GRADUATE HANDBOOK

DEPARTMENT OF EARTH SCIENCES

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GRADUATE HANDBOOK

Department of Earth Science – Montana State University

INTRODUCTION

This handbook serves two purposes.

- It provides advice for understanding and completing each step of the degree process.
- It also provides the information needed to manage your responsibilities in your new professional role.

This document covers some departmental, college, and university policies, procedures and expectations. **Students are expected to be familiar with the Graduate School Policies and Procedures,** as posted on the Graduate School website. **Departmental policies always meet or exceed the minimum requirements set by the Graduate School, which are subject to change**.

1. EXPECTATIONS FOR A GRADUATE STUDENT

- Graduate studies are an opportunity to focus on an area of specialization in a discipline or profession of choice. Graduate studies are much more than classes. It is expected that you will demonstrate the initiative, ambition, excitement, and creativity that a professional position will require when you graduate. Recognize that more than coursework is required to become independent in your specialization. Only extensive reading and research, beyond the requirements of a course, and a continuing discussion of your ideas, for insight, revision, or expansion, will allow you to meet the purpose of the degree. This means that you should set aside time for these activities on campus.
- All graduate appointments are awarded with the understanding that the student will be involved in the departmental activities as an integral part of their academic program and training.
- Evaluation is a continuous process and is constantly being done by the major advisor, graduate committee, department head, and Earth Sciences faculty. Unsatisfactory student progress may lead to termination of the assistantship or graduate program.
- Learn to ask the questions that go beyond the facts. The ability to ask challenging questions reflects your knowledge and its applications.

Progress is your responsibility

- You are responsible for meeting all registration requirements, deadlines, and confirmation of attendance requirements.
- You are responsible for reading and understanding policies and procedures outlined by The Graduate School (TGS) and department
- You are responsible for completing your degree within the TGS established statute of limitations. If you do not meet the recommended deadlines, your coursework may need to be revalidated (with written approval only) or retaken, or you may have to reapply for admission to the program.

- You are responsible for meeting all deadlines and for submitting all your paperwork verifying the completion of each step toward graduation. Throughout the course of your graduate study, you will be required to complete paperwork to document your progress toward your degree. Your advisor and/or the office may or may not remind you of the deadlines for completing requirements that are specific to your program.

Funding is your responsibility

- You are responsible for checking the balance on your student account regularly. Fees may post at any time without specific notification. These include Graduate School fees, student health services, library fines and other charges.

Accounting Documentation is your responsibility

- You are responsible for receiving prior approval from the department, advisor or major professor for purchases and travel related to your work.
- Know your responsibilities for travel and ask for help whenever it seems confusing.

2. MASTER OF SCIENCE PROGRAM REQUIREMENTS IN EARTH SCIENCES

2.1. Program Overview

This document follows the Graduate School Rules for a Master of Science Degree (Policy & Procedures at the Graduate School Webpage). The Graduate School at MSU outlines minimum requirements for all departments, and therefore the departmental requirements are more restrictive. All students must be familiar with both the Graduate School and Earth Science Departmental degree requirements.

Students are only accepted to the Department of Earth Sciences for the Master of Science Degree under a 'Plan-A' Degree Option (as described on the Grad School Policies and Procedures). This research-oriented degree requires the student complete a Research Thesis based on original research. A Master of Science student should learn to identify an achievable research question, develop and execute a research methodology to answer the question, perform guided but independent research to answer the question, and write a thesis which describes the question, methodology, and results and synthesizes findings in the context of past work to address the research question.

Program Learning Outcomes at the Master's level include:

1) Conduct research resulting in original thesis or professional paper
2) Demonstrate mastery of subject matter content
3) Demonstrate mastery of one or more methods of inquiry appropriate to Earth Science subdiscipline
4) Demonstrate effective written communication of substantive content
5) Demonstrate effective oral communication of substantive content
6) Familiarity with guiding principles and strategies in the ethical conduct of research and/or teaching
7) Knowledge of the pathways and key skills required to securing a professional or academic position appropriate to Master's degree holders

The resulting MSc degree will be Master of Science in Earth Sciences. No specialty area such as geography, geology, GIS, or snow science will be on your transcript or degree. MSc candidates are required to be thoroughly familiar with all information and requirements outlined in the Graduate Catalog and Division of Graduate Education website and are responsible for meeting all dates and deadlines.

2.2. Course Requirements

Credit breakdown

MSc students must complete a minimum of 30 credits. These include both coursework and thesis credits as outlined below:

- A minimum of twenty (20) credits of course work
- A minimum of ten (10) thesis credits (ERTH-590).
- Up to nine (9) credits taken as a non-degree graduate or reserved as an undergraduate may be applied. You must obtain advisor approval to apply these credits.

