

**DEPARTMENT OF GEOSCIENCES**

**GRADUATE PROGRAM**

**Regulations and Procedures
for Graduate Students**

 (revised 24 June, 2018)

Introduction 5

General Requirements and Expectations of the Geosciences Graduate

Programs (M.S. & Ph.D.) 7

Program Overview 7

General Course Requirements for the Completion of M.S. and Ph.D. Degrees 7

Exceptions from Course Requirements 8

Special Case of Students Entering with a Completed M.S. Degree 8

Graduate Program Course Schedule 9

Requirement for Science Communication Activity 10

Minor Fields 10

Concurrent Degree Program 11

Timelines for the Completion of Degrees 11

Financial Support 12

Annual Review of Progress 12

Scholarship and Research Integrity: Training in the Responsible Conduct of Research 13

CITI On-line Training 13

Discussion-Based RCR Training 13

Administrative and Academic Oversight and Responsibility

for the Graduate Programs 14

General Oversight 14

Academic Research Advisors 15

M.S. Committees 15

Doctoral Advisors and Committees 16

The Official Student File 18

## Expectations for Graduate Students in Geosciences 19

Academic Integrity 19

Commitment to Maintaining an Ethical Workplace 19

Student Support and Resources 19

Course Schedule and Academic Progress 20

Academic Standing (M.S. or Ph.D.) 20

Duties of Graduate Assistants 20

Graduate School Guidelines Regarding Leaves for Graduate Assistants 21

Registration 22

Credit Loads 22

Graded vs. “R” credit 22

Completing Your Registration 22

Registration for Students nearing the Completion of the Ph.D. and M.S. Programs 23

## The M.S. Degree: Specific Requirements 23

M.S. Degree Requirements 23

Time to Completion for Master’s Degree 23

The Ph.D. Degree: Specific Requirements 24

Ph.D. Degree Requirements 24

Foreign Language Competency 25

English Competency 25

Formal Oral Presentation 26

Qualifying Examination 27

Appointment of the Qualifying Committee 27

Comprehensive Examination 29

Continuation for the Ph.D. Following the M.S. Degree at Penn State 30

## M.S. and Ph.D. Thesis Preparation 31

The Thesis Proposal 31

Thesis Formats 31

Theses with Separate Research Chapters 31

Multi-Authored Papers 32

The State of the Thesis at the Time of the Final Oral Examination 32

Thesis Defense 32

Copies of the Thesis 33

Costs of Thesis Preparation 34

Dual-Title Ph.D. Degree Program in Astrobiology 34

Dual-Title Ph.D. Degree Program in Biogeochemistry 36

Earth Science Degrees 37

 On-Line M.Ed. in Earth Sciences 37

General Student Support and Benefits 38

Financial Support for Graduate Students 38

Health Insurance Benefit 38

## Student Concerns 39

Departmental Ombudspersons 39

Sexual Harassment 39

Formal Resolution of Problems 40

## Facilities and Services 39

Student Offices 39

Graduate Student Mail 40

Conference Rooms 40

Office Supplies 40

Copy Machines 41

Keys to Student Offices and Laboratories 41

Motor Vehicle Regulations 41

Employment Services 42

Graduate Student Committees 42

Selection/Election of Graduate Student Representatives 42

Graduate Program Committee Representative 42

EMS Graduate Student Council Representative 42

Department Faculty Meeting Representatives 42

PSU Graduate Student Association Representatives 43

Department Colloquium Committee 43

Graduate Student Colloquium Committee 43

Activities and Events Committee 43

Computer Committee 43

Welcoming Committee for New Students 43

TGIF Committee 43

## Departmental/Research Laboratories and Equipment 44

General Laboratory Facilities 44

Computer Facilities 44

Safety Training 44

Rock Preparation Room 44

Introduction

The M.S. and Ph.D. programs in Geosciences provide students with a strong scientific background and intensive research experience, culminating in a formal thesis. The goal of each program is to prepare students for scientific careers in academia, government, or industry. The administration of the graduate programs follows the Guiding Principles for Good Practices in Graduate Education adopted by the Penn State Graduate School; these state:

Working relationships between faculty, staff, and students are an important component of graduate education at Penn State. The quality of these relationships can make or break the graduate school experience. The development of a positive learning environment depends on a shared vision of educational values, objectives, and expectations.*It is the joint responsibility of faculty, staff, and students to work together to nurture this vision, and to encourage freedom of inquiry, to demonstrate personal and professional integrity, and to ensure a climate of mutual respect.*

The following six principles are elements in a productive environment for graduate education at Penn State.

* **Understanding the work environment.** Faculty, staff, and students must each take the initiative to learn the policies, rules, regulations, and practices that affect them, their work, and the units in which they work. Graduate program handbooks, pertinent University publications, funding agency references, and other resources can typically be obtained from graduate program officers, the Internet, registered student organizations, department faculty, other students, faculty advisors, and thesis committee chairs.
* **Academic honesty, professional integrity, and confidentiality.** These qualities are the responsibility of all faculty, staff, and students. Each member of the graduate community must endeavor to adhere to the highest level of these ideals in all their personal and professional activities. All Penn State programs require participation in The Scholarship and Research Integrity (SARI) program (<http://www.research.psu.edu/training/sari>)
* **A clear course of study.** The student and her/his faculty advisor should develop and agree upon a clear plan of academic study and the responsibilities associated with it. Careful planning and discussion throughout a graduate program are the best ways to avoid later misunderstandings and problems.
* **An atmosphere of openness.** Students and faculty must work to establish and maintain an environment that is open, sensitive, and encourages free discussion between members of the graduate community. Clear, two-way communication is a critical ingredient in a successful graduate experience.
* **Acknowledgment of intellectual rights and property.** Students and faculty should discuss issues associated with academic freedom, intellectual property, authorship, and publication as part of the student's academic plan. Resolution of these issues early in the graduate program is often the best way to avoid later disputes.
* **Opportunities for evaluation.** Evaluation, reflection, and feedback are integral parts of the academic process. These items should be a regular part of every graduate program. Early, frequent, and constructive feedback helps to prevent small differences from becoming serious problems.

While these six guiding principles are not exhaustive, they do reflect a spirit that can make the graduate education process at Penn State more rewarding and productive for everyone.

This Handbook has been prepared within the spirit of these guiding principles, with the aim of providing graduate students in the Department of Geosciences with policies and procedures that relate to the graduate academic programs within the Department. The Graduate School policies are listed in the [Graduate Degree Programs Bulletin](http://www.psu.edu/bulletins/whitebook/). It is the responsibility of the graduate students to familiarize themselves with the pertinent policies and deadlines of the Graduate School.

The Geosciences Graduate Programs are administered by the Acting Associate Head for Graduate Programs and Research, Mark Patzkowsky, Professor of Geosciences, and Graduate Program Assistant, Angela Packer, who can be contacted for further information.

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**General Requirements and Expectations of the Geosciences
Graduate Programs (M.S. & Ph.D.)**

Students are expected to have a bachelor's degree in some branch of the natural or physical sciences, engineering, or mathematics. A student also is expected to have completed standard introductory courses in geosciences, chemistry, physics, and mathematics through integral calculus, plus 15 credits of intermediate-level work in one or a combination of these subjects. Students who are admitted but have less than the minimum preparation in these subjects must make up their deficiencies prior to entry to the program. They may take such courses concurrently with their graduate studies, but this is not encouraged. Students with special backgrounds, abilities, and interests whose undergraduate grade-point average in courses pertinent to geosciences is below a 3.00 (on a 4.00 scale) will be considered for admission only when there are strong indications that a 3.00 average can be maintained at the graduate level.

Students are admitted either to the M.S. or Ph.D. degree program. A student may work toward a Ph.D. degree without first earning a master's degree.

**Program Overview**

The graduate program involves coursework, teaching, and research. These help the student build her or his skills in observation, critical thinking, quantification, and presentation. Our goal is for students to gain deep knowledge in a subfield of geosciences and a broad understanding of the overall discipline. Our graduates are prepared for professional opportunities both at the time of graduation and throughout their careers.

Because the Geosciences graduate program accepts students from widely different academic backgrounds, the graduate curriculum aims to provide commonality in the vernacular and key ideas at the core of the geosciences. The first-semester course (“Issues in Geosciences”) aims to instill camaraderie among students and provide them with skills and background necessary for taking full advantage of the intellectual and educational opportunities at Penn State. The boundaries of geosciences are ever expanding, and our courses and training promote interdisciplinary inquiry as well as a foundation in the core of geosciences.

**General Course Requirements for the Completion of M.S. and Ph.D. Degrees**

All graduate students in Geosciences are expected to acquire breadth of knowledge in the geosciences, fundamental and advanced knowledge of their subdiscipline, and skills in the areas of data collection and quantitative analysis. Toward that end, all students must complete the **Geosciences Breadth** course Geosc 500, "Issues in Geosciences." In addition, students must select one approved course in each of the following areas (please see below for exemptions):

* **Disciplinary Fundamentals:** Courses that survey the discipline at the advanced level, building upon undergraduate coursework, while also providing fundamental knowledge required for other advanced, graduate-level courses.
* **Data Gathering/Interpretation:** Courses that develop skills in observation, data gathering, and interpretation in the field and/or laboratory.
* **Quantitative Analysis:** Courses that develop skills in the quantitative analysis of geosciences data and theories, including geostatistics, mathematics, numerical modeling, and data analysis. The selection of courses does not include all courses that are “quantitative.” Rather it includes only those courses where quantitative analysis of data and theories is the primary emphasis.

A list of approved courses is provided below and on the [Department Website](http://www.geosc.psu.edu/graduates). The list of approved courses may be modified by approval of the Department’s Graduate Program Committee.

The selection of advanced coursework will be at the discretion of the student, with advice from her/his advisor and thesis committee. In the initial advising session, the new student and the advising committee will discuss which, if any, undergraduate courses would be useful to the student in preparation for advanced coursework.

**Exemptions from Course Requirements**

Under exceptional circumstances, a student may petition for a waiver of one or more of these course requirements. Examples are:

* Ph.D. students with M.S. degrees: Graduate coursework at other institutions with substantial overlap with any of the courses listed may be substituted for courses in the curriculum.
* Courses in other departments that meet the expectations of one of the categories above: this could include graduate-level mathematics, time series analysis, field or laboratory techniques, or courses in analytical methods.
* Students designing a truly hybrid degree program that involves substantial coursework from one or more departments outside of Geosciences.

Exceptions to the curriculum will only be granted in special cases. Petitions should be submitted before a course to be considered for substitution is taken. *Petitions must include:*

* a statement of justification written by the student
* a syllabus of the class the student would like to substitute for one of the required courses
* a statement of support from the advisor.

**Special Case of Students Entering with a Completed M.S. Degree**

Incoming students who have completed a M.S. degree in geosciences or a closely allied field may be advised upon entry to petition for exemption from either the curricular Data Gathering or the Quantitative Analysis requirements, depending on the nature of their M.S. research. It is recommended that students bring a copy of their M.S. thesis to the advising session with their assigned Initial Advisory Committee. The faculty advising team will recommend whether it is appropriate to make this petition.

|  |
| --- |
| Graduate Program Course ScheduleDept. of GeosciencesApproved Courses for Graduate Curriculum |
|  |  |  |
| ***Category*** | ***Course Number*** | ***Course Name*** | ***Course Number*** | ***Course Name*** |
| **Geosciences Breadth** | Geosc 500 | Issues in Geoscience |  |  |
| **Disciplinary Fundamentals** | Geosc 452Fall | Hydrogeology | Geosc 479Fall | Advanced Stratigraphy |
|  |  | Geosc 488Spring | An Introduction to Seismology | Geosc 489Fall | Dynamics of the Earth |
|  |  | Geosc 502Spring | Evolution of the Biosphere | Geosc 518Fall | Stable Isotope Geochemistry |
|  |  | Geosc 533Spring | Principles of Geochemistry | Geosc 548Fall | Surface Processes |
| **Data Gathering and Interpretation** | Geosc 410Spring | Marine Biogeochemistry | Geosc 413WFall | Techniques in Environmental Geochemistry |
|  |  | Geosc 483Fall | Environmental Geophysics | Geosc 508Fall & Spring | Mechanics of Earthquakes and Faulting |
|  |  | Geosc 558Fall | Multi-Channel Seismic Proc. | Geosc 565Spring | TectonicGeomorphology |
|  |  | Geosc 572Spring | Field Stratigraphy |  |  |
| **Quantitative Analysis** | E MCH 524Fall | Mathematical Methods in Engineering | EGEE 520/596Fall | Math. modeling of Energy and Geo-Env. Systems. |
|  |  | GEOEE 557Spring | Computational Geomechanics | Geosc 514Spring | Data Inversion in Earth Sciences |
|  |  | Geosc 560Spring | Kinetics | Geosc 561Spring | Mathematical Modeling in Geosciences |
|  |  | Geosc 597Fall | Multivariate Analyses in Geosciences | PNG 425Spring | Well TestAnalysis |
|  |  | PNG 511or PNG 430Fall | Num. Sol’n PDEin Flow orRes. Modeling | STAT 500 | Applied Statistics |

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**Requirement for Science Communication Activity**

It is an obligation of those engaged in the pursuit of science at all universities to foster its use for the public good. A particular goal of our program is to train the next generation of Geoscientists in skills necessary for the effective communication of scientific ideas. Science communication skills lead to both public and personal gain: by helping to maintain an informed citizenry and by providing essential tools for personal advancement and success in industrial, government, and academic professions.

