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THE OHIO STATE
UNIVERSITY

GRADUATE

STUDENT HANDBOOK

2014-2015



The OHIO STATE UNIVERSITY
School of Earth Sciences
Guidelines for Graduate Students
Earth Sciences Degree Programs
(Coordinated with OSU Graduate School Handbook (GSH))
Edition 2014-15

Goals and Objectives

The overall goal of the Graduate Degree Program in the School of Earth Sciences is to provide students the opportunity to develop advanced professional training in the Earth Sciences. The program includes providing students opportunities to participate in advanced classes and seminars and to conduct independent research on fundamental issues in the Earth Sciences. The product of both M.S. and Ph.D. research projects are expected to be suitable for publication in the refereed scientific literature, and after graduation a student should be prepared to begin a career in the Earth Sciences.

Admission Standards

Normal Admission Standards

The faculty has adopted the following guidelines as minimum standards for admission (GSH II):

1. A minimum of 3.0 cumulative point-hour ratio is required for admission into the graduate program. This point-hour ratio is based on the 4.0 scale used at this university and applies to all previous undergraduate work.
2. Normally expect an average score of 60 percentile or better on the average of the Verbal and Quantitative parts of the GRE and 4.0 or better on the Analytical Written part of the GRE.
3. International applicants whose first language is not English are required to take one of three possible exams, including the TOEFL (Test of English as a Foreign Language), Michigan English Language Assessment Battery (MELAB), or the International English Language Testing System (IELTS). For admission minimum scores must be of 550 on the paper-based TOEFL, 79 on the internet-based TOEFL, 82 on the MELAB, or 7.0 on the IELTS.

Maintaining rigid admission standards does not always serve the best interests of the School; and therefore, the admission standards above will serve as guidelines. The Graduate Studies Committee (GSC) strongly recommends the following:

1. The GRE be taken in the same year (calendar or academic) that application is made to the graduate program.
2. Prospective students who fail to meet the standards outlined above may be admitted to the graduate program only under exceptional circumstances. For example, such circumstances might include extensive professional experience.

Support

M.S. Students

Qualified M.S. students, who are offered support when first accepted into the M.S. program, are conditionally assured support for four academic-year semesters (not including summer support). Support is conditional on maintaining reasonable progress, on maintaining good standing in the Graduate School (GSH V.1), and satisfactory performance of GTA or GRA duties. Support is also conditional on availability of funds.

Completion of the M.S. is expected within two years. Slightly longer time-to-degree may occur, but additional support should not be expected.

Ph.D. Students

Students may enter the Ph. D. program in one of three ways: 1, with a completed M.S. degree; 2, directly from a completed B.S. degree; or 3, as from a transfer from the M.S. program to the Ph.D. Program. Students entering the Ph.D. program with a M.S. and who are offered support when first accepted into the Ph.D. program are conditionally assured support for eight academic-year semesters (not including summer support). Alternatively, if a student enters the Ph.D. program either directly from the B.S. or by transfer from the M.S. degree program and offered support when first accepted into the Ph.D. program, a student is conditionally assured support for a total of ten academic-year semesters (not including summer support).

All support is conditional on maintaining reasonable progress, on maintaining good standing in the Graduate School (GSH V.1), and satisfactory performance of GTA or GRA duties. Such support is also conditional on availability of funds. Additional support beyond that described above should not be expected.

Admission and Support of International Students

Consideration of support is an important part of the admissions process. Admission of international students for who English is not the first language requires guaranteed support for the first twelve months of residence (including support for the summer semester).

On arrival, an international student from a country in which English is not the first language must take the ESL composition Placement Essay assessment and satisfy all provisions outlined in GSH II.6.

An international student for whom English is not the first language may be offered GTA support, if the following conditions, in addition to those outlined under Normal Admission Standards, are met:

1. The student has passed the Mock Teaching Test administered by the Spoken English Program of the College of Education at The Ohio State University (GSH II.7).
2. The student has demonstrated a proven ability in writing, reading and speaking the English language. This ability may be demonstrated through personal contact with faculty in the School of Earth Sciences or by having already obtained a degree (BS or MS) at another university in the U.S. or an English-speaking country.

An international student may be admitted with Graduate Research Assistant (GRA) support if the applicant satisfies the criteria required for admission to the program. Such admission requires prior agreement with an individual faculty member. This support also must cover the first twelve months of residence.

GTA Qualifications

Students with GTA support are expected to have mastery above and beyond the course material taught in the assigned course. Demonstration of mastery includes an undergraduate background in relevant course material, sitting in on the course in previous semesters, or by examination. GTA duties include, but are not limited to, teaching laboratory sections, attending GTA meetings, grading homework and lab assignments, administration of grade books, proctoring exams, and holding weekly office hours.

Outside Work

School support, in the form of GTA and GRA stipends, is intended to help graduate students complete their studies in a timely fashion, as described in these guidelines as reasonable progress. Thus, all students supported as GTAs and GRAs are expected to devote full time to the assigned duties of their associateship, their course work, and their thesis/dissertation research. It is expected that students supported by University funds WILL NOT hold other regular employment during their appointments as GTAs or GRAs. Meeting this stipulation is considered a **condition** for accepting a GTA or GRA appointment.

Enrollment in Courses

The normal course load for graduate students is 12 to 16 semester credit hours and cannot exceed 16 semester credit hours during Autumn and Spring Semesters and 8 credit hours during Summer Semester without approval of the student's advisor and the GSC (GSH III.1).

A graduate student must register for at least one credit hour to maintain office space and access to other University facilities.

The minimum course loads are as follows (All students are strongly encouraged to register for more than the minimum requirement, especially early in the time as a student):

Graduate Associates:

M.S. and pre-candidacy Ph.D. students supported by a 50% or greater GTA or GRA must register for a minimum of 8 semester credits for each of Autumn and Spring Semesters. During the Summer semester, the minimum is 4 semester credits (GHS III.1).

Post-Candidacy Doctoral Students:

Post-Candidacy doctoral students must register for 3 credit hours per semester (GSH III.1) and exceptions must be approved in advance by the Graduate Studies Committee. Post-candidacy students must maintain continuous enrollment of 3 credits every semester (summer semester is **excluded**) until graduation. (See GSH III.1 for exceptions and further discussion).

Fellows and Trainees:

Graduate students funded by a Fellowship or Trainee regardless of source of funding must enroll for 12 credit hours during Autumn and Spring Semesters and 6 credit hours during Summer Semester, with the exception of a post-candidacy doctoral student, as described above (GSH III.1).

International Students without a GRA, GTA, Fellowship or Trainee Appointment:

M.S. and doctoral pre-candidacy international students must register for a minimum of 8 credit hours during Autumn and Spring Semesters and 4 credit hours during Summer Semester; post-candidacy international Ph.D. students register for 3 credit hours, as described above.

M.S. Degree Requirements

Expected Background

All Master's degree aspirants are expected to have a Bachelor's degree, and they normally will have a degree in an Earth science field. However, students with non-geology backgrounds commonly make significant contributions to the Earth sciences, and they also are encouraged to apply to the M.S. program.

Program Approval Form

In consultation with the student's advisor, a student will design a course of study appropriate to the field of specialization. Each Division may have a separate Program Approval Form. A completed *Program Approval Form* should be submitted to the Graduate Studies Committee when the thesis proposal is submitted to the Committee or before. This will provide a record of the proposed course work and will serve as a guide for the completion of this portion of the graduate program.

Advisory Committee Selection

A student should seek an advisor during the first semester of residence and no later than the end of the second semester. The advisor and the student will choose two additional faculty members to serve on the M.S. Advisory Committee. At least one committee member is recommended from outside the student's immediate area of research.

Advisory Committee Meetings

The student shall meet with the Advisory Committee at the beginning of the program (prior to submission of the thesis proposal) and additional meetings shall be scheduled as appropriate, especially if the focus of the research proposal changes.

Credit Hours

A minimum of 30 graduate semester credit hours is required for the Master's degree (GSH VI.1). Of these, The School of Earth Sciences requires at least 20 credits must be in graded 5000-, 6000-, 7000-, and 8000-level courses in the Earth Sciences or in graduate-level courses in related sciences, mathematics, etc. Credits earned from 4000-level courses in other Departments may also be applied toward Earth Sciences degree programs.

The *Application to Graduate* form must be submitted to the Graduate School by the third Friday of the semester in which a student wishes to graduate (GSH VI.6). The final Master's Examination cannot be scheduled until the Advisory Committee has given preliminary approval of the thesis document.

Each student must complete a Master's thesis (GSH VI.4), which describes the results of an original research project. The thesis document must be prepared according to the guidelines described in the "Graduate School Guidelines for Formatting Theses, Dissertations, and D.M.A. Documents".

After completion of the Master's thesis, candidates for the M.S. degree must complete a final oral examination, which may include questions on both the thesis research and other aspects of the M.S. training not related to the thesis (GSH VI.4). Additional information on the M.S. Thesis and M.S. Examination is in section VI of the Graduate School Handbook.

