spring

to Earth Sciences Department and public.	but before the end of the third Spring semester	semester but before the end of the third Fall semester
Take Comprehensive Exam.	Just before start of third Fall semester	Just before start of the third Spring semester
Present research at a professional meeting or the U of M Student Research Forum.	During the third Fall or Spring semesters	During the third Spring or Fall semesters
Fill out Intent to Graduate and Candidacy forms.	Beginning of fourth Spring semester	Beginning of fourth Fall semester
Submit two manuscripts for publication in peer-reviewed journals.	End of fourth Spring semester	End of fourth Fall semester
Complete all graduate course work.	End of fourth Spring semester	End of fourth Fall semester
Defend dissertation.	End of fourth Spring semester	End of fourth Fall semester

Note: a student must be registered during the semester containing the dissertation defense.

THE GIS CERTIFICATE

The graduate certificate in Geographic Information Systems is intended for students currently admitted to a graduate program at the University of Memphis or another university or students holding a graduate degree with an interest in using GIS as a problem-solving tool.

Admission Procedures

The Department of Earth Sciences will accept students into the program in January of each year. Admission into the program is competitive. A selection among the applications will be made by the Certificate Admission Committee on the basis on the information included in the application.

Applications must include:

1. Graduate GIS Certificate Application Form
2. Two letters of recommendation
3. A letter from the applicant describing reasons for attaining a graduate certificate in the area of GIS and how the program corresponds to prior experience and anticipated career plans.
4. Admission to the University of Memphis Graduate School. Students should submit an application to the graduate school (<http://www.memphis.edu/graduateadmissions/index.php>) if not already a graduate student at the University of Memphis.
5. Transcripts of undergraduate degree program and prior and current graduate study.
6. GRE scores are required and are an important factor in admission.
7. A minimum score of 550 (paper-based), 210 (computer-based), or 79 (internet-based) on the TOEFL and a minimum score of 50 on the Test of Spoken English (for students whose native language is not English).

Items 1 through 3 should be mailed to:

Academic Services Associate, Department of Earth Sciences, University of Memphis, rm. 111 Johnson Hall, Memphis, TN 38152.

The remaining items should be completed with the application to the University of Memphis Graduate School, if necessary.

Program Requirements

Total credits required for the GIS certificate: 12 credit hours. As many as 9 credit hours approved by the Certificate Program Committee from a student's graduate degree program may be used to satisfy the GIS certificate requirements.

1. REQUIRED COURSES: Total credit hours: 9
 ESCI 6515 Geographic Information Science 3
 ESCI 6525 Analytical Geographic Information Science 3
 ESCI 7998 Capstone GIS Project 3
2. ELECTIVE COURSES: Total credit hours: 3

Students are required to take 3 hours of electives. These electives could come from a variety of related fields with approval of the Certificate Program Committee.

ESCI 6431 Urban Geography 3
ESCI 6443 Transportation Planning 3
ESCI 6502 Computer Mapping 3
ESCI 6511 Remote Sensing of the Environment 4
ESCI 6521 Quantitative Methods 3
ESCI 6531 Field Methods 3
ESCI 6610 Automation Processes in GIS 3
ESCI 7320 Archaeological Spatial Analysis 3
ESCI 7504-8504 Seminar in Geographic Information Systems 3
ESCI 7312 Spatial Statistics 3
ESCI 7515 GIS and Human Health 3
COMP 6001 Visual Basic 3
COMP 6011 Advanced Visual Basic 3
PLAN 7202 Land Use Planning 3

THE MASTERS DEGREE

Program Requirements

The following course requirements are imposed by the Graduate School:

1. A minimum of 70% of the total required hours must be 7000 or higher level courses
2. No more than 12 hours of independent study courses may be applied to the degree

The following requirements are imposed by Earth Sciences:

M.A.

1. Student may be required to make up deficiencies as determined by the student's advisory committee.
2. Satisfactory completion of three-credit hours of ESCI 7990 (Research in Earth Sciences) or ESCI 6700 (Earth Sciences Internship).
3. Completion of a minimum of 36 graduate credit hours.
4. Completion of ESCI 7000 and at least 1 of the following courses: ESCI 6515, ESCI 6521, ESCI 7310 or ESCI 7801.
5. Successful completion of a written Comprehensive Examination.