***For M.S. students***, the focus of their efforts should be on developing skills in communicating scientific findings and interpretations with other researchers. The department further encourages MS students to develop science communication skills for a broader audience through teaching and outreach activities. The Science Communication Activity must be completed prior to the thesis defense and will be assessed by the student’s advisor.

***For Ph.D. students***, the Department of Geosciences Graduate Program requires participation in a meaningful and substantive science communication experience. The experience must contain the following elements: 1) developing and delivering scientific or pedagogic findings to a technical audience; and 2) assessment of the experience by a faculty mentor. Appropriate examples include presenting one’s scientific research at a national or international conference; or designing and leading a hands-on outreach activity and presenting the curricular approach in a geoscience education session at a national meeting. The Science Communication Activity must be completed prior to the comprehensive exam. The Graduate Program Head will evaluate the proposed effort, with input from the student’s advisor, and provide guidance as necessary.

***All graduate students*** will participate in discussions with Dept. Colloquium Speakers and other guest lecturers associated with Geosc 500 (Issues in Geosciences), which will focus on a range of topics related to science communication, including, for example, teaching and assessment tools, classroom management, broader impacts of science, ethics, integrated/interdisciplinary scholarship and diversity in education. Students will acquire teaching, mentoring, and technical skills that will enhance their abilities in science communication.

**Minor Fields**

The incorporation of a minor field in a graduate program is optional. A minor field may be recommended by the Doctoral Committee or included at the student's request. A graduate minor may be taken in one of the approved graduate degree programs offered at Penn State. In addition, some departments offer formal graduate minors that have been approved by the Graduate Council. A minor at the graduate level must represent curriculum and study that reflect graduate-level concepts and scholarship, with a preponderance of courses at the 500 level. See the [Graduate Bulletin](http://bulletins.psu.edu/bulletins/whitebook/) and the [list of graduate minors](http://www.gradsch.psu.edu/prospective/programlist.cfm#minors) for the credit requirements for a minor in the master's and doctoral programs. Additional information about graduate minors is available [here](http://bulletins.psu.edu/graduate/programs/minors).

**Concurrent Degree Program**

A student may wish to design a program that leads to the awarding of two degrees. Normally such concurrent degree programs involve two M.S. degrees or a Doctorate in the major field and a Master's degree in a related field. Students who elect a concurrent degree program should contact the Graduate School as well as the outside department as early as possible, and not less than one and one half years before they expect to receive their degrees. With the permission of the outside Department Head and Program Chair, and with the approval of the Graduate School, an advisor will be assigned in the outside field, and together with the student's principal advisor, a suitable course program will be worked out that satisfies the requirements of both degree programs. A maximum of 10 credits may be used in common to fulfill the requirements for both degrees. Two theses are required.

**Timelines for the Completion of Degrees**

An outline of normal academic progress is shown below. Students typically complete the M.S. within 2 years and the Ph.D. within 5 years. Students entering with the M.S. should complete the Ph.D. within 4 years. Students completing the M.S. followed by the Ph.D. should finish both degrees within 6 years.

**MILESTONES IN GEOSCIENCE GRADUATE PROGRAMS**

|  |  |
| --- | --- |
|  | Semester |
| IncomingDegree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| BS | Advisor | Form Committee Thesis Proposal | **MS****Defense** |   Long & Happy Career |
|  |  |  | Ph D Committee |  |  |  |  | **Ph D Defense** |
| BS / MS | Advisor  | Form Committee | Qualifying Exam |  |  |  |  |  |

**Financial Support**

The Department of Geosciences strives to support all graduate students in good standing. Requests for Teaching Assistantships (TA) will be considered when funds are available. The need for a TA in a given course is identified by the Undergraduate Program Head. The Graduate Program Head will approve TA support to specific graduate students and assign TA duties to specific courses.

We believe that graduate students should have both a strong connection to funded research and high quality, mentored teaching experiences. Therefore, our goal is for students to be supported by a combination of TA and Research Assistantships (RA) during their graduate student tenure. Teaching assistantships will be provided to graduate students based on a variety of factors, including academic performance and length of time in degree program. When RA funding is not available, priority for TA funds will go to students of Assistant Professors, faculty who maintain a strong ratio of RA to TA support within their research group, and to faculty with strong track records of funded research and mentoring of graduate students. TA funds will normally support students working with tenure-track faculty, although students working with other faculty may receive support. The Graduate Program Head and the graduate admissions committee will work closely to ensure that students are admitted into active, well-funded research groups, and to minimize the chances of admitting students who will be supported solely or primarily via teaching assistantships during their tenure. Our expectation is that TA funding will normally constitute no more than 50% of the support a student receives during their graduate studies.

**Annual Review of Progress**

Every graduate student is required to submit an annual progress report documenting research and academic progress, plans for the coming year, and feedback from their thesis committee. The report should include the [Annual Progress Report](http://www3.geosc.psu.edu/gradprogram/ProgressReportForm2011.pdf), a concise summary of achievements, and a plan for coursework to fulfill degree requirements.

Students should schedule a meeting with their Thesis Committee to review The Progress Report. The final Report should include feedback from the Thesis Committee. The following deadlines will be used.

The completed report should be submitted to the Geosciences Grad. Program Office. *Failure to submit a report can lead to termination of financial support.*

|  |  |
| --- | --- |
| **Student****Degree (status)** | **Report Deadline** |
| M.S. | March 1 |
| Ph.D.  | April 1 |

Students who have formally scheduled a thesis defense date are exempted from the requirement to submit an annual report. ***Other milestone events (qualifying, comprehensive exams) may or may not fulfill the requirement; in some cases a separate committee meeting is necessary.***

The Graduate Program Head will review reports and make a determination of progress. When progress is deemed unacceptable, reports will then be reviewed by the Graduate Program Committee, which will recommend academic and financial consequences. The student will be informed of the results of the evaluation, and a copy will be placed in the official student file.

**Scholarship and Research Integrity: Training in the Responsible Conduct of Research**

As research has become more complex, more collaborative, and more costly, issues of research ethics have become similarly complex, extensive, and important. The education of graduate students at Penn State must prepare students to face these issues in their professional lives. The SARI (Scholarship and Research Integrity) program at Penn State is designed to offer graduate students comprehensive, multilevel training in the responsible conduct of research (RCR), in a way that is tailored to address the issues faced by students in individual programs.

All graduate students at Penn State are required to complete SARI requirements during their graduate program of study. The SARI program has two parts:

**CITI On-Line Training**

During the first year of enrollment, graduate students will complete an on-line RCR training program provided by the Collaborative Institutional Training Initiative (CITI). The Office for Research Protections (ORP) provides the conduit to this training via the SARI Resource Portal on the ORP website ([www.research.psu.edu/orp/sari](http://www.research.psu.edu/orp/sari)).

The CITI program can be accessed through the SARI Resource Portal on the ORP website. Students must first register with CITI and create a unique user name and password. Be sure to select “Pennsylvania State University” (NOT Hershey) as your institution. On the Curriculum Selection page, check the course that covers the physical sciences. You may log in and out as often as you like to complete the course. When you have completed the course (with 80% or higher scores on the quizzes), you will receive a completion report. Save the report as a PDF file and send it to the Grad Program Office.

**Discussion-Based RCR Training**

Graduate students are required to engage in an additional five hours of discussion-based RCR education prior to degree completion. These discussions will encompass both universal and discipline-specific material. The Graduate Program Committee has developed the following plan for Geoscience M.S. and Ph.D. graduate students. Discussion-based RCR education will take place in three steps:

1. A one-hour discussion during new-student orientation.
2. A two-hour discussion during Geosc 500, a course required of all graduate students in Geosciences.
3. A two-hour discussion to be offered through specialized research groups within the department. These might include the paleobiology group, the Astrobiology group, the ice and climate group, AfricaArray students, etc.

RCR topics to be discussed will be organized as follows:

1. During new-student orientation, discussion will focus on acquisition, management, sharing, and ownership of data and mentor/trainee responsibilities
2. During Geosc 500, discussion will focus on publication practices and responsible authorship, conflict of interest and commitment, research misconduct and peer review
3. During research group discussions, the topics will include sub-discipline related concerns in data acquisition, management, sharing, for example such as the different nuances of reporting of lab or field data. It will also cover collaborative science and interdisciplinary concerns as appropriate.

Discussion will be facilitated by faculty instructors, who will be aided by readings that highlight case studies and materials on RCR provided by the graduate program office (drawn, for example, from teaching tools available through the Rock Institute website).

**Administrative and Academic Oversight and Responsibility**

**for the Graduate Programs**

*Updated 27 March 2015*

**General Oversight**

The Department of Geosciences is administered by a Head and two Associate Heads, one for Undergraduate Programs and one for Graduate Programs and Research. Each Associate Head chairs a Program Committee, composed of elected faculty and student representation. In addition, an Executive Committee, composed of the Head, the two Associate Heads, the Department’s Representative to the Diversity Council of the College of Earth and Mineral Sciences, and two elected at-large faculty members, has responsibilities in faculty evaluation and in policy-making on a long-term basis.

*The Associate Head for Graduate Programs and Research* is responsible for administering the Graduate Program. Specific duties include certifying completion of degree requirements and approving final theses, assigning Teaching Assistants (with the Associate Head for Undergraduate Programs), appointing Research Assistants (with project directors), assigning student offices, scheduling and developing graduate courses, appointing M.S. and Ph.D. committees, administering an annual review of student progress, administering admissions, and maintaining official student files. The Associate Head also has responsibilities in coordinating and administering research proposals, facilities, and equipment.

*The Graduate Program Committee* has important oversight functions in advising the Associate Head, approving appointments to committees, awarding or recommending fellowships, monitoring the annual review of student progress, and in serving as an appeals board, for faculty and students, on academic decisions of the Associate Head. A non-voting student representative is included in all discussions concerning general policies, but not in those that involve individual students.

The *Initial Advisory Committee* appointed by the Associate Head advises first-year students upon arrival. The committee will meet with the student prior to initial registration and recommend courses and other requirements for the first semester. The committee shall designate one faculty member as Initial Advisor. This temporary advisor will fill out a form indicating the student's research interests and the courses advised.

**Academic/Research Advisors**

Students should choose an academic and research advisor during the first semester. The academic advisor/research supervisor is usually the same person, except when the research supervisor is not a member of the [Penn State Graduate Faculty](http://www.gradsch.psu.edu/facstaff/faculty.cfm) and the Department of Geosciences. In such a case, a Geosciences faculty member will serve as the academic advisor.

It is the responsibility of the thesis advisor to guide the design and implementation of the project so that the scope is realistic and the aims are viable. For M.S. theses, it is also the responsibility of the advisor that the magnitude of the M.S. project should not deviate greatly from the standard 4-semesters-plan established in this Handbook. The actual project deliverables should be made clear and agreed upon with the student. The advisor will review thesis drafts in a timely manner agreed upon with the student.

Adjunct faculty may hold temporary graduate faculty appointments for periods not to exceed the term of their affiliation. Such appointments will be reviewed by the Department Executive Committee after each term. Individuals holding these temporary faculty appointments are expected and encouraged to participate actively in the graduate program, to serve on academic committees, and to interact with students and faculty. As such, they may serve on doctoral committees, supervise M.S. and Ph.D. theses, and teach 500-level courses on a temporary basis, as authorized by the Department. If a student is advised by such an adjunct faculty member, the student will also have an academic advisor who is a regular Geosciences faculty member. The academic advisor will co-chair the M.S. or Ph.D. Committee.

