GEOSCIENCE GRADUATE HANDBOOK

A Guide to the Doctoral Program in the Department of Geosciences, Stony Brook University

Fall 2023

Structure of this Handbook:

Pages 2-6 give a brief overview of how the graduate program works.

Pages 6-17 give a glossary of the italicized terms used in the overview of pages 2-6. It is there that graduate program procedures are specified most completely.

Pages 18-19 provide a sample timeline from entering the graduate program to graduation with a Ph.D.

Page 20 outlines course requirements and some graduate course offerings

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OVERVIEW OF THE GRADUATE PROGRAM

Degrees Described in this Document

This document is intended to help to guide new and continuing students toward the successful completion of the requirements of the Ph.D. and M.S. (with thesis) in the Department of Geosciences. These guidelines do not encompass the M.S. degree (without thesis) in the Hydrogeology Program, the Earth Science M.A.T. (Master of Arts in Teaching) degree, or the M.S in Geosciences with Concentration in Earth and Space Sciences. This handbook includes a brief summary of degree requirements, followed by a glossary. All terms appearing in italics are described in greater detail in the glossary section of this guidebook (pages 6-17).

Admission and Credit Requirements

Graduate students are admitted to the Geosciences graduate programs with either a B.S. or an *accepted M.S.* degree (or equivalent) in geology or a related science. Graduate students entering the GEO programs with a bachelor's degree may seek the Ph.D. degree either directly or by obtaining an M.S degree first. The M.S. degree requires 30 credits, of which at least 18 must be from courses, rather than research (*R.A.*) or teaching practicum (*T.A.*), as well as an M.S. *thesis abstract*, an *M.S. thesis*, and an *M.S. thesis defense*. Many students choose, after consulting their potential *advisors*, to proceed directly to *Ph.D. candidacy* without first earning an M.S. Good academic standing as a graduate student requires a GPA of 3.0 or higher. Academic standing can also be negatively affected by repeated failure to obtain "S" grades in S/U courses.

Educational Goals

Students who complete our M.S. program will:

1) be knowledgeable in how to conduct and communicate the results of independent research
2) demonstrate technical expertise in one or more laboratory, field and/or computational methods used in the geological sciences

Students who complete our Ph.D. program will:

1) be able to define, design, propose, and execute original research projects that yield meaningful advances in scientific knowledge
2) be experts in communicating the results of independent research in both verbal and written form
3) demonstrate technical expertise in one or more laboratory, field and/or computational methods used in the geological sciences
4) have gained experience in instructional methods for undergraduate science courses
5) have detailed understanding of the foundational knowledge underpinning the student's sub-specialty in the geosciences

Degree Candidacy
Entering graduate students interested in pursuing the Ph.D. degree are not *Ph.D. candidates*. Students become *Ph.D. candidates* only after successfully passing the *Ph.D. preliminary examination*, commonly called "*prelims"*. This two-month long process consists of writing a *proposal abstract* and a *Ph.D. dissertation proposal* and defending the proposal in an oral examination.

Advisement
The *graduate committee* will hold an *initial advisory meeting* with each incoming student before the start of the fall term of the incoming student's first year. The student is then assigned an *advisory committee* of 3 faculty with research interests near those of the student, with whom the student should maintain close contact throughout the first year of graduate study. In addition, each first-year student is required to convene a meeting of their advisory committee at least once each semester, generally in November and in April. At that time, the student and the committee plan a course of study and discuss any concerns raised by the student or by faculty. Each student is also urged to consult with the members of their advisory committee before and after their first *grad circus* talk.

Required Courses
Each semester, all students are required to register for two zero-credit courses: GEO 696 *Geosciences Colloqium* and GEO 697 *Geosciences Seminar* ('*grad circus*'). At least once during their graduate career each student must also serve as a *TA* and register for GEO 600 *Practicum in Teaching* (for 0 to 3 credits). Students register for GEO 500 *Geosciences Research Seminar*, an extended orientation to the department and university policies, during their first fall semester in the Department. Every summer while in residence each student must register for 0 credits of GEO 800 *Summer Research* (note that there is an administrative fee that you must pay to do this, but it is required for a number of reasons, not the least of which is that failure to do so can leave you without health insurance).

Any student who is not a citizen or permanent resident of the U.S. who is doing CPT (Curricular Practical Training) at the end toward the end of their graduate career, or OPT (Optional Practical Training) after that, will need to speak further with the *graduate coordinator* about additional requirements.

Although it is sometimes possible to make arrangements for a graduate student to take an undergraduate course (in Geosciences or another department), doing so takes additional planning and discussion in advance with the *graduate director* and the *graduate coordinator*. Depending upon the student's research interests, their advisory committee or advisor may require or suggest additional courses necessary for advancing in the research program.

Courses Outside the Department
For some students, taking courses or seeking research collaboration outside the department (such as Chemistry, Mathematics, Physics, Anthropology, Engineering, or Marine Sciences) is appropriate and encouraged. However, the time required to take

courses outside of the department should be carefully weighed against time that would otherwise be used to find a research niche within the department. It is essential for each student to maintain an intellectual and personal home base in the Geosciences Department. Therefore, students must discuss any plans for work outside the department in advance with their *advisor* or (during the 1st year of graduate study), with the student's *advisory committee*. They must then speak with the *Graduate Director* who notifies the *Graduate Program Coordinator (Grad Coordinator)* that permission has been given.