Master's Degree Research

Choice of Research Area

If necessary, the Chair of the Graduate Studies Committee will provide advice on coursework and help in the selection of a research area and an advisor. By the end of the second semester in the program every student is strongly encouraged to have identified a research area and to have obtained the consent of a faculty member to serve as an advisor. Until the student has an advisor, a member of the GSC will act in that capacity.

Research Proposal

During the end of the second semester in the program, the Master's degree aspirant will submit a written proposal to their advisor and the members of the Advisory Committee. The proposal shall outline an original research problem, and the scientific part of the proposal shall be 3 to 5 pages in length. The proposal shall include: (1) title page, (2) a statement on the nature and significance of the research, (3) description of the procedures to be employed, (4) projected timetable for completion of the project, and (5) estimated budget (stipend and its duration, anticipated source of funds; fieldwork costs; analytical costs and technician time; computer hardware and software costs; illustration expenses; etc.). NOTE: Anticipated and/or potential sources of funds for the research must be identified for all budget categories. A separate document on thesis and dissertation proposals is available to all students.

It is normal for the student and their advisor to work together to develop a proposal and that the advisor approves the proposal for circulation to the remainder of the committee. Other members of the M.S. Advisory Committee will review the proposal, and the proposal with appropriate revisions will be submitted to the GSC with the advisor and M.S. Advisory Committee signatures indicating approval for submission. The GSC will review the proposal with respect to science plan, timetable, and budget, and if the proposal is acceptable to the GSC, then it will be included in the student's permanent M.S. acceptance and advising file. Proposals should be on file by the end of the student's second semester in the M.S. program.

Final Oral Examination

1. Members of the Advisory Committee must be given at least one week to read the thesis prior to the final oral examination. The reading copy of the thesis should be complete (i.e., with table of contents, illustrations, references, etc.
2. The thesis draft must be approved for defense by members of the Advisory committee prior to the beginning of the examination. The thesis must conform to the Graduate School format requirements outlined in the "Graduate School Guidelines for Formatting Theses, Dissertations, and D.M.A. Documents." (GSH VI.4).
3. The Master's Examination should be scheduled during the regular class or final examination periods a semester or May Session and during regular university business hours.

4. The Master's Examination Committee consists of the Advisory Committee as originally constituted, although substitutions can be approved by the GSC in situations where members cannot be present at the time of the examination. The advisor serves as chairperson of the examination (GSH VI.2).
5. The examination shall be scheduled in the semester of graduation and announced to the entire School.
6. All committee members must be present throughout the entire examination and are expected to participate fully in questioning during the course of the examination and in the discussion to determine the result of the exam (GSH VI.2).
7. A Master's Examination shall begin with a presentation by the Master's candidate, comprised of a 20 to 30 minute summary of his/her research. This portion of the defense is open to the public.
8. The examination is normally two hours in duration.
9. A Final, approved thesis must be submitted electronically as a PDF document as described in the Graduate School Handbook (GSC VI.4).

NOTE: Students are encouraged to present an unbound copy of the complete thesis, to the Orton Memorial Library of Geology.

Master's Thesis Presentation

All Master's candidates are strongly encouraged to give a 30 minute presentation to faculty and students at an open forum within the semester of the final examination.

Good Standing and Reasonable Progress

Reasonable progress for completion of the Master's Degree is two calendar years (six semesters including summers) after initial registration in the graduate program. After three calendar years in residence, a full time M.S. student must provide written explanation for lack of progress and seek permission from the Graduate Studies Committee to continue to register.

Reasonable progress and good standing includes:

1. maintaining a 3.0 grade point average
2. meeting the course load requirements of the Graduate School (GSH III.1)
3. having an M.S. thesis proposal approved by the Advisory Committee and GSC by the end of the second semester of enrollment
4. making appropriate progress on the thesis research

NOTE the section "Reasonable Progress" in the Graduate School Handbook (GSH V.4).

Variances and Exceptions

Variances from the stated requirements and schedules, as well as exceptions to any of the requirements over which the graduate faculty in the of School of Earth Sciences has control, may be granted by the GSC in response to a petition from the student *and* their faculty advisor.

Additional Information

Complete information concerning the rules and regulations for the M.S. degree are given in the Graduate School Handbook (GSH VI.1 through VI.8) and are summarized in GSH VI.6.

Ph.D. Degree Requirements

Admission to Program

A student normally enters the Ph.D. program after completion of a Master's degree, although in exceptional cases a student may be admitted directly to the Ph.D. program from a baccalaureate program. A Ph.D. aspirant who matriculates into the Ohio State program with an incomplete Master's degree may be admitted conditionally, but the M.S. degree must be completed within two semesters to remain in the Ph.D. program.

As described below, after admission into the M.S. program, a student may transfer from the M.S. to the Ph.D. program in exceptional cases.

Degree Requirements

A minimum of 80 graduate semester credits beyond the baccalaureate degree is required for the Ph.D. degree. Students who have earned a M.S. degree at another institution may apply 30 semester credits (10 hours of graded coursework plus 20 research hours) earned as part of a Master's degree toward the 80 hours (GSH VII.2). As approved by the GSC and the student's advisor, a student who earned a M.S. degree at Ohio State University may transfer a maximum of 50 credit hours toward his/her Ph.D. program (GSC VII.2) The School of Earth Sciences requires that 80 credits must include at least 20 credits of graded graduate coursework in the Sciences or appropriate related fields. The 20 credits of graded coursework must include at least 4 credits of 8000-level seminars. A summary of all University degree requirements is summarized in the Graduate School Handbook (GSH VII.14). Under exceptional circumstances (for example, a student with an M.S. degree in the School of Earth Sciences), the Graduate Studies Committee will consider petitions requesting modifications to the required number of graded credit hours.

Program Approval Form

In consultation with the student's advisor, a student will design a course of study appropriate to the field of specialization. Each Division may have a separate Program Approval Form. A completed Program Approval Form should be submitted to the GSC by the end of the first year in the program. It will provide a record of the proposed course work and will serve as a guide for the completion of this portion of the graduate program.

Advisory Committee Selection

It is assumed that a Ph.D. student, before entering the program, has met with a potential advisor and discussed possible research topics. The advisor and the student will choose three additional faculty members to serve on the Ph.D. Advisory Committee. One committee member from outside the student's immediate area of research is recommended.

Advisory Committee Meetings

The student shall meet with the Advisory Committee at the beginning of the program (prior to submission of the thesis proposal). Annual committee meetings are recommended, and additional meetings shall be scheduled as appropriate, especially if the focus of the research proposal changes.

Transfer to the Ph.D. program before completion of the MS degree

Students who initially enroll as M.S. students in the School of Earth Sciences may petition the GSC committee to transfer to the Ph.D. program without completion of the M.S. degree. This process is reserved for students who make an exceptional start in their graduate research and can establish their ability to do Ph.D.-level research early in their time as a graduate student. A petition to the GSC must occur within 18 months of starting the M.S. program. The petition must include a letter from the student requesting the conversion, description of their research, a listing of their accomplishments (papers, meeting abstracts, awards), and a list of faculty who can comment on their abilities. The petition must be accompanied by a letter of support written by the student's research advisor outlining the evidence for Ph.D.-level abilities.

Students granted a conversion from the M.S. and Ph.D. program will be expected to submit a dissertation proposal on the same schedule as other Ph.D. students based on matriculation date, not their M.S. to Ph.D. conversion date. The qualifying examination should be taken when sufficient coursework is completed that a student can reasonably graduate given the 3-credit rule.

If a student converted to the Ph.D. program or entered the Ph.D. program directly from the B.S. and either fails to take the candidacy examination or fails the candidacy examination, the student may reapply to the Graduate School to the M.S. program. A M.S. thesis will remain a requirement for the M.S. degree.

If a student converted to the Ph.D. program or entered into the Ph.D. program directly from the B.S. and passed the candidacy examination but decides to terminate the doctoral course of study, she/he may petition the Graduate Studies Committee, as described in the Graduate School Handbook.

Admissions to Candidacy and the Candidacy Examination

A Ph.D. aspirant must pass a Candidacy Examination to be admitted to candidacy for the Doctoral degree. The Ph.D. Candidacy Examination (GSH VII.4) should be completed within the second year of enrollment in the Ph.D. Program for students who earned a M.S. prior to doctoral studies. The exam includes both written and oral parts. A part-time student should complete the Candidacy Examination either during the semester following the semester in which the student has earned a total of 20 graduate credits or according to the approved program. Similarly, a student who entered the doctoral program directly from a Bachelor's degree or transferred to the doctoral program before completion of the M.S. degree should take the candidacy examination at an appropriate time, commonly following the semester during which the student earned a total of 30 graduate credit hours of course work. The student must be in good standing and registered for at least 3 credits during the semester of the Candidacy Exam, and must enroll in 3 credits each semester until graduation.

The Candidacy Examination is administered by the student's Advisory Committee (Dissertation Committee) (GSH VII.4). The examination consists of both written and oral examinations. The Candidacy Examination shall test the student in the chosen field of dissertation research, as well as in related fields.