**Thesis and Dissertation Committees**

The graduate school at Penn State outlines the basic requirements for appointment and membership of graduate committees (<http://www.gradschool.psu.edu/faculty-and-staff/faculty/committee/>). Additional information regarding committee composition, appointments, changes to membership, and timelines is provided below.

**M.S. Committees**

For students pursuing the M.S. degree, a committee of at least three graduate faculty members must be appointed *by the middle of the second semester*. A majority must be members of the Geosciences Graduate Faculty.

To form this committee, the student and his/her proposed advisor should submit the tentative title of the thesis and a list of committee members to the Associate Head for approval.

The M.S. Committee will first meet with the student at or before the progress report meeting (deadline: March 1). Prior to the end of the second semester of study, the student should submit and orally present a brief (5-page maximum) statement of the proposed thesis research. This meeting will normally coincide with the Annual Progress Report meeting. The student, advisor, and committee should agree to a tentative schedule for completion of the degree. The scope of the work in the thesis proposal should be consistent with this schedule.

The thesis committee must meet at least once during each academic year to participate in the Annual Progress Report. However, the student is advised to meet with her/his committee frequently, to discuss research progress and problems. Although the primary guidance of the student’s program should be provided by the advisor, the thesis committee should assist by providing oversight on courses and on planning and conduct of the research, as appropriate.

It is the responsibility of the committee to judge viability of the proposed research, the plausibility of the time frame, and the validity of the project’s aim. Committee members are often involved for specialized knowledge—if so, this function should be clear to the student and to the committee member. Committee members will read progress reports and proposals from the student and provide feedback. They will also attend review meetings and provide individual feedback if either the student or committee member sees fit. If committee members find that they cannot meet these obligations, they should inform the student and advisor so that accommodations can be made. Part of the committee’s function is to prevent the student and advisor from losing perspective regarding the scope of the master’s thesis project.

**Doctoral Advisors and Committees**

Ph.D. students should choose an academic advisor within their first semester. This person may be a member of the doctoral committee or someone else designated by the head of the major program for this specific duty. The academic advisor may be different from the dissertation advisor.

***Doctoral Committee*** *(see details here:* [*http://bulletins.psu.edu/graduate/degreerequirements/degreeReq1*](http://bulletins.psu.edu/graduate/degreerequirements/degreeReq1)*)*

The doctoral committee is formed after the student has passed the qualifying exam; in preparation for the qualifying exam, students are advised to meet with staff in the Geosciences Graduate Program office to discuss the process and committee selection. Program members of the committee should be appointed in advance of the first progress report meeting following successful completion of the qualifying exam. The outside member (see description below) should be selected and appointed as soon as possible, but must be in advance of the comprehensive exam.

General guidance of a doctoral candidate is the responsibility of a doctoral committee consisting of three or more active members of the Graduate Faculty, a majority of whom must be faculty of the Geosciences Graduate Program, and one Outside Member, as described below, for a total of four or more committee members. A member of the Geosciences Graduate Faculty must have agreed to supervise the student by the time the committee is appointed. The dissertation advisor must be a member of the doctoral committee and usually (but not required to) serves as chair. If the candidate has a minor, that field must be represented on the committee. This committee is appointed by the graduate dean through the Office of Graduate Enrollment Services, upon recommendation of the head of the major program, soon after the student is admitted to qualifying.

A person not affiliated with Penn State who has particular expertise in the candidate's research area may be added as a special member, upon recommendation by the head of the program and approval of the graduate dean. A special member is expected to participate fully in the functions of the doctoral committee. If the special member is asked only to read and approve the doctoral dissertation, that person is designated a special signatory of the thesis. Occasionally, special signatories may be drawn from within the Penn State faculty in particular situations. The committee should be selected to reflect appropriate depth and breadth in the thesis topic and in related geoscience subdisciplines.

***Chair*—**The chair or at least one co-chair must be an active member of the graduate faculty of the specific doctoral program in which the candidate is enrolled. A retired or emeritus faculty member may chair a doctoral committee if he/she began chairing the committee prior to retirement and has the continuing approval of the department head or program chair. The primary duties of the chair are:

* to maintain the academic standards of the doctoral program and the Graduate School
* to ensure that the comprehensive and final examinations are conducted in a timely fashion
* to arrange and conduct all meetings
* to ensure that requirements set forth by the committee are implemented in the final version of the thesis.

***Outside Member*—**While one or more members of the doctoral committee may be from outside the department in which the graduate program resides, an official "Outside Member" must be appointed who serves a specific role as described below. The primary responsibilities of the Outside Member are to

* maintain the academic standards of the Graduate School
* assure that all procedures are carried out fairly.

The Outside Member represents the Graduate School and, as such, the Outside Member shall be a member of the Graduate Faculty who may, but is not required, to have direct expertise in the research area of the candidate. The Outside Member should have no conflicts of interest with members of the committee, in such a way as to preclude fulfilling their duties as the Outside Member.

In particular, in order to avoid potential conflicts of interest, the primary appointment of at least one regular member of the doctoral committee must be in an administrative unit that is outside the unit in which the dissertation adviser's primary appointment is held (i.e., the adviser's administrative home; in the case of tenure-line faculty, this is the individual's tenure home). This committee member is referred to as the “Outside Unit Member.” In the case of co-advisers, the Outside Unit Member must be from outside the administrative home(s) of both co-advisers. In some cases, an individual may have a primary appointment outside the administrative home of the student’s dissertation adviser and also represent a field outside the student’s major field of study; in such cases, the same individual may serve as both the Outside Field Member and the Outside Unit Member.

If the candidate has a minor, that field must be represented on the committee by a “Minor Field Member.” (For additional information related to minors for D.Ed. students, see "Major Program and Minor Field" under "D.Ed.—Additional Specific Requirements" in this *Bulletin*).

The Outside Member cannot chair or co-chair the committee. This does not preclude other members of the Graduate Faculty, regardless of budgetary appointment, from serving on the committee and, potentially, in dual roles, for example, as co-chair. The committee member representing the minor may serve as the Outside Member if she/he meets the required conditions.

***Changes to committee membership and conflicts of interest—*** To address potential additional scenarios, establish expectations for timing of committee appointment, and provide guidance for conflicts of interest, the following clarifications have been adopted by the department of Geosciences:

* Requests for changes to committee membership must be accompanied by an appropriate justification, and will be evaluated in the same manner as initial proposed committee membership.
* The most likely reason for a recommendation of change of membership is a perceived or real conflict of interest. The following policies are intended to prevent conflicts of interest, in order to maintain the fairness and objectivity of exams and thesis and dissertation evaluation.
	+ External committee membership: The external, or “Outside Unit” member of the dissertation committee may not hold a graduate faculty appointment in the student’s major department (as described above). Members of the Geosciences graduate faculty can serve as advisor, co-advisor, or internal member of a graduate committee, and therefore do not fulfill the intended role of the Outside Unit member. (See the Graduate School policy on Outside Field Member and Outside Unit Member at the website URL given above.)
	+ Committee members having a direct conflict of interest with the student or advisor may serve on the thesis or dissertation committee, but with restrictions. Specific examples and the associated restrictions include (but are not limited to):
		1. In the case that committee members serve as ***Co-investigator*** on funded research that forms part or all of the basis of the student’s research, the Co-Investigators cannot constitute a majority of the voting membership of the committee.
		2. In cases of personal or financial conflicts of interest (e.g., members of the committee are ***current or former spouse*** of the advisor or student, or are or have been *business partners*), the faculty member(s) with the conflict of interest may serve in a ***non-voting role only***. Because the Outside Unit committee member must also be a voting member of the committee, individuals having a conflict of interest may not serve in the Outside Unit capacity.

***Responsibilities of Doctoral Committees*—**The doctoral committee is responsible for approving the student's academic and research plans within the context of degree requirements; they should review the program as soon as possible after the student's admission to qualifying. Moreover, continuing communication among the student, the committee chair, the research supervisor, and the members of the committee is strongly recommended to preclude misunderstandings and to develop a collegial relation between the candidate and the committee. For example, students who wish to publish dissertation chapters prior to their oral exam are advised to provide committee members with copies of the manuscript prior to submission for publication.

The Doctoral Committee must meet with the student at least once each year during the annual review of the progress. The advisor will provide day-to-day advice, but the committee will have final authority over the student's program and over the Comprehensive Examination and Thesis Defense. The committee provides scientific advice on planning and executing of the thesis research.

**The Official Student File**

The Graduate Program Office maintains an official file on each student that contains application materials (except letters of recommendation), transcripts and grade sheets, progress reports, qualifying proposals, thesis proposals, results of examinations, all official communications to the student, and communications with the Graduate School.

This file is available for the student to examine on site in accordance with University regulations. It is not available to outside parties. Files will be kept for at least seven years after a student's graduation or termination of program.

**Expectations for Graduate Students in Geosciences**

*Updated Feb 2, 2012*

The policies and procedures described in this Handbook supplement those of the [Graduate School](http://www.gradsch.psu.edu/) as published in the [Graduate Bulletin](http://www.psu.edu/bulletins/whitebook/). It is the student's responsibility to know and observe the departmental regulations as well as the regulations of the Graduate School, in particular to meet established deadlines for the scheduling of examinations and the submission of theses.

**Academic Integrity**

Each student and faculty member is expected to assume personal responsibility for the encouragement and promotion of the highest ethical and moral standards. It is the responsibility of the program and each faculty member to set up conditions of operation that will encourage students to strive for these high ideals. Dishonesty in any regard is a serious offense, raising grave doubt that a student is worthy of continued membership in the Graduate School community. We encourage everyone to review Regulations and Conduct Standards for Graduate Students here: [Graduate Bulletin](http://www.psu.edu/bulletins/whitebook/) and to read the Statement of the Graduate School’s Code of Conduct here: [Graduate Bulletin Appendix I](http://www.gradsch.psu.edu/policies/student/appendix1.html). Additional information and resources for academic integrity can be found here: <http://tlt.its.psu.edu/plagiarism/links/policy> and here: <http://www.ems.psu.edu/current_undergrad_students/academics/integrity_policy>

Penn State [policy AD-47](http://guru.psu.edu/POLICIES/AD47.html) outlines General Standards of Professional Ethics and [RA-10](http://guru.psu.edu/policies/RA10.html) discusses how Inquiries and Investigations into Questions of Ethics in Research are handled. Additional information is presented as part of the [SARI/RCR training](http://www.research.psu.edu/training/sari) to all graduate students at Penn State.

**Commitment to Maintaining an Ethical Workplace**

Students and faculty of the Department of Geosciences are expected to assume personal responsibility for maintaining an open, understanding, non-biased, and ethical department community. In addition to awareness of the information provided in this document, we expect everyone to stand ready to help those in need. Faculty, staff and students should be prepared to disseminate information about counseling services and strive to recognize and aid victims of abuse or those in need of emotional support. The following services and resources are recommended. Additional *Student Support and Resources are available here:* <http://www3.geosc.psu.edu/gradprogram/StudentResources.GradHandbook.html>

**Student Support and Resources**

* CAPS (Counseling and Psychological Services, Student Affairs):

<http://studentaffairs.psu.edu/counseling/>

Emergencies: 911

CAPS Main #: 814.863.0395

Centre County CAN HELP: 1.800.643.5432

* Online training from CAPS: recognizing students in distress

<http://studentaffairs.psu.edu/counseling/distress/>

* Worrisome student behaviors information from CAPS: <http://studentaffairs.psu.edu/caps/wsb/>
* CAPS community provider locator: <https://elections.psu.edu/caps-cpd/>
* CAPS crisis management guidelines: <http://studentaffairs.psu.edu/counseling/crisis/>
* Center for Women Students: <http://studentaffairs.psu.edu/womenscenter/>, guidelines and protocols for helping victims of violence and sexual assault: <http://studentaffairs.psu.edu/womenscenter/awareness/howtohelp.shtml>
* Centre County Women’s resource Network (general information about abuse and local/regional resources): <http://www.ccwrc.org/resources/>

**Course Schedule and Academic Progress**

Each student is responsible for planning her/his curriculum in partnership with the advisor and thesis committee. The annual progress review will identify schedules that needlessly postpone courses, do not include work required for the degree sought, or do not provide for the removal of deficiencies of courses specified by qualifying or doctoral committees. Students have responsibility to maintain good academic standing and to meet degree requirements and carry out their research in a timely fashion.