Registering for Classes, TAs, and Research

The university indicates a student's *graduate status* using the letter 'G' followed by a number that governs the number of credits for which a student must register. Unless the *Graduate Coordinator* says otherwise in writing, this means that all G3 students must register for exactly 12 credits and all G4 & G5 students must register for exactly 9 credits. There is some flexibility in making your schedule conform to this arbitrary credit total: classes (including ESL) generally carry 3 credits, but GEO 600 Practicum in Teaching (for which you register when doing a *TA*) can carry 0-3 credits, and research (GEO 599 before passing *prelims*, 699 after) can carry anywhere from 0 to 9 credits (3 is typical in the first semester). Because G3 students must take 12 credits per term, they reach (by definition) the 24-credit criterion for G4 status before the start of their second year. Therefore, beware that your status will have changed to G4 (and you must then register for only 9 credits)!

The number of research credits for which the student registers depends upon the student's schedule and needs. It is to be determined in consultation with their *advisor*. Students who have passed the *Ph.D. preliminary exam* (prelims) register for GEO 699 and those who have not register for GEO 599. In either case, a student registers for the section number corresponding to the faculty member who is supervising the research. (see also: *advisor, Ph.D. preliminary exam, section number*)

Time Commitments and Work Expectations

It is the department's intention to have Ph.D. students receive stipends to help offset the cost of living during the time that they are working on their graduate degrees. The stipends are typically funded through state-appointed *Teaching Assistants*hips (TAs) or through research grants as *Research Assistants* (RAs), and are distributed biweekly.

How many hours? Students appointed to full-time TA/RA positions are expected to devote up to 20 hours/week to the duties associated with these positions. Graduate students also register for research credits, which further account for their time as full-time students.

An additional 20 hours/week spent on research is realistically not enough time to complete a Ph.D. degree in a reasonable time frame. Students are encouraged to ask their advisor(s) about workload expectations. Most advisors expect that their students are devoting a minimum of 40 hours per week to reading/research/training, with reduced expectations in the semesters that they work as TAs. For many students, there will be "crunch" times when longer hours are needed (such as during scheduled beamtime or

nearing a conference), usually followed by a more relaxed period. As described in the GSEU contract, the time that it takes to produce output from professional activities such as research can be variable, thus fluctuating workload is expected.

Working hours: Graduate students should discuss their work schedules with their advisor(s). Most advisors will expect students to maintain a regular work schedule, on campus. Flexible work hours are both a necessity and a privilege. Refusal to be on campus, working and focused on dissertation research will be noted in the written semester evaluation letters and can negatively affect the student's academic standing and potentially result in loss of their RA appointment (and stipend).

Time off: Graduate research is a year-round activity and a full-time job. Though classes typically only run during the fall and spring semesters, graduate students are expected to continue working during most of the duration of the summer and winter semester breaks. Graduate students should discuss vacation time with their advisor(s), well in advance, to ensure their absence will not conflict with research activities (e.g. proposal/abstract deadlines, beamtime, etc). It is suggested that graduate students take a cumulative maximum of 3 weeks off each year, but it is also recognized that international students may need a longer period to return home. Students needing more time should discuss these plans with their advisor. Additionally, students on TA appointments will have less flexibility on vacation timing due to the need to be on campus when classes are in session.

Keeping Your Head Above Water

Being a graduate student is a balancing act. It is essential to keep current in research developments through courses and by attending *grad circus* and departmental colloquium, taking an active part in formal and informal seminars, and remaining aware of the literature in the field. Students doing teaching assistantships must work conscientiously in their TA assignments, because graduate students are a key part of the department's undergraduate program and also because teaching experience is an important part of the Ph.D. program. Taking (and doing well in) courses is also important, but in the end graduate school is about succeeding in research – not classes.

It is essential to make sure that all administrative issues are dealt with properly and promptly. For that reason, all e-mail from the *Graduate Program Coordinator* should be read and responded to promptly. Failure to do so could result in a loss of your stipend or health benefits, as well as other unfortunate consequences.

The First Priority: Research

It is important for students to begin conducting research through the first two semesters in the Department. Depending upon the student's background, either one or two short (approximately 1 semester) *research projects* are typically completed under the guidance of faculty members: each student's program is different, depending on their research interests. Most students admitted to the program come in with the expectation that they are there to work with a primary supervisor that they have already committed to work with. That supervisor is responsible for working with the student to define a first year

project that provides them with the research experience needed to assess whether or not they wish to continue on with a graduate research career, and whether the primary supervisor's group is a good fit for that student. Research experience during the first year is very important because, before the first summer, the student must choose and be accepted by an *advisor* who will provide long-term intellectual and financial support for the student's research. Any member of the Geoscience Department teaching or research faculty can serve as an *advisor*.

Advance to Candidacy
When a student is close to having finished course work and is converging on a *Ph.D. dissertation* topic, they should speak with their advisor about preparing for the submission of a *proposal abstract*. The student then has 6 weeks to submit a *Ph.D. proposal*, after which the *Ph.D. preliminary exam* (prelims) can be scheduled. Passing this qualifying exam is what causes a student to become a Ph.D. candidate. The exam is passed only once: a change of advisor or a change in research plans does not require that the exam be retaken.

Working with one or more faculty members, the student pursues their research until the *Ph.D. dissertation (thesis)* is ready. At that time, the graduate committee appoints a *Ph.D. defense committee*, and the thesis defense is scheduled. There are no set departmental time limits for completion of the Ph.D., but the University has enforced such a time limit. At present, the limit for the Ph.D. is a period of seven years after the time when 24 graduate credits have been attained. Typically, the time to degree completion should be, and is, much shorter. Students are advised to keep aware of possible changes in this and all other University regulations.