The format, principles and policies for the Candidacy Examination adhere to those of the Graduate School that are set out in the Graduate School Handbook (GSH VII.4 to VII.7). If the Candidacy examination must be repeated, it should be retaken during the semester following the first examination.

The student becomes a Ph.D. candidate on successful completion of the Candidacy Examination. (GSH VII.8). NOTE: If the final oral exam is not taken within five years of admission to Candidacy, the Candidacy exam must be retaken (GSH VII.8).

Continuous Enrollment

All students who successfully complete the doctoral candidacy examination are required to be enrolled in every semester (summer session is excluded) until graduation (GSH III.1).

Dissertation

To be awarded the Ph.D. degree, students must complete a dissertation that presents the results of an independent, original research project that is a scholarly contribution to the sciences (GSH VII.9). The dissertation document must be prepared according to the guidelines described in the “Graduate School Guidelines for Formatting Theses, Dissertations, and D.M.A. Documents.”

Final Oral Examination

Ph.D. candidates must satisfactorily defend the dissertation research in a Final Oral Examination (GSH VII.10, 11), and they must submit an approved final copy of the dissertation to the Graduate School (GSH VII.12).

NOTE: Students are encouraged to present an unbound copy of the complete dissertation, as submitted to the Graduate School, to the Orton Memorial Library of Geology.

Ph.D. Research Requirements

Choice of Research Area

A Ph.D. student will usually have identified an area of proposed research and contacted potential faculty advisors at the time of application to the program or by the time of initial registration. A student has until the end of the second semester of registration to select an area of research, by which time they also should have obtained the consent of a faculty member to serve as their Ph.D. advisor.

Dissertation Committee Selection

The student’s Dissertation Advisory Committee should be established by the advisor and the student before the end of the second semester of registration. The committee must include at least four members of the graduate faculty (GSH VII.9), among them the advisor and two faculty members with appropriate expertise. The fourth member shall be from outside the student’s immediate area of specialization.

Before the end of the second year of enrollment (two calendar years), a Ph.D. aspirant should prepare a written dissertation proposal that outlines the student's research problem. The proposal shall include: (1) title page, (2) nature and significance of the research, (3) description of the procedures to be employed, (4) projected timetable for completion of the project, and (5) estimated budget (stipend and its duration, anticipated source of funds; fieldwork costs; analytical costs and technician time; computer hardware and software costs; illustration expenses; etc.). NOTE: Anticipated and/or potential sources of funds for the research also must be identified for all budget categories. A separate document on thesis and dissertation proposals is available to all students.

It is normal for the student and her/his advisor to work together to develop a proposal and that the advisor approves the proposal before circulation. The other members of the Advisory Committee will review the dissertation proposal, and the proposal, with appropriate revisions, will be submitted to the GSC with the advisor and PhD Dissertation Committee signatures indicating approval for submission. The GSC in turn will review the proposal with respect to science plan, timetable, and budget; and if all is in order, the proposal will be accepted and included in the permanent file of the student. The Dissertation proposal must be approved by the Advisory Committee and GSC before the Candidacy Examination. Significant changes to the proposed dissertation research must be approved by the Advisory Committee and the GSC.

Application to Graduate

The candidate must submit an *Application to Graduate* form to the Graduate School by the third Friday of the semester in which graduation is expected (GSH VII.13).

Dissertation

The candidate must submit a typed draft of the completed dissertation to the Dissertation Advisory Committee for review. Approval of the dissertation draft means that the members of the committee judge it to be of sufficient merit to warrant holding the Final Oral Examination. Each committee member indicates approval of the draft copy of the dissertation by signing the *Draft Approval/Notification of Final Oral Examination* form that must be submitted to the Graduate School no later than two weeks before the date of the Final Oral Examination (GSH VII.10). The dissertation document must conform to the Graduate School format requirements outlined in the "Graduate School Guidelines for Formatting Theses, Dissertations, and D.M.A. Documents" (GHS VII.9).

Doctoral Dissertation Lecture

In the academic semester during which the Final Oral Examination is undertaken, the candidate should present a public research lecture to an audience of faculty, students and guests. This lecture may be part of the School colloquium or in a Divisional colloquium. The lecture, of approximately 40 minutes duration, will treat the principal dissertation results to be presented, discussed, and defended at the Final Oral Examination. There will be an opportunity for the audience to discuss research results with the candidate at the conclusion of the presentation. The lecture shall be attended by the advisor and Advisory Committee.

Final Oral Examination Committee

The committee for the Final Oral Examination (GSH VII.10) will include the members of the Dissertation Committee plus a Graduate Faculty representative appointed by the Graduate School.

Scheduling the Final Oral Examination

The *Application to Graduate* form must be submitted to the Graduate School by the third Friday of the semester in which the student plans to graduate (GSH VII.13). The Final Oral Examination cannot be scheduled until the Dissertation Advisory Committee has approved the dissertation document.

The Final Oral Examination must be scheduled during regular class or final examination periods of a semester or May Session and must take place during normal University business hours.

Guidelines for Reading Dissertation

At least one week must be allowed for reading of the dissertation by the members of the Dissertation Committee. The reading copy of the dissertation should be complete (i.e., with table of contents, illustrations, references, etc.).

Conduct of Final Oral Examination

The rules and regulations covering the Ph.D. Final Oral Examination are detailed in the Graduate School Handbook (GSH VII.10 to VII.12). The GSC of the School of Earth Sciences adheres to these rules and regulations. The format, principles, and policies satisfy the requirements on standards. They enable the Ph.D. aspirant to present research results and engage in discussion of these and other topics before an audience of mentors, teachers and the student's peer group, as well as responding to formal questioning by the Examination Committee.

Under Attendance and Format (GSH VII.10) the GSH states that, "...all members of the final oral examination committee must be present during the entire examination. All committee members are expected to participate fully in questioning during the course of the examination and in the discussion of and decision on the result. Other faculty members and graduate students may attend the examination, subject to the rules of the GSC".

The presentation of the research at the Final Oral Examination in the School of Earth Sciences is open to all faculty and students (GSH VI.10), but only the Examination Committee is present for the formal examination, discussion of the student's performance, and the decision about the outcome of the examination. Each examiner indicates judgment by signing the *Final Oral Examination Report* form that must be submitted to the Graduate School no later than the posted deadline for the semester or summer session of graduation.

Approximately one week before the Final Oral Examination (the dissertation defense), the time and place will be broadly announced to all faculty and students of the School of Earth Sciences and other interested individuals. A title and abstract of the dissertation will also be provided.

According to Graduate School rules, the advisor chairs the examination (GSH VII.10) and the duration of the final examination is approximately 2 hours (GSH VII.10).

Format for the PhD Final Oral Examination:

1. Introduction of the Ph.D. degree candidate; the candidate's committee; the Graduate School Representative; and a welcome to all other faculty, students, and guests. The introduction and welcome shall be conducted by the candidate's advisor.
2. A 30 minute *brief synopsis* of the dissertation research will be presented by the Ph.D. candidate.

3. Questions addressed to the candidate by non-committee members shall take no more than 15 minutes. All but the candidate, the Dissertation Committee, and the Graduate School Representative are excused at the conclusion of this portion of the Final Oral Examination.
4. Questions are addressed to the doctoral candidate by the Dissertation Committee and the Graduate School Representative. The candidate is excused at the completion of this portion of the exam.
5. Meeting of the candidate's committee, with the Graduate School Representative, to consider action on the Graduate School Final Oral Examination and Dissertation forms. Decisions taken are then immediately announced to the candidate.

Good Standing and Reasonable Progress

To remain in reasonable standing (GSH V.4), a student must maintain a GPA of 3.0 and maintain reasonable progress. Reasonable progress for a student in Earth Sciences requires that the student:

1. has a Program Approval Form on file with the GSC.
2. meets the course load requirements spelled out in the Graduate School Handbook (GSH III.1).
3. has an annual Advisory Committee meeting that is reported to the GSC.
4. has a dissertation proposal approved and filed by the end of the second year of enrollment.
5. takes the Candidacy Examination within the prescribed time.

After successful completion of the Candidacy Examination, the advisor and Advisory Committee will monitor progress on the dissertation research and report annually to the GSC.

Registration Guidelines

A Ph.D. student is generally expected to complete all requirements for his or her degree within five years of the semester following successful completion of the Candidacy Examination (GSH VII.8).

A student must register for at least one credit hour, to maintain office space and to use University facilities.

A student must register for at least three graduate credit hours during the semester in which any portion of the General Examination is taken, the semester during which the Final Oral Examination is taken, and the semester of expected graduation (GSH VII.14). A student must maintain continuous enrollment of 3 credits as described above.

Variations and Exceptions

Variations from the stated requirements and schedules, as well as exceptions to any of the requirements over which the graduate faculty in the School of Earth Sciences has control, may be granted by the GSC in response to a petition from a student and faculty advisor, as outlined in the GSH.

A student may have valid reasons for not making reasonable progress (e.g., serious medical problems, unexpected lengthy absence of the advisor from campus, pregnancy). A non-traditional student may not be able to take a normal course load for reasons of full time work or other commitments outside the University. In such cases, students cannot be expected to meet the guidelines for reasonable progress, and the student should petition the GSC in writing for an extension of the deadlines. This petition should give the reasons why such an extension is needed. The petition must be accompanied by a planned timetable for completion and also be supported in writing by the student's advisor.

