

Northwestern | Earth and Planetary Sciences

Graduate Student Guidebook 2019-2020



Graduate Student Guidebook

Department of Earth and Planetary Sciences (EPS)

For Students Admitted Academic Year 2019-2020
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The EPS Graduate Guidebook contains department-specific policies and procedures that supplement the rules set by The Graduate School (TGS). Students are subject to the regulations in effect at the time of matriculation. It is the responsibility of the student to be aware of these and TGS regulations.

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Introduction

This *Guidebook* summarizes the departmental programs and requirements for graduate students in Earth and Planetary Sciences. The Department of Earth and Planetary Sciences (EPS) is part of the Weinberg College of Arts and Sciences (WCAS). Administrative roles for individuals are in Appendix B.

The academic life of graduate students is guided by the rules of The Graduate School (TGS), the administrative unit for all graduate programs at Northwestern University (NU). Each department has its own supplementary rules concerning the fulfillment of the requirements for graduate degrees. EPS requirements are outlined in this document. Information about university policies relating to graduate students can be found in the following electronic publications:

TGS is located in the Rebecca Crown Center at 633 Clark Street

www.tgs.northwestern.edu

TGS PhD Degree Policies

www.tgs.northwestern.edu/about/policies/phd-degree-requirements.html

TGS Academic Services

www.tgs.northwestern.edu/academics/academic-student-services/index.html

This web site addresses Master's and PhD Degree Requirements, Leaves of Absence, Registration Questions and Problems, TGS Fellowships and Grants, Academic Integrity Policies and Violations, Department Transfers, Withdrawals, and Readmissions, Dissertation Formatting and Submission, **Degree Deadlines**, and Awarding of Graduate Certificates, among other things.

NU Student Handbook,

<http://www.northwestern.edu/student-conduct/about-us/student-handbook/>

Class Schedules and course descriptions are available electronically via the online CAESAR system. You will need a NetID to log in.

www.northwestern.edu/caesar

The **EPICENTERS** annual reports are also useful as you familiarize yourself with the department –

<https://www.earth.northwestern.edu/about/newsletter/>

Graduate students' progress is tracked in the Graduate Student Tracking System (**GSTS**). You will need a NetID to log in.

<https://gsts.northwestern.edu/site/login>

While ample advice is available from faculty and staff to assist students in planning their academic and research programs, ***it remains the responsibility of the student to know the University and department rules and meet all the requirements and deadlines.***

Disclaimer: Northwestern University reserves the right to change without notice any statement in this publication concerning, but not limited to, rules, policies, tuition, fees, curricula, and courses.

EPS General Requirements

All graduate students are expected to have minimum levels of proficiency in basic science and mathematics. To satisfy departmental general requirements for the PhD program, **students must have completed any combination of FOUR from the following SIX options** before qualifying for PhD candidacy:

- A) One year of **Calculus** through calculus of several variables, equivalent to MATH 226, MATH 230-1 & 2 or 234, and MATH 240-0 (linear algebra);
- B) Elementary **Differential Equations**, equivalent to MATH 250-0; OR **Statistics** through multivariate methods, equivalent to a course sequence such as STAT 320-1,2,3
- C) One year of calculus-based **Physics**, equivalent to PHYSICS 135-1/136-1, 135-2/136-2, and 135-3/136-3, with labs;
- D) One year of **Chemistry**, equivalent to CHEM 131/141, 132/142, 151/161, 152/162, 171/181, 172/182, with labs.
- E) One year of **Biology**, equivalent to BIOL 215-0, 220, 219, 221, with labs.
- F) **Thermodynamics and/or kinetics** (advanced physical chemistry), equivalent to CHEM 342-1 or 342-3, EARTH 302-0, MAT_SCI 314-0, CHEM 303-0, or CHEM 329-0.

In addition, all students are encouraged to have or gain literacy in scientific computer programming such as Python (taught in EARTH 361), R, or another programming language; *some EARTH courses require programming knowledge.*

Spoken English Proficiency

TGS requires students to demonstrate proficiency in spoken English before they become teaching assistants, take the Qualifying Examination, or receive a Master's Degree. TGS, along with the Department of Linguistics will test all incoming international students, and make a recommendation for coursework needed in English as a second language (ESL).

<http://www.tgs.northwestern.edu/funding/assistantships/graduate-and-teaching.html>

PhD Degree Requirements

Students in the EPS PhD program should enter with a background in basic sciences and mathematics as noted above. Deficiencies should be made up as soon as possible after admission to the program.

The department's specific PhD requirements complement the more general [TGS degree requirements](#) (see introduction). The aim of these requirements, in addition to providing the training necessary for your graduate research, is to develop professional breadth and depth.

The PhD requires a total of 16 courses that should be taken within the first eight quarters of residence.

These courses are grouped into four categories as follows:

Group A) Six 300- level EARTH courses, taken with regular letter grades;

- Group B)** Two 300- or 400-level courses in mathematics, statistics, natural sciences or engineering, taken with regular letter grades;
- Group C)** Six other courses bearing graduate credit in science or engineering, including Independent Study courses (499's), and other EARTH courses. No more than two of the courses in this group can be taken with a P/N (pass/no pass) option. Yet other courses may be considered towards fulfillment of group C by written petition to the Director of Graduate Studies (DGS).
- Group D)** Two EARTH 499 courses (Independent studies) with two different faculty, taken with regular letter grades.