**Academic Standing (M.S. or Ph.D.)**

All students are expected to remain in good academic standing. A graduate student in good academic standing has a GPA of 3.0 or better in 400-500-level courses, has been deemed to be making adequate progress toward completion of the degree by their thesis committee, and has submitted an annual report of progress in the last academic year. A student who fails to submit a progress report will be notified of her/his poor academic status and asked to schedule a meeting with the thesis committee immediately. Failure to meet with the committee within the next 6 months may result in termination of the student from the Geosciences Graduate Program. The Graduate Program Committee will also act upon the recommendation of the thesis committee to terminate a student based on lack of progress toward completion of the degree.

The Graduate School Procedures for the termination of the degree program for unsatisfactory scholarship can be found in [Appendix III](http://www.gradsch.psu.edu/policies/student/appendix3.html) of the Graduate Bulletin.

**Duties of Graduate Assistants**

Teaching Assistantships are intended to serve as part of the educational training of graduate students and primarily involve providing competent instruction for undergraduate students. If for any reason a student appointed as a Teaching Assistant cannot perform a given assignment, he/she should notify the professor in charge immediately, or, if he/she cannot be contacted, the office of the Associate Head for Graduate Programs.

Assistantship duties require 20 hours per week for l8 weeks at the half-time support level and 10 hours per week for l8 weeks at the quarter-time level. Note that this interval is longer than the academic term of 15 weeks. Thus, students who are supported on assistantships are expected to be available for assignments during the entire l8-week interval.

Under special circumstances, exceptions to the reporting date, specified in the "Terms of Offer of a Graduate Assistantship and General Conditions of Graduate Assistantship Appointments," accepted by a student, can be made. Such a request will be considered by the Program Chair if it has academic merit and the support of both the thesis advisor and the faculty who the student is assigned to assist.

If it should become necessary to terminate an assistantship due to inadequate performance, the Procedures outlined in [Appendix IV](http://www.gradsch.psu.edu/policies/student/appendix4.html) of the Graduate Bulletin will be followed.

Students and faculty should note that paid university work outside their assistantship requires approval by the department Grad Program Officer. Further, the Graduate Degree Programs Bulletin specifies that a graduate assistant may accept concurrent employment outside the University *only* with permission from the assistantship department head and the assistant’s graduate academic program chair.

*The student is specifically and strongly cautioned against taking outside employment of any nature (i.e., house or pet sitting, piece work, lawn work, running errands, etc.) from a faculty member with any sort of supervisory role in the student’s academic or assistantship activities.*

**Graduate School Guidelines Regarding Leaves for Graduate Assistants**

If a graduate assistant (defined as TAs, RAs, GAs, or students on fellowships) is unable to fulfill the duties of his/her appointment because of illness, injury, pregnancy or adoption, every effort should be made to assist the graduate assistant in performing the level of duties possible for the duration of the semester. If the graduate assistant cannot fulfill any duties, the stipend should be maintained for up to three weeks or until the end of the stipend period (whichever occurs first). If circumstances are such that three weeks of paid leave do not provide the graduate assistant with sufficient time to resume his or her duties, the department head/unit leader is authorized to grant an additional three weeks leave of absence. Such a request for paid leave for medical reasons should be in writing and be accompanied by a written certification of illness from a health care provider and written permission by the graduate assistant for a University Health Services physician to contact the certifying health care provider, if needed. When the leave is requested due to pregnancy or adoption, certification by a health care provider will not be necessary.

If the source of funding is external to the University, prior to granting the leave, it will be the responsibility of the PI to be sure that the commitments to any grant or contract are fulfilled by the Principal Investigator, and to be sure that the funding agency rules allow the implementation of such a leave. Note: most funding agencies defer to the policies of the institution. There are some special programs e.g., NIH and NSF fellowship, which have defined policies. In those cases, the agency policy will prevail.

If it becomes necessary to terminate funding of a graduate assistant, the individual should be referred to the [Student Insurance Office](http://www.sa.psu.edu/uhs/basics/insurance.cfm)  (203 Student Health Center, 865-7467) to be accurately informed of the implications of the termination for his/her health insurance coverage, and of the mechanisms available for coverage once that provided by their stipend benefit is no longer in effect. It is recommended that such referral be documented in writing to the graduate assistant, in addition to any verbal provision.

Graduate assistants may take an unpaid leave for medical reasons of no more than one calendar year. In the case where the student requests an unpaid leave for medical reasons, the request should be in writing and be accompanied by a written certification of illness from a health care provider and written permission by the graduate assistant for a University Health Services physician to contact the certifying health care provider, if needed. Such a leave would not guarantee that support would be available when the student would return to full-time graduate work. However, the program should not count the leave against the student's time to degree and should notify the Graduate School in writing of the approval of the leave, its circumstances (i.e., for medical/health reasons), and its duration. Before a leave of absence is discussed with a foreign national graduate assistant, the program chair or mentor needs to contact the [International Student Services](https://global.psu.edu/info/internationals-psu/students/contact-us) office (814 865-6348) to ensure consistency with federal regulations.

**REGISTRATION**

Credit Loads

Graduate assistants (TA or RA) at the normal half-time level should register for 9-12 credits per semester, with no more than 24 credits total in two consecutive semesters. Students holding fellowships or other awards based on academic excellence are required to carry 9 or more credits each semester. This rule does not apply to Ph.D. students who have passed their comprehensive exams and are registered for 601 or 610.

Graded vs. “R” credit

For M.S. students, up to 6 credits of research (Geosc 600 or 610) may have an assigned letter grade. Any additional research credits must be assigned a grade of “R.” For Ph.D. students, up to 12 credits of research (Geosc 600 or 610) may have an assigned letter grade. Any additional research credits must be assigned a grade of “R.”

Completing Your Registration

The Penn State registration process consists of enrolling in specific courses and is complete upon receipt of payment of tuition and fees. Your billing statement includes amount(s) due as well as possible credits resulting from applicable scholarships, loans, grants, and other forms of financial assistance. In some cases, because of the financial credits, a student may not be required to make payment to the University. In other cases, a student may be due a refund from the University. In all cases, regardless of amount due, action is required to complete the registration process. If the “net payable” is less than $100, you may confirm your registration online by using [eLion](https://elion.psu.edu/).

You may pay the amount due by credit card via eLion. PSU no longer sends a paper bill, and is no longer using the website for the Bursar’s office. All payments are to be submitted on [eLion](https://elion.psu.edu/).

Failure to complete the registration process may result in any or all of the following actions:

* You will not receive grades for courses you are attending.
* You will be unable to enroll for future semesters.
* Your Penn State [Computer Access Account](http://aset.its.psu.edu/accounts/) will be suspended.
* If you receive student loans, you may enter a repayment status with your lender.
* If you receive student aid, some of the aid sources may be cancelled and will be unavailable for reinstatement at a later date.
* If you are living in University Housing, you will need to vacate your housing.
* Starting with the first day of the semester, you will not be allowed to add courses.
* If you receive a Federal Work Study award, you will not be eligible for employment.
* Faculty members are not obligated to provide instruction or administer assessment for the student.

It should be noted that: (a) *proper* *registration* (See Graduation Bulletin [Registration](http://bulletins.psu.edu/bulletins/whitebook/academic_procedures.cfm?section=procedures3)) is expected of all graduate students; (b) graduate assistants must carry the prescribed credit loads (see [Credit Loads and Academic Status](http://bulletins.psu.edu/bulletins/whitebook/academic_procedures.cfm?section=procedures5)); and (c) because of visa considerations, international students must register every semester, no matter what their degree objectives.

##### Registration for Students near the Completion of the Ph.D. and M.S. Programs

A candidate for the Ph.D. degree is required to register continuously for each semester from the time the comprehensive examination is passed and the two-semester residence requirement is met until the thesis is accepted by the doctoral committee, regardless of whether work is being done on the thesis during this interval. (*See* [Graduate Bulletin](http://bulletins.psu.edu/bulletins/whitebook/degree_requirements.cfm?section=degreeReq2): Registration and Continuous Registration under Requirements.)

A master's candidate is not required to register for the final semester in order to graduate or in order to make minor revision to the thesis and/or to take a final examination for the degree.

The Master’s Degree: Specific Requirements

# M.S. Degree Requirements

The [Graduate Bulletin](http://bulletins.psu.edu/bulletins/whitebook/degree_requirements.cfm?section=masters#mastersAdmission) specifies that a total of at least 30 credits are required for the M.S. degree, the minimum credit requirements are distributed is as follows:

* 18 credits in the 500 and 600 series, combined, must be included in the program.
* 12 credits in course work (400 and 500 series), as contrasted with research, must be completed in Geosciences courses.
* 6 credits in thesis research (600 or 610) must be included in the program. *Only 6 research credits may have a letter grade; all additional research credits must have a grade of “R.”*

A minimum grade-point average of 3.00 for work done at the University is required for graduation. The completion of a M.S. Thesis is part of the requirements for the completion of the M.S. degree in Geosciences

**Time to Completion for Master’s Degree**

The following section presents a *suggested* schedule for completion of the degree within a two-year time period. Note that every student and every thesis is different: some may require less time and some may require more, but the amount of time spent should be in the best interest of the student and consistent with department policy to complete the M.S. degree within two years. *This suggested schedule is meant to provide students with a realistic framework for the completion of a M.S degree, but is not intended to be a rigid plan.*

• By the end of the second semester in residence, the M.S. student should have chosen an advisor, formed a committee, and begun work on a thesis topic.

• The formal presentation to the thesis committee of a project proposal should be done in the early part of the second semester.

• Initial stages of research (pilot study, background research, etc.) should be started in the second semester and grants-in-aid should be applied for, if necessary.

• For students starting in the fall semester, summer can serve as the opportunity for fieldwork or concentrated research (particularly for those supported as TAs during the regular school year).

• Research should be approaching completion by the end of the third semester. A meeting with the committee to report progress and describe how the thesis project has evolved is strongly recommended.

• The fourth semester in residence should be reserved for final analysis of results, writing of the thesis, and formal oral defense.

A fifth academic semester should not be incorporated into the timetable for the thesis, and support from the Department for the fifth and subsequent semesters is neither guaranteed nor encouraged. Remember that the Department does not guarantee summer support for its students; most students who are supported during the summer receive that support from faculty with funds available from research grants.

The M.S. Committee will first meet with the student no later than the end of the first academic year, at which time the student should submit and orally present a brief (5-page maximum) statement of the proposed thesis research

It is the *responsibility of the student* to perform the thesis research and to meet the proposed goals in a timely fashion. In addition, it is the student’s responsibility to keep the committee informed on how the project is evolving and progress toward completing the research. When research deviates from the original proposed plan, the student should promptly provide the committee members with the opportunity for input.

Finally, any problems or conflicts that the student, advisor, and committee cannot resolve among themselves should be brought promptly to the attention of the Associate Head of the Graduate Program for final resolution.

**The Ph.D. Degree: Specific Requirements**

Ph.D. Degree Requirements

For the completion of a Ph.D. degree, a student must fulfill both Geosciences Department and Graduate School requirements. The Ph.D. student must meet the following:

***Departmental requirements***:

* satisfy the Core Course Curriculum of the Geosciences Department
* demonstrate proficiency in the use of the English language
* complete Science Communication Activity
* complete a language requirement, if specified by the Doctoral Committee
* deliver at least one formal oral presentation

***Graduate School requirements***

* 2 semesters of residence
* Maintain a minimum grade-point average of 3.00 for work done at the University. This is required for: Ph.D. qualifying, taking the comprehensive examination, final oral examination, and graduation
* Up to 12 credits of research (Geosc 600 or 610) may have an assigned letter grade. Any additional research credits must be assigned a grade of “R.”
* Pass qualifying and comprehensive examinations
* Preparation and defense of a thesis
* Register for each semester (Fall and Spring) from the time the comprehensive examination is passed and the two-semester residence requirement is met, until the thesis is accepted by the doctoral committee, regardless of whether work is being done on the thesis during this interval
* Complete requirements developed by the Doctoral Committee, which is responsible for ensuring that the candidate has developed scientific breadth and depth by a combination of course work and personal study. This ability is tested mainly by the Comprehensive Examination. The Language and Communication requirement is also evaluated by the Doctoral Committee. A high level of proficiency in English is required. Doctoral Committees may wish to require a foreign language.