Additional Information

Additional information concerning the rules and regulations for the Ph.D. degree are given in the Graduate School Handbook (GSH VII.1 through VII.14) . A summary of these requirements is also given (GSH VII.14).

Monitoring Student Progress (M.S. and Ph.D.)

A student must hand in an annual progress report to his/her adviser. The adviser should give approval to the report and submit it to the graduate committee by May 1st. The format of the annual report is specified by the Graduate Studies Committee.

Response to Lack of Reasonable Progress (M.S. and Ph.D.)

Initial Letter

Any graduate student who fails to meet a deadline for reasonable progress will receive a warning letter from the GSC during the first week of the first semester after the deadline has passed. A copy of this letter will also be sent to the student's advisor. This letter will state the following:

1. the student is not making reasonable progress according to the guidelines.
2. the Graduate School may be notified that the student has failed to make reasonable progress.
3. the Chair of the GSC requests an immediate meeting with the student and the advisor to determine the reasons for lack of reasonable progress.

Additional Actions

If the GSC determines that the reasons given for lack of Reasonable Progress are not valid, the GSC will issue a second letter to the student and the advisor. The purpose of this letter is to:

1. Issue a formal warning to the student that the student is not making reasonable progress according to the School's guidelines.
2. Specify a definite deadline (usually the last day of that semester) by which the student must complete the required action (e.g. submit a thesis or dissertation proposal or take the Candidacy Examination).
3. Inform the student that a formal request will be made to the Graduate School to block further registration unless the student completes the required action by the specified deadline.

According to the Graduate School handbook, the Graduate School can place a hold on registrations of students who fail to make Reasonable Progress as defined by these guidelines (GSH V.4). Under University Rules, a student denied registration cannot be employed as a GTA or a GRA. According to the rules of the School's Graduate Program, such students also can neither maintain office space nor use any facilities.

Reinstatement

Graduate School rules require that a student who has received formal warning about lack of reasonable progress, as described above, must apply to the GSC to be reinstated in the graduate program after the requirements for reasonable progress have been met (GSH V.8). The GSC further requires that such an application should include a formal letter from the student's advisor supporting the petition.

Addressing Graduate Student Concerns

Personal communication between the Graduate Studies Committee members, advisers, and students is strongly encouraged. Four graduate student representatives are non-voting members of the GSC. New ideas, concerns, and compliments can be transmitted to the GSC through the student representatives. Meetings between the Graduate Studies Committee members and graduate students will be held if requested.

Dates to Remember for M.S. Degree Program

General

Recommended: Yearly meeting with advisor and committee

Required: During Spring Semester submit “Graduate Student Activity Report”

Enrollment Requirements

G.T.A./G.R.A.: Autumn, Spring Semesters: minimum, 8; maximum 16.

G.T.A./G.R.A.: Summer Semester: minimum, 4 maximum 8.

Fellowship or Trainee: Autumn, Spring Semesters: minimum, 12; maximum 16.

Fellowship or Trainee: Summer Semester: minimum, 6; maximum 8.

International student without support from Ohio State: Autumn, Spring Semesters: minimum, 8; maximum 16.

International student without support from Ohio State: Summer Semesters: minimum, 4; maximum 8

Post-Candidacy Ph.D. student: 3 credits, Autumn, Spring, and Summer Sessions

Year 1, Semester 1; Term of Initial Enrollment

Establish your advisor.

If you have post-B.S./B.A. graduate credit that you want transferred to the OSU degree, start this process. First, speak with your advisor and the GSC chair. Credit transfers should be completed prior to the second semester of enrollment as discussed in GSH IV.2.

If you are native to a country where English is not the first language, you must take the ESL composition Placement Essay assessment and satisfy all provisions outlined in GSH II.6. If you have aspirations to be a G.T.A. during your tenure at Ohio State, you will need to pass the Test of Spoken English and take language classes if appropriate (GSH II.6, II.7).

Register normally from 12-16 semester credits (see SES Guidelines above and Graduate School Handbook for further explanation).

Year 1, Semester 2

Unless already completed, you must establish a research advisor for your M.S. program.

Submit a Program Approval Form to the GSC.

Year 1, Semester 2

By the end of the second semester, you and your advisor should have decided on a committee, and your M.S. Thesis Proposal should be approved by your committee and the GSC, including the Program Approval Form.

Year 2, Semester 1

Any credit hour transfers must be completed.

Semester of Graduation (see above for further details)

- An application to Graduate must be submitted to the Graduate School by the third Friday of the semester of the semester when graduation is anticipated.
- Double check with the Graduate Secretary that credit hour degree requirements are met.
- Consult members of your committee for availability for the final Master's Examination
- Complete your thesis
- Secure preliminary approval to schedule the Final Master's Examination from your committee
- Prepare the examination draft of your thesis that must be complete and conform to the requirements established in the "Graduate School Guidelines for Formatting Theses, Dissertations, and D.M.A. Documents".
- Format check of document at Graduate School
- Submit a complete copy of your M.S. thesis to each committee member at least one week before the M.S. Examination.
- Complete Final Master's Examination
- Turn in the Examination Result document to Graduate School
- Finalize thesis and obtain committee approval of the final document
- Turn in the Thesis Approval document to Graduate School, and submit PDF of your thesis electronically as outlined in the Graduate School Handbook (GSH VI.4)
- You are encouraged to submit of an unbound paper copy of your final thesis to the Orton Memorial Library of Geology.

Dates to Remember for Ph.D. Degree Program from Master's Degree

General

Recommended: Yearly meeting with advisor and committee

Required: During Spring Semester submit "Graduate Student Activity Report"

Enrollment Requirements

G.T.A./G.R.A.: Autumn, Spring Semesters: minimum, 8; maximum 16.

G.T.A./G.R.A.: Summer Semester: minimum, 4 maximum 8.

Fellowship or Trainee: Autumn, Spring Semesters: minimum, 12; maximum 16.

Fellowship or Trainee: Summer Semester: minimum, 6; maximum 8.

International student without support from Ohio State: Autumn, Spring Semesters: minimum, 8; maximum 16.

International student without support from Ohio State: Summer Semesters: minimum, 4; maximum 8

Post-Candidacy Ph.D. student: 3 credits, Autumn, Spring, and Summer Sessions

Year 1, Semester 1

Establish your dissertation advisor.

Transfer of Graduate Credits to your M.S. Degree Program to your Earth Sciences doctoral program. Also, if you have additional post-B.S./B.A., graduate credits that need to be transferred to the OSU degree, inquire about transferring these credits. First, speak with your advisor and the GSC chair. Credit transfers must be completed prior to the third semester of enrollment as discussed in GSH IV.2.

If you are native to a country where English is not the first language, you must take the ESL composition Placement Essay assessment and satisfy all provisions outlined in GSH II.6. If you have aspirations to be a G.T.A. during your tenure at Ohio State, you will need to pass the Test of Spoken English and take language classes if appropriate (GSH II.6, II.7).

Year 1, Semester 2

Unless already completed, you must establish a research advisor for your Ph.D. program.

Submit a Program Approval Form to the GSC.

Year 2, Semester 1

Any credit hour transfers must be completed.

Year 2, Semester 2

By the end of the second year, you and your advisor should have decided on the composition of a committee, and your Ph.D. Proposal and Program Approval Form should be approved by your committee and the GSC. The proposal must be approved before the Candidacy Examination.

Your candidacy examination should take place during this semester. All students who successfully complete the doctoral candidacy examination are required to be enrolled in every semester (summer session is excluded) until the dissertation is successfully defended.

Semester of Graduation (see above for further details)

- An application to Graduate must be submitted to the Graduate School by the third Friday of the semester when graduation is anticipated.
- You should present a public research lecture summarizing your research to a School or Divisional Colloquium.
- Double Check with the Graduate Secretary that your credit degree requirements are met.
- Consult members of your committee for availability for the final Ph.D. Examination.
- Complete your dissertation.
- Secure preliminary approval to schedule the Final Ph.D. Examination from your committee.
- Prepare the examination draft of your dissertation that must be complete and conform to the requirements established in the “Graduate School Guidelines for Formatting Theses, Dissertations, and D.M.A. Documents”.
- No later than two weeks before the Final Oral Examination, you must submit the “Draft/ Notification of Final Oral Examination” form to the Graduate School. Each Committee member must sign this form, which signifies their approval of the dissertation draft for defense.
- Format check of document at Graduate School
- Submit a complete copy of your dissertation to each committee member at least one week before the Final Ph.D. Examination.
- Complete Final Ph.D. Examination.
- Turn in the Examination Result document to Graduate School.
- Finalize dissertation and obtain committee approval of final document.
- Turn in the Dissertation Approval document to Graduate School, and submit PDF of your dissertation electronically as outlined in the Graduate School Handbook (GSH VII.9).
- You are encouraged to submit of an unbound paper copy of your dissertation to the Orton Memorial Library of Geology.