Other credit requirements

- All incoming students are required to complete a two (2) credit ERTH-594-002 Seminar course in their first Fall Semester. This course serves as an Introduction to Graduate Study and focuses on writing a thesis proposal, professional development, and review of regulations and expectations. The course also includes attendance and participation in the weekly Earth Sciences Seminar. They must also enroll in an additional one (1) credit ERTH-594-001 seminar that requires attendance and participation at the Earth Sciences Department Seminar/Lecture series.
- No 300-level courses may be applied toward the degree. However, such courses may be required if the graduate committee determines that the student has coursework deficiencies that must be made up.
- A maximum of nine (9) 400-level course credits may be applied to the degree.
- A maximum of nine (9) 400/500-level credits taken as a non-degree graduate or reserved as an undergraduate may be applied toward the graduate program requirements with the approval of the student's graduate committee and the Graduate School.
- A minimum of two-thirds (2/3) of the program (including both course and thesis credits) must be comprised of 500 and 600-level courses.
- Seminar (594), Independent Study (592), Internship (598) and department practicum courses may not comprise more than one-third (1/3) of the minimum required credits for a graduate degree.
- Only courses listed on the Graduate Program of Study are applicable toward the graduate degree credit requirements. The Program of Study can be updated at any time.
- All requirements here are in excess or meet those of The Graduate School. You must check their policies and procedures page to see if there are any additional restrictions.
- If a student is using faculty time or university facilities to work on their thesis, they must be registered for thesis credits.

2.3. Formation of a Graduate Committee

(By end of 1st Semester, through E-form on MyInfo > Student Services)

Committee Chair

The chair of your thesis committee is your advisor in Earth Sciences. Your chair was assigned when you were accepted into the graduate program in Earth Sciences and must be a tenure-track faculty member in the Department of Earth Sciences, but you may have an affiliate faculty member as co-chair. You may not change chairs without gaining acceptance in writing from your new chair and Department Head in writing. These documents will be placed in your file in the Earth Sciences office. Switching chairs may require significant changes to a research project.

Committee Members

A minimum of three committee members is required. You may have up to five committee members, though the department strongly urges you to restrict your committee size to three

faculty members to facilitate the scheduling of committee meetings. You may ask the advice of other faculty, even if they are not on your committee. Members of the committee should be individuals who can provide constructive input to your research and program of study. Check with your major professor for recommendations and/or concurrence on prospective members. Faculty should be asked if they are willing to serve.

The majority of committee members must be tenure track or adjunct faculty at Montana State University; the primary advisor is a tenure track faculty member within the Department of Earth Sciences. Majority is defined as two out of three, three out of four, or three out of five members. If a potential committee member is not already a tenure track member of the faculty at MSU, you must obtain Department and The Graduate School approval. You will need to obtain a current Curriculum Vitae from the potential member, and your major advisor will need to write a letter of recommendation to the Department and Graduate School explaining why he/she should be a member and what he/she will contribute. Postdocs at MSU or any institution may serve as committee members. The committee can have up to one person without a PhD to fulfill a content expert role. For example, the head of a forest service research center, museum curator, or tribal member are all experts in their fields but may not hold a PhD.

When all members have agreed to serve and any required documentation is provided, their names and signatures are required on the Graduate Program of Study and Committee Form to show their willingness and to give their approval to your Program of Study.

2.4. Year 1 Committee Meeting and Evaluation

(By end of 2nd semester)

The Year 1 Committee Meeting and Evaluation consists of an in-person meeting where the student and committee members will discuss and finalize the Program of Study and review and provide feedback on the Research Proposal. In addition, a committee may request a ~15-20 minute oral presentation to accompany the proposal.

A. Program of Study

Meet with your Graduate Committee members to plan the courses you will take and the sequence for your graduate program. Your Program of Study should reflect your background and the knowledge base necessary to achieve a broad understanding of Earth Science. Based upon their evaluation in the Year 1 committee meeting, your Committee may suggest changes to your Program of Study. Following the Year 1 meeting, students must submit the E-form (accessed through MyInfo > Student Services) to the department for the signature of the Department Head and for forwarding to The Graduate School for the Dean's signature. Committee members approve and sign your final Graduate Program of Study. This form requires the signatures of the full committee for approval.

The Program of Study can be updated at any time. Once a course has been taken, (received a grade) it cannot be removed from the Program.

If you do not meet the deadline for filing your program of study/committee form with The Graduate School, a hold may be placed on your registration until it is approved. There is a $30 fee from the Graduate School for processing. No charges are made for changes. You will be responsible for this fee unless your advisor specifically approves payment.

B. Proposal: Your thesis topic is selected in consultation with your advisor and your committee. Your thesis proposal should be developed during your first semester in residence during the ERTH 594 seminar. The proposal must be submitted to your committee a minimum of two weeks prior to your Year 1 Committee Meeting. At this meeting, the committee will review your proposal, ask clarifying questions, and provide feedback for improvement.

Proposal Format: The committee will provide guidelines for specific requirements, which may differ across disciplines, but all proposals must contain the following components:

Introduction/Motivation

Research Questions and, if applicable, hypotheses

Research Methods

Intellectual Merit

Broader Merit

Timeline

References

The Graduate Committee recommends the length be between 10-15 pages, with figures, not including references. This generally follows guidelines from major funding organizations.