6. Successful completion of a public oral presentation regarding professional experience or internship as it links to the Earth sciences.

M.S.

1. A student may be required to make up deficiencies as determined by the student's advisory committee.
2. Completion of at least 3 semester hours of graduate seminar coursework.
3. Completion and successful defense of a thesis (ESCI 7996): at least 6 semester hours.
4. Completion of ESCI 7000 and at least 1 of the following courses: ESCI 6515, ESCI 6521, ESCI 7310 or ESCI 7801. At least 22 hours of coursework at or above the 7000-level (including thesis).
5. Preparation of an acceptable written thesis proposal and oral presentation of thesis proposal.
6. Successful completion of a written Comprehensive Examination. Concentration requirements:
 - a. Archaeology concentration:
 - i. Completion of 12 semester hours of archaeology graduate coursework. It is recommended that these 12 hours include courses in archaeological theory, methods, and fieldwork.
 - ii. Completion of elective graduate coursework, in consultation with the student's advisory committee, to obtain a minimum total of 32 semester hours.
 - b. Geography concentration:
 - i. Completion of 12 semester hours of geography (ESCI) graduate coursework. It is recommended that these 12 hours include courses in: environmental and earth sciences; human-economic geography, and geography techniques. Students not submitting acceptable undergraduate credit in quantitative methods or statistics will be required to take a quantitative methods or statistics course.
 - ii. Completion of elective graduate coursework, in consultation with the student's advisory committee, to obtain a minimum total of 32 semester hours.
 - c. Geology concentration:
 - i. Completion of 12 semester hours of geology (ESCI) graduate coursework.
 - ii. Completion of elective graduate coursework, in consultation with the student's advisory committee, to obtain a minimum total of 32 semester hours.
 - d. Interdisciplinary Studies concentration:
 - i. Completion of 12 semester hours of archaeology, geography, geology, or geophysics coursework.
 - ii. Completion of elective graduate coursework, in consultation with the student's advisory committee, to obtain a minimum total of 32 semester hours.
7. Successfully defend thesis.

Time Limitation

All requirements for the Masters degrees must be completed in eight years. No course credit earned more than eight years prior to the student's expected date of completion of the master's degree will be applied toward satisfying course requirements for the degree. There are no exceptions to this policy. However, students may request the option of validating old courses as described in the Academic Regulations portion of the Graduate Catalog.

Comprehensive Exam

A written examination will be administered by the student's advisory committee after the end of the second semester and before the end of the third semester, as determined by the student's advisory committee. The student must have completed 18 graduate credit hours prior to taking the comprehensive examination. The examination will not exceed three hours in length and will cover basic material presented in courses taken while the student was enrolled in the Earth Sciences graduate program. Committee members will submit questions to the thesis advisor and the advisor will be responsible for writing the examination using his/her own questions and all or a subset of the questions provided by the committee members. Students should talk to committee members concerning the nature and content of the questions to be asked. The examination will be graded by the committee members (each grading the questions they submitted). A majority of the committee members must certify that the student has passed. If the student fails the examination, it may be taken again after one additional semester of residence.

Master Thesis Proposal

A student should prepare a written thesis proposal by the end of the second semester in the graduate program and present the proposal to the student's advisory committee for approval. The thesis proposal should conform to the writing standards expressed in the English Competency section above and should include headings such as Abstract, Introduction, Purpose or Hypothesis, Importance of the Project, Method of Approach, Work Plan, Budget, and References. The complete proposal, including figures, should not exceed 15 pages. A copy of the committee-approved proposal and a completed and signed Thesis Proposal Form should be submitted to the Academic Services Associate.