The letter grade system employed at Northwestern University, as well as TGS policies on incomplete grades is explained at:

www.tgs.northwestern.edu/about/policies/general-registration-policies.html#grades

First-year graduate students may take a maximum of half of their total course credits in any given quarter as EARTH 499 (Independent Study). (www.tgs.northwestern.edu/academics/registration-and-courses.html).

Some graduate level courses completed to fulfill PhD requirements (Group A, B, C or D) may also be counted towards "General Requirements" upon documented approval from the DGS.

Students need to pass their qualifying examination to advance to PhD candidacy. See also the **Qualifying Examination** section. In addition, a **dissertation** under the direction of a faculty member and approved by a dissertation committee appointed by the DGS is a requirement of the degree. See also the **Final Examination** section.

Transfer of Credit

A graduate student who completed advanced coursework before entering the EPS graduate program, such as a student with a Master's degree, may petition the DGS for a waiver of up to three NU courses, which will be applied toward the requirements of course group "C" or "B" for the PhD. The student needs to petition for a course waiver within the first two quarters of the program. In some circumstances, the student may also petition for the transfer of credit to be counted toward some of the six-courses in group "A." The total number of credits that may be approved against the courses in group "C," "B," and/or "A" will not be greater than 3 courses. In such a case, the student will need to successfully complete a total of 13, not 16, courses before the Qualifying Examination.

The department reserves the right to require that a student complete the full 16 courses required for EPS PhD students.

Maintaining Status as a Full-Time Graduate Student

To maintain status as a full-time graduate student, students must be registered for *no fewer than three and no more than four course units* authorized for graduate credit per quarter. Most, but not all, courses carry one unit of credit. Students must successfully complete at least three course units for which they

are registered each quarter in order to maintain status as a full-time graduate student. Various options for withdrawing from a course during the quarter are available, see TGS general registration policies at

<https://www.tgs.northwestern.edu/about/policies/general-registration-policies.html>

There are **serious consequences** for students who fail to successfully complete the minimum of three course units in a given quarter. The student will no longer be considered a full-time graduate student and will not only lose their stipend and tuition, but will also be asked to reimburse the university for a portion of the stipend already received by the student. Details on what constitutes satisfactory academic progress and consequences of unsatisfactory progress can be found on the TGS web site:

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/satisfactory-academic-progress.html>

The DGS is available to offer advice and help in difficult situations. However, staying in touch with the DGS while in good standing and reaching out early when things begin to change are far more effective at preventing problems than waiting until the problem arrives.

Course Credit

Only courses listed in CAESAR under a Course Career of The Graduate School bear graduate credit (see image at right).

In sciences and engineering, typically all 400-level and most 300-level courses appear in the TGS Course Career section. However, not all 300-level courses bear graduate credit and thus will not appear in the TGS Course Career. Courses with 100 or 200 codes also do not bear graduate credit.

Students taking general-requirement courses to obtain the minimum proficiency levels in mathematics and science must additionally take at least three approved graduate courses each quarter to maintain status as a full-time graduate student (which impacts registration and eligibility for financial support).

The screenshot shows the CAESAR search interface. At the top, it says 'Northwestern University CAESAR'. Below that are navigation links for 'Favorites' and 'Main Menu'. There is a search bar with a 'go to ...' dropdown and a search icon. Below the search bar are three buttons: 'Search', 'Enroll', and 'My Academics'. The main section is titled 'Search for Classes' and 'Enter Search Criteria'. There is a sub-section 'Search for Classes' with a blue header. It contains a form with the following fields: 'Institution' (Northwestern University), 'Term' (2014 Fall), and a link 'Hover for Search Tips'. Below these is a note: 'Select at least 2 search criteria. Click Search to view your search results.' There is a 'Class Search' section with a dropdown for 'Subject', a 'Course Number' field, a 'Course Career' dropdown menu (highlighted with a red circle and containing 'The Graduate School'), and a 'Course Keyword' field. There is also a checkbox for 'Show Open Classes Only'. At the bottom are 'Additional Search Criteria' and 'Class Attributes/Requirements' sections, and 'CLEAR' and 'SEARCH' buttons.

Academic Integrity

Students need to maintain and promote academic integrity at all times. The University policies with respect to academic integrity can be found at the following sites:

<http://www.northwestern.edu/provost/policies/academic-integrity/>

<http://www.weinberg.northwestern.edu/undergraduate/courses-registration-grades/integrity/>

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/academic-integrity.html>

Responsible Conduct of Research (RCR) Training

All graduate students must complete the Responsible Conduct of Research (RCR) training in their first year in the EPS graduate program. This training course does not contribute to course credit but is mandatory for students engaged in research, which, per definition, includes all graduate students. This training includes online "CITI" modules and face-to-face discussion sessions. New students should contact the Assistant Chair about RCR training.