Committee Meeting: This meeting should be held prior to the end of your 2nd semester as a MS student. As a departmental rule, the Year 1 committee meeting is generally not held during summer or during semester breaks. Please plan accordingly. Exceptions to this rule must be obtained with written approval by the thesis committee and department.

It is the student's responsibility to set up the meeting time with their committee's approval, notify the department Academic Service Coordinator and to reserve a suitable room, as well as necessary presentation equipment (laptop and projector) for committee meetings and examinations.

Off campus members may participate either in person or through a conference or video call. See the related content on Video Conferencing in this document's index.

Completion

The following outcomes of the meeting are possible.

- No changes to the Program of Study or Proposal are requested.
- The student may be asked to revise their Program of Study, adding or removing specific courses. No edits to the proposal are required.
- The student may be asked to revise their Program of Study, adding or removing specific courses. The student may be asked to revise or significantly re-write their proposal and submit the revised proposal to their primary advisor, only
- The student may be asked to revise their Program of Study, adding or removing specific courses. The student may be asked to revise or significantly re-write their proposal,

submit the revised proposal to the entire committee, and hold a follow-up meeting within the first four weeks of the following semester.

- The student may fail evaluation of the proposal and Program of Study (e.g., failing grades in courses) and will not be permitted to continue the graduate program in the Earth Sciences Department.

Following the exam, the student is responsible for processing the digital form indicating the result of the Year 1 Committee Meeting (MyInfo > Forms > Year 1 Meeting Result). The department head gives the final approval, and it is passed along to the graduate school and a copy placed into your department file.

2.5. Writing a Thesis

Overview

The Earth Science department requires a thesis manuscript and successful defense for completion of the MSc degree. Your thesis is the high point of your degree work. You will want it to point to the professional and academic achievements that you have accomplished and that indicate that you are ready to find employment or to do specialized work in a PhD program.

Your thesis/dissertation must be well written. The writing process is challenging, and it will take a great deal of time. There should be many revisions. Do not expect to complete it with a single draft. Your fellow graduate candidates will be excellent reviewers for the early drafts. Ask you major professor to comment on a more polished draft before you even consider presenting it to any other graduate committee members. Everyone rewrites their thesis/dissertation. Be prepared for an individual committee member to require substantial changes before they agree that you are ready for your formal defense.

Format Considerations

You must understand and use the format requirements for the Graduate School (see "The Graduate School Handbook for Thesis/Dissertation Writing"). Your Graduate Committee may set additional requirements to follow. The department highly recommends writing a thesis with intent to publish. Thus, the thesis research should be conducted with publication beyond the thesis in mind. Authors are encouraged to write in a manner that requires the least rewriting for a publication format and still meets the requirements of The Graduate School's guidelines. Often, the format for journals is not identical to The Graduate School format in all cases. You will need to work with your advisor to creatively meet both requirements.

Prior to writing your thesis, and during the writing process, refer to the online "Preparation Guide for Theses, Dissertations, and Professional Papers" available on The Graduate School website. Understanding the formatting will help you avoid rewriting based on formatting errors. You can save yourself a lot of effort if you read and follow the formatting requirements in the guide for both the electronic and printed versions.

It is your responsibility to meet Graduate School guidelines for formatting your thesis before it is accepted by your Graduate Committee, the Department Head, and the Graduate School. All theses are now submitted electronically. Thesis formatting guidelines are available on the

Graduate School website, and a representative is available to assist you with formatting. Contact this person early in the writing and formatting process.

2.6. Thesis Defense

Overview

The M.S. Thesis must be formally defended to your graduate committee. The Defense of Thesis will entail:

1) A public Seminar that is open to all faculty and graduate students, in which your research and conclusions are presented with an opportunity for questions from the audience.
2) A closed-door Defense Meeting with the Graduate Committee. The Committee Chair must attend in person. See the associated rules for "Video Conferencing for Examinations and Defenses".

IMPORTANT: Do not schedule your Defense of Thesis until you have clear indications that your committee is ready to approve your work.

Scheduling

Students must be registered for at least three (3) credits in the term during which they want to graduate.

The Application for Advanced Degree must be submitted to The Graduate School before the deadline of the semester in which you plan defend your thesis. This date is usually the third Friday of the term; however, it is your responsibility to learn and know this deadline.

Public presentation and defense must be completed during the period of scheduled classes in the academic year, and should not be held during final exam week, holidays, or summer term. Exceptions must be obtained in writing from the thesis committee and department.

The defense may only be scheduled when the committee agrees that a complete thesis draft is ready. Approval may take some time. In general, each time a draft is submitted to the Chair or committee, the student should not expect a response in less than fourteen (14) days. The chair of the committee must approve a defense draft before the thesis is submitted to the committee. Note: this implies that at least twenty-eight (28) days for review and the defense.

You must notify the Earth Science Department at least fourteen (14) days before the scheduled date of your defense. It is your responsibility to ensure that:

- All Supervisory Committee members can be present at the times and dates of the seminar and meeting
- The seminar time and date are publicly advertised (the office staff may offer assistance).