Dates to Remember for Ph.D. Degree Program from Bachelor's Degree

General

Recommended: Yearly meeting with advisor and committee

Required: During Spring Semester submit "Graduate Student Activity Report"

Enrollment Requirements

G.T.A./G.R.A.: Autumn, Spring Semesters: minimum, 8; maximum 16.

G.T.A./G.R.A.: Summer Semester: minimum, 4 maximum 8.

Fellowship or Trainee: Autumn, Spring Semesters: minimum, 12; maximum 16.

Fellowship or Trainee: Summer Semester: minimum, 6; maximum 8.

International student without support from Ohio State: Autumn, Spring Semesters: minimum, 8; maximum 16.

International student without support from Ohio State: Summer Semesters: minimum, 4; maximum 8

Post-Candidacy Ph.D. student: 3 credits, Autumn, Spring, and Summer Sessions.

Year 1, Semester 1

Establish your dissertation advisor.

If you have additional post-B.S./B.A., graduate credit needs to be transferred to the OSU degree, inquire about transferring these credits. First, speak with your advisor and the GSC chair. Credit transfers must be completed prior to the third semester of enrollment as discussed in GSH IV.2.

If you are native to a country where English is not the first language, you must take the ESL composition Placement Essay assessment and satisfy all provisions outlined in GSH II.6. If you have aspirations to be a G.T.A. during your tenure at Ohio State, you will need to pass the Test of Spoken English and take language classes if appropriate (GSH II.6, II.7).

Year 1, Semester 2

Unless already completed, you must establish a research advisor for your Ph.D. program.

Submit a Program Approval Form to the GSC.

Year 2, Semester 1

Any credit hour transfers must be completed.

Year 2, Semester 2

By the end of the second year, you and your advisor should have decided on the composition of a committee, and your Ph.D. Dissertation Proposal and Program Approval Form should be approved by your committee and the GSC. The proposal must be approved before the Candidacy Examination.

Year 3

Your candidacy examination should occur after enough graded coursework has been taken so that graduation is possible with the 3-credit rule. The proposal must be completed before the candidacy Examination. All students who successfully complete the doctoral candidacy examination are required to be enrolled in every semester (summer session is excluded) until the dissertation is successfully defended.

Semester of Graduation (see above for further details)

- You should present a public research lecture summarizing your research to a School or Divisional Colloquium.
- An application to Graduate must be submitted to the Graduate School by the third Friday of the semester of the semester when graduation is anticipated.
- Double Check with the Graduate Secretary that your credit degree requirements are met.
- Consult members of your committee for availability for the final Ph.D. Examination.
- Complete your dissertation.
- Secure preliminary approval to schedule the Final Ph.D. Examination from your committee.
- Prepare the examination draft of your dissertation that must be complete and conform to the requirements established in the “Graduate School Guidelines for Formatting Theses, Dissertations, and D.M.A. Documents”.
- No later than two weeks before the Final Oral examination, you must submit the “Draft/Notification of Final Oral Examination” form to the Graduate School. Each committee member must sign this form, which signifies their approval of the dissertation draft for defense.
- Format check of document at Graduate School.
- Submit a complete copy of your dissertation to each committee member at least one week before the Final Ph.D. Examination.
- Complete Final Ph.D. Examination.
- Turn in the Examination Result document to Graduate School.
- Finalize dissertation and obtain committee approval of final document.
- Turn in the Dissertation Approval document to Graduate School, and submit PDF of your dissertation electronically as outlined in the Graduate School Handbook (GSH VII.9).
- You are encouraged to submit of an unbound paper copy of your dissertation to the Orton Memorial Library of Geology.

PROGRAM APPROVAL FORM

The following courses will provide the background appropriate to a graduate degree in the School of Earth Sciences.

Earth Sciences

_____	_____
_____	_____
_____	_____
_____	_____

Biological Sciences

_____	_____
-------	-------

Chemistry

_____	_____
-------	-------

Mathematics

_____	_____
-------	-------

Physics

_____	_____
-------	-------

_____	_____
-------	-------

(Student)

(Date)

_____	_____
-------	-------

(Adviser)

(Date)

_____	_____
-------	-------

(Associate Director of Graduate Studies)

(Date)

Guidelines for Master's Thesis and Ph.D. Dissertation Proposals

Graduate students should begin investigating potential research areas and discussing the feasibility of possible topics with appropriate faculty as soon as is practical after beginning their graduate careers. The ideal situation would be for a student to have chosen the general research area and to have received an indication from a faculty member that he or she would be willing to serve as advisor to the student before the end of the first semester in residence. It is recognized that commonly this will not occur until the second quarter in residence.

Only members of the Graduate Faculty (Status M or P) can serve as advisors at the Master's level. Only members with Status P can serve as Ph.D. advisors. All regular faculty in the School of Earth Sciences qualify as well as several adjunct faculty members. Adjunct faculty, however, can only serve in a co-advisor capacity along with a co-advisor from the regular faculty.

To formalize this agreement between the student and faculty advisor, the department requires that a Thesis/Dissertation Proposal be submitted to the Graduate Studies Committee for its approval.

The procedure for preparing and submitting the proposal is given below. It is expected that the text of the M.S. proposal will be 3 to 5 pages, including references. The Ph.D. proposal is expected to be no more than 5 to 9 pages, including references.

1. The student develops a proposal that meets the approval of his or her advisor and which addresses the following points:
 - a. nature and significance of the problem;
 - b. description of the procedures the student will use to solve the problem;
 - c. timetable for the work; and
 - d. estimated budget which shall include; i) stipend and its duration and anticipated source of funds (GRA, GTA); ii) analytical costs and technician time; iii) computer hardware and software costs; iv) fieldwork costs; v) illustration expenses; etc.

2. The student in conjunction with his or her advisor selects a second faculty member (for an M.S.), or two additional faculty members for a Ph.D., who is (are) willing to serve on the committee and who approve the written proposal. All faculty committee members sign and endorse the proposal before submission to the Graduate Studies Committee.

3. The Graduate Studies Committee will review the proposal, after which it may a) return the proposal to the student for clarification, amplification, or rewriting, or b) approve the proposal as written. Approval of the proposal is accompanied by appointment by the Graduate Studies Committee of a third (fourth for Ph.D.) faculty member to serve on the student's committee, filing of the proposal in the student's folder in the Departments Graduate Records Office, and notification of the student of these actions. It shall be incumbent upon the Graduate Studies Committee to take action on Thesis/Dissertation Proposals as quickly as possible when they are submitted during the regular academic year.

For a student in the M.S. program, the committee will serve as the Reading committee for the thesis and as the Master's Examination committee. The Ph.D. student's committee will serve as the Ph.D. Candidacy Examination committee, Reading committee, and Ph.D. Final Examination committee. If a member of such a committee can not be present for any Examination, the Chairman of the Graduate Studies Committee should be informed and in consultation with the student's advisor, a substitute for the Examination will be appointed.

Please note that:

1. A student must have an approved Thesis/Dissertation Proposal before enrolling in GS 8999 (Thesis/Dissertation Research).
2. Under the guidelines for "Normal Progress", a student must have an approved Thesis Proposal by the end of the second semester or a Dissertation Proposal by the end of the second year (4 semesters) at OSU.
3. Students are encouraged to apply for small grants from Sigma Xi, AAPG, GSA, etc. when the necessary financial support for research expenses is uncertain. The deadlines for these proposals are normally in January or early February, requiring early planning for thesis/dissertation research.

Guidelines for Entering the Ph.D. Program from the M.S. Program

Except for “special” and “non-degree” graduate students (who do not intend to pursue a graduate degree), students admitted to the Graduate School have graduate standing in a particular degree program of an academic unit. In the School of Earth Sciences, this means either the M.S. or the Ph.D. degree program. In its review of new applications for graduate study in the School of Earth Sciences, the Graduate Studies committee considers the stated degree program before making a recommendation on admission.

A graduate student admitted to the Master’s degree program in the School of Earth Sciences is expected to work towards the M.S. degree. Upon completion of the M.S. degree, a student is not automatically considered to be in the Ph.D. program even though continued course registration is permitted by the Graduate School. Program status is changed by notification of the Graduate School by the Graduate Studies Committee that the student has been admitted to the Ph.D. program. Requests for admission to the Ph.D. program in the School of Earth Sciences must be made through the Graduate Studies Committee, as described below.

Application to enter the Ph.D. program in the School of Earth Sciences does not require re-application to the Graduate School for admission. Rather, application is made in the form of a letter to the Graduate Studies Committee and by having new recommendations forwarded to the Committee. The letter also should include: a statement of progress in the M.S. program and plans for completion of the M.S. degree; a statement of goals and career objectives; identification of the anticipated area of Ph.D. research; and the name of the Earth Sciences Faculty member in that area who is willing to serve as the Ph.D. advisor. The applicant must request recommendation letters from three School of Earth Sciences Graduate Faculty, one of whom is the potential Ph.D. advisor. In its evaluation, the Graduate Studies Committee will consider these new materials and the applicant’s graduate work and performance in this school, along with the other credentials require of all applicants (e.g., GRE scores, undergraduate transcripts) previously submitted for entrance into the M.S. program.