Teaching Requirement

Teaching experience is a crucial aspect of graduate student training and is generally required of PhD students during their time in the program. Effort is made to exempt first year students, students in the final stages of dissertation writing, and students with externally funded fellowships, but at times members of these groups are needed to fully staff departmental teaching assistantship (TA) positions. Graduate students lead discussion or lab sections, grade homework and exams, and occasionally present class lectures. Our students have found teaching experience to be a valuable asset, and potential employers, especially in academia, commonly inquire about the quality of teaching performed by job applicants.

The Searle Centre for Advanced Learning and Teaching provides opportunities for graduate students to develop teaching skills throughout the year

<https://www.northwestern.edu/searle/initiatives/grad/index.html>

Of particular value is the New TA Conference held in September of each year, which all students should attend before being assigned to a TA position. First year students may attend even if not yet assigned as a TA, but all students entering their second year should register and attend.

<https://www.northwestern.edu/searle/initiatives/grad/new-ta-conference/index.html>

The Course and Teacher Evaluation Council (CTEC) collects teaching evaluations for every class, with evaluations of graduate TA's included in these reports. The CTEC results may be accessed online after grade submission for a course. With appropriate interpretation, CTEC can help improve quality of teaching.

A teaching portfolio is a commonly required component of the application package for academic positions. Student evaluations of teaching in CTEC's provide this component of a comprehensive teaching portfolio. It is often best to collect CTEC and other materials for a teaching portfolio as they are generated.

Research Advisor

The student identifies a primary research advisor via mutual agreement during the first three quarters in the program. Ways to learn about mutual research interests include reading professional publications from prospective advisors, actively participating in courses taught by potential advisors, attending departmental seminars, requesting individual discussions with prospective advisors, consulting with mentors, etc. Once the primary research advisor has been identified, the student enters the name of the

advisor in GSTS. The student must notify the DGS if in their 3rd quarter they have not yet matched with a primary research advisor. In special cases, the DGS may grant an extension.

After a student is matched with a primary research advisor, the student meets regularly with their primary advisor, shares research progress, and receives research advice. The research advisor often acts as a mentor. However, students are free to also obtain mentoring advice from others, such as members of the student's advisory committee, department leadership, or the DGS.

If a student and/or primary research advisor believe at any point that the student would be better served by a different primary research advisor, the student must identify another advisor by mutual agreement or be subject to possible exclusion from the graduate program. In such a situation, the student must immediately contact the DGS, who will determine a deadline by which the student must identify a new advisor. If the EPS program deems a student to not have been making satisfactory academic progress, the student may be excluded from TGS according to stated policy.

As stated by TGS policy at

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/phd-degree-requirements.html#dissertation>, the primary research advisor needs to be a member of the NU Graduate Faculty. Composition of the following program committees also needs to adhere to the above cited TGS policy.

To establish required ad-hoc committees in support of research and academic progress, a graduate student may talk to potential committee members, suggest names of committee members, discuss them with their research advisor and the DGS, then enter the names in GSTS. Upon formal approval by the DGS, the student may formally invite the faculty members and other experts onto the committee.

Required Committees

A graduate student formally interacts with three different ad-hoc committees:

1. **Graduate Advisory Committee**

This committee is comprised of a minimum of two NU Graduate Faculty members and one additional expert in the pertinent field of study. Typically, the student's primary research advisor serves as the chair of the Graduate Advisory Committee. The committee needs to be formed by and meet during the 3rd quarter, which is typically the Spring Quarter of Year One in the program.

Regular meetings between the student and their Graduate Advisory Committee are encouraged. One annual meeting, to review course work and research activity, is required in the Spring Quarter.

One week prior to the scheduled meeting the student should provide each committee member:

- An unofficial transcript, for pre-candidacy students only;
- An updated *Curriculum Vita* (CV) including activities, awards/honors, publications, and other accomplishments for the reporting period (i.e., since the last committee meeting);
- A self-evaluation;
- A narrative statement on progress and a description of the student's current research topic;

- A list of professional meetings that the student presented research at as well as attendance of non-credit courses, trainings, seminars, workshops, etc.;
- Goals for academic and research progress for the upcoming academic year.

These updates should be included in GSTS under the tab “Academic Progress”, while the student’s CV should be uploaded under the “Documents” tab at <https://gsts.northwestern.edu/site/login>

The information provided by the student will be reviewed by the research advisor and the graduate advisory committee and will be discussed with the student during the annual spring meeting. During the meeting with the student, the committee chair will record the discussion in a brief synopsis to accompany the materials prepared by the student. This synopsis must be entered in GSTS. The student’s research advisor will evaluate the student’s academic progress in GSTS. The committee may ask the student to amend or update the information provided. After the advisory meeting concludes and the student completes requested updates, both the research advisor and the committee chair must approve the student’s record of academic progress for that academic year, which includes the date of the meetings and names of those present at the meetings. In EPS, the research advisor and committee chair are often the same person. ***This system of documentation and approval is a requirement of TGS -failure to file summaries by stated deadlines may result in suspension of departmental financial support.***

The members of the Graduate Advisory Committee can be changed by request of the student to the DGS. Such requests should be made and approved in writing.