Thesis Proposal Presentation

A student should give an oral presentation to the public regarding their thesis research proposal before the end of the third semester in the graduate program. The purpose of the presentation is to communicate the intent of their research proposal and the preliminary results of their thesis research so as to obtain critical and constructive feedback from the faculty, staff, and other interested individuals. The presentation should be between 15 and 30 minutes long and elicit subsequent discussion from the audience. The student should notify the permanent thesis committee members at least a week in advance of the presentation so as to coordinate the date and time of the presentation. The student should notify the Academic Services Associate of the date, time, and title of the presentation a week in advance so that an announcement can be prepared and an e-mail notification can be sent. The student should post flyers at Johnson Hall and any other appropriate departmental building to advertise the presentation. One of the flyers should also be given to the Academic Services Associate for insertion in the student's official file.

Thesis Defense

The student will arrange for a location, date, and time for the thesis defense after receiving written or e-mail approval from their advisory committee to do so. Please arrange the thesis defense location and time with the departmental administrator to clarify room availability no later than two weeks prior to the defense and have a thesis defense announcement prepared. The departmental administrator will also provide the following to the Graduate School for the student's scheduled defense, no later than two weeks prior to a given event:

- a) Full name of student and committee members (noting which member is the chair).
- b) Place, day and time of defense.
- c) Degree/major being sought.
- d) Title of dissertation/thesis.
- e) Abstract.

The thesis defense presents an opportunity for intellectual exchange among the wider Earth science community, as well as an opportunity to learn about graduate student research. As such, approximately 45 minutes of the defense, to include an oral presentation (not to exceed twenty minutes) and questions from the audience, should be scheduled as a public seminar. The ensuing questioning period will be open to the public; an audience may remain in the room but may not ask questions until the time of an executive session for discussion and a vote. The executive session is closed to the public and to the candidate.

The student's advisory committee will conduct the thesis defense and approve the final thesis. Approval of the thesis requires a favorable vote of a majority of the committee. The Thesis Defense Form must be signed by the committee and by the Graduate Coordinator. If the student fails the examination, or presents an unacceptable thesis, the committee will advise the Graduate Coordinator whether the student must submit a revised thesis, or whether the student should be dropped from the Master's program. Unsuccessful students will normally be given a second chance.

An approved final version of the thesis must be submitted to the Graduate Coordinator for approval no later than 10 days before the completed thesis is due in the Graduate School.

A Master's candidate is required to be registered during the semesters in which 1) the thesis defense occurs and 2) the student graduates.

THE DOCTORAL DEGREE

Bypassing the Master's Degree

Students seeking a Ph.D. degree are placed at the time of their admission into either the Masters or Ph.D. program by the faculty, based upon careful examination of their academic background, demonstrated abilities, and stated preferences on bypassing the Masters. If a student is admitted in the Master's degree program, the degree must be obtained before proceeding to the Ph.D. unless a bypass petition is submitted to the Graduate Coordinator. The student's Masters Committee and two additional faculty members who have agreed to serve on a Ph.D. Committee must submit the petition. All five committee members, signifying that the committee thinks the Master's degree can be by-passed, must sign the petition. The petition should contain a record of achievement, a definitive statement of research interests, and discussion of background preparation. The Graduate Coordinator, in consultation with the Earth Sciences Graduate Program Committee, will make the decision to approve or deny the petition. If the petition is approved, the Graduate Coordinator will initiate a change-of-status petition with the Graduate School. Normally, the petition must be submitted within the first year.

Change of Status Following the Master's Degree at the U of M

A student admitted to the Master's degree program, having completed a Master's degree, may continue for the Ph.D. degree if accepted to the program by the faculty. The student must provide a written statement of research interests and letters of recommendation from appropriate faculty. The student will be placed in the normal applicant pool for admission to the Ph.D. program and for financial support. Financial support cannot be provided until the Master's degree is completed.

Students Admitted with the M.S. or M.A. Degree

Students admitted with the M.S. or M.A. degree are expected to have the degree in hand upon arrival. In exceptional circumstances, and with permission from the Graduate Coordinator, incidental degree

requirements can be completed during the first semester in residence. If this is the case, the M.S. or M.A. granting institution must certify that the degree requirements have been completed before a second semester of financial support can be approved.