Typically, the public presentation is approximately one hour (~45 minutes presentation and with at least 15 minutes for questions from the audience). It is your responsibility to find a date and time that fits the schedule of each committee member. In addition, you must broadly advertise the seminar at least fourteen (14) days before the presentation and submit an announcement for the MSU Calendar of Events. The graduate administrator can help to advertise within the department, but you will probably want to so some additional advertising in other departments which share research interests. Additionally, you must submit a complete,

digital copy of your thesis to the department; this copy will be emailed along with a flyer fourteen (14) days before your scheduled thesis defense.

Because it is a formal presentation, the seminar should be well prepared and include visuals and/or media. Be sure to include these insights into your research work:

- A clear statement of the question that your research addressed
- An explanation of the importance of your question, considering earlier work by others
- A presentation of the methods and/or techniques of research and analysis of the data
- A clarification of any weaknesses in your data and/or how your might have done the research differently given the experience that you gained
- The conclusions supported by your data and their comparison with other findings

Thesis Approval

Following the defense, the committee will vote on the quality of your thesis and your oral examination. Three decisions are possible:

1) Acceptable - This means that your committee will sign the *Report on Thesis Defense* brought to the meeting by your advisor, recommending you be granted an advanced degree. This often includes minor revision of the thesis and/or passing of courses that you are currently taking.
2) Conditional acceptance - This means that your committee will sign the *Report on Thesis Defense* in the future, after you fully satisfy one or more of the following:
    - A major revision of the thesis
    - Action(s) to correct a given deficiency in the defense such as additional reading and report or a correction in statistics
    - The satisfaction of a deficiency in your Program of Study
3) Failure - This means that you will be dismissed from the graduate program without receiving a degree. Without exception, a decision of failure will be reviewed by The Graduate School and the Department Head.

It is the student's responsibility to find and bring all appropriate paperwork requiring committee signatures. Once your defense is complete, it is your responsibility that all your committee members sign the *Defense of Thesis Form*. If your committee requires revisions to your thesis prior to final submission, these changes must be made and approved before you can obtain required signatures. The Earth Sciences office will obtain the signature of the Department Head and forward it to TGS for signatures.

Thesis Submission

After your thesis/dissertation defense and approval by your graduate committee, your thesis/dissertation will need to be submitted to The Graduate School. The Graduate School checks the formatting of your thesis for online publication to determine how well it adheres to the requirements. Upon final approval of your thesis by your committee, you have the responsibility to complete the *Electronic Thesis/Dissertation (ETD) Approval Form,* which must be signed by each committee member and submitted for additional signatures. The Graduate School requires students to submit the electronic version of their thesis/dissertation. There are specific guidelines for formatting the printed version of the thesis which differs

slightly from the electronic version. The Permission to Use Form must be bound into any copy for public use.

Approval of the thesis will be defined by the signature of the Graduate Dean only after the thesis has been judged to meet all expectations. A thesis is considered completed when accepted by the MSU Library in an electronic format. M.S. candidates must then provide a digital copy of this electronic file to be posted to the department website.

The thesis must be defended and the final file submitted to the Graduate School on or before the 14th business day prior to the end of the semester in which the student intends to graduate.

If you have been unable to meet the graduation requirements before the semester deadline, you must submit the *Withdraw My Application for Advanced Degree* to TGS. It may only be submitted online. You must then submit a new application and another fee for the correct semester.

2.7. MSc Planning Checklist

Within your first semester:

- ☐ Enroll in the two credit Graduate Seminar (ERTH 594-002) for all incoming students
- ☐ Enroll in the one credit Departmental seminar (ERTH 594-001)
- ☐ Review your research plans individually with potential committee members and request their feedback.
- ☐ Choose and confirm your Graduate Committee members. Complete the Graduate Committee form through MyInfo.

Within your second semester:

- ☐ Complete Year 1 Committee Meeting
    - Complete a Program of Study form and submit through MyInfo.
    - Complete and submit a Thesis Proposal with approval of your major advisor; proposals should be provided to the committee a minimum of 14 days prior to the Year 1 meeting.

Within your third semester:

- ☐ Hold a committee meeting or meet with individual committee members to provide research and coursework updates and request their feedback
- ☐ Revise and resubmit the Program of Study, if necessary

In any subsequent semesters:

- ☐ Plan to hold a committee meeting or meet with individual committee members at least once a year to provide research and coursework updates and request their feedback

In your planned final semester:

- ☐ Enroll in at least 3 credits the final term during which you intend to graduate.
- ☐ Submit the *Application for Advanced Degree* to The Graduate School (TGS) before third week of the term.
- ☐ Provide a complete thesis draft to committee members and acquire approval for defense at least 14 days before defense date
- ☐ Advertise your thesis talk and provide a complete digital copy of your thesis manuscript to the front office 14 days before the defense date.
- ☐ Defend thesis and bring necessary paperwork to defense.
- ☐ Make appropriate revisions.
- ☐ Ensure *Defense of Thesis Form* is signed by the committee and submitted once thesis is approved by the committee
- ☐ Complete the *Electronic Thesis/Dissertation (ETD) Approval Form* and submit formatted thesis to Graduate School no later than 14 days before end of the term. Your committee must sign this form.