2. Qualifying Examination Committee

By the beginning of the 2nd year the DGS will appoint a Qualifying Examination Committee consisting of the two proposition advisors and one additional faculty member, of which the primary and one other committee member must be Graduate Faculty at Northwestern. The composition of this Committee may, but is not required to, be identical to the Graduate Advisory Committee.

The Qualifying Examination Committee examines the graduate student during their 7th quarter as a full-time graduate student during an oral examination. The student presents the research and plans described in the two propositions and the committee questions the student about their research and probes the depths of their expertise in all aspects of earth and planetary sciences and related fields.

3. Final Examination Committee.

This committee consists of the primary research advisor and two additional experts in the pertinent field, of which the primary and one other committee member must be Graduate Faculty at Northwestern. The composition of this Committee may, but is not required to, be identical to the Qualifying Examination Committee.

Members of this committee read the student’s dissertation, suggest corrections and other enhancements, and conduct the Final Examination, during which the student defends their dissertation and answers questions from the committee members. The committee may decide to give the audience a chance to ask questions first. After the Final Examination, the committee recommends to pass or fail the student. Usually, but not always, a student passes conditionally upon completing a final set of corrections to the research and/or dissertation.

Members of one or more of these committees can be replaced upon request at any time, but only with approval from the DGS.

The Qualifying Examination

The Qualifying Exam consists of an oral defense of two written research propositions on different subjects, each prepared under the guidance of a different faculty advisor. The nature and scope of the two propositions are chosen and approved in consultation with the student's advisors and the DGS. Propositions commonly are the result of the student's work in Independent Study courses (499's) and form the basis for future dissertation research.

The oral examination itself focuses on the development of the research question, the significance of the research, the student's command of relevant and related disciplines, and the appropriateness of the methods used, as outlined in the propositions. For students entering with a Master's degree, one of the propositions may be based on their Master's thesis, but only with 1) prior approval of the student's primary advisor and the DGS, and 2) a faculty sponsor, other than the primary research advisor, who is willing to a) approve this secondary proposition, which is based on the student's Master's thesis, as equivalent in rigor and scope to a typical qualifying examination proposition, and b) lead the questioning on this secondary proposition during the oral examination.

As soon as practically possible, but no later than the first quarter of their second year in the program, students should submit via GSTS the titles of the two research propositions they will defend in the Qualifying Examination, including the name of the advisor for each proposition. This is a requirement before scheduling of the Qualifying Examination can proceed. To schedule the Qualifying Exam, students should contact the DGS and submit a completed Outline of PhD Requirements form.

Students entering with a Bachelor's degree are required to take the Qualifying Examination by the middle of their seventh quarter as a full-time graduate student, which is typically the spring quarter of their second year. Students who were approved to use their Master's thesis research for one proposition must take the qualifying exam by the middle of the sixth quarter of residence, typically the winter quarter of academic year 2.

Propositions should be delivered to the Qualifying Examination Committee not less than five working days before the examination. Propositions should be uploaded to GSTS before the Qualifying Examination begins. The Qualifying Examination is open to departmental faculty, in addition to the members of the Qualifying Examination Committee.

After the exam the committee produces an electronic record, i.e. an e-mail to the DGS that is cc-ed to all committee members and the graduate student examined, of the outcome of the examination, including conditions imposed upon a conditional pass. In the event of a failed examination, the student may be invited to retake the Qualifying Examination no later than one quarter after the original exam. If the committee does not recommend a second exam, the student will be expected to leave the program by the end of the quarter, at which time financial support will cease. In the event of a conditional pass, the student is responsible for meeting the conditions and obtaining electronic approval from their primary advisor and committee members. Once the conditions have been met, the student's committee electronically reports this to the DGS, cc-ing other committee members and the graduate student. In the

event of an unconditional pass, or once the conditions of a conditional pass are met and have been met and reported, the student needs to submit TGS form “The PhD Qualifying Exam”.

Students who pass the Qualifying Examination are admitted to PhD candidacy.

The Prospectus (Dissertation Proposal)

Once a student passes their Qualifying Exam completely and is admitted to PhD candidacy, EPS considers the two propositions presented by the student at their Qualifying Exam and updated as requested by the Qualifying Examination Committee, as constituting the PhD Prospectus required by TGS. Once the program approves the student's PhD Qualifying Exam form, the student needs to submit the PhD prospectus form before the end of their fourth year in the program. A student not meeting this milestone will be considered not in good standing and will not be eligible for fellowships, traineeships, teaching or research assistantships, and scholarships, and may be excluded from TGS.

Good Academic Standing & Exclusion Policies

To be in good academic standing, a student must meet both the standards set by TGS and by the EPS degree program (see <https://catalogs.northwestern.edu/tgs/academic-policies-procedures/satisfactory-progress/>). The following sets of criteria are taken into account by EPS in determining whether or not students are making satisfactory academic progress and are in good academic standing. It is important to note that in some instances the criteria for determining a student's academic standing in EPS are more strict than those established by TGS.