GLOSSARY:

"Accepted" M.S. thesis: For an M.S. thesis to be 'accepted' by the department it must be:

• A research M.S. thesis in geoscience or a related field from a U.S. university. In addition:

• In some cases, a foreign M.S. thesis can be accepted by the department after it has been submitted in English to the geosciences *graduate committee*, who will inform the student as to its acceptability, after consultation with other faculty. (see also: *graduate committee*)

Advisor or **thesis advisor** or **research supervisor**: A research supervisor, or advisor, is a faculty member with whom a student works closely on a project leading to a graduate degree, providing the intellectual and, usually, the financial support necessary for the completion of the thesis. The advisor (or advisors) supervise the student's progress. Typically, the student works on a project for which the professor has funding to pay the student as a *Research Assistant* (an *RA*). The student-advisor relationship is generally a close and mutually helpful one, with each person bearing

many responsibilities toward the other. Although this is the single most important working relationship to be formed by each student, it is intentionally kept informal: there are no officially binding ties between a student and their advisor. It is completely acceptable to change advisors if the student's interests change or if the relationship is not working out due to scientific or personal incompatibilities. It is also common (and sometimes advisable) to have different advisors for the M.S. and Ph.D. degrees. A student who wants to change advisors must simply find another faculty member who is willing and able to serve as the advisor – and able to provide RA support. (see also: *RA*)

Advisory Committee: At the *initial advisory meeting* (in late August, before the start of the first term) each first-year student is assigned an advisory committee of three faculty with research interests close to those of the student. At any time, the student may ask the *graduate director* to change the composition of the committee. Each first-year student is strongly encouraged to keep in informal contact with the members of their *advisory committee*. The student is <u>required</u> to convene a meeting of the *advisory committee* at least once each semester, generally in November and in April. At that time, the student and the committee plan a course of study and discuss any concerns raised by the student or by faculty. The meetings will usually be simple, asking the student about concerns and problems, and advising them on upcoming courses. (see also: *advisory committee*, *initial advisory meeting*, *graduate director*)

Chair (of the department): The Chair of the Department of Geosciences is responsible for the overall running of the department, and reports to the Dean of the College of Arts and Sciences. At present the chair of the department is Dr. Brian Phillips.

Geosciences Colloquium (GEO 696): Each Thursday at 4:00 PM in room 123 during the academic year, there is a one-hour talk, usually by a speaker from outside the Department. Attendance is <u>mandatory</u>. A grade of U (unsatisfactory) will result from consistent non-attendance. All students must register for GEO 696 Geoscience Colloquium each term (0 credits).

Geosciences Research Seminar (GEO 500): A zero-credit course in the fall term that is <u>required</u> for all first-year graduate students. Course meetings are used to 1) learn about the structure, requirements and resources of the university and the department, 2) receive required trainings (e.g. lab safety and harassment), and 3) learn about techniques for successful research and teaching as a *TA*. (see also *TA)*

Graduate Assistant (GA): Tuition and stipend for graduate students in the department are usually supported through a position as a research assistant (*RA*) or, in the first year, as a teaching assistant (*TA*). In a small number of cases, a student may have an outside fellowship provided by government funding agencies or the university. On rare occasions, the department has been able to obtain a graduate assistantship (GA), through which a student can be supported in exchange for university-based work that involves neither teaching nor research. Assigned GA duties are to be taken as

seriously as TA duties, but like TA duties they should be limited to an average of 20 hours/week of work, leaving plenty of time for the student to pursue their own research and classes. (see also: *RA, TA)*

'Grad Circus' or Geosciences Seminar (GEO 697): A set of two 20-25 minute talks by graduate students, given on Fridays during the academic year at 1:00 PM in room 123. Attendance is mandatory, and all students must register for 0 credits of Geoscience Seminar (GEO 697) every term. A grade of U (unsatisfactory) will result from either consistent non-attendance or from failure to give a talk, which is required of every student each year.

A new student generally gives their first grad circus talk during the second semester here (usually the spring term). It is strongly recommended that they prepare thoroughly for their presentation, including doing at least one practice talk in front of fellow students and/or their *advisory committee*. Shortly after the first grad circus talk, the student should meet with members of their *advisory committee* for feedback and to discuss any potential areas of weakness before they can create problems in *prelims* (the Ph.D. preliminary exam).

Some of our earliest graduate students chose and adopted the seminar nickname "*Grad Circus*"; the name stuck and has continued to be favored over the years.

Graduate Committee: During the 2023-2024 academic year, the graduate committee consists of Dr. Deanne Rogers (*Graduate Director*), Dr. Weisen Shen, Dr. Marine Frouin, and Dr. Joel Hurowitz. The graduate committee has the job of admitting new students, advising them when they first arrive, monitoring the observance of departmental rules, and making arrangements for *Ph.D. preliminary exams* and *thesis defenses*. (see also: *graduate director*, *Ph.D. preliminary exam*, *thesis defense*)

Graduate Program Director (Director of Graduate Studies): The (GPD) graduate program director (currently Dr. Deanne Rogers) is the chair of the *graduate committee* and is therefore the person primarily responsible for the functioning of the graduate program. The GPD reports to the *Chair* of the department, currently Dr. Brian Phillips. (see also: *Chair*; *graduate committee*)

Graduate Program Coordinator (Grad Coordinator): The (GPC) graduate coordinator is responsible for all administrative aspects of a student's graduate career. Issues that she handles include all aspects of administering student stipends, health insurance enrollment, university registration deadlines, and advancement to candidacy. Failure to respond in a prompt and complete manner to any of her e-mails can place your academic career and personal finances in danger.