3. DOCTORAL DEGREE PROGRAM REQUIREMENTS IN EARTH SCIENCES

3.1. Program Overview

This document follows the Graduate School Rules for a Doctoral Degrees (Policy & Procedures at the Graduate School Webpage – http://www.montana.edu/gradschool). The Graduate School at MSU outlines minimum requirements for all departments, and therefore the departmental requirements are more restrictive. All students are expected to be familiar with both the Graduate School and Earth Science Departmental degree requirements.

The Doctor of Philosophy degree (Ph.D.) is awarded on evidence of a particular field of knowledge, the ability to carry out independent research, and to present the results of such research in a scholarly manner. The philosophy behind a doctoral degree is focused, intense research in a specific field of Earth Sciences.

Program Learning Outcomes at the PhD level include:

1) Produce and defend an original and significant contribution to knowledge in the form of a dissertation (which may or may not include professional publications)
2) Demonstrate ability to design and execute an independent research exercise
3) Demonstrate mastery of subject matter content
4) Demonstrate mastery of one or more methods of inquiry appropriate to the student's Earth Science subdiscipline
5) Demonstrate effective written communication of substantive content
6) Demonstrate effective oral communication of substantive content
7) Familiarity with guiding principles and strategies in the ethical conduct of research and/or teaching
8) Knowledge of the pathways and key skills required to securing a professional or academic position appropriate to PhD degree holders
9) Capacity to develop effective proposals for external funding
10) Documented engagement with professional field in Earth Science subdiscipline as demonstrated through publications, presentations, and professional association activities

The resulting PhD degree will be in Earth Sciences. No specialty area such as geography, geology, GIS, or snow science will be on your transcript or degree. PhD students are required to be thoroughly familiar with all information and requirements outlined in the Graduate Catalog and Division of Graduate Education website and are responsible for meeting all dates and deadlines.

3.2. Course Requirements

Credit breakdown

A minimum of sixty (60) total post-baccalaureate credits are required for a PhD degree. These include both coursework and thesis credits as outlined below:

- A minimum of thirty (30) credits must be taken from MSU
- A minimum of eighteen (18) and maximum of thirty (30) dissertation credits (ERTH 690)
- A minimum of thirty (30) total coursework credits
- A minimum of twelve (12**)** credits in new coursework relevant to the research focus
- A maximum of thirty (30) credits from a previously earned Master's Degree at an accredited University may be applied to the sixty (60) credit minimum for the Doctoral Degree. You must obtain advisor approval to apply these credits.
- A minimum of six (6) coursework credits must be taken within the Department of Earth Sciences

Other credit requirements

- All incoming students are required to complete a two (2) credit ERTH-594-002 Seminar course in their first Fall Semester. This course serves as an Introduction to Graduate Study and focuses on writing a thesis proposal, professional development, and review of regulations and expectations. The course also includes attendance and participation in the weekly Earth Sciences Seminar. They must also enroll in an additional one (1) credit ERTH-594-001 seminar that requires attendance and participation at the Earth Sciences Department Seminar/Lecture series.
- No 300-level courses may be applied toward the degree. However, such courses may be required if the graduate committee determines that the student has coursework deficiencies that must be made up.
- A maximum of nine (9) 400-level course credits may be applied to the degree.
- A maximum of nine (9) 400/500-level credits taken as a non-degree graduate or reserved as an undergraduate may be applied toward the graduate program requirements with the approval of the student's graduate committee and the Graduate School.
- A minimum of two-thirds (2/3) of the program (including both course and thesis credits) must be comprised of 500 and 600-level courses.
- Only courses listed on the Graduate Program of Study are applicable toward the graduate degree credit requirements. The Program of Study can be updated at any time.
- All requirements here are in excess or meet those of The Graduate School. You must check their policies and procedures page to see if there are any additional restrictions.
- If a student is using faculty time or university facilities to work on their thesis, they must be registered for thesis credits.

3.3. Formation of a Graduate Committee

(Recommended by end of 2nd Semester)

Committee Chair

The chair of your thesis committee is your advisor in Earth Sciences. Your chair was assigned when you were accepted into the graduate program in Earth Sciences and must be a tenure-track faculty member in the Department of Earth Sciences, but you may have an affiliate faculty member as co-chair. You may not change chairs without gaining acceptance in writing from your new chair and Department Head in writing. These documents will be placed in your file in the Earth Sciences office. Switching chairs may require significant changes to a research project.

Committee Members

A minimum of four committee members is required (including your Committee Chair). Half of the committee must be tenure track or adjunct faculty at Montana State University; the primary advisor is a tenure track faculty member within the Department of Earth Sciences.

Members of the committee should be individuals who can provide constructive input to your research and program of study. Check with your major professor for recommendations and/or concurrence on prospective members. Faculty should be asked if they are willing to serve.