- Grades and cumulative GPA: A student whose overall grade average is below B (3.0 GPA) or who has more than **two** incomplete (Y or X) grades is not making satisfactory academic progress and will be placed on probation by EPS. (Note: This policy differs from TGS, which allows three incomplete grades).
- Milestone deadlines: Doctoral students who have not been admitted to candidacy (have not passed the Qualifying Examination) by the end of their second year are not making satisfactory academic progress and will be placed on academic probation by EPS. (Note: This policy differs from TGS, which states that students must be admitted to candidacy by the end of their third year.)
- Program length: Doctoral students must complete all requirements for the PhD within **nine** years of initial registration in The Graduate School. Students who do not complete degree requirements by the established deadline will be placed on academic probation by EPS and TGS.
- Failure to make satisfactory academic progress may also be a result of, but not limited to: poor performance in classes, unsatisfactory performance in a qualifying examination, unsatisfactory research progress, unsatisfactory progress in writing the dissertation, failure to communicate with program and/or advisor, failure to have a primary research advisor, or the inability to meet other program requirements (such as language proficiency).

Failure to make satisfactory academic progress as determined by either The Graduate School or The Department of Earth and Planetary Sciences will result in probation or exclusion (dismissal).

EPS Academic Probation

When a student fails to meet any of the criteria listed above for maintaining satisfactory academic progress, the student will be placed on probation by the Department of Earth and Planetary Sciences. When a decision to place a student on probation is made by EPS, the student and TGS will be notified in writing. A student will be given *at most* two quarters to resume satisfactory academic standing. At the end of the probationary period, progress will be reviewed by EPS. If a student does not reestablish satisfactory academic standing, the student will become ineligible to receive financial aid and will be excluded (dismissed) from the program.

TGS's Academic Probation

When a student fails to meet any of the three sets of criteria established by TGS (see <https://catalogs.northwestern.edu/tgs/academic-policies-procedures/satisfactory-progress/>) for maintaining satisfactory academic progress, the student will be placed on probation by TGS.

TGS will notify the student in writing, along with the program's DGS, and the student will be given *at most* two quarters (not including summer quarter) to resume satisfactory academic standing. TGS notifies students of probation status on a quarterly basis.

During the TGS-imposed probationary period, students will remain eligible to receive federal and institutional assistance (except when they have exceeded their degree deadline or failed to maintain status as a full-time graduate student). At the end of the probationary period, progress will be reviewed by TGS. If a student does not re-establish satisfactory academic standing during the two probationary quarters and does not successfully petition for an extension of the probationary period (see <https://catalogs.northwestern.edu/tgs/academic-policies-procedures/satisfactory-progress/>), the student will become ineligible to receive financial aid and will be excluded (dismissed) from TGS.

Notification of Termination - When a decision to exclude is made, both the student and TGS must be informed of this decision in writing and sent the withdrawal document(s) within three business days. Students should be told clearly the reason(s) for their dismissal, and these reasons must be in line with written program and TGS guidelines.

Published Appeal Process – The appeal process for students who have been dismissed or excluded will follow existing appeal procedures (<https://catalogs.northwestern.edu/tgs/academic-policies-procedures/satisfactory-progress/>). To appeal a program decision, students should submit a request in writing to the attention of the Senior Director of Student Services within ten calendar days of the date of the program's final written determination of exclusion to the student and include any supporting materials at that time. If no appeal is filed within the ten-day period, the program's decision becomes final and not subject to appeal.

Misconduct

Cases of academic and/or research misconduct, discrimination or harassment, and inappropriate or unprofessional behavior are considered outside the boundaries of "satisfactory academic progress." Resources for these issues can be found here:

TGS Academic Integrity policy:

<https://catalogs.northwestern.edu/tgs/academic-policies-procedures/satisfactory-progress/>

Office for Research Integrity:

<http://www.researchintegrity.northwestern.edu>

Office of Equal Opportunity and Access:

<https://www.northwestern.edu/equal-opportunity-access/index.html>

Student Handbook:

<https://www.northwestern.edu/student-conduct/shared-assets/homepage/panel1/quick-links/images/student-handbook-2019-2020.pdf>

Guidelines on the boundaries of professional behavior and misconduct are provided by the American Geophysical Union (AGU)'s ethics policy at

<https://ethics.agu.org/files/2013/03/Scientific-Integrity-and-Professional-Ethics.pdf>

Recourse:

EPS is committed to assisting students with a concern, conflict, complaint, or other issue. If a student's advisor, the DGS, and the Department Chairs are unable to provide appropriate assistance, the DGS, Chairs, and/or the Program Assistant will refer the student to a third NU party inside or outside EPS. All other University employees are obligated to report sexual misconduct to the University's Title IX Coordinator. Confidential support for a sexual misconduct case can be found via the University's Office of Equity (see <https://www.northwestern.edu/sexual-misconduct/get-help/confidential-support.html>).

Financial Support

Students may be supported during the academic year by University Fellowships, Teaching Assistantships, Research Assistantships and Research Grants, as well as other (e.g., external) Fellowships. Internal awards and appointments are made by TGS acting on the recommendations of the department. Financial support typically provides a living stipend and covering the graduate tuition fees. Continuing financial support in the graduate program is contingent on satisfactory academic progress, which is evaluated each quarter. At least once per year, in the spring, but preferably more frequently, each student's Graduate Advisory Committee meets to review past accomplishments and future plans. At these times, decisions about the continuation of support are made.