Graduate School: The Graduate School is the university body that is responsible for campus-wide administration of graduate studies in programs offered and run by the various departments. Their offices are located on the 2nd floor of the Computer Science Building.

Graduate status G1, G2, G3, G4, and G5: This is the university's way of stating where it believes a student to be in their graduate career. A student's graduate status is indicated by the university using the letter 'G' followed by a number.

- G1 and G2 students are those who have entered the university with the intention of leaving with an M.S.
- G3 students are Ph.D. program students who have less than 24 recognized graduate credits: new students with a B.S. are G3. They take 12 credits per term.
- G4 students have 24 or more graduate credits but have not passed the *Ph.D. preliminary examination* (regardless of whether or not they have an M.S.). All G4 students register for 9 credits per term (unless the *Graduate Coordinator* has told them in writing to do otherwise).
- G5 students are those who have passed the Ph.D. preliminary exam. Like G5 students, they register for 9 credits per term (unless the *Graduate Coordinator* has told them in writing to do otherwise).

Although their workload is no smaller, all G4 and G5 students must register for only 9 credits. A G4 or G5 student who registers for more than 9 credits will have to pay a tuition bill. There is nothing the department can do about this, so it is essential for all G4 and G5 students to be careful to register for only 9 credits - unless the *graduate school* changes its rules, in which case the *Graduate Coordinator* will explicitly tell them in writing to do otherwise.

Because G3 students must take 12 credits per term, they have (by definition) reached the 24 credit criterion for G4 status before the start of their second year. Therefore, beware that your status will have changed to G4 (and you must then take only 9 credits)!

(see also: *Ph.D. preliminary exam*)

Initial advisory meeting: Each student will meet with the *graduate committee* before the start of his or her first term in order to discuss how to explore research opportunities, and help to identify and solve initial problems settling in at Stony Brook. (see also: *Graduate Committee)*

M. Phil: The M.Phil degree indicates academic achievements well beyond those required for a regular master's degree and may be awarded to a continuing student en route to the Ph.D. when there is compelling reason to do so - but it is very much the exception, rather than the rule.

M.S.: sequence of events: *see: (in order): M.S. thesis abstract, M.S. thesis, M.S. thesis defense committee, and M.S. thesis defense*.

M.S. thesis abstract *or* ***Abstract of proposed M.S. thesis:*** A one or two page document stating the most essential aspects of the student's proposed M.S. thesis, the M.S. thesis abstract is generally prepared and submitted to the *graduate committee* during the student's second semester here. It must be signed by between one and three faculty, including a 'potential sponsor', who thereby states a tentative willingness to be the student's thesis advisor, providing the intellectual and possibly the financial support necessary for the completion of the thesis. The receipt by the

graduate committee of the signed proposal abstract is all that is required for the student to formally begin the M.S. thesis research, leading to the *M.S. thesis* preparation and defense. (see also: *M.S. thesis, graduate committee*)

M.S. thesis: The M.S. thesis is the document that summarizes the work that went into a student's M.S. research. The scientific content of the thesis is determined by the student and their *advisor*, and must be approved by the student's *M.S. thesis defense committee*. The university has very specific rules about how the text and figures in the thesis are to be formatted. (see also: *'accepted' M.S. thesis, advisor, proposed M.S. thesis abstract, M.S. thesis defense, M.S. thesis defense committee*)

M.S. thesis defense committee: The M.S. defense committee is selected by the *Graduate Director*, with advice from the student's *advisor*. It consists of three scientists, at least two of whom must be members of the Geoscience faculty. One of the three committee members is generally the student's *advisor* and another is the voting chair of the committee. (see also: *M.S. thesis, M.S. thesis defense*)

M.S. thesis defense: During the M.S. thesis defense a student's thesis is evaluated to determine whether it is acceptable for the M.S. degree.

BEFORE THE EXAM: When an M.S. thesis nears completion, the student's *advisor* asks the *graduate committee* to appoint an *M.S. thesis defense committee* for the student. Once the thesis is complete, the committee reads it and within a week or two decides whether it is defensible. If it is, then the student may take the oral thesis defense examination. Two or three days before the exam, the student distributes notices to all department members stating the thesis title and the time of the open presentation. If the thesis is not deemed to be defensible, then the committee may require that it be modified or rewritten, or it may fail the student and recommend to the *graduate committee* and the Graduate School that the student's degree candidacy be terminated. (see also: *graduate committee, Graduate School*)

DURING THE EXAM: The student makes a short (20-30 minute) public (open) presentation of the major results of the thesis research. Then there is a closed meeting, during which *the M.S. thesis defense committe*e asks the student a variety of questions, most (but not all) of which are generally related to the specifics of the M.S. research. (see also: *M.S. thesis defense committee*)

AFTER THE EXAM: The *M.S. thesis defense committee* will determine whether the thesis is acceptable without revision, acceptable after specified revisions, or unacceptable. If revisions are required, the chair of the defense committee will tell the student what they are and how their completion will be certified. (see also: *M.S. thesis, M.S. thesis defense committee, graduate committee, Graduate School*)

Ph.D. candidate: A graduate student becomes a Ph.D. candidate after successfully passing the Ph.D. preliminary examination. The department then recommends to the Graduate School that the student be regarded as having advanced to Ph.D. candidacy.