The graduate committee chair and the department head recommend the committee composition to The Graduate School. Final approval of committee composition rests with The Graduate School. If a potential committee member is not already a tenure track member of the faculty at MSU, you must obtain Department and The Graduate School approval. You will need to obtain a current Curriculum Vita from the potential member, and your major advisor will need to write a letter of recommendation to the Department and Graduate School explaining why he/she should be a member and what he/she will contribute. Postdocs at MSU or any institution may serve as committee members. The committee can have up to one person without a PhD to fulfill a content expert role. For example, the head of a forest service research center, museum curator, or tribal member are all experts in their fields but may not hold a PhD.

When all members have agreed to serve and any required documentation is provided, their names and signatures are required on the Graduate Program of Study and Committee Form to show their willingness and to give their approval to your Program of Study.

3.4. Outlining a Program of Study

(Recommend within 2nd semester, and no later than end of 3rd Semester)

Meet with your Graduate Committee members to plan the courses you will take and the sequence for your graduate program. Your Program of Study should reflect your background and the knowledge base necessary to achieve a broad understanding of Earth Science. The major professor and student's graduate committee will determine additional specific course requirements for completion of the Doctor of Philosophy degree. In some cases, competency in a foreign language may be required by the student's graduate committee. This paperwork should be turned into the department by the end of the 1st semester. Based upon their evaluation in the Qualifying Examination, your Committee may suggest changes to your Program of Study.

By the end of their first semester, students must submit the form to the department for the signature of the Department Head and for forwarding to The Graduate School for the Dean's

signature. Committee members approve and sign your final Graduate Program of Study and Committee Form. This form requires the signatures from the full committee for approval to show their willingness to serve and to give their approval to your Program of Study. The graduate administrator will forward the form for approval from the Department Head and TGS. The Program of Study can be updated at any time. Once a course has been taken, (received a grade) it cannot be removed from the Program.

If you do not meet the deadline for filing your program of study/committee form with The Graduate School, a HOLD will be placed on your registration until it is approved. There is a $30 fee from the Graduate School for processing. No charges are made for changes. You will be responsible for this fee unless your advisor specifically approves payment.

3.5. Thesis Proposal

(Recommend within 2nd semester and before end of 3rd Semester)

Your thesis topic is selected in consultation with your advisor and your committee. The topic may be part of a funded research project. If you receive a graduate Research Assistant appointment, the Department may require that you sign a letter of agreement between the principal investigator and the student which outlines the ownership of data, the scope of the thesis with respect to the grant, and the number of hours per week the student must work on the grant separate from the time dedicated to the thesis, and the relationship between grant and the thesis.

You should begin your thesis proposal development during your first semester in residence. Your proposal should be developed in consultation with your advisor and committee. The proposal is submitted as part of the qualifying exam (see below) and must be approved by the committee.

3.6. Qualifying Examination

(Recommend within 2nd semester and before end of 3rd Semester)

All doctoral students will be required to successfully pass the written Qualifying Examination and orally defend their written research (dissertation) proposal during the first year of residence, typically late in the second semester of residence. The written qualifying examination shall consist of:

1) The dissertation proposal including a thorough literature review of the research problem
2) An in-depth essay on the trends and future directions of the candidates chosen field of study as defined by the dissertation chairperson and committee. The format of this paper is determined by committee, but typically follows a review paper format with 5,000 – 10,000 words.

The oral defense will also include questions on the written "trends and future directions" essay. Doctoral students are offered one opportunity to successfully pass the written qualifying exam and oral qualifying exam. It is typical that a committee request and require proposal revisions. The Qualifying Exam should not be taken in summer or during semester breaks. Please plan accordingly. Exceptions to this rule must be obtained with written approval by the thesis committee and department.

3.7. Comprehensive Examination

(Before defense of thesis; cannot be in the same semester as thesis defense)

Overview

The Comprehensive Exam includes both a written an oral examination. The student should speak with each Committee member to ascertain what subject matter that member will hold them responsible for knowing. Successful completion of the Comprehensive Exam advances a PhD student to doctoral candidacy.

The Comprehensive Exam should not be taken in summer or during semester breaks. Please plan accordingly. Exceptions must be obtained with written approval by the thesis committee and department. You must be registered for 3 credits when you take the exam and have completed 75% of your course work.

Written Component

Each Committee member composes their questions and determines an amount of time that the student may have to answer their questions. The typical range is from 2-4 hours of continuous time (not including breaks); in cases in which either field or laboratory content is included in the written exam component, this may range up to 8 hours. The student's dissertation advisor collects the questions from each Committee member and then administers the exam over 4 days to their student (one Committee member exam-component per day). The student gives each completed exam component to their dissertation advisor and respective Committee member.

Oral Component

The written exam is followed by an oral exam that is focused on elaboration, elucidation, and (or) clarification of the written components. It is administered by the entire committee over a ~2-3 hour period of time. It is the student's responsibility to ensure that all committee members are available when scheduling the comprehensive examination. The Graduate School requires the entire Committee to be present at any oral exam (qualifying exam, comprehensive exam, and defense). See the Graduate School rules for Video Conferencing for Examinations and Defenses. The oral component of the comprehensive exam must be held within 2 weeks or less of the completion of the written component.