After review of the application, the Graduate Studies Committee will inform the applicant by letter of its decision to recommend, or not to recommend, admission to the Ph.D. program. In the former case the Committee will recommend by letter to the Graduate School that the student be recognized as a Ph.D. student. This letter may indicate certain “conditions” to be satisfied, such as successful completion of the Master’s degree before admission into the Ph.D. program or other requirements, as is done for all “external” applications. Additionally, this letter will inform the Graduate School whether credits earned as a Master’s student should be counted toward the Ph.D. credit-hour requirements.

It is inappropriate to apply for entrance to the Ph.D. program until significant progress has been made toward completion of the M.S. requirements (e.g., coursework and progress on thesis research).

THE OHIO STATE UNIVERSITY
School of Earth Sciences
 ANNUAL REPORT OF GRADUATE STUDENT ACTIVITY
 June 2014 to May 2015

NAME:

DATE:

Degree program (MS/PhD; Earth or Geodetic Sciences): _____

Ohio State Graduate School entry (quarter, year): _____

MS/PhD Thesis proposal approved or expected submission date: _____

PhD qualifying exam date (taken or expected): _____

EXPECTED GRADUATION (quarter, year): _____

TOTAL NUMBER OF SEMESTERS REGISTERED: _____

TOTAL NUMBER OF SEMESTERS as GTA: _____

Thesis title:

Thesis advisor:

Thesis committee:

HONORS RECEIVED (prizes, fellowships, grants, etc)

Continuing grants/Fellowships (begin and end dates)

Grants/fellowships applied for but not received

PROFESSIONAL ACTIVITIES

Publications:

Refereed

Other

Publications in progress:

Conference papers/posters/talks:

Other

COMMITTEES AND EXTRACURRICULAR ASSIGNMENTS (student govt., student organizations, committees, etc.)

School of Earth Sciences and Ohio State

Other

TEACHING ACTIVITIES (14-15)

Course name & number	Course instructor	Quarter/Semester	Approx weekly hours	Teaching Evaluation

Other (curriculum innovation, coordination, etc.)

COURSES

Graded courses (14-15)

Course name & number	Instructor	Credit hours	Quarter/Semester	Grade

Seminars/S/U Courses (14-15)

Seminar name & number	Instructor	Credit hours	Quarter/Semester	Grade

Transfer credits earned (14-15)

University	Course name & number	Credit hours	Quarter / semester	Grade

Other (audited classes, etc)

2012-2013 GPA: _____

2013-2014 GPA: _____

Cumulative GPA: _____

Proposed course of study 2013-2014:

Department	Course number	Course title	Quarter/Semester

Signature: _____

Date: _____

Advisor's Signature: _____

Date: _____

Procedure and Standards for MS → PhD conversion

Standards:

The *Position Statement on Graduate Admissions and Teaching Assistantships* document outlines the following admission standards:

1. A minimum of 3.2 cumulative point-hour ratio for admission into the MS program. The point-hour ratio is based on the 4.0 scale used at this university and applies to all previous undergraduate work.
2. A GPA of 3.4 or better for admission to the Ph.D. program for students without a Masters degree, and a Graduate GPA of 3.6 or better for students that have completed a Master's degree.
3. An average score of 60% or better on the Verbal and Quantitative parts of the GRE and 4.5 or better on the Analytical Written part of the GRE.

Students admitted to the MS program may have a GPA between 3.2 and 3.4. However, the GSC committee recognizes that there is a fundamental difference between being a top student in the classroom and an excellent research student.

Therefore, the GSC committee proposes that the standards applied to students wishing to convert from the MS to PhD program without completion of the MS degree be on a case-by-case basis. Primary emphasis is made on an evaluation of solid progress on PhD-level research within the first 18 months. Evidence of research progress is:

- *First author abstract submitted to a national meeting (AGU, GSA and similar)
- *First author publication in progress.
- *Successful application for graduate fellowships from national programs (e.g. NSF, DOE, NASA and similar)
- *Successful application for competitive funding from external sources
- *Other achievement in their research area showing ability to complete 3 publishable papers in 4-5 years.

This is not a mechanism for which students who have been in the MS program for more than 2 years can gain more time as students in SES.

Procedure:

Students wishing to convert from MS to PhD must have the support from their academic advisor to make the conversion.

Within 18 months of beginning the MS program, a student can petition to the GSC for permission to switch status from the MS to PhD program. The petition includes:

*A letter from the student requesting the conversion, describing their research, and list faculty with whom they have had significant interaction who can comment on their abilities.

*A letter from the student's research advisor in support of the conversion outlining the evidence for PhD-level abilities.

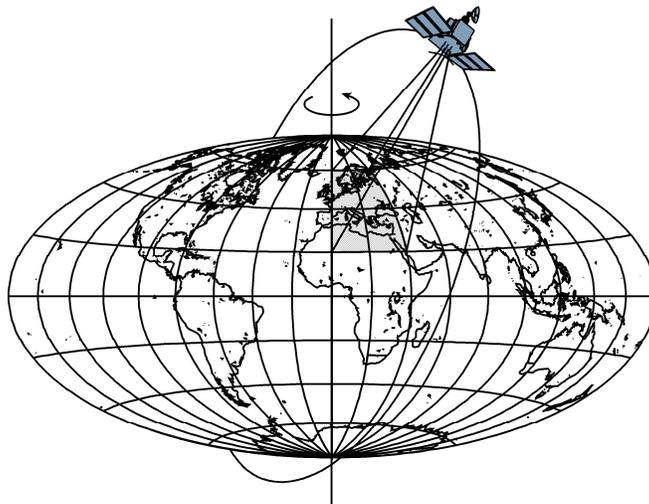
The GSC will have conversations with other faculty familiar with the student in situations where the case is not clear. The process needs to be converted by the end of the middle of the Spring Semester of the student's second year.

Students granted a conversion will be expected to take their qualifying exams and submit a dissertation proposal on the same schedule as other PhD students based on matriculation date, not their MS to PhD conversion date.

In the event that this student either fails the qualifying exams or fails to complete the dissertation in a timely fashion, then the student may reapply to the Graduate School to the MS program. A MS dissertation will remain a requirement for the MS degree.

Geodetic Science

Program and Course Offerings



**Division of Geodetic Science
School of Earth Sciences
Ohio State University**

275 Mendenhall Laboratory
125 South Oval Mall
Columbus, OH 43210
tel: 614-292-2721

<http://geodeticscience.org>

Geodetic Science Graduate Degree Program

I. What is Geodesy?

Geodesy is the science of determining the size and shape of the Earth (including its temporal variation) using measurements primarily (today) of distance, time, and gravity. Being one of the oldest sciences, with a history of more than two thousand years, the traditional measurements were mostly associated with land surveying (distance and direction measurements of landmarks and celestial objects) and gravity observations (to determine the geoid, as reference surface for heights, and the plumb direction). The age of satellites, radio and optical science, and computer technology have completely transformed these methods and enabled geodesy to branch into many of the Earth sciences where the exquisite measurement precision has enabled observations of ocean circulation, terrestrial hydrology, tides, solid Earth deformation, tectonic plate motions, ice sheet mass change, ionospheric and atmospheric changes, Earth rotation variation, and other geodynamical phenomena with unprecedented detail and accuracy. Contemporary geodesy utilizes the latest in mathematical modeling, research in physics, astrometry, scientific computations, and statistical analysis to aid in the understanding of ocean currents, sea level rise, the world's hydrological cycles, atmospheric conditions, global climate change, post-glacial rebound, and elastic deformation, particularly as it relates to natural hazards, such as earthquakes, volcanoes, and flooding. In these Earth science applications, accurate terrestrial reference frames, high-resolution global gravity models, and precise time keeping are of paramount and fundamental importance. Geodesy, of course, continues the tradition of forming the backbone for all national and international datums and reference systems needed to establish three-dimensional positional control of regional and global networks of terrestrial points, as well as the world's civilian and military satellite missions to the Earth and beyond. Many geodetic principles and techniques also have found application in studies of the Moon, other planets, and their satellites.

II. Geodetic Science M.S. Degree

The overall goal of the Graduate Degree Program in Geodetic Science is to provide students the opportunity to gain an advanced education in Geodetic Science. Specific objectives of the program include participation in advanced classes and seminars and, for the M.S. thesis option, to conduct independent research on fundamental problems in Geodetic Science. The products of M.S. research projects are expected to be suitable for publication in the scientific literature.

The M.S. program in Geodetic Science traditionally has focused on the thesis-based M.S. degree; however, there is also an approved Non-Thesis Option (Plan B). The Non-Thesis Option is intended for geodetic scientists in government or industry who do not plan to continue for a Ph.D., and therefore do not require significant preparation in independent research, but whose career paths will benefit from additional educational and practical experience.