(see also: *Ph.D. preliminary exam*)

Ph.D. dissertation or **thesis defense procedures:** see (in order) *Ph.D. dissertation, Ph.D. dissertation defense,* and *Ph.D. dissertation defense committee***.**

Ph.D. dissertation** or **thesis: The dissertation is the document summarizing the original scientific research in recognition of which the Ph.D. candidate seeks the doctoral degree. The university has very specific rules about the formatting of the dissertation, but the nature of its scientific content is at the discretion of the student and their *advisor*(s) and *Ph.D. dissertation defense committee*. In many cases, the dissertation consists of a linked set of published and soon-to-be-published scientific papers. Although various advisors and research groups within the Department may have their own standards to which the student must adhere, there are no departmentally defined page limits or formatting requirements. However, the university's procedural and formatting rules must be followed in every detail. (see also: *advisor, Ph.D. dissertation defense committee*)

Ph.D. dissertation defense: It is in the Ph.D. defense that a graduate student's research is evaluated for satisfaction of the requirements for the Ph.D. degree.

BEFORE THE EXAM: When their *Ph.D. dissertation* (or thesis) nears completion, the student's advisor asks the graduate committee to form a *Ph.D. dissertation defense committee*. When the thesis is completed, it is distributed to the defense committee at an agreed date, several weeks before the planned date of the dissertation defense. If the thesis has been deemed defensible, then a few days before the exam, the student distributes notices to all department members stating the dissertation title and the time of the open part of the dissertation defense. It is important to note that university rules require that the date and time of the exam be set at least four weeks in advance, so work with your committee to schedule accordingly. The completed dissertation must be distributed to the Ph.D. dissertation defense committee well in advance of the defense date (typically at least two weeks).

THE EXAM: The student makes a public presentation, usually about 40 minutes long, of the major results of their dissertation, followed by a period for questions from anyone present. The student and the committee then meet privately, and the student is asked a variety of questions, most (but not all) of which are generally related to the specifics of the Ph.D. research.

AFTER THE EXAM: *The Ph.D. dissertation defense committee* meets in private to decide whether or not the dissertation and its defense warrant the granting of a Ph.D. The committee may vote to accept the dissertation as is, to require any necessary level of modifications, or to reject it outright. Any decision other than a pass with little or no required modification must be accompanied by a clear description of the impediments to acceptance of the dissertation. In the event of an unsuccessful defense the candidate is entitled to a second opportunity to defend

the dissertation. The second defense opportunity must be scheduled for a date between one and six months after the first, unless another date is agreed upon by both the committee and the student.

After a successful dissertation defense, there are usually a significant number of minor changes required or suggested by the defense committee. (see also: *Ph.D. dissertation, Ph.D. dissertation defense committee*)

Ph.D. dissertation defense committee: When informed by a student's *advisor* that a Ph.D. dissertation is on track to be ready to be defended during the upcoming term, the *graduate committee* forms a *Ph.D. dissertation defense committee*. The *graduate school* requires that a list of the members of this committee be named far in advance – at least four weeks prior to the defense date. The usual size for the committee is five members, of whom four are faculty in this department and one is an outside member (not directly affiliated with the department and typically from outside the university). If the committee has six members, the committee chair (appointed by the *graduate committee*) does not vote. After the committee members have read the dissertation (and within two weeks of its submission), the defense committee chair polls the committee members to ascertain that the dissertation is actually defensible. If it is, the defense committee chair then formally schedules the defense. If it is not, then specific changes may be required, or the student may be terminated as a degree candidate without the Ph.D. (see also: *advisor, graduate committee, Ph.D. dissertation defense*)

Ph.D. dissertation proposal (prelim proposal): A document specifying the scientific rationale for the proposed dissertation work, the relevant work done thus far, and the techniques and work required to reach the research objective, the Ph.D. proposal is an important part of the process of proceeding to Ph.D. candidacy. It requires summarizing a proposed dissertation project in terms of both the fundamental questions being addressed and the means of addressing them. It provides an opportunity to address potential problems early in the process, rather than later (when they may present serious difficulties).

The dissertation proposal must be primarily the student's own work, but students are advised and encouraged to initiate discussions with and solicit comments from both the members of their *prelims committee* and from their fellow graduate students. It is generally best kept as short as possible, and anything ***over about 10 double-spaced pages*** (not counting figures, tables, and references) is generally regarded as ***excessive and a poor indication of the student's ability to be concise***. Students are encouraged to follow the structure and format required for graduate fellowships from national agencies (e.g. NASA FINESST or NSF GRFP proposals).

One of the purposes of the *Ph.D. preliminary examination* is to allow the student an opportunity to demonstrate an ability to identify and carry out good, original research. The dissertation proposal is one of the means of demonstrating that ability. It does not necessarily represent the actual direction that the dissertation research

will take, and a student who changes dissertation topic after successfully achieving Ph.D. candidacy is NOT required to retake any part of the prelim process. The department does not, however, recognize Ph.D. preliminary examinations from other departments or universities. Ph.D. candidates from elsewhere who transfer to the department must go through the Ph.D. prelims process in a manner and timing to be specified by the *graduate director*, who may tailor the process somewhat to accommodate the student's background and needs. (see also: *graduate director, prelims committee, Ph.D. preliminary exam*)

Ph.D. preliminary exam process (prelims process):

PURPOSE: Persons who have received a Ph.D. degree are expected to exhibit creativity, technical competence, scholarship, and leadership, such that they can successfully advance the level of knowledge in their discipline and be called on as experts in their chosen field. Thus, the purpose of the preliminary exam is to evaluate the student's potential to:

(a) formulate an original research project that is achievable in the timeframe of a Ph.D. and that is likely to produce results that represent a meaningful advance in the field.