Foreign Language Competency

The Geosciences Program doctoral committee may require proficiency in a foreign language or languages, if this should be necessary for the successful completion of a thesis. The committee should decide at an early stage whether or not the background, thesis topic, and subdiscipline of the candidate require competence in a foreign language or languages and, if so, the procedures by which competence will be demonstrated. The requirement must be fulfilled before the Comprehensive Examination can be scheduled.

English Competency

Students in the Geosciences Program are expected to demonstrate proficiency in communicating scientific information and ideas in formal and informal professional settings. The Geosciences faculty expects spoken English to be of sufficient quality that listeners can concentrate on data and ideas rather than on the form of delivery, and that questions addressed to the candidate are readily comprehended. The Geosciences faculty expects students to perform with a uniform standard of quality in writing. Documents should demonstrate correct grammar, spelling, and punctuation. Organization, sentence length, logical sequences of thought, clarity, and avoidance of jargon and colloquialisms are all components.

English competency is *formally assessed at the Qualifying Examination and certified at the time of the Thesis Proposal*. A student will not be cleared for a Comprehensive Examination until competency is certified.

Assessment instruments prior to the Qualifying Examination include the application essay, the initial meeting with an advisory faculty panel and subsequent meetings with an advisor, the MS thesis, the essay accompanying the annual Progress Report, oral communications at the annual candidate/committee meeting, the TSE (ESL) test (oral, for international students appointed as TAs), the required formal oral presentation (see section below) and the two required formal research papers prior to Qualifying.

The initial advisory panel and the interim doctoral committee will assess the measures of English competency available and make recommendations on remediation, if required, as a part of the written reports to the Associate Head that result from those meetings.

The Qualifying Committee will assess English competency as part of the Qualifying examination, based upon the written proposals and performance on the oral portion of the examination. Its recommendations on the form provided will determine if further remediation is required.

The Doctoral Committee has the responsibility of assuring that further remediation after the Qualifying Examination, if necessary, has been effective. They will base their decision upon oral presentations at the candidate-committee meetings that will occur at least yearly, upon the required oral presentation, and, ultimately, upon the Thesis Proposal.

International students who arrive with speaking deficiencies are recommended to enroll for ESL 114G, and those who arrive with writing deficiencies are recommended to enroll for ESL 116G. International students are encouraged to use English in ordinary conversation both inside and outside Deike Building. Those students required to remediate written English as a result of the Qualifying Examination will be required to take ENGL 004, a writing course, during the ensuing Summer Session. Students who do not receive a "B" or better in ENGL 004 will be required to write two review papers under the supervision of their research advisor during the ensuing semester. It will be the responsibility of the research advisor to require an appropriate number of revisions of these papers.

The doctoral committee will make the final decision on attainment of competency in speaking and writing ability (if not satisfied previously) on the occasion of the Thesis Proposal, which involves both a written proposal and an oral presentation. Insufficient performance will result in a second required Thesis Proposal or in dropping the student from the Graduate Program.

Formal Oral Presentation

As part of the Department's program in Communication and English Competency, each doctoral student is required to present at least one formal oral talk on a geoscience topic, with appropriate visual aids. The venue for the talk may be the [Annual Graduate Student Colloquium](http://www3.geosc.psu.edu/GradColloquia/), a National Geoscience Meeting, or another venue upon application to the Graduate Program Committee. The following *do not* satisfy this requirement: a talk to a class or seminar, the annual Review of Progress presentation, or Qualifying exam. The talk must be presented prior to the Comprehensive Exam in order that evaluation of the talk may be used in the assessment of English competency at that meeting. The student must designate a faculty mentor, not necessarily the advisor, who will serve as a resource, who will attend the talk, and who will provide feedback. The mentor will complete a short summary to be entered in the student file.

**Qualifying Examination**

***Objective:*** The Qualifying Examination is intended to:

1. Assess the student’s intellectual capacity, ability to construct meaningful and testable hypotheses, depth of understanding of relevant scientific background, and professional aptitude in the context of successfully completing a Ph.D.;

1. Explore and identify any deficiencies in the student's background and training in order to plan additional course work that may be needed. Although not the primary purpose of the qualifying examination, evaluation of a student’s background and preparation remains an important part of the evaluation;
2. Assess the student’s verbal and written English competency.

***Appointment of the Qualifying Committee:***

At the time of a Qualifying Examination, a student must have a research advisor and thesis committee. The Qualifying Committee will consist of a minimum of 4 members of the Graduate Faculty in the Geosciences Graduate Program. The members normally include the thesis advisor as well as a departmental "roving panel member," one of 3 or 4 faculty members who will serve on numerous qualifying examinations during a given year to ensure consistency among qualifying examinations. The "Rover" will chair the exam. The other members should be chosen to ensure representation of sub-disciplines within the Geosciences relevant to the student's main area of research.

The student and advisor should submit a memo (via email is appropriate) to the Graduate Program Head that contains a statement of student interests and a list of suggested members. The Graduate Program Head will appoint a Rover and approve or modify the committee members to ensure depth and balance. The Qualifying Committee should be established at least six weeks prior of the actual examination.

***Scheduling and Timeline for the Exam:***

Students entering the Ph.D. program must take the exam before completing the third semester. Additional requirements and guidelines for scheduling the exam are outlined below.

***Timeline for the Qualifying Exam:***

1. Exams may not be scheduled during the last week of classes or during the week of final exams. Summer exams are discouraged, but are possible with approval of the Grad. Program Head.
2. The Qualifying Committee should be established at least six weeks prior of the examination.
3. At least two weeks prior to the exam, candidates are required to submit the following to the Rover for their Qualifying Exam. The Rover will review the qualifying materials and make a recommendation to the Grad. Program Head.
	1. Resume containing information on courses taken or planned, the name of the advisor, title of the planned thesis, previous degrees, honors, etc.;
	2. Two propositions whose defense will form the basis of the exam (**see “Propositions”, below**). Proposals should be in acceptable form before the exam in writing style and length.
	3. [Rover Approval Form.](http://www.geosc.psu.edu/sites/default/files/Rover_Approval_Form_V8.docx)
4. At least one week prior to the exam, after receiving approval from the Rover and Grad Program Head, candidates will submit items 3.1 and 3.2 to their qualifying committee.

***Propositions:***

The two separate research proposals should each be no more than 5 double-spaced pages of text, exclusive of figures and references. Each proposal should contain an introduction, setting the stage for the formulation of the hypothesis or driving research question(s) and providing background information; a clear statement of the hypothesis to be tested; a description of the proposed work; the criteria that would be used to accept and/or reject the hypothesis; as well as a statement of the significance of the proposed work. The audience for the research proposals is the qualifying committee.

A fundamental expectation is that both proposals will demonstrate ownership of the material by the student, independent thought and conception of a sustained and feasible approach to answering a scientific question or testing a hypothesis, and be framed in the context of relevant literature and existing work. Each of these documents should be prepared solely by the student. These propositions and the student's defense of them in the examination should demonstrate originality and judgment, as well as geosciences background and abilities in writing, speaking, and reasoning.

The first proposition is intended to assess **depth** of thinking, and is expected to exhibit understanding of both background and detail. It quite properly can focus on a proposed thesis topic and can involve an advisor's ideas and input. In many cases it may be based on the student’s ongoing or planned research, and may include preliminary data collected as part of ongoing or completed work, to the extent that the data help to motivate or provide a context for the proposed study. *However, the document should represent the student’s own writing. The advisor should not edit the text of the proposal, although the student and advisor may discuss its content and style, as well as logic, depth of scholarship, and significance of the ideas.*

The second of the propositions is intended to assess **originality** of thinking. *It should be entirely original work of the student in concept and in background literature research.* Students are encouraged to consult with colleagues and share ideas with graduate student peers, but are expected to develop and write the proposal on their own. Neither of the proposals may be based on the student’s earlier research carried out for the MS or BS degree, or for any other purpose.

***Approval of the Qualifying Proposals:*** Students must discuss the planned topics of the qualifying papers with the Rover well in advance of the qualifying exam. The Rover will identify if the topics are too similar, too narrow, or otherwise inappropriate for the exam. The student should discuss with the Rover the origin of the ideas and make sure they fulfill the requirements for depth and originality as discussed above.

***Conduct of the Exam:*** The Qualifying Examination is chaired by the roving panel member in order to ensure uniformity of procedures, e.g., the relative time devoted to proposals or to general questions, and the level of background required. The student should consult with the roving member if he or she has any questions on exam procedure or philosophy.

The Examination will be oral and about 3 hours length. An introductory oral presentation for each proposal is limited to 10 minutes. Committees will normally devote at least half the time to the propositions and ancillary questions. Questions typically asked include:

* What is the hypothesis being tested?
* Will the experimental design lead to valid tests of the hypotheses?
* How would you interpret the following hypothetical results?
* What is the significance of your research?

Time should be reserved for "general" questions unrelated to proposals, and attention should be given to deficiencies in background.

***Evaluation:*** The primary objective of the evaluation is to determine whether a student has the preparation, intellectual capacity, and professional attitude to complete a Ph.D. program successfully. The committee’s evaluation will be based upon the quality of the submitted propositions, their oral presentation and defense, as well as the student’s background preparation. The evaluation will be reported on the qualifying examination form (Appendix I of this handbook), which is meant to provide detailed feedback on the student’s propositions, background preparation, presentation of the propositions, and oral defense of the propositions. The committee will assess the following and make necessary recommendations:

1. The preparedness of the student to be a Ph.D. candidate. The preparation and defense of the two research propositions will serve as the primary means of assessing the student's ability to complete a Ph.D. program.

2. The student’s command of the necessary background to carry out the proposed work.

3. The student’s ability to communicate verbally and in writing.

***Outcome of the Exam:*** At the conclusion of the examination, the committee will first take a non-binding vote on accepting the student as a Ph.D. candidate, discuss the student’s performance, and then cast the binding vote. A majority vote is needed to pass. In the event of a tie, the outcome is a failure. The following outcomes are possible:

1. Pass without conditions;
2. Pass with minor deficiencies in background or English competency. In this case, the committee will specify a timescale for completion of additional coursework;
3. Failure with recommendation to complete the M.S. Upon successful completion of the M.S. thesis, a student may be considered for admission to the Ph.D. program, at which point a second Qualifying Examination would be conducted;
4. Failure with recommendation to retake the exam; and
5. Failure with decision to leave the Ph.D. program at the end of the semester.

Comprehensive Examination and Thesis Proposal

The Comprehensive Exam is administered by the Doctoral Committee after the student has completed course work and after a language requirement (if required) and the English competency requirement are fulfilled. The exam must be completed within two years after a student passes the qualifying exam.

The purpose of the examination is to determine the student's understanding of the chosen field of specialization ("depth") as well as general knowledge in the geosciences ("breadth"). A student may consult the Committee Chair (normally the Advisor) for clarification of the areas in which comprehension is expected (e.g., paleontology, seismology, igneous petrology, Appalachian geology, etc.).

Students should prepare a 10 to 15 page, Ph.D.-level proposal for their dissertation research. The document should introduce and motivate the dissertation, provide an explanation of the impact and importance of the proposed study, summarize completed research, and describe in detail plans for remaining work. This document serves as the Thesis Proposal as required by The Graduate School (<http://bulletins.psu.edu/graduate/degreerequirements/degreeReq1#doctoralComprehensive>) and, as such, it should include evidence of feasibility of the proposed dissertation research. Although preliminary and completed work should be included, they are not the primary focus on the dissertation proposal. The detailed format of the dissertation proposal will be decided by the thesis advisor in consultation with the thesis committee, and these expectations should be communicated to the student prior to or at the time The Exam is scheduled.

The thesis proposal is intended to consolidate a student’s thinking about the dissertation problem, to define its limits, and to inform the committee of research initiatives. The student, advisor, and committee should also agree to a tentative schedule for completion of the degree. The scope of the work in the thesis proposal should be consistent with this schedule. The thesis proposal should serve to focus a student’s scientific ideas into a manageable project and should include a plan for achievement of research goals and scheduling of committee meetings.

The oral exam will include both a defense of the proposal and questioning that enables assessment of- and adds to the student’s mastery and understanding of their field. The exam will begin with a short (20 to 25 minute) oral presentation of completed research and remaining, proposed work.

