graduateHANDBOOK 2019-2020



EARTH AND ATMOSPHERIC SCIENCES 2019-20 GRADUATE HANDBOOK AND APPENDICES

TABLE OF CONTENTS

Graduate Committee	2
General Information for all Graduates	4
Master of Science Thesis Overview	6
Master of Science Report Option Overview	7
Master of Science Geological Science-Atmospheric Sciences	8
Doctor of Philosophy Degree Overview	9
Doctor of Philosophy Geological Science-Atmospheric Sciences	14
Doctor of Philosophy Degree with No Prior Masters Degree	14
Figure 1: Degree Timelines	15
Appendices	

GRADUATE COMMITTEE

The Graduate Committee is responsible for administration of admissions, academics, and other advisory issues for graduate students in the department. The committee acts on applications for associate instructorships, fellowships, and summer research support and monitors academic progress of students. The committee consists of faculty members chosen to represent a range of disciplines and research fields in the department. The committee is assisted in its work by the Graduate Services Coordinator.

2019-20 GRADUATE COMMITTEE MEMBERS

Dr. Doug Edmonds, Director of Graduate Studies (edmondsd@indiana.edu)

Kaj Johnson (kajjohns@indiana.edu)

Ben Kravitz (bkravitz@indiana.edu)

Jackson Njau (jknjau@indiana.edu)

Graduate Services Coordinator Bryan Roberts (geolgrad@indiana.edu)

LINKS PROVIDED IN THIS HANDBOOK

Graduate School Bulletin: https://bulletins.iu.edu/iu/gradschool/2018-2019/index.shtml



IU Graduation Ceremony: https://universityevents.iu.edu/

Graduate Student Annual Review Forms: https://graduate.indiana.edu/forms/index.shtml

Graduate Student Theses Deadlines: https://graduate.indiana.edu/thesis-dissertation/index.html

Degree Requirements: https://bulletins.iu.edu/iu/gradschool/2018-2019/requirements/index.shtml









GENERAL INFORMATION FOR ALL GRADUATE STUDENTS

Degrees Offered

The following graduate degrees are offered In the Department of Earth and Atmospheric Sciences: M.S. Geological Sciences, M.S. Geological Sciences-Atmospheric Sciences, Ph.D. Geological Sciences, Ph.D. Geological Sciences-Atmospheric Sciences.

Admission Requirements (TOEFL)

If the graduate applicant's native language is not English, the College requires a score of at least 79 on the TOEFL iBT (delivered via the internet). Please note that the paper-based TOEFL ITP exam – sometimes called the institutional TOEFL – offered by the Intensive English Program on the Bloomington campus, cannot be used in place of the TOEFL iBT. Alternatively, an international applicant may submit the result of the International English Language Testing System (IELTS) examination in lieu of the TOEFL iBT. The College requires a score of at least 6.5 on the IELTS for graduate admission.

Residency

All graduate students must complete at least 30 hours of graduate credits in residence at the IU Bloomington campus. Ph.D. students must be in residence at the Bloomington campus for at least two consecutive semesters during the degree program.

IUB College Information

The websites for the College and the Graduate School (http://graduate.indiana.edu/index.shtml) provide links on the College Graduate Office page to submit requests (Extensions of Incomplete, Family and Medical Leave), to apply for funding (College Travel Awards, College of Arts and Sciences Dissertation Year Research Fellowships), and to appoint your Doctoral Advisory Committee.

Selection of Advisors and Research Committee

The Graduate Committee advises graduate students on course selection until a primary advisor is selected. Students should choose a primary advisor with graduate faculty status (Appendix 5) from the Department of Earth and Atmospheric Sciences or the Indiana Geological Survey (IGS https://igs.indiana.edu/). A co-advisor from the Department is required (Appendix 1) if the primary advisor is from the IGS. A Research Committee will oversee the student's academic and research progress toward the degree. For all degrees, a majority of members of the research committee must be selected from the Department of Earth and Atmospheric Sciences. The field of expertise of both the primary advisor and the research committee should reflect the topic of research chosen by the student.

Communication with Research Committee

Students must keep members of their Research Committee informed of progress with research and fulfillment of academic requirements on a regular basis, through both meetings and e-mail. Meetings should occur at least once each semester of the academic year (Spring and Fall), although students are strongly encouraged to meet more frequently with their committee members on an informal basis.