(b) successfully carry out the proposed research.

(c) independently build a depth of knowledge in their chosen research discipline and line of inquiry, and demonstrate understanding of the fundamental concepts that are the foundation for their research.

(d) accurately and clearly communicate their expertise and ideas, defend the merits of their proposed research and approach, and converse with others in a way that allows them to evaluate and incorporate new information into their research.

OVERVIEW: The preliminary exam is the process that permits a graduate student to become a Ph.D. candidate. The student prepares a *proposal abstract*. A copy of the abstract is then given to the *graduate committee*, usually to *the graduate director*, who is the chair of the *graduate committee*. To ensure that the student has received appropriate advice, the proposal must be signed by three faculty members (one of whom must be a potential sponsor - a person tentatively willing to be the student's *advisor*.

Once the signed *proposal abstract* has been given to the *graduate committee*, the *graduate program director* sets a deadline (usually six weeks) for handing in the *Ph.D. dissertation proposal*. After speaking with the student and their potential thesis advisor, the *graduate program director* also names a *Ph.D. prelims committee*. During this time, the student is encouraged to meet with the chair of the *prelims committee* to discuss the examination and its timing.

The Ph.D. preliminary exam consists of a public oral presentation and a private examination with the student and the Ph.D. prelims committee present.

The entire process, from submitting the *proposal abstract* through the oral exam can

take about 2 months. It is therefore important before starting the process for the student to consult with their *advisor* and possibly the *graduate committee* as to timing. It is best to avoid having either the examination (or preparation for it) occur during semester break and it is wise to avoid the difficulty of scheduling an exam during the summer when many faculty members will be away. Upon the advice or instruction of the student's *advisor*, the student may take additional courses after the exam. Specific course requirements that could delay the process of seeking Ph.D. candidacy should not be added without the student's consent after the student's second semester in the Department. (see also: *proposal abstract*, *prelims committee*, *Ph.D. dissertation proposal*, and *Ph.D. preliminary exam, often called "prelims"*)

TIMING: It is important that the prelim exam be completed as soon as is practical, so that the student's progress and ability to conduct Ph.D. research can be assessed in a timely manner. The deadline for completion of the preliminary exam is the end of the third semester for students entering with G4 status (more than 24 units of graduate credit) and the end of the fourth semester for entering G3 students, unless an MS thesis is completed first. For students who complete a MS thesis in the program and are continuing on for the Ph.D., the prelim deadline is the end of the second semester after receiving the MS degree. Submission of a Ph.D. proposal after the deadline requires a written explanation for the extension request, with the advisor's approval and signature, and then written approval of the Graduate Program Director. If the prelim exam has not been completed by the end of the semester following the deadline, then the Graduate Committee will set a date for submission of the full Ph.D. proposal. Failure to submit a Ph.D. proposal by this date will be considered a failed prelim exam and the student will not advance to candidacy for the Ph.D.

BEFORE THE EXAM: The *prelims committee* normally plans to meet to determine the defensibility of a *Ph.D. dissertation proposal* within one week of receiving it. The *prelims committee* chair must promptly inform the student of any substantial delay. If the committee decides that the proposal is not defensible, the student may be asked to rewrite it, and if it is deemed irredeemably unacceptable, the student may be failed and terminated from the program. If it is defensible, the committee chair schedules a time for the examination that is acceptable to the student and to all of the committee members. This is not always easily done, so everyone must be willing to exercise some flexibility, particularly during the summer, near the end of the term, or around national AGU, LPSC, and GSA meetings.

During the period leading up to the oral *Ph.D. preliminary examination*, students are encouraged to discuss their research and their proposals with both the *prelims committee* and their fellow students. It is appropriate to solicit help in improving the clarity of the proposal, as long as this is done in the proper spirit and does not threaten the student's intellectual ownership of the proposal's contents (see also: *graduate committee, prelims committee, Ph.D. preliminary exam, proposal abstract*)

DURING THE EXAM: The examination begins with a roughly 30 minute public presentation of the proposed dissertation work. The student and the *prelims committee* then meet privately and each member of the committee asks the student questions. Typically, many of the questions are related to specific aspects of the intended research described in the dissertation proposal. Other questions usually cover the full range of the student's area of specialization, as well as other aspects of the earth sciences, and related fields. During the questioning period, it is common for students to be asked to demonstrate concepts through sketches, diagrams or mathematical formulas. Students are encouraged to ask for clarification on posed questions and to take a moment to consider the questions before answering. Typically, it is rare for the private questioning period to last more than two hours. After the questioning period is completed, the student will be excused from the examining room so that the committee can deliberate and determine the course of action. (see also: *prelims committee*)