The dissertation proposal will be delivered to the thesis committee at least a week prior to the exam. Date, time, and place for an oral examination will be arranged by the Graduate Program Office in consultation with the student and members of the Committee. Prior to scheduling the exam and at least two weeks before the examination date, the Graduate Program Head must request the Dean of the Graduate School to schedule the examination. Students should meet with the Graduate Program Administrator to file relevant paper work.

A favorable vote of at least two-thirds of the committee is required to pass the exam. The Committee Chair will report the result of the examination to the Graduate Program Head and to the student, and will deliver the signed examination forms (Appendix II of this handbook) to the Graduate Program Office for transmittal to the Graduate School.

**Continuation for the Ph.D. Program Following the M.S. Degree at Penn State**

A student who successfully completes the M.S. degree in Geosciences may request to continue for the Ph.D. Students should contact the Graduate Program Head *prior to completion of the M.S.* To initiate the process, students should:

* Send a memo to the associate head for graduate programs indicating their interest in entering the Ph.D. program.
* Include a brief (~1-2 page) explanation and/or personal statement explaining the reasons for requesting the change: Why do you wish to pursue a Ph.D., with whom, and on what topic(s)?
* The graduate program office will contact members of your current M.S. committee to provide recommendations. In addition, the office will request a statement from your proposed primary Ph.D. advisor indicating their willingness to advise the Ph.D.. In some cases, the potential Ph.D. advisor may provide additional conditions (for example, successful completion of specific coursework or defense of the M.S. thesis).
* Upon receipt of the above materials, the associate head will forward the request to the admissions committee. The associate head may also ask the potential advisor for a plan describing how the student will be supported. The admissions committee will provide their recommendation to the associate head for a final decision.
* The request will be considered for the next available semester, amongst the other applicants for that semester. The final decision will be made in the context of available funding, the strength of the supporting documentation, the student’s record, and other factors. Potential outcomes include:
1. Approval of the request, to be effective beginning in the next available semester;
2. Conditional approval of the request, pending specific coursework or completion of the MS thesis;
3. Deferred decision, with the request evaluated among the next pool of applications for graduate admission; or
4. Denial of the request.

If the application is approved, students will petition the Graduate School for a change of program via the Resume Study/Change of Graduate Degree or Major. Students cannot expect financial support on a Ph.D. track until a Resume Study/Change of Graduate Degree or Major petition is approved. The materials to petition for the change of program are accessible via the Graduate School’s website at: <http://www.gradschool.psu.edu/> (select “How to Apply”, which will take you to the following link and provide further instructions: <http://www.gradschool.psu.edu/prospective-students/how-to-apply/>).

**M.S. and Ph.D Thesis Preparation**

**Thesis Formats**

The [Thesis Office](http://www.gradsch.psu.edu/current/thesis.html) at 114 Kern Building is responsible for reviewing all theses to assure that accepted standards for scholarly writing are met. Questions concerning thesis regulations, format, or submission should be answered by consulting the [Thesis Guide](http://www.gradschool.psu.edu/current-students/etd/thesisdissertationguidepdf/). It is the student's responsibility to be aware of the current regulations and policies regarding thesis format and submission procedure.

**Theses with Separate Research Chapters**

It is common for theses to contain sections or chapters that represent separate research papers that have been, are being, or will be submitted for publication in journals. This practice stands in contrast to traditional theses of the past that were monograph-like and were subsequently rewritten for publication. The main criterion for deciding whether a published (or about-to-be published) work may appear in the thesis, in part or in its entirety, depends on whether the work was completed as part of the thesis. If the research is a product of the Thesis, then it belongs in the thesis document. Another important criterion is whether the student is the first author of such publications.

We encourage students to develop the Thesis as a series of papers that take a multidisciplinary approach to a problem in the Geosciences. The problem can be broad, however the thesis should have a coherent direction and should not be a set of unrelated papers. The Thesis should be a cohesive document with an introduction that provides a framework for linking chapters and conclusions, such that it constitutes a source for those who want to study the research in greater detail than can be found in one or more journal articles.

**Multi-Authored Papers**

The Thesis may contain multi-authored papers if the candidate is first author of the material. In cases where the candidate is not first author, the candidate's contributions would need to be clearly and fully indicated in a preface and/or introduction. In particular, the contributions of each author in each chapter should be properly attributed.

Committees should specifically address such contributions and reach a consensus about whether the candidate's contributions are clearly delineated and that such contributions represent independent work—in data acquisition, in analysis of data, and in writing (subject to normal review by advisors, committee, and colleagues). Students are strongly encouraged to provide their committee members with copies of manuscripts before they are submitted for publication. This will help the committee to be aware of research findings and student progress, and it will provide an opportunity for the committee to provide suggestions or guidance on thesis content.

## For additional information see Penn State policy [IP02 Co-Authorship of Scholarly Reports, Papers And Publications](https://guru.psu.edu/policies/IP02.html) (Formerly Policy RA13)

**The State of the Thesis at the Time of the Final Oral Examination**

The [Graduate School Bulletin](http://www.psu.edu/bulletins/whitebook/) specifies that "major revisions to the thesis should be complete before the oral examination. The thesis should be in its final draft, with appropriate notes, bibliography, tables, etc., at the time of the oral examination; both the content and style should be correct and polished by the time this final draft of the thesis is in the hands of the committee."

Both the thesis advisor and the student are responsible for assuring the completion of a sufficient number of drafts of the thesis and for adequate consultation with members of the thesis committee well in advance of the oral examination. If the copy submitted to a Committee member is not in suitable form, the member should return it to the student, and, if necessary, the examination should be rescheduled. If a previous draft was read and comments were submitted to the student, then the student should have either incorporated the comments into the thesis or should have supplied justifications why the comments were not incorporated.

Committees enjoy some latitude on the issue of scientific content of a thesis, as opposed to clear statement of scientific ideas. Some committees will want to settle major questions or disagreements about scientific approaches and conclusions before the thesis defense. Others may prefer to defer some or all such questions to the defense. The Advisor, Committee, and student should agree on the proper venue for discussion of such questions, but if possible they should adhere to the standard above that the defense copy and the final submitted copy should be substantially the same.

**Thesis Defense**

A date, time, and room for a thesis defense shall be arranged by the candidate in consultation with his/her advisor. It is the responsibility of the candidate to ascertain that the examination date and time are acceptable to all members of his or her Thesis Committee. In the case of Ph.D. thesis defense, the Associate Head will then request that the Dean of the Graduate School officially schedule the examination. This request to the Dean of the Graduate School must be made no later than three weeks before the time of the examination.

The candidate shall distribute the final draft of the thesis to each member of the Thesis Committee at least 10 days before the scheduled defense. This draft must be complete in every detail and in suitable form for presentation to the Graduate School. In most cases, very few changes should have to be made in style or content of the thesis after the defense. The thesis must be complete in every detail and include, in the case of a Ph.D. thesis, the required vita and abstract, and in a form suitable for presentation to the Graduate School. The title page should follow the format given in the [Thesis Guide](http://forms.gradsch.psu.edu/thesis/thesisguide.pdf). If the thesis is not in a form suitable for defense, the committee should return it to the student, and the examination should be rescheduled.

The Final Oral Examination will be conducted by the Thesis Committee. The thesis defense presents a needed opportunity for intellectual exchange among the wider geosciences community, as well as an opportunity to learn about graduate student research. Accordingly, approximately 30-45 minutes of the defense, to include an oral presentation and questions from the audience, should be scheduled as a public seminar. The ensuing examination will also be open to the public—that is, an audience may remain in the room until the time of an executive session for discussion and a vote that is closed to the public and to the candidate. The audience may not ask questions, however, after discussion of the presentation by the audience and candidate at the close of the public seminar portion of the exam.

At least three members of the committee must be physically present at the thesis defense, including the thesis advisor or chair. The graduate student must also be physically present at the exam. Thus for a five-person committee, two committee members could participate via distance. No more than one member may participate via telephone; a second member could participate via videoconference. A favorable vote of at least two-thirds of the members of the committee is required for passing. If the student fails the examination, the Committee will advise the Associate Head whether the student should be reexamined, or whether he/she should be dropped from the Program. Unsuccessful students will oftentimes be given a second chance. The Associate Head will inform the Dean of the Graduate School about the outcome of the exam.

The thesis in its final form (and including advisor and all committee member signatures) must be submitted to the Associate Head for approval no later than 10 days before the completed thesis is due in the Graduate School. No exceptions to this schedule will be approved.

**Copies of the Thesis**

The Graduate Program Head requires an electronic copy of the thesis, typically as a PDF file, at the time of final approval. The student should first obtain signatures from the advisor and all thesis committee members prior to requesting final approval from the Graduate Program Head. The Department of Geosciences does not require a printed copy of M.S. or Ph.D. theses for its files. The EMS Library receives the copy submitted to the Graduate School after the thesis has been bound. Doctoral candidates submitting a thesis electronically do not provide a hard copy to either the Department or the Graduate School.

**Costs of Thesis Preparation**

The student will bear the cost of word processing and illustrations and of preparing the required number of copies of the thesis or research paper. Additional copies, if required by the sponsor of the research project, will be paid for by the sponsor. The sponsor of the research may also defray expenses of drafting and processing illustrations in the thesis or research paper if they will be used in reports and publications. Other illustrations and typing will be the responsibility of the student.

**Dual-Title Ph.D. Degree Program in Astrobiology**

The complete description of the program, including the currently participating faculty and courses offered, can be found in the [Graduate Degrees Program Bulletin under Astrobiology (ABIOL)](http://bulletins.psu.edu/bulletins/whitebook/graduate_degree_programs.cfm?letter=A&program=grad_abiol.htm).

The Astrobiology dual-title degree program is administered by the Department of Geosciences for the participating graduate programs. The dual-title degree program is offered through participating programs in the College of Earth and Mineral Sciences and the Eberly College of Science and, where appropriate, other graduate programs in the University.

**Admission into Dual-Title Program**

Graduate students with research and educational interests in Astrobiology may apply to the [Astrobiology Dual-Title](http://bulletins.psu.edu/bulletins/whitebook/graduate_degree_programs.cfm?letter=A&program=grad_abiol.htm) degree program. Candidates must submit transcripts of their undergraduate and graduate coursework, a written personal statement indicating the career goals they hope to serve by attaining an Astrobiology dual title, and a statement of support from their dissertation adviser to the Astrobiology Program Chair. A strong undergraduate preparation in the basic sciences is expected, with evidence of an interest in multiple disciplines

For admission to pursue a dual-title degree under this program, a student must apply to: (1) the Graduate School; (2) one of the participating major graduate programs (Astronomy and Astrophysics, Biochemistry, Microbiology and Molecular Biology, Biology, Chemistry, or Geosciences); and (3) the Astrobiology program committee. Usually students will apply and be accepted into the major program first. Application to the dual-title degree program can occur upon matriculation, but should be completed before the qualifying examination in the major program is scheduled.

**Degree Requirements**

To qualify for a dual-title degree, students must satisfy the requirements of the major graduate program in which they are enrolled, in addition to the minimum requirements of the Astrobiology program. The minimum course requirements for the dual-title in Astrobiology are:

* ABIOL 574 Planetary Habitability (3 credits)
* ABIOL 590 Astrobiology Seminar (2 credits)
* ABIOL 570 Astrobiology Field Experience (2 credits)
* and at least 2 credits of 400- or 500-level course work outside of the student's major program in an area relevant to Astrobiology (through consultation with their adviser).

All students must pass a qualifying examination that assesses their potential in the field of astrobiology. This examination may be part of the qualifying examination in the student's major graduate program if an Astrobiology faculty member serves on the examination committee and if acceptable to the major program. If not, the Astrobiology dual-title program will offer a second qualifying examination. The structure and timing of the second qualifying examination will be determined jointly by the dual-title and major program. The student's doctoral committee should include faculty from the Astrobiology program, but this person may be the adviser and have an appointment in the major program of study. The field of Astrobiology should be integrated into the comprehensive examination. A Ph.D. dissertation that contributes fundamentally to the field of Astrobiology is required. A public oral presentation of the dissertation is required.