Both the M.S. Thesis and Non-Thesis options require a minimum of 30 semester credit hours. Core courses are selected in 4 general categories, where some selections are mandatory and others are elective. Three pre-approved tracks of core courses are available, in the areas of Geodesy, GIS, and Geodynamics. For the M.S. Non-Thesis Option, there is greater emphasis on completing graded courses than in the Thesis Option. However, the Non-Thesis M.S. student is

required to write a technical report, as well as a comprehensive examination in accordance with Graduate School rules.

A. Expected Background

All Master's degree aspirants are expected to have a Bachelor's degree, and they normally will have a degree in the sciences or engineering. The basic entrance requirements to the program include courses in advanced calculus, linear algebra, and introductory physics, and some knowledge of and experience with scientific computer programming using a high-level language. Matlab, C++, Java, and FORTRAN are some of the most commonly used computer programming languages in geodetic science. Completion of the Graduate Record Exam (GRE) is recommended for applicants wishing to be considered for graduate research appointments; and it is required for applications to university academic fellowships or financial assistance thereof (such as tuition waivers).

B. Program of Study

In consultation with the student's advisor, and with approval of the Graduate Studies Committee (GSC), a student will design a course of study appropriate to the field of specialization. If needed, in consultation with the advisor, and with approval of the GSC, students will design a course of study to remedy program deficiencies, to bring the student to the level required to do work in the field of specialization. Students should plan on completing all deficient course work with a grade of "B" or better within one year of entry into the program.

If necessary, the Chair of the Graduate Studies Committee will provide advice on coursework and help in the selection of a research area (Thesis Option) and an advisor. By the end of the first semester in the program every student is strongly encouraged to have identified a research area (Thesis Option) and to have obtained the consent of a faculty member to serve as an advisor. Until the student has an advisor, the chair of the GSC will act in that capacity.

Once a faculty advisor has been identified, the graduate student, in consultation with his/her advisor, will define the curriculum of study and a research topic of appropriate level and scope (Thesis Option). At least one additional faculty members will be identified to serve on the student's Advisory Committee and Master's Examination Committee, subject to approval by the Geodetic Science GSC.

C. Coursework in Geodetic Science

For the M.S. in Geodetic Science a minimum of 30 graduate semester credit hours is required. Of those 30 graduate semester credit hours, approximately 16-24 semester credit hours are earned by completing 4 to 6 courses from 4 core areas; these courses cover basic knowledge and analytic skills required of all M.S. students in the Geodetic Science program. The remaining credit hours are fulfilled with elective courses, including research courses, in one or more areas within Geodetic Science or in related disciplines. Three standard sets of courses are pre-approved to meet requirements within the core areas, as described below. If a student chooses one of these standard sets of courses, then his/her selection of core and elective courses only

requires approval by his/her advisor. Any selection of “core courses” that deviates from these 3 pre-approved sets of courses must be approved by the student’s advisor and the GSC.

Except as noted below for one of the pre-approved sets of core courses, a student must complete the 2 foundational courses and 1 course chosen from each of the following 3 categories: Geodetic Science, Geomathematics, and Sensor Systems and Applications.

1. Foundational Courses

- a) Geod Sci 5660, Geometric Reference Systems (4 semester credit hours)
- b) Geod Sci 5636, Geovisualization Geometry (4 semester credit hours)

2. Geodetic Science

- a) Geod Sci 6776, Physical Geodesy (4 semester credit hours)
- b) Geod Sci 6777, Satellite Geodesy (3 semester credit hours)
- c) Geod Sci 5781, Geodesy and Geodynamics (3 semester credit hours)
- d) Geod Sci 6786, Geospatial Data Structures for Computer Mapping and GIS (3 sem. cr. hrs.)
- d) Earth Sci 5646, Geodynamics (3 semester credit hours)

3. Geomathematics

- a) Geod Sci 5652, Adjustment Computations (5 semester credit hours)
- b) Earth Sci 5642, Geomathematical Analysis (3 semester credit hours)
- c) Math 5601, Essentials of Numerical Methods (3 semester credit hours)
- d) Physics 5300, Theoretical Physics (4 semester credit hours)
- e) Stat 6450, Applied Regression Analysis (4 semester credit hours)

4. Sensor Systems and Applications

- a) CE 7442, Fundamentals of GPS and Reference Systems (4 semester credit hours)
- b) Earth Sci 5781, Gravity Exploration (3 semester credit hours)
- c) Earth Sci 5782, Magnetic Exploration (3 semester credit hours)
- d) Geod Sci 7745, Inertial Navigation/Positioning Analysis (4 semester credit hours)
- e) Earth Sci 5650, Glaciology (4 semester credit hours)
- f) Earth Sci 5655, Land Surface Hydrology (3 semester credit hours)

The following Table represents suggested 2-year coursework plans for students specializing in Geodesy, GIS, and Geodynamics. These are pre-approved curricula; however, petitions from the student and his/her advisor for deviations in these plans will be considered for approval by the Graduate Studies Committee.

	Geodesy	GIS	Geodynamics*
Autumn Semester, Year 1	GS5636, GS5652, GS5660 Total = 13 credits	GS5636, GS5652, GS5660 Total = 13 credits	GS5636, GS5652, GS5660 Total = 13 credits
Spring Semester, Year 1	CE7442, GS6776, GS6777 Total = 11 credits	GS6786 Other courses Total = \geq 8 credits	GS5781, CE7442 Other courses Total = \geq 8 credits
Subsequent Semesters	Geod Sci or other electives + research credits	Geod Sci or other electives + research credits	Geod Sci or other electives + research credits

* Because this track tends to engage the students more deeply in the Earth sciences, it is common that the core selections in the Foundational Category 1 deviate from the prescribed ones.

D. Thesis Option (“Plan A”)

The *Application to Graduate* form must be submitted to the Graduate School for the semester in which the student wishes to graduate, according to the rules of the Graduate School. The final Master’s Examination cannot be scheduled until the Advisory Committee has given preliminary approval of the thesis document.

Each student must complete a Master’s thesis, which describes the results of an original research project. The thesis document must be prepared according to the guidelines described in the Graduate School handbook.

Upon completion of the Master’s thesis, candidates for the M.S. degree must complete a final oral examination, which may include questions on both the thesis research and aspects of the M.S. degree preparation not necessarily related to the thesis. The Master’s Examination Committee consists of the Advisory Committee as originally constituted, although substitutions may be approved by the GSC in situations where a member cannot be present at the time of the examination. The advisor serves as chairperson of the examination. The final oral examination will be scheduled and conducted according to the rules of the Graduate School.

E. Non-Thesis Option (“Plan B”)

In addition to the core course requirements for the Thesis Option, the Non-Thesis-Option student must complete a minimum of 7 additional semester credits of graded graduate-level coursework

in Geodetic Science or other approved areas, chosen in consultation with his/her advisor, as part of the completion of a minimum of 30 graduate semester credit hours.

The student must also write a 3000–5000 word technical paper on an approved topic, chosen in consultation with his/her advisor, and must orally present it satisfactorily prior to the written Master's Examination. This oral presentation will be evaluated by the student's advisor and one other faculty member, approved by the Geodetic Science Graduate Studies Committee, who usually is also on the Master's examination committee.

The Master's Examination for the non-thesis option (Plan B) is a written, comprehensive examination covering material presented in the required courses. Questions will be written and evaluated by the student's advisor and one other faculty member, approved by the Geodetic Science GSC. The student must successfully complete the Master's Examination to receive the M.S. degree.

F. Awarding of the M.S. Degree upon Completing the Ph.D. Candidacy Examination

In general, the M.S. degree is also awarded (if it has not been earned through a formal curriculum as described above) upon the successful completion of the Ph.D. Candidacy Examination.

G. Transition Plan

Students who began their degree under quarters will not be penalized as we move to semesters, either in terms of progress towards their degree or their expected date of graduation. Arrangements will be made for individual students on a case-by-case basis by their advisors and the Graduate Studies Committee within Geodetic Science, but we anticipate few complications because few of our courses are contained in sequences.

Because our M.S. degree requirements are specified in terms of a required number of credit hours, rather than a required number of courses, credit hours will serve as the "currency" during the transition. Students who have completed graded coursework under quarters will be allowed to count the equivalent number of semester credit hours toward their degree requirements. Students who have completed the quarter equivalent of a pre-approved semester "core course" will be considered to have fulfilled that semester-course requirement; students who have completed quarter courses that are not included in the new pre-approved "core courses" will apply the semester-equivalent credit hours toward their electives.

III. Geodetic Science Ph.D. Degree

The overall goal of the Ph.D. Degree Program in Geodetic Science is to provide students the opportunity to develop advanced research techniques in Geodetic Science. Specific objectives of the program include providing opportunities for students to participate in advanced classes and seminars and to conduct advanced, independent research on fundamental problems in Geodetic Science. The products of the Ph.D. research are expected to be suitable for publication in the refereed scientific literature.

The Ph.D. degree is a research degree, so most coursework is taken during the first 2-3 years. Usually only advanced seminars or pertinent courses that are offered infrequently are taken after that time. The purpose of the coursework in the Ph.D. program is threefold:

- 1) to prepare students to complete the Ph.D. candidacy exam (which should be completed no later than the end of the student's third year in the program);
- 2) to prepare students to undertake significant original research in Geodetic Science, culminating in the Ph.D. dissertation; and
- 3) to prepare students for a long and productive career in the diverse field of Geodetic Science.