AFTER THE EXAM: Based upon the student's performance both before and during the examination, the *prelims committee* may vote to 1) pass the student unconditionally, 2) deny Ph.D. candidacy, either with or without a second opportunity to go through all or part of the examination procedure (including submission of the proposal), or 3) pass the student contingent upon the student doing something, such as making changes in or rewriting the proposal. In the case of a failed preliminary examination, the *prelims committee* may either bar a second opportunity to take the exam, require specific remedial actions, or schedule a second opportunity to take the examination. It may either accept the proposal or require some specified level of rewriting. All decisions are made by a majority vote and are conveyed in writing to the *graduate director* and to the student. When a student passes the *Ph.D. preliminary examination*, the Department recommends to the Graduate School that the student be regarded as having advanced to Ph.D. candidacy. (see also: *prelims committee, graduate director, Ph.D. preliminary examination*)

Prelims committee: When a prospective Ph.D. candidate gives the *graduate committee* a copy of their dissertation *proposal abstract*, the *graduate committee* begins to assemble a 5- or 6-member committee for the *Ph.D. prelims*. The committee generally includes a chair (whose job it is to monitor the conduct of the examination), the student's potential sponsor (the likely dissertation *advisor*), and three other scientists with Ph.D.s. A majority of the committee members, including the chair, must be affiliated with this department. A minimum of five voting members is required. Thus, if the committee consists of five members, the committee chair becomes a voting member. If the committee chair is absent, the remaining committee members choose one of their number to be a voting chair. However, under no circumstances may the potential sponsor act as committee chair. (see also: *graduate committee, proposal abstract, Ph.D. prelims, advisor, Ph.D. preliminary exam*).

proposal abstract *or* ***abstract of proposed Ph.D. dissertation:*** A one-page document stating the most essential aspects of the student's *Ph.D. dissertation proposal*, the

proposal abstract must be signed by three faculty members before being given to the *graduate committee*. One of the three faculty members must be identified as a 'potential sponsor', meaning that they are sufficiently interested in the proposed work to be tentatively willing to be the student's thesis *advisor*. Within one week after the abstract is submitted, the graduate committee sets a deadline (usually six weeks from the date of submission of the abstract) for the submission of the *Ph.D. dissertation proposal*. Students may not name their own prelims committees, but they are encouraged to discuss the composition of the committee with the *Graduate Director*, who also consults the student's *advisor* before choosing the committee. Once the proposal is submitted, the *prelims committee* reads the proposal and meets to decide whether it is defensible. If it is not defensible, they decide whether the proposal should be rewritten or whether it is unacceptable. If it is unacceptable, the student is failed and is terminated as a potential Ph.D. candidate. If the proposal is determined to be defensible, the chair of the *prelims committee* schedules the exam, in consultation with the student and the other members of the committee. (see also: *graduate committee, Ph.D. dissertation proposal, prelims committee*)

Prelims (see *Ph.D. preliminary exam*)

RA (Research Assistant): The typical source of financial support for most of a student's time in the department is through a Research Assistantship (RA). An RA is a position as an assistant researcher, working with a faculty member (*advisor*) who has a research grant capable of supporting a graduate student's salary and who is interested in having that particular student work on their funded research project. Funding sources include several branches of the U.S. government, a variety of industrial corporations, and some private foundations. Because research grants are hard to obtain and many of them call for very specific research tasks to be performed, faculty must be careful in how the research money given them is spent and they cannot be required to support any particular student. Students should obtain research experience as early as possible, both to learn what sort of work interests them and to convince faculty members with grant support that they are capable of doing the work required for the professor's research project. RA duties can include: tasks that support the research activities of the advisor or student, lab manager roles, training other students, supporting research tasks of lab collaborators, etc.

research papers or **research projects** or **semester projects**: Prospective Ph.D. students often complete a couple of individual research projects with separate faculty members before handing in a *Ph.D. thesis abstract* and taking the *Ph.D. qualifying exam* (the "prelims"). These projects are typically initiated through discussions between the student and individual faculty members. Most faculty will have suggestions for possible projects. It is then up to the student to choose a project that best matches their interests. The requirements and duration of such projects are determined by the individual professors with whom the research is carried out. Each student should work with their advisory committee to determine what sort of project(s) to undertake during their first two years. The purpose of such project(s) is to give students an opportunity to sample the available research options. When

working on such a project, students usually register for between 0 and 9 credits of GEO 590 or GEO 599 Research (each professor has their own *section number*). (see also: *Ph.D. thesis abstract, Ph.D. qualifying exam, section number*)

section number: Each faculty member is assigned a section number. When registering for GEO 600 (*Practicum in Teaching*) or Research (either GEO 599 or GEO 699), a student must indicate the section number of the supervising faculty member. The numbers are as follows:

03=Glotch	04=Holt	05=Wen	07=Bokuniewicz
10=Aller	11=B. Li	15=Rasbury	16=Rogers
21=Nekvasil	22=Stidham	24=Weidner	26=Parise
27=Phillips	32=Ehm	33=Hurowitz	34=Henkes
35=Shen	36=Frouin	37=Q. Li	

TA (Teaching Assistant): One of the ways in which a graduate student's salary and tuition can be paid is by being a Teaching Assistant (TA). A TA is assigned by the graduate committee to work with a particular professor as an assistant in teaching undergraduates. It is very important for students to be good and diligent TAs, but it is also essential not to permit TA duties to absorb so much time that course work and (most importantly) research are ignored. The department has only a small number of TA positions available, so support is predominantly in the form of a research assistantship (RA). Typically, each TA registers for 3 credits of GEO 600 Practicum in Teaching, with the *section number* corresponding to the supervising faculty member. All Ph.D. students are required be a TA and register for GEO 600 at least once. Typically, TA support is only available for the first two semesters, after which it is expected that the student has arranged for *RA* support.
(see also: *RA (research assistant), section number, advisor, graduate committee*)

Work Study: Summer work study funding is available to some students who are U.S. citizens or permanent residents. If you receive an e-mail from the Graduate Program Coordinator about applying for work study it is essential that you do so promptly. Work study support has an important impact on the department's ability to support students not supported by the program, as well as those who are.