Approval and Passage

The comprehensive examination is graded with either a passing or failing grade determined by a majority vote of the student's approved graduate committee. This vote is based on the student's overall performance on both the written and oral components. The graduate committee and department head are responsible for submitting written notice of the results of the comprehensive examination to the student and to The Graduate School no later than five (5) business days after the examination is held or after each section is administered. The form is to be submitted to The Graduate School by the department.

The student may be allowed up to two (2) total attempts to pass the comprehensive examination. At least six (6) months must elapse before the second (2nd) examination attempt. Failure to pass the second (2nd) attempt results in termination of graduate study and dismissal

from the academic program. Students who are dismissed from the program due to a second (2nd) failed attempt are ineligible to reapply to the same degree program.

It is the student's responsibility to set up the Exam time with their Committee's approval, notify the department secretary and to reserve a suitable room, as well as necessary presentation equipment (laptop and projector) for committee meetings and examinations. It is the student's responsibility to bring all appropriate paperwork.

3.8. Public Presentation

(Approximately halfway through course of study)

All PhD candidates are required to present a minimum of one talk on their research in the Department of Earth Sciences seminar program. This professional seminar is typically given in the style of a typical professional talk (~45-minute talk with 15 minutes for questions) approximately halfway through their course of study.

3.9. Writing a Thesis

Overview

Your thesis is the high point of your degree work. It will also open the doors to future research opportunities. This means that its degree of scholarship should be acceptable for peer-reviewed publication in your field of expertise. The writing process is challenging, and you should expect to make revisions. Your fellow graduate candidates will be excellent reviewers for the early drafts. Ask you major professor to comment on a more polished draft before you consider presenting it to any other graduate committee members. Remember that everyone must rewrite/revise their thesis/dissertation. Be prepared for an individual committee member to require substantial changes before they agree that you are ready for your formal defense.

Format Considerations

You must understand and use the format requirements for The Graduate School. Your Graduate Committee may set additional requirements to follow. The expectation of your PhD thesis is that it represents published or publishable work. You therefore can select options that will minimize your need to rewrite material before submission to a journal, monograph series, etc. You should consider writing one or more chapters of your thesis in the format for the journal in which you intend to publish. Consult with your thesis committee on their expectations for thesis format. Authors are encouraged to write in a manner that requires the least rewriting for a publication format and still meets the requirements of The Graduate School's guidelines. Often, the format for journals is not identical to The Graduate School (TGS) format in all cases. You will need to work with your advisor to meet both requirements.

Prior to writing your thesis, and during the writing process, refer to the online "Preparation Guide for Theses, Dissertations, and Professional Papers" available on The Graduate School website. Understanding the formatting will help you avoid rewriting based on formatting errors. You can save yourself a lot of effort if you read and follow the formatting requirements in the guide for both the electronic and printed versions.

It is your responsibility to meet TGS guidelines for formatting your thesis before it is accepted by your Graduate Committee, the Department Head, and the Graduate School. All theses are

now submitted electronically to the TGS. Thesis formatting guidelines are available on the TGS website, and a representative from the TGS is available to assist you with formatting. Contact this person early in the writing and formatting process.

3.10. Thesis Defense

Overview

The PhD Thesis must be formally defended to your graduate committee. The Defense of Thesis will entail:

1) A public Seminar that is open to all faculty and graduate students, in which your research and conclusions are presented with an opportunity for questions from the audience.
2) A closed-door Defense Meeting with the Graduate Committee. The Committee Chair must attend in person. See the associated rules for "Video Conferencing for Examinations and Defenses".

IMPORTANT: Do not schedule your Defense of Thesis until you have clear indications that your committee is ready to approve your work.

Scheduling

Students must be registered for at least three (3) credits in the term during which they want to graduate.

The *Application for Advanced Degree* must be submitted to The Graduate School before the deadline of the semester in which you plan defend your thesis. This date is usually the third Friday of the term.

Public presentation and defense must be completed during the period of scheduled classes in the academic year, and should not be held during final exam week, holidays, or summer term. Exceptions must be obtained in writing from the thesis committee and department.

The defense may only be scheduled when the committee agrees that a complete thesis draft is ready. Approval may take some time. In general, each time a draft is submitted to the Chair or committee, the student should not expect a response in less than fourteen (14) days. The chair of the committee must approve a defense draft before the thesis is submitted to the committee. Note: this implies that at least 28 days between the submittal of a thesis for review and the defense. The defense must be completed on or before the 14th business day prior to the end of the semester in which the student intends to graduate.

You must notify both The Graduate School and the Earth Science Department at least fourteen (14) days before the scheduled date of your defense. It is your responsibility to ensure that all Supervisory Committee members can be present and that the seminar time and date are publicly advertised (the office staff may offer assistance).