- **University Fellowships** are provided by TGS and typically used for first-year graduate students.
- **Teaching Assistantships** (TA) are provided to students in any year. Teaching is an essential element of the education and training experience of PhD students at Northwestern. TGS requires that all PhD students serve in some instructional capacity for at least one academic quarter during their graduate education at Northwestern. This teaching requirement is an integral aspect of professional development.
- **Research Assistantships** (RA) represent a principal source of financial support for students in all years. RAs are contained within research grants to faculty members from external funding sources. RAs are for specific research as described in specific research proposals. Research projects and financial support are arranged by mutual consent of the student and faculty members.
- **Sloss Fellowships** are supported by endowment funds, created to honor the memory of geologist Larry Sloss.

- **Boos Fellowships** are supported by endowment funds, created to honor the memory of geologist Margaret Boos, and provide support to qualified female graduate students.

- **Health insurance** - All graduate students are required by the University to carry health insurance. The Department and TGS support the annual premium for a health insurance plan that is provided through the University.

TGS External Award Policy. TGS strongly encourages every graduate student to apply for funding from a source external to the University some time before the end of their fourth year. Please follow this link for more details: www.tgs.northwestern.edu/funding/fellowships-and-grants/index.html.

Examples of awards include but are not limited to:

- NSF Graduate Research Fellowship: <https://www.nsfgrfp.org/>
- Fellowships for Graduate Environmental Study: <http://www.epa.gov/ncer/rfa/>
- NASA Future Investigators in NASA Earth and Space Science and Technology: <https://astrobiology.nasa.gov/funding/future-investigators-in-nasa-earth-and-space-scienc/>
- **Diversity Fellowships** from external sources can be found through TGS' funding resources page at: <https://www.tgs.northwestern.edu/diversity/funding-resources/index.html>
- Other fellowships can be found through TGS' fellowship and scholarship information pages at: <http://www.tgs.northwestern.edu/funding/fellowships-and-grants/index.html>

Taxes

Your funding source may change from quarter to quarter, and on rare occasions even from month to month. At other times, it changes from one year to the next. In some cases tax advances are automatically withheld from your stipend, and on other cases they are not. If too much is withheld, you will receive a refund after you file your tax return each year before or by April 15. If too little is withheld, you will need to pay at the same time that you file your tax return each year before or by April 15.

What can you do?

1. You can voluntarily change the amount of taxes that is being withheld (consult with Lisa and/or the Payroll Department on how to do so).
2. You can read the information on the TGS web site and ask for clarification if something is not clear:
<https://www.tgs.northwestern.edu/funding/taxes/>
<https://www.tgs.northwestern.edu/funding/taxes/tax-faqs.html>
3. You can try to save some of your stipend in order to be prepared for tax uncertainties and surprises.

Conference Travel

The primary responsibility for support of student participation in research conferences rests with the student's advisor. However, students who have completed three quarters of full-time registration who will be presenting research at a professional conference or in a seminar may apply for a TGS Conference Travel Grant (see <https://www.tgs.northwestern.edu/funding/fellowships-and-grants/internal-fellowships-grants/conference-travel-grant.html>). Students are eligible to receive one grant up to \$600 per fiscal year and are eligible for a maximum of two grants over the entire course of their graduate career. See the [TGS website](#) for further eligibility requirements.

Additionally, TGS travels funds may be further supplemented by \$300 from the Department, upon written application to the Department Chair. The application email sent to the Chair and the Business Administrator should include a copy of the research abstract, and be submitted ideally 60 days prior to the conference, but no later than one month beforehand.

For travel to a second meeting, departmental support of up to \$300 may be awarded upon application. In general, students should remind their faculty advisors that conference travel for presenters should be supported by the research grants funding their work. Students may also seek additional funding for conference attendance awarded on a competitive or need basis from sources such as the major professional associations (AGU, GSA, etc.).

NOTE: First-year students wishing to present research completed *prior* to arriving at NU must seek travel funds from former advisors or major professional associations such as AGU, GSA, and others.

Special Awards

The department recognizes excellent performance in teaching and research by graduate students. Our alumni have generously endowed the *Horace A. Scott Awards* for outstanding research, and the *Marion Sloss Award* to an outstanding Teaching Assistant. These awards are made at the spring graduation reception every year.

Students may also be eligible for other National or University awards, and these opportunities should be brought to the attention of the research advisor, the DGS, or the Chair's Office so that nomination of the student may be considered.

Path to the PhD Degree

Advising

The first step in the advising process is for the student to meet with the DGS shortly upon arriving on campus and determine whether all General Requirement prerequisites have been met, and if not, to plan appropriate coursework. A *Worksheet for PhD Requirements* (Appendix D) is included at the end of this *Guidebook* to aid each student in academic planning. Please upload updated copies of this form to GSTS under the tab "Documents": <https://gsts.northwestern.edu/site/login>

Each newly admitted graduate student is assigned an initial faculty adviser based on research interests expressed in the graduate application. The faculty advisor works together with the DGS to provide initial research and curricular consultation. During the first year, students should identify faculty advisors for

their two qualifier propositions (usually, but not always, the initial faculty advisor becomes the primary dissertation advisor).