SAMPLE TIMELINE for Ph.D.:

Below is a typical timeline for the sequence of events leading to a Ph.D. in the Geosciences program. This is for students entering with a B.S. and obtaining the Ph.D. without a M.S. with thesis. Timeline could be longer, especially for those choosing to obtain a M.S. degree with thesis along the way, or shorter if a research program and dissertation topic are chosen quickly.

Year 1, Fall:

Before start of term:

- Hold initial advisory meeting with graduate committee.
- Consult advisory committee regarding courses and research.
- Meet with instructor regarding TA duties.

During 1st week:

- Meet with individual faculty with similar research interests to discuss potential semester research project.
- Choose a semester project and begin research.
- Make sure you're fully registered on SOLAR.

November:

- Meet with advisory committee to gauge progress and get advice for spring semester courses.

Year 1, Spring:

Mid-late January:

- Meet with instructor responsible for TA assignment.
- Choose/begin new/continued semester research project. Identify potential research advisor and source of RA support, to begin in June.

March/April:

- Give first Grad Circus talk…Beforehand, speak with advisor(s) and give practice talks to more senior graduate students…Afterward, get feedback from members of your advisory committee.
- Meet with advisory committee to get feedback on Grad Circus talk, your research progress, and integration into the department. Plan courses for following fall semester.

Year 1, Summer:

- Begin RA duties, continue research project(s).
- Begin to identify potential topics for prelim proposal.

Year 2:

Begin Prelim Process:

- Prepare abstract (< 1 page) and obtain signatures of 3 faculty members, including potential research sponsor.
- Upon approval, graduate director appoints prelim committee
- Prepare full proposal (ca. 10 pages).

- Arrange examination date in consultation with committee chair.
- Distribute full proposal to prelim committee, at least 2 weeks before exam.
- Committee decides whether proposal is defensible. If so, exam takes place as scheduled.
- Prelim Exam: 20-30 minutes public presentation, then questions from audience, then more questions from committee in private. Decision by committee, if passed the student advances to candidacy.

Year 2, Fall:

- Continue with courses and research.
- Submit prelim proposal (students who entered with MS degree)

Year 2, Spring:

- Continue with courses and research.
- Give Grad Circus presentation (usually February or March).
- Submit prelim proposal (students who entered with BS degree)

Year 2, Summer:

- Continue research project(s).

Years 3+:

- Continue research to be included in PhD. dissertation.
- Write and publish important papers and give great talks at conferences.
- Grad Circus presentation each year (Fall, typically).
- As PhD. dissertation nears completion, begin process for defense:
    - Graduate committee selects a PhD. dissertation committee, which must include one member external to the program (and, typically, outside the university).
    - Arrange a defense date that fits the schedule of all committee members.
    - Distribute completed dissertation to the committee, at least two weeks prior to the exam date.
    - PhD. dissertation committee decides whether the dissertation is defensible and if so, the exam proceeds as scheduled.
    - PhD. dissertation defense: 30-40 minutes public presentation, questions from audience, then more questions from committee in private.
    - PhD. dissertation committee meets to decide whether student has successfully defended the dissertation and whether it warrants awarding degree.

COURSE REQUIREMENTS:

Course requirements are flexible. Indeed, there are nominally no course or course credit requirements of the Ph.D. degree, and the requirement for the M.S. with thesis is only 18 course credits (of a total of 30 credits, including research and teaching). In practice, students are expected to take between 1 and 3 courses per term during the first two years, depending upon their academic backgrounds and the courses that are needed to prepare for their chosen research. A tentative course plan is determined in consultation with the *graduate committee* at the beginning of studies based upon these constraints and revised at meetings of the *advisory committee* each semester of the first year. During their first two years in the department, students generally take one to three courses per term. In addition, they participate in appropriate formal and informal seminars. During their first fall term all students must take GEO 500 (GEO Research Seminar). In addition, all graduate students must register for GEO 696 (Geosciences Colloquium), and GEO 697 (Geosciences Seminar) each term and Ph.D. students must register for GEO 600 (Practicum in Teaching) at least once. Below are listed the courses that are typically offered on a fairly regular basis.

Course #	**Course Name**
GEO 503	Mineral Equilibria
GEO 312/512	Structure and Properties of Materials
GEO 507	Petrogenesis
GEO 515	Geohydrology
GEO 519	Geochemistry of Natural Waters
GEO 523	Isotope & Trace Element Geochemistry
GEO 526	Low Temperature Geochemistry
GEO 530	The Geology of Mars
GEO 531	Crystalline Solids
GEO 533	Geochemistry of the Terrestrial Planes
GEO 310/540	Geophysics
GEO 303/543	Stratigraphy
GEO 306/546	Mineralogy and Petrology
GEO 309/549	Structural Geology
GEO 547	Remote Sensing
GEO 550	Global Tectonics
GEO 551	Physics of the Earth I
GEO 552	Physics of the Earth II
GEO 556	Solid-State Geophysics
GEO 564	Numerical Hydrology