A. Expected Background

Students entering the Geodetic Science Graduate Degree Program with the goal of attaining the Ph.D. degree must meet all entrance requirements for the M.S. degree (see I.A.) and generally have obtained a M.S. degree (thesis option) in an equivalent discipline. In some cases, a student may be admitted directly to the Ph.D. program with approval of the Graduate Studies Committee. A Ph.D. student is responsible for knowledge and competency at the M.S. level in Geodetic Science or a related field, and the core courses of the Ph.D. curriculum are designed to prepare for the general examination that will allow the student to become a candidate for the Ph.D. degree. It is recommended that students applying directly to the PhD program and wishing to be considered for graduate research appointments should complete the Graduate Record Exam (GRE); it is required for applications to university academic fellowships or related financial assistance (such as tuition waivers).

B. Program of Study

Each Ph.D. student will meet with, or correspond with, a potential advisor either during the application process or within the first semester of enrollment. Possible research topics will be discussed at this time. A student will be considered to have an advisor when both the student and the potential advisor have agreed to establish this relationship, and it has been approved by the Geodetic Science GSC. If necessary, the Chair of the Geodetic Science GSC will serve as interim advisor, and will assist the student in finding an advisor. The advisor and the student will choose additional faculty members to serve on the Ph.D. Advisory Committee, subject to approval by the GSC.

The student's research topic will be identified by mutual agreement of the student and advisor, subject to approval by the other members of the Ph.D. Advisory Committee and the Geodetic Science GSC. To formalize this agreement, the student will write a Dissertation proposal after

completing the Ph.D. Candidacy Examination; the Dissertation proposal will be approved by the student's advisor and the other members of his/her Ph.D. Advisory Committee, and will be filed with the Geodetic Science GSC.

At the time of the Ph.D. Candidacy Examination, the student is responsible for the knowledge and competencies developed during the Geodetic Science M.S. program, as well as those developed in the core courses of the Ph.D. curriculum.

C. Coursework in Geodetic Science

A minimum of 80 graduate semester credit hours beyond the baccalaureate degree is required for the Ph.D. degree. Students may apply 30 semester credit hours (20 hours of graded coursework plus 10 research hours) earned as part of a Master's degree toward the 80 semester hours, according to the rules of the Graduate School.

For the Ph.D. in Geodetic Science, the student must complete a minimum of 10 credit hours of letter-graded, advanced courses from the list below, or from available advanced courses in the Earth Sciences or related disciplines with approval of the Geodetic Science GSC. The remaining credit hours may be fulfilled with elective courses (including research and seminar courses). The entire curriculum for a student must be approved by the Geodetic Science GSC before the student begins the Ph.D. Candidacy Examination.

Advanced Geodetic Science Courses for the core requirements of the Ph.D.

GS7763	Advanced Adjustment Computations (4 semester credit hours)
GS7765	Analysis and Design of Geodetic Networks (2 semester credit hours)
GS7837	Computational Cartography (4 semester credit hours)
GS8862	Adjustment Computations for Random Processes (2 semester credit hours)
GS8871	Advanced Physical Geodesy (3 semester credit hours)
GS8873	Advanced Satellite Geodesy (3 semester credit hours)
GS7875	Spectral Methods in Geodesy (3 semester credit hours)

D. Ph.D. Candidacy Examination

A Ph.D. aspirant must pass the Ph.D. Candidacy Examination to be admitted to candidacy for the Ph.D. degree, and must ultimately complete and defend a dissertation that presents the results of an independent, original research project that is a scholarly contribution to the science. All components of these requirements (i.e., the Ph.D. Candidacy Examination, the Ph.D. dissertation, and the Ph.D. oral defense) must be fulfilled to meet the requirements of the Graduate School.

A Ph.D. aspirant who enters the program with an M.S. in Geodetic Science is expected to complete the Ph.D. Candidacy Examination by the end of his/her second year in the program. A Ph.D. aspirant who enters the program without an M.S. in Geodetic Science is expected to complete the Ph.D. Candidacy Examination by the end of his/her third year in the program; the additional time is required for the student to achieve the competencies expected of an M.S. student in Geodetic Science. Some exceptions to this general schedule occur because the student

is involved in extensive field work, or some desired courses are not offered at an appropriate time in the student's plan.

The Candidacy Examination includes both written and oral portions, and begins only after the respective Application has been submitted in accordance with procedures outlined by the Graduate School. The student is responsible for knowledge and competency at the M.S. level in Geodetic Science or a related field, as well as competencies presented in the core courses of the Ph.D. curriculum. The Candidacy Examination is administered by the student's Advisory Committee (Dissertation Committee), comprising the student's advisor and faculty members and/or guest members in accordance with Graduate School rules.

The student becomes a Ph.D. candidate on successful completion of the Candidacy Examination. NOTE: If the final oral exam is not taken within five years of admission to Candidacy, the Candidacy exam must be retaken, as required by the Graduate School.

E. Dissertation and Final Oral Examination

To be awarded the Ph.D. degree, a student must complete a dissertation that presents the results of an independent, original research project that is a scholarly contribution to the sciences. The dissertation document must be prepared according to the guidelines described in the Graduate School Handbook.

A Ph.D. candidate must satisfactorily defend the dissertation research in a Final Oral Examination, and must submit an approved copy of the dissertation to the Graduate School. These requirements must be fulfilled according to the requirements of the Graduate School.

The committee for the Final Oral Examination will meet the requirements set by the Graduate School. It is headed by the Student's advisor and includes the members of the Dissertation Committee (comprising faculty and/or guest members in accordance with Graduate School rules) plus a Graduate Faculty representative appointed by the Graduate School.

The rules and regulations covering the PhD Final Oral Examination are detailed in the Graduate School Handbook. The Geodetic Science GSC adheres to these rules and regulations. The format, principles and policies of the Final Oral Examination in Geodetic Science satisfy the Graduate School's requirements and enable the Ph.D. aspirant to present research results and engage in discussion of these and other topics before an audience of mentors, teachers and the student's peer group, as well as responding to formal questioning by the Examination Committee.

F. Registration Guidelines

A Ph.D. student is generally expected to complete all requirements for his or her degree within five years of the semester following successful completion of the Candidacy Examination.

A student must register for at least one credit hour to maintain office space and to use School and University facilities.

A student must meet Graduate School guidelines for registration during the semester in which any portion of the General Examination is taken, the semester during which the Final Oral Examination is taken, and the semester of expected graduation.

GEODETIC SCIENCE SEMESTER COURSES

Geod Sci 5194	Group Studies (1-6 semester credits)
Geod Sci 5612	Introduction to Geodesy (3 semester credits)
Geod Sci 5636	Geovisualization Geometry (4 semester credits)
Geod Sci 5637	Topics in Mapping (3 semester credits)
Geod Sci 5652	Adjustment Computations (5 semester credits)
Geod Sci 5660	Geometric Reference Systems (4 semester credits)
Geod Sci 5781	Geodesy and Geodynamics (3 semester credits)
Geod Sci 6193	Individual Studies (2-6 semester credits)
Geod Sci 6776	Physical Geodesy (4 semester credits)
Geod Sci 6777	Satellite Geodesy (3 semester credits)
Geod Sci 6786	Geospatial Data Structures for Computer Mapping and GIS (3 sem. cr.)
Geod Sci 7745	Inertial Navigation/Positioning Analysis (4 semester credits)
Geod Sci 7763	Advanced Adjustment Computations (4 semester credits)
Geod Sci 7765	Analysis and Design of Geodetic Networks (2 semester credits)
Geod Sci 7837	Computational Cartography (4 semester credits)
Geod Sci 7875	Spectral Methods in Geodesy (3 semester credits)
Geod Sci 7998	Research in Geodetic Science (1-12 semester credits)
Geod Sci 7999	Research for M.S. Thesis in Geodetic Science (1-12 semester credits)
Geod Sci 8862	Adjustment Computations for Random Processes (2 semester credits)
Geod Sci 8871	Advanced Physical Geodesy (3 semester credits)
Geod Sci 8873	Advanced Satellite Geodesy (3 semester credits)
Geod Sci 8785	Research Principles and Techniques (2-6 semester credits)
Geod Sci 9998	Research in Geodetic Science (1-12 semester credits)
Geod Sci 9999	Research for Ph.D. Dissertation in Geodetic Science (1-12 sem. credits)

Please note that not all courses are offered every year. Several offerings also depend on enrollment. The student should check with corresponding instructors and his/her advisor to ensure that his/her curriculum will be completed in a timely manner.

PROGRAM APPROVAL FORM

The following courses will provide the background appropriate to a graduate degree in the School of Earth Sciences.

Geodetic

_____	_____
_____	_____
_____	_____
_____	_____

Geography

_____	_____
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Computer Science

_____	_____
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Mathematics

_____	_____
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Physics or Related

_____	_____
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(Student)

(Date)

(Adviser)

(Date)

(Graduate Studies Chair Geod.)

(Date)



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES



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