Students are encouraged to make progress in research work as soon as possible, and to choose a curriculum that provides needed training for their research. However, course work should also expand one's knowledge beyond sub-discipline boundaries. Graduate Advisory Committees will assist in guiding each student's selection of courses.

Dissertation Research

Students should formally identify the research topic of the PhD dissertation as soon as practically possible after having passed the Qualifying Examination. By that time the PhD candidate should file a brief statement in GSTS identifying the subject matter of the thesis, the name of the primary dissertation advisor, and an outline of the research involved. Submissions are reviewed by the DGS. The statement is not binding on the student as far as the field and nature of the upcoming research are concerned, but any substantive changes in topic or any change of dissertation advisor(s) must be submitted in writing to the DGS as soon as such changes occur.

At the end of the sixth year after matriculation, each doctoral student must submit to TGS a statement of progress and timetable for completion of the dissertation, signed by the student and endorsed by the dissertation advisor.

The Final Examination

A completed dissertation must be read and approved by the primary dissertation advisor. It is subsequently read and approved by two or more additional faculty members, who, along with the principal advisor, constitute the Final Examination committee. One copy of the approved version of the dissertation must be placed in the Department Office for consultation by any member of the department faculty not less than 7 days before the Final Examination.

The Final Examination is an oral presentation held in an open-lecture format, and defense to the committee of the dissertation. Following the presentation, the thesis committee meets to decide on final approval of the thesis and recommendation to confer the degree.

Students who are completing their degree will submit the following TGS forms through GSTS:

- 1) Application for Degree;
- 2) Final Exam Form, which must be approved by the department;
- 3) NRC Survey of Earned Doctorates, which will be sent to you by TGS;
- 4) Online submission of dissertation via UMI ProQuest. www.etsdadmin.com/cgi-bin/home

In order to graduate, it is the student's responsibility to ensure that all graduation requirements of EPS and TGS are fulfilled.

Deadlines and Extensions

TGS mandates that all requirements for the PhD degree must be met within **nine years** of initial registration in a doctoral program. The Final Examination on a completed dissertation and its subsequent submission to TGS in a required format must fall within this period.

During the period of extension, the student is not required to maintain a full-time graduate student status or register for courses. In this case, the student must register for TGS 513 Resident Research Continuation if a student is supported by a scholarship, needs University health insurance, access to certain University facilities, or must meet registration requirements for foreign students.

Master's Degree

Students who pass the PhD Qualifying Examination may apply to receive a Master of Science (MS) degree from TGS. Students who do not achieve PhD candidacy by passing the qualifying exam may also earn the MS degree, pending approval of the faculty. In each case, the student must meet requirements for the MS degree established by TGS and EPS. Graduate School requirements are summarized at, and MS degree completion forms are found on, the TGS website at:

<http://www.tgs.northwestern.edu/about/policies/masters-degree-requirements.html>

Departmental requirements for the MS Degree in Earth and Planetary Sciences include the following:

- A)** Twelve courses from among those bearing graduate credit in science or engineering.
- B)** A Master's thesis approved by the student's Advisory Committee. The thesis is ordinarily the result of Independent Study course work (EARTH 499) taken by the student within the required 12-course total and should be formulated as a manuscript intended for submission to a geoscience journal.

Note:

- ***TGS stipulates that no more than one-third of the courses qualifying for credit can be Independent Studies (EARTH 499).***
- ***The EARTH 590 Research is the only EARTH course for which the Pass/No Pass option is acceptable.***

Appendix A: Timetable of the PhD Degree

START	<p>Upon arrival,</p> <ol style="list-style-type: none"> 1) Attend TGS and EPS graduate orientation meetings and 2) Meet with the DGS individually. 3) Submit top of Worksheet for PhD course Requirements, transcript, and CV to GSTS Documents 4) Meet with prospective research advisor and other faculty to discuss research interests. 5) Start courses, teaching, and research.
3rd quarter from start	<p>Submit to DGS:</p> <ol style="list-style-type: none"> 1) Names of faculty advisors 2) Anticipated date of Qualifying Examination 3) Have first advisory committee meeting
After 1 year	<p>Preparation for Qualifying Exam:</p> <ol style="list-style-type: none"> 1) Submit possible titles of propositions 2) Consult your Advisory Committee and the DGS about the appointment of the Qualifying Examination Committee 3) Evaluate examination preparation strategy with research advisor and/or DGS 4) Book a date for Qualifying Examination
After 6-7 quarters (by Spring of Year 2)	<ol style="list-style-type: none"> 1) Submit completed Worksheet for PhD course Requirements and updated CV to EPS files. 2) Qualifying exam completed no later than the middle of the seventh Quarter. 3) Upon passing, student submits TGS forms: PhD Qualifying Exam and PhD Prospectus
1-2 quarters after Qualifying Exam	<p>Inform the DGS of the selected PhD dissertation topic and research advisor.</p>
After Qualifying Exam and before the end of the 4 th year	<ol style="list-style-type: none"> 1) Form a Final Examination Committee. 2) Final Examination Committee must approve the dissertation prospectus.
5 years from start	<ol style="list-style-type: none"> 1) Defend dissertation in Final Examination 2) Submit dissertation
9 years from start	<p>Final deadline for completion and submission of dissertation.</p>