Program Requirements

The following course requirements are imposed by the Graduate School:

1. The last thirty hours of credit must be earned at the U of M
2. No more than 15 post-baccalaureate hours of 6000-level courses may be applied to the Ph.D.

The following requirements are imposed by Earth Sciences:

1. Completion of a minimum of 72 semester hours beyond the bachelor's degree or a minimum of 40 semester hours beyond the master's degree. The courses to be completed shall be determined in consultation with the student's advisory committee.
2. Satisfactory completion of a comprehensive examination.
3. Submission of two manuscripts for publication in peer-reviewed journals.
4. Completion of a dissertation (ESCI 9000) for a total of 9 hours credit.
5. Successful defense of a dissertation.

NOTE: a student must be registered during the semester in which the dissertation is defended.

Time Limitation

No credit earned more than twelve years prior to the student's expected date of completion of the doctoral degree will be applied toward satisfying course requirements for the degree. There are no exceptions to this policy. However, students may request the option of validating old courses as described in the Academic Regulations portion of the graduate catalog.

The Comprehensive Examination

The Comprehensive Examination will be given just before the beginning of the third semester of residence, on a date set by the Chair of the student's advisory committee in consultation with the Graduate Coordinator. The student will take a two-day (12 hour maximum) written examination followed by an oral examination. The purpose of the comprehensive examination is to determine the student's understanding of the chosen field of specialization ("depth") as well as general knowledge in geosciences ("breadth"). The oral examination will be taken no more than two days following the written examination and will be used to clarify any points left in question by the written responses. As part of the oral examination to demonstrate the ability of the student to develop a testable scientific question or hypothesis and structure a research plan, the student should present an unresolved scientific question or hypothesis, provide a brief review of relevant background material to motivate the research, and describe a feasible analytical approach. The oral exam will not exceed two hours. A student should consult his or her dissertation advisor and Committee regarding the areas in which comprehensive is expected. The time and location for the oral examination will be arranged by the Chair of the student's advisory committee, in consultation with the student and the other members of the student's advisory committee. It is the student's responsibility to determine when committee members are available for the examination. At the conclusion of the examination, the committee will vote by ballot to either accept or reject the student as a Candidate. If a majority vote is to pass, recommendations may be made to remove deficiencies in background by coursework or reading. In the event of a tie, the outcome is a failure. In the event of a failure, the committee may recommend completion of a Master's thesis followed by a reexamination, or a second examination at the option of the student.

The student's advisory committee has the responsibility of determining that a student has removed any deficiencies revealed by the Comprehensive Examination. This judgment will be based upon the mandatory twice-yearly meetings with the student and upon performance in the assigned remedial courses. It is the responsibility of the Chair of the student's advisor committee to gather all pertinent material for the evaluation.

Degree Requirements

The Ph.D. candidate must satisfy Graduate School requirements including the residency requirement, passing a Comprehensive examination, and preparation and defense of a dissertation. The candidate must also satisfy requirements appropriate for his or her specialty, as determined by the student's advisory committee. The advisory committee is responsible for ensuring that the candidate has developed scientific breadth and depth by a combination of course work and personal study. This ability is tested mainly by the Comprehensive examination. The language and communication requirement is also the responsibility of the student's advisory committee. A high level of proficiency in English is required.

Foreign Language Requirement

There is no foreign language requirement.

Formal Oral Presentation

Each doctoral student is required to present at least one formal talk during the 3rd fall or spring semester discussing his or her research topic. Usually, this talk will be a public "Dissertation Proposal" and should make use of appropriate visual aids. The purpose of the talk is to familiarize others in the Department with the student's dissertation research, receive appropriate feedback that may serve to strengthen the dissertation, and provide practice in public speaking for the student. This talk is not intended to constitute an oral defense of the dissertation research.