Typically, the public presentation is approximately one hour (~45 minutes presentation and with at least 15 minutes for questions from the audience). It is your responsibility to find a date and time that fits the schedule of each committee member, including the Graduate Representative if you have chosen this option. In addition, you must broadly advertise the seminar at least fourteen (14) days before the presentation. You are required to submit an announcement for the MSU Calendar of Events. The graduate administrator can help to

advertise within the department, but you will probably want to so some additional advertising in other departments which share research interests.

Because it is a formal presentation, the seminar should be well prepared and include visuals and/or media. Be sure to include these insights into your research work:

- A clear statement of the question that your research addressed
- An explanation of the importance of your question, considering earlier work by others
- A presentation of the methods and/or techniques of research and analysis of the data
- A clarification of any weaknesses in your data and/or how your might have done the research differently given the experience that you gained
- The conclusions supported by your data and their comparison with other findings

Thesis Approval

Following the defense, the committee will vote on the quality of your thesis and your oral examination. Three decisions are possible:

1) Acceptable - This means that your committee will sign the *Report on Thesis Defense*, brought to the meeting by your advisor, recommending you be granted an advanced degree. This often includes minor revision of the thesis and/or passing of courses that you are currently taking.
2) Conditional acceptance - This means that your committee will sign the *Report on Thesis Defense* in the future, after you fully satisfy one or more of the following:
    - A major revision of the thesis
    - Action(s) to correct a given deficiency in the defense such as additional reading and report or a correction in statistics
    - The satisfaction of a deficiency in your Program of Study
3) Failure - This means that you will be dismissed from the graduate program without receiving a degree. Without exception, a decision of failure will be reviewed by The Graduate School and the Department Head.

It is the student's responsibility to find and bring all appropriate paperwork requiring committee signatures. Once your defense is complete, it is your responsibility that all your committee members sign the *Defense of Thesis Form*. If your committee requires revisions to your thesis prior to final submission, these changes must be made and approved before you can obtain required signatures. The Earth Sciences office will obtain the signature of the Department Head and forward it to The Graduate School for signatures.

Thesis Submission

After your thesis/dissertation defense and approval by your graduate committee, your thesis/dissertation will need to be submitted to The Graduate School. The Graduate School checks the formatting of your thesis for online publication to determine how well it adheres to the requirements. Upon final approval of your thesis by your committee, you have the responsibility to complete the *Electronic Thesis/Dissertation (ETD) Approval Form,* which must be signed by each committee member and submitted for additional signatures. The Graduate School requires students to submit the electronic version of their thesis/dissertation. There are specific guidelines for formatting the printed version of the thesis which differs

slightly from the electronic version. The Permission to Use Form must be bound into any copy for public use.

Approval of the thesis will be defined by the signature of the Graduate Dean only after the thesis has been judged to meet all expectations. A thesis is considered completed when accepted by the MSU Library in an electronic format. Ph.D. candidates must then provide a digital copy of this electronic file to be posted to the department website.

The thesis must be defended and the final file submitted to the Graduate School on or before the 14th business day prior to the end of the semester in which the student intends to graduate.

If you have been unable to meet the graduation requirements before the semester deadline, you must submit the *Withdraw My Application for Advanced Degree* to TGS. It may only be submitted online. You must then submit a new application and another fee for the correct semester.

The initial fee is currently $30 for processing. A re-audit costs $20 each semester of application. You will be responsible for graduation fees unless your advisor specifically approves the payment.

3.11. PhD Planning Checklist

Within your first semester:

- ☐ Enroll in the two credit Graduate Seminar (ERTH 594-002) for all incoming students
- ☐ Enroll in the one credit Departmental Thursday seminar (ERTH 594-001)
- ☐ Review your research plans individually with potential committee members and request their feedback.
- ☐ Seek out Graduate Committee members.

Within your second or third semester:

- ☐ Complete the Graduate Committee form through MyInfo
- ☐ Complete a Program of Study form through MyInfo
- ☐ Complete and submit a Thesis Proposal with approval of your major advisor
- ☐ Participate in the Qualifying Exam

In subsequent semesters and prior to your final semester:

- ☐ Hold a committee meeting every semester to provide research and coursework updates and request committee feedback
- ☐ Revise and resubmit the Program of Study if necessary
- ☐ Hold a Comprehensive Exam
- ☐ Present a minimum of one professional talk during the ESCI seminar series

In your planned final semester:

- ☐ Enroll in at least 3 credits the final term during which you intend to graduate
- ☐ Submit the *Application for Advanced Degree* to The Graduate School before third week of the term
- ☐ Provide a complete thesis draft to committee members
- ☐ Acquire approval for defense at least 14 days before defense date
- ☐ Defend thesis and make appropriate revisions
- ☐ Ensure *Defense of Thesis Form* is signed and submitted once thesis is approved by the committee
- ☐ Complete the *Electronic Thesis/Dissertation (ETD) Approval Form* and submit formatted thesis to Graduate School no later than 14 days before end of the term

4. IMPORTANT PROGRAM MATTERS

Please refer to the most recent policies set forth by the Graduate School regarding Leave of Absence and Continuous Enrollment and One Credit Extension options.

Website: http://catalog.montana.edu/graduate/#policiestext