Appendix B: EPS Program Administration

Position	Name	Office	Phone	E-mail*
Department Chair	Matt Hurtgen	F392/393	1-7539	<i>matt@earth.</i>
Dir. Grad. Studies (DGS)	Suzan van der Lee	F494/495	1-8183	<i>suzan@earth.</i>
Assistant Chair	Patricia (Trish) Beddows	F295/296	1-7460	<i>patricia@earth.</i>
Business Administrator	Lisa Collins	F377	7-1002	<i>lisa@earth.</i>
Program Assistant	Robin Stark	F279	1-3238	<i>robin@earth.</i>
Program Assistant	Tia Groce	F374	1-3238	<i>tia.adams@</i>
Financial Assistant	Richard William Dodd	F374	1-8190	<i>richard.dodd1@</i>
Research Technologist	Grace Schellinger	Hogan 1-100	7-2963	<i>grace@earth.</i>

* e-mail addresses all end in "northwestern.edu".

Appendix C: Course Registration Guidelines

Year 0	Summer		Students who start the PhD program in the summer before Year 1 fall quarter, register for TGS 500.
Year 1	Fall	Q1	Typical enrollment is three or four graded courses, with three required to maintain full time status. In Year 1, a max of 50% of courses may be EARTH 499; only one EARTH 499 enrollment is possible when total enrollment is 3 courses.
	Winter	Q2	
		Spring	Q3
	Summer	Q4	EARTH 590 for 3 units.
Year 2	Fall	Q5	Typical enrollment is three or four letter-graded courses, with three required to maintain full time status. No limitation in the second year on EARTH 499 enrollments as long as other course requirements are fulfilled.
	Winter	Q6	
		Spring	Q7
	Summer	Q8	If Qualifying exam passed in Spring Q, then register for TGS 500. If the Qualifying exam process and paperwork is not completed, then register for EARTH 590 for the summer Q. All requirements of the Qualifying exam are ideally fulfilled in the Spring (7th) quarter, but if the Chair approves a recommendation by the committee for continuation in the summer, then completion of Qualifying exam requirement is typically needed 3 weeks before Fall quarter begins.
Year 3	Fall	Q9	Students with no courses, register for TGS 500.
	Winter	Q10	Students registering for one or two courses must co-register with TGS 500. Only students registering for 3 or 4 letter grade courses need not register for TGS 500.
	Spring	Q11	
	Summer	Q12	All course requirements for a doctoral program must be completed by the end of the twelfth quarter.
Year 4 +	Q 13 and beyond		TGS 500
If funding terminating			TGS 512
If beyond limit of program			TGS 513

Appendix D: Worksheet for PhD Requirements

All requirements must be completed prior to scheduling the Qualifying Examination.

Student	_____		
Start Date		Current Date	_____

REQUIREMENT	COURSES	WHEN TAKEN	GRADE
Four of the following six:			
Calculus - Multivariable	_____	_____	_____
Differential Eqns or Statistics	_____	_____	_____
Physics	_____	_____	_____
Chemistry	_____	_____	_____
Thermodynamics or P. Chem	_____	_____	_____
Biology	_____	_____	_____
A) SIX REQUIRED	1. _____	_____	_____
300-level EARTH courses	2. _____	_____	_____
	3. _____	_____	_____
	4. _____	_____	_____
	5. _____	_____	_____
	6. _____	_____	_____
B) TWO REQUIRED	1. _____	_____	_____
300- or 400-level courses in	2. _____	_____	_____
math, statistics, natural			
sciences or engineering			
C) EIGHT REQUIRED	1. _____	_____	_____
Other graduate courses,	2. _____	_____	_____
of which:	3. _____	_____	_____
- Maximum two P/N grades	4. _____	_____	_____
- Minimum two 499 with	5. _____	_____	_____
two different faculty	6. _____	_____	_____
	7. _____	_____	_____
	8. _____	_____	_____

NOTE: Indicate any awarded transfer credits (max. 3) for graduate courses completed elsewhere.

PROPOSITIONS

Advisor _____ Title _____

Advisor _____ Title _____

Qualifying Exam Date _____

Appendix E: Acronym Glossary

<u>AGU</u>	<u>American Geophysical Union</u>
<u>CTEC</u>	<u>Course and Teacher Evaluation Council</u>
<u>CV</u>	<u>Curriculum Vitae</u>
<u>DGS</u>	<u>Director of Graduate Studies</u>
<u>EPS</u>	<u>Earth and Planetary Sciences</u>
<u>GSA</u>	<u>Geological Society of America</u>
<u>GSTS</u>	<u>Graduate Student Tracking System</u>
<u>NU</u>	<u>Northwestern University</u>
<u>RA</u>	<u>Research Assistantship</u>
<u>RCR</u>	<u>Responsible Conduct of Research</u>
<u>TA</u>	<u>Teaching Assistantship</u>
<u>TGS</u>	<u>The Graduate School</u>
<u>WCAS</u>	<u>Weinberg College of Arts and Sciences</u>