Dissertation Proposal

A doctoral candidate should prepare a written dissertation proposal by the end of the 3rd semester in the graduate program and present the proposal to the student's advisory committee for approval. The dissertation proposal should conform to the technical writing standards appropriate for their academic discipline and should include headings such as Abstract, Introduction, Purpose or Hypothesis, Importance of the Project, Method of Approach, Work Plan, Budget, and References. The complete proposal, including figures should not exceed 15 pages. A copy of the committee-approved proposal should be given to the Academic Services Associate, the Graduate Coordinator, and the Earth Sciences Chair.

Doctoral Dissertation Defense

The student will arrange for a location, date, and time for the dissertation defense after receiving written or e-mail approval from their advisory committee and Graduate Coordinator to do so. Please arrange the thesis defense location and time with the departmental administrator to clarify room availability no later than three weeks prior to the defense date and have a thesis defense announcement prepared. The departmental administrator will also provide the following to the Graduate School for the student's scheduled defense, no later than two weeks prior to a given event:

- a) Full name of student and committee members (noting which member is the chair).
- b) Place, day and time of defense.
- c) Degree/major being sought.
- d) Title of dissertation/thesis.

e) Abstract.

The Ph.D. defense presents an opportunity for intellectual exchange among the wider Earth science community, as well as an opportunity to learn about graduate student research. As such, approximately 45 minutes of the defense, to include an oral presentation (not to exceed 30 minutes) and questions from the audience, should be scheduled as a public seminar. The final oral examination will be conducted by the candidate's advisory committee. The oral examination will also be open to the public; the audience may remain in the room, but may not ask questions. The executive session will follow the oral examination, during which time the student's advisory committee will discuss the presentation and examination performance and a vote on approval of the dissertation defense. The executive session is closed to the public and to the candidate.

By University regulations, all members of the student's advisory committee must be present for the final oral examination and a unanimous positive vote is required for a successful dissertation defense. The final draft of the dissertation must be approved by all members of the advisory committee and by the Dean of the Graduate School. This final draft must be submitted to the Graduate School following the defense. If the student fails the final oral examination, or presents an unacceptable dissertation, the student's committee will advise the Graduate Coordinator whether the student must submit a revised dissertation, or whether the student should be dropped from the Ph.D. program. Unsuccessful students will normally be given a second chance. A member of the Earth Sciences Graduate Program Committee, from a different discipline, will be present if a second oral examination is given.

A final version of the dissertation, approved by the student's advisory committee, must be submitted to the Graduate Coordinator for approval no later than 10 days before the completed dissertation is due in the Graduate School. A Ph.D. candidate is required to be registered during the semesters in which 1) the dissertation defense occurs and 2) the candidate graduates.

APPENDIX A

Conflict Resolution Examples

1. I can't get along with my office mate. See the Academic Services Associate and request a change in your office location.
2. The student office area is too noisy (cold, hot, stuffy, etc.). See a Earth Sciences discipline representative. The problem should be corrected in a timely manner. If the problem persists, see the Graduate Coordinator.
3. I do not get along with my thesis/research advisor. Discuss the matter with the Graduate Coordinator. The coordinator will act as your advocate and discuss the problem with your advisor. Usually, these problems can be worked out to the benefit of all. However, a student can change advisors – this is perfectly acceptable.
4. I no longer enjoy my research. This is also a problem and one that most (if not all) graduate students encounter at some time. Discuss the problem with your thesis or research advisor and explore the possibility of changing the thrust of the research or switching to another project. If no solution can be found, discuss the possibility of changing advisors with the Graduate Coordinator. If you switch to an advisor within a different Earth Sciences discipline, then you should discuss this with the Earth Sciences Chair, Graduate Coordinator, and the discipline representative for the new discipline.
5. There is a problem with one of my courses (poor teaching, excessive homework, class time extended beyond the appropriate amount, unfair grading, etc.). Discuss the matter with the discipline representative to the Graduate Committee and/or the Graduate Coordinator. Your discussions will be confidential and the Graduate Coordinator will act as your advocate. Reporting these problems is very important.
6. Sexual or racial harassment. Reporting these problems is very important and should be done to the appropriate university person. Reporting an incident to a faculty member is tantamount to informing the university and the faculty member must report the conversation to appropriate university personnel if a specific individual is named.