**Committee Structure, Qualifying and Comprehensive Exams, and Defense of Dissertation**

The establishment of a student’s dissertation committee and the timing of the qualifying and comprehensive examinations and final dissertation defense must first satisfy the requirements of the student’s primary program. The normal sequence of events will be:

1. Admission into the primary program
2. Admission into the dual-title program (can be contemporaneous with admission into the primary program)
3. Passage of the primary program’s qualifying examination
4. Passage of the dual-title program’s qualifying examination (may be integrated into 3; see below)
5. Establishment of the dissertation committee
6. Comprehensive Examination
7. Dissertation Defense

**Qualifying Examination**

Normally, students admitted into the Astrobiology Program will pass a qualifying examination that assesses their potential in the field of Astrobiology prior to their fourth semester in the program. This examination may be part of the primary program’s qualifying examination if an Astrobiology faculty member participates in the examination and, as part of that examination, assesses the student’s potential in the field of astrobiology. Please consult your advisor or primary program’s chair to determine whether an Astrobiology faculty member is serving in this role. If so, the student must request that the chair of the primary program send a copy of the qualifying report form, and the advisor send a memo confirming that the above condition was met, to the chair of the Astrobiology dual-title program.

If an Astrobiology faculty member can not or did not participate in the primary program qualifying examination and/or if astrobiology was not incorporated into the qualifying examination, the Astrobiology dual-title program must offer a second qualifying examination to comply with Graduate School rules. The student’s advisor will make a request for qualifying examination at least one month prior to the anticipated date of examination. The Astrobiology program head will assign a committee consisting of the student’s advisor (unless the advisor is not a member of the Astrobiology Graduate Faculty) and two other Astrobiology faculty members. The student will be asked to select, in consultation with his or her advisor, a journal article from the recent literature that addresses an astrobiological topic, and provide the article to the committee at least one week before the examination. At the examination, the student will summarize the article, provide a critical assessment of it, and lead a discussion with the committee members concerning the article. A favorable vote of 2/3 of the committee is required for passing. The committee may recommend that the student be allowed to re-take the examination in the following semester, or that the student be denied qualifying for the dual-title.

**Dual-Title Ph.D. Degree Program in Biogeochemistry**

The complete description of the program, including the currently participating faculty and courses offered, can be found in the [Graduate Degrees Program Bulletin](http://bulletins.psu.edu/bulletins/whitebook/index.cfm) under Biogeochemistry (BGC).

The Biogeochemistry Dual-Title Degree Program will be administered by the Department of Geosciences for the participating graduate programs. A program committee with representatives from each participating department maintains program definition, identifies courses appropriate to the program, and recommends policy and procedures for the program's operation to the dean of the Graduate School and to the deans of the participating colleges. The dual-title degree program is offered through participating programs in the College of Earth and Mineral Sciences, College of Agricultural Sciences, College of Engineering, Eberly College of Science, and the Intercollege Graduate Degree Programs. The program enables students from several graduate programs to gain the perspectives, techniques, and methodologies of Biogeochemistry, while maintaining a close association with major program areas of study.

**Admission into the Dual-Title Program**

For admission to pursue a dual-title degree under this program, a student must apply to:

1. the Graduate School and
2. one of the participating major graduate programs; and then subsequently to
3. the Biogeochemistry program committee. Students may only apply to the dual-title program once they have been accepted into a major program. Once a student has been accepted to a major program, application to the dual-title degree program can occur immediately or at a later time, such as upon matriculation. The application to the dual-title degree program, however, should be completed before the qualifying examination in the major program is scheduled.

**Admission Requirements**

Graduate students with research and educational interests in biogeochemistry may apply to the [Biogeochemistry Dual-Title Degree Program](http://bulletins.psu.edu/bulletins/whitebook/college_campus_details.cfm?id=31&program=grad_bgc.htm). Candidates must submit transcripts of their undergraduate and graduate coursework, a written personal statement indicating their interests in the interdisciplinary arena of Biogeochemistry and their career goals they hope to serve by attaining a Biogeochemistry dual-title, and a statement of support from their dissertation advisor, if assigned. A strong undergraduate preparation in the basic sciences is expected, with evidence of an interest in multiple disciplines.

**Degree Requirements**

To qualify for a dual-title degree, students must satisfy the requirements of the major graduate program in which they are enrolled, in addition to the minimum requirements of the Biogeochemistry program. Students are required to have two advisors from separate disciplines: one individual serving as a primary advisor in their major degree program (i.e., Soil Science, BMMB, Material Science & Engineering, Chemistry, Ecology, Environmental Engineering or Geosciences) and a secondary advisor in an area within a field covered by the dual-title program and a member of the Biogeochemistry faculty. The major program advisor normally will also be a member of the Biogeochemistry faculty. The two faculty advisors can represent different academic programs, but this is not required, as faculty from a scientifically diverse department could represent very different areas of expertise.

To fulfill the course requirements for the dual-title in Biogeochemistry, students must complete a total of 15 graduate credits chosen in consultation with the advisor from an approved list of courses in the areas of biochemistry and microbiology, environmental chemistry, environmental engineering, geochemistry, materials science and engineering, and soil science.

**Qualifying Examination**

All students must pass a qualifying examination that includes an assessment of their potential in the field of biogeochemistry. In all cases, the result of a single qualifying exam for both entrance to the student's major Ph.D. program and this dual-title program will be reported to the Graduate School. When possible, the qualifying exam will involve a single examination that includes biogeochemistry. However, in some cases, such as with the Chemistry Department, existing qualifying procedures preclude use for the Biogeochemistry Dual-title Program. In these instances that require a major program's existing qualifying procedure to be augmented by a biogeochemistry examination, the structure and timing of this exam will be determined jointly by the dual-title and major program.

**Committee Structure, Comprehensive Exam, and Defense of Dissertation**

The student's doctoral committee should include faculty from the major program of study and also faculty with expertise within Biogeochemistry. The field of Biogeochemistry should be integrated into the comprehensive examination. A Ph.D. dissertation that contributes fundamentally to the field of Biogeochemistry is required. A public oral presentation of the dissertation is required, which may be part of the final defense within the major degree program.

**Earth Science Degree**

**On-line M. Ed. In Earth Sciences**

The M.Ed. degree in Earth Science is designed for secondary and college science teachers. The degree is interdisciplinary and may include geological science, but their procedures and administration are separate from those of the Geosciences program. The procedures and facilities described in this Handbook are not applicable to Earth Science students. More detail about the program can be found [here](https://earth.e-education.psu.edu/).

The M.Ed. in Earth Sciences program combines graduate courses from academic departments in Penn State's College of Earth and Mineral Sciences, College of Education, and Eberly College of Science. The curriculum will prepare teachers to help students in grades 7 through 12 master educational objectives related to Earth and space science, as specified in National Science Education Standards (National Academy of Sciences, 1996). To accommodate working teachers who are only able to study part-time and at a distance, courses will be offered online through Penn State's World Campus. Fall, Spring, and Summer semester offerings will be available. Students will be granted licenses to use the courseware modules developed for the M.Ed. in Earth Sciences program in their secondary classrooms.

Students may initially enroll in M.Ed. in Earth Sciences classes as non-degree graduate students. Up to 15 credits earned in non-degree status may be counted toward the M.Ed. in Earth Sciences degree.

**Master's Degree Requirements: t**he M.Ed. in Earth Sciences degree is conferred upon students who earn a minimum of 30 credits with grades of "B" or better in all courses, including at least 18 credits at the 500 level or above (with at least 6 credits at the 500 level), and who complete a quality culminating individual project in consultation with a graduate adviser. Students will have the opportunity to participate in face-to-face field experiences or workshops at University Park or other locations during Summer sessions.

**General Student Support and Benefits**

**Financial Support for Graduate Students**

The Department is committed to providing financial support for non-provisional graduate students who are making satisfactory progress toward the completion of their degree(s). That commitment must be tempered by the availability of Department, College, and University funds, or outside research grants. The financial support base also includes several fellowships sponsored by industry, private donations, as well as fellowships awarded by the Graduate School. Nominations for University Graduate Fellowships and awarding of departmental fellowships are made by the Department on a competitive basis within the guidelines of eligibility established by the sponsor of the fellowship. Students admitted provisionally may petition for support.

Decisions about the financial support of students are normally made at the time of the annual review of progress. It should be emphasized that ongoing appointments as Teaching or Research Assistants require both a financial base and an academic decision on the candidate's merits. Support may also be given, however, on a temporary (semester by semester) basis as particular needs for teaching or in research projects arise. P.I.s of projects may also pay hourly wages to students without support as needs arise.

Students without support may also consider drawing upon loan funds available in the College (see Dean, 116 Deike Building). Tuition‑Grant‑in‑Aid support is also available from the Graduate School in particular circumstances ([Office of Graduate Fellowships and Awards Administration](http://www.gradschool.psu.edu/graduate-funding/fellowships/), 313 Kern Building).

**Health Insurance Benefit**

The University provides a health insurance benefit as part of the assistantship contract and all graduate assistant appointments are automatically enrolled in the currently available health insurance policy. Insurance coverage is mandatory for all international students. Coverage for spouse and children must be added to the student’s policy each year. More information is available from the [Student Insurance office](http://www.sa.psu.edu/uhs/basics/insurance.cfm)  (203 Student Health Center, 865-7467).

Graduate Assistants who have adequate alternate medical coverage and who do not wish to be enrolled in the Penn State Student Health Insurance Plan must submit a waiver application with the Student Insurance Office, 203 Student Health Center. The University will not supplement nor will a payroll deduction be made for other insurance policies. For further information, contact the Student Insurance Office, 865-7467. The Terms of Offer of a Graduate Assistantship and General Conditions of Graduate Assistantship Appointments includes a description of the university policy regarding health insurance.

**STUDENT CONCERNS**

There are a number of venues within the University and College of Earth and Mineral Sciences and the Department of Geosciences through which students who experience difficulties can pursue the resolution of conflicts.

**Departmental Ombudspersons**

Normally the advisor should be the first point of contact for graduate students who are having conflicts with other students, instructors, or administrators. However, in some cases the conflict is with the advisor, and the student may be uncomfortable reporting the conflict to the Associate Head for Graduate Programs or the Department Head. In such a circumstance, the student should communicate the problem to a designated departmental Ombudsperson.

Two faculty members serve as Ombudspersons, to enhance communication between graduate students and their advisors. They act as impartial parties to facilitate the timely and fair resolution of conflicts or grievances. The Ombudspersons will report unresolved conflicts and grievances to the Associate Head for Graduate Programs, or, if necessary, to the Department Head or the appropriate administrative or legal office of the University. The GPC and the Associate Head appoint the Ombudspersons for a 2-year term, with approval of the Department Head. The appointments should, if possible, normally consist of one male and one female faculty member.

**Sexual Harassment**

Penn State works hard to ensure an environment in which students, faculty, and staff can learn and work to fullest potential. Nothing is more antithetical to such an environment than discrimination or harassment of any kind. The University takes a strong stand against all forms of discrimination.

Sexual harassment is a form of discrimination based on sex, including sexual orientation. Harassment impinges upon graduate students as teachers or as students when submission to such conduct is a condition for grades or academic status; when submission to or rejection of such conduct is used as the basis for academic decisions; and when such conduct interferes unreasonably with an individual's work or academic environment.

Anyone can be a victim of sexual harassment. Most reported cases involve women harassed by men who are in a position of power over them, either on the job or in the classroom. Some particular examples include: students involved in close working academic relationships that can develop into personal relationships; women in nontraditional fields who may be perceived as entering an area where they do not belong; and minority women who may be sexually harassed as a form of racism.

Further information can be found in the [University’s policy AD-41](http://guru.psu.edu/policies/ad41.html) prohibiting sexual harassment. The Affirmative Action Office has primary responsibility for resolving sexual harassment complaints. In addition, the Dean of the College of Earth and Mineral Sciences has designated Ron Nargi (C211 Coal Utilization Lab., 814-863-7381 RNargi.psu.edu) and Colleen Swetland (206 Deike, 814-863-4667 to assist in resolving complaints of sexual harassment from faculty, staff, and students.

**Formal Resolution of Problems**

The Graduate School has put into place formal procedures for the resolution of problems. These are available in [Graduate Bulletin Appendix II](http://www.psu.edu/bulletins/whitebook/front/appendix2.htm).

**FACILITIES AND SERVICES**

**Student Offices**

Each student will be assigned a desk in one of the offices or laboratories within the Department. Desk space in a laboratory ordinarily will be assigned to a student who is using the laboratory for research. Only academic books and materials should be stored in offices; personal materials should be kept to a minimum. Holes can be placed in the office walls only for the installation of fixed equipment and only by an authorized person. To avoid the peeling or discoloration of paint on the office and laboratory walls, they should be kept free of tape of all types. Offices and laboratories should always be kept locked when unoccupied to avoid theft or vandalism.

**Graduate Student Mail**

Mail addressed to graduate students will be deposited in designated graduate student boxes. Students should check these boxes on a regular basis. A student who is to be out of town for more than a few days should make arrangements for mail to be collected. . Students should not use the Department (or Program) address for any personal mail.

**Conference Rooms**

Conference rooms are available in the Deike Building for scheduling various Departmental activities, such as oral examinations, seminars, and interviews. They can be scheduled by any staff assistant in the department.

**Office Supplies**

Various office supply items are kept in stock in the department office (503 Deike) for use by faculty and teaching assistants for assigned teaching activities. Students are expected to obtain office supplies for their research through their research projects and to provide their own materials for their course work.

**Copy Machines**

The copy machines in the Department were acquired for use by staff assistants, professors, and teaching assistants for the duplication of illustrative material and handouts for regularly scheduled courses. Personal copies may not be put on research or departmental budgets and, if done, may lead to legal action by the University (theft of services). Personal copying can be done at designated photocopiers located throughout campus (EMS Library, HUB, IST Building, etc.) using your Penn State id+ card or by using commercial services available downtown.

**Keys to Student Offices and Laboratories**

Each graduate student will be issued a key to the outside door of the Deike Building, his or her office, and to the laboratories that are used regularly in his/ her research. Keys can be requested through the Graduate Program office in Room 507 Deike Building.

Failure to return keys upon termination or transfer will result in the withholding of the appropriate amount from the employee's paycheck or a charge to a student's account or in withholding of grades/ transcripts/ registration/ diplomas until the keys are returned or the cost of rekeying the facility is recovered.

**Motor Vehicle Regulations**

Each graduate student who possesses, maintains, or parks a motor vehicle (including a motorcycle, motor bike, motor scooter, or any other motor-driven vehicle) on any university property is required to register such vehicle with the [Parking Office](http://www.transportation.psu.edu/transportation/parking/), Eisenhower Parking Deck, before the first day of classes. Failure to register a vehicle renders a student liable for a financial penalty or a magistrate's citation for each offense.

A permit for parking on campus during the day, evening, or weekend can be purchased at the Parking Office. A more restricted permit allowing parking on campus for evenings and weekends is available at a reduced rate. Please check with the Parking Office for permits and fees.

A graduate assistant is required to comply with student regulations concerning motor vehicles. A graduate assistant receiving any permit must present a valid driver's license and the owner's card for the vehicle. The vehicle must be owned by the student, his parent, or spouse. A Student Parking Rules and Regulations map is available in the Parking Office, Eisenhower Parking Deck.

Bicycles—All bicycles operated on the University Park campus or in the surrounding community must be registered once each year. Expiration date is May 31. Registration can be obtained from University Police, Eisenhower Parking Deck, or at any parking kiosk, Monday through Friday between 8:00 a.m. and 4:30 p.m. Rules and regulations are available at the time of registration. No bikes, skateboards, or rollerblades are permitted in the building.

The parking areas adjacent to Deike Building, between Hosler and Steidle Buildings and behind the Steidle Building are closed to student parking. University regulations provide a graded scale of fines for parking violations and permit Security Officers to tow illegally parked vehicles. During winter months, overnight parking in these lots is strictly prohibited, and vehicles will be ticketed or pushed out by snowplows.

**Employment Services**

Each year the Department is visited by numerous industrial interviewing teams and also receives many announcements of academic, government, and private-sector openings in the geosciences. Announcements related to these recruiting activities are posted on the [Geosciences Industry Support and Recruiting](http://www.geosc.psu.edu/industry-recruiting) website. Many interviewers are interested in talking with students whose graduation dates are two or three years away, or who are interested in summer jobs, as well as with those who will be available by the end of the school year. Students who are even remotely interested in industrial positions, or who may want to gain insight into industrial employment opportunities, are encouraged to arrange for appropriate interviews.

**Graduate Student Committees**

Active student participation in committees is a long-standing tradition in the Department, and one that provides students with opportunities to participate and take leading roles in important Department activities.

**Selection/Election of Graduate Student Representatives**

All graduate students participate in one of the graduate student committees. In the fall at a general graduate student meeting (usually held during a TGIF meeting), slots on the various committees are filled by volunteers. Students unable to attend the meeting can make their preferences for committee assignments known to the meeting organizer prior to the meeting. Students who do not attend will be placed on committees with available slots. The term of each graduate student committee appointment is one year, from the time of the fall meeting until the next year's meeting when committee memberships are re-assigned.

**Graduate Program Committee Representative:** The two GPC representatives (one representative and one alternate) attend meetings of the Graduate Program Committee in order to express student opinions and concerns and to ensure that graduate students are kept informed of decisions made or considered which might affect them. The GPC representative acts as a contact point between grad students (individuals or committees) and faculty/staff, is available to assist newer students with questions concerning student life, is responsible for the selection/election of the student committee and assures that the committees are functioning properly.

**EMS Graduate Student Council Representatives:** Two students from the department represent our graduate students on the EMS Graduate Student Council. This body meets approximately once a month. The Council’s primary function is to advise the Deans of the college on how to improve graduate life. The council also helps organize events such as the EMS Grad Poster Exhibition and the EMS New Student Welcoming Reception/Awards Ceremony.

**Department Faculty Meeting Representatives:** One representative (post-comps Ph.D. student) and one alternate attend the scheduled meetings of the department faculty in order to express student opinions and concerns and to ensure that graduate students are kept informed of decisions made or considered which might affect them.

**PSU Graduate Student Association Representatives:** Two representatives (or two alternates) attend meetings of the University Graduate Student Association (GSA) in order to express student opinions and concerns and ensure that graduate students are kept informed of decisions made or considered which might affect them. More information about the Graduate Student Association can be found at the [GSA web site](http://www.clubs.psu.edu/up/gsa/).

**Department Colloquium Committee** –This committee (two co-chairs and unlimited number of students) is responsible for organizing and holding the Department of Geosciences Colloquium. Committee members solicit ideas for colloquium themes and speakers, invite and schedule speakers, publicize the colloquium schedule, and provide refreshments. The committee asks faculty to host the visiting speakers and to work with staff to coordinate their transportation, housing, schedule, and meals.

**Graduate Student Colloquium Committee:** This committee (one chair and unlimited members) is responsible for scheduling and organizing the annual Department of Geosciences Graduate Student Colloquium held during Spring semester. Committee members handle organizational logistics (reserve room and equipment, solicit abstracts, schedule speakers, compile program booklet, publicize sessions), chair colloquium sessions, and arrange for refreshments and clean-up. Guidelines for the organization of the annual Graduate Student Colloquium are spelled out in a document available from the Committee chair

**Activities and Events Committee:** This committee (one chair and unlimited members) helps schedule and organize the Departmental activities, including the *Fall Picnic*, the *Holiday Party* (generally held the last day of Fall classes) and *Entropy* (generally held the last day of the student colloquium). Committee members reserve space and equipment, advertise, solicit donations/sell tickets, and arrange for decorations, entertainment, food, and clean-up.

**Computer Committee:** This committee (one chair and unlimited members) helps ensure that the computer needs of grad students are met, regardless of their affiliation (or lack thereof) with a specific computer-rich group (i.e. ESSC, Geophysics, Geodynamics, Basin Research, Ice and Climate). The Committee represents grad student interests at meetings of the Faculty Computer Committee and should interact regularly with faculty in designing access to computer facilities. The chair of this committee should have a good knowledge of computer systems and the various department facilities.

**Welcoming Committee For New Students** –This committee (one chair and unlimited members) provides information about housing, parking, insurance and other issues that would help incoming students and those considering offers of acceptance. In the past, this committee has compiled a folder of relevant materials to be mailed to students to whom offers of admission are extended (generally in mid-April). The chair of this committee, in coordination with the Grad Program Office staff, coordinates over-night housing (often in a student's home) and lunch or dinner for visiting potential grad students. The committee may be asked to organize welcoming social events.

**TGIF Committee:** This committee (one chair and unlimited members) organizes and publicizes opportunities for grad students to present their work and field/travel experiences to their peers in an informal setting, often in preparation for qualifying exams, defenses, or professional meetings. This committee solicits speakers, reserves rooms and equipment, and publicizes the talk. The decision of whether to invite faculty to these talks is left to the speaker. *The head of the TGIF committee is also in charge of running the meeting where committees are put together.*

**Departmental/Research Laboratories and Equipment**

The Department maintains a variety of facilities and equipment for research to which the students may arrange to have access. Each of the laboratories is under the direct supervision of a faculty member. Any planned use of these facilities should be discussed with the faculty member in charge, as the cost of operation of much of the equipment is mainly carried by particular research projects. There are also facilities available in other departments and colleges of the University. Please make sure that you secure permission of the person in charge of these facilities before using them, and ensure that you do not act in any way to lessen cooperation for yourself and your colleagues.

General Laboratory Facilities

In addition to the research laboratories there are other more general laboratories and facilities. In most cases, a faculty member is in charge of them. If there is a question as to who is in charge, please consult with the Associate Head.

Computer Facilities

The Department has extensive computer facilities of various types. As one might expect, they change frequently. The departmental policy regarding computer access is available at the [Geosciences](http://www.geosc.psu.edu/) Department website.

Safety Training

The Department is committed to providing a safe environment for research and education. All students, staff and faculty who have potential exposure to any hazardous chemicals (through their own work or exposure by location) are required to receive safety training within 90 days of entering our program. Students are introduced to chemical safety issues and to chemical waste disposal procedures as part of the orientation sessions when they enter the Geosciences Graduate Program. The department of [Environmental Health and Safety](http://www.ehs.psu.edu/) offers additional safety training courses on specific topics.

Rock Preparation Room

The rock preparation room (B28 Deike) is equipped for the wet cutting and grinding of rock and mineral specimens. To make possible fine grinding, the room must be kept free of dry rock dust and rock particles at all times. Consequently, the breaking up or pulverizing of rocks must be done somewhere else (see Steve Swavely, 509 Deike). After each period of use, the equipment must be thoroughly cleaned by the person who has used it.

**QUALIFYING EXAMINATION: DEPARTMENT OF GEOSCIENCES**

**SUMMARY OF THE CHAIR**
Committee Member: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Evaluation of Student's Performance as a Ph.D. candidate

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CRITERION | COMMENTS | E | VG | G | F | P |
| Propositions: Quality, originality, and demonstration of knowledge of fundamental principles & methods |  |  |  |  |  |  |
| Written Proposals:Clarity, organization, quality of writing, logical presentation of ideas |  |  |  |  |  |  |
| Oral Presentation:Clarity, organization, and at appropriate level |  |  |  |  |  |  |
| Defense of propositions:Command of disciplinary knowledge and techniques, demonstration of critical thinking |  |  |  |  |  |  |
| Background Preparation for the Proposal Defense:Knowledge of context, relevant literature, and facility with core concepts & methods  |  |  |  |  |  |  |

Vote: Pass \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fail \_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Recommendations or remediation including strengths and weaknesses related to categories above (if failed, also include a brief summary of reasons for fail)*:

*Recommended course of action if failed:*
\_\_\_\_\_ Complete M.S. degree and retake exam

\_\_\_\_\_ At student's request, a second exam may be scheduled within two semesters

\_\_\_\_\_ Graduate program is terminated

\_\_\_\_\_ Should program termination appear on transcript?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Date Chair of Qualifying Committee Student Signature

**This summary document will become part of the official student file and available to the student.**

**COMPREHENSIVE EXAMINATION: DEPARTMENT OF GEOSCIENCES:**

**COMMITTEE CHAIR’S BALLOT**

Committee Chair: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Evaluation of Student's Performance in comprehensive exam

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CRITERION | COMMENTS | E | VG | G | F | P |
| Proposal & Presentation: Quality, originality, and demonstration of knowledge of fundamental principles & methods |  |  |  |  |  |  |
| Oral Examination: |  |  |  |  |  |  |
| Disciplinary Knowledge |  |  |  |  |  |
| Critical Thinking |  |  |  |  |  |
| Knowledge of context |  |  |  |  |  |
| Command of skills & methods (experimental, numerical, data analysis) |  |  |  |  |  |

Vote: Pass \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fail \_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Recommendations or remediation including strengths and weaknesses related to categories above (if failed, also include a brief summary of reasons for fail)*:

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Date Chair of Committee Student Signature

**This summary document will become part of the official student file and available to the student.**