Annual Review

An Annual Review of academic and research progress is required of all graduate students in the department. All students are to submit the completed Annual Review forms by March 15 following the announced procedures for submission. The Graduate Affairs Committee may require a student to submit forms earlier than the March 15 deadline under certain circumstances. Appendices 2 and 3 contain sample copies of M.S. and Ph.D. Annual Review forms. These are available on the departmental website as interactive PDF forms under the Education tab and by the following link to the Graduate Handbook Appendices:

http://earth.indiana.edu/education/handbook.html

To activate the fillable forms, click on "open in another program" and choose "open in Adobe PDF."

Completion of the Annual Review forms requires a meeting of the student with the research committee and signatures from committee members and the student. Students must scan all pages of the review, including the signed forms, and submit as one PDF to the Graduate Service Coordinator. Students who fail to complete their annual review are subject to loss of departmental support following a review by the Graduate Affairs Committee and the Chair. Annual reviews will normally consist of three components:

An oral presentation by the student of research progress with a detailed plan for degree completion including coursework and research.

An in-depth discussion with the research committee to critically evaluate the student's progress and advise the student on future plans to advance his/her research.

Grading of student progress by the research committee. The grading scale, form and the submission process will be determined each year by the Graduate Affairs Committee.

The annual review process is the primary mechanism used by the Department to gauge student research performance and evaluate whether or not a student should continue to receive departmental support and continue in their degree program. It also assists the Graduate Affairs Committee in evaluating merit for student awards. Those students whose performance is judged unsatisfactory by their research committee will be subject to departmental summer probation, which behooves them to demonstrate improved performance in their research and/or coursework. Students in this category are required to undergo a second review by an extended committee (henceforth referred to as the evaluation committee) consisting of the student's research committee and one or more representative of the Graduate Affairs Committee. This review must take place in August prior to the start of the fall semester. If performance is still judged unsatisfactory the student will be placed on formal academic probation with the Graduate School for the fall semester. Students in probation are afforded a final opportunity to show progress in research based on a third review session administered by the evaluation committee before the end of the fall semester.

Sources of Funding

The Department of Earth and Atmospheric Sciences awards AI, RA, and Fellowship support, as well as summer research funds, on a competitive basis. AI support encompasses responsibilities in preparing and/ or teaching laboratory courses, among other duties. RA support is dependent on the availability of specific research funds procured by individual faculty members through externally-funded grant proposals. Fellowships and summer research support are available from assets allocated to general or specific departmental accounts.

Diplomas

Degrees are granted every month of the year. The University Graduate School requires receipt of an electronic copy of the thesis/dissertation prior to the 15th day of the month for which the degree is to be granted; if received after the 15th the degree will be granted the next month. A degree diploma is mailed to a student's home address two to three months after the degree is conferred. Diplomas are sent by third-class mail (Printed Matter) through the US Postal Service. Please be aware that items sent third-class are not forwarded to a new address. Hence, students must verify that their correct permanent home address is on file with the Registrar to ensure that the degree is mailed to the desired location. Please see the Graduate Services Coordinator if you are an international student desiring special arrangements for receipt of the diploma. The Graduate Services Coordinator can instruct you in how to have the diploma sent from the University Graduate School to the EAS Graduate Office (GY107). Our department will then send the diploma by airmail to your international address. Duplicate diplomas may be obtained through the Registrar for an additional fee.

MASTER OF SCIENCE THESIS OVERVIEW

This degree option is recommended for most students entering the program with an undergraduate degree. The degree requirements include:

• A total of 30 credit hours

At least 22 of the 30 hours must be graduate-level courses. 400-level courses from the Department of Earth and Atmospheric Sciences that can be taken for graduate credit are listed in Appendix 6. 500-700-level Geology courses and lower-level courses from other departments that count toward graduate credit can be found in the University Graduate School Academic Bulletin (http://bulletins.iu.edu/iu/gradschool/2015-2016/index.shtml; see the section entitled Graduate Credit - General in the Academic Regulations section of the University

Graduate School Academic Bulletin).

- 12 of the 22 hours must be coursework taken in Earth and Atmospheric Sciences.
- A minimum of 3 credits of G810 (research credits) are required; a maximum of 8 credits of G810 can be applied toward the degree.
- At least three 3-credit hour courses of 500-level or above must be taken from the Department of Earth and Atmospheric Sciences.
- Selection of courses must be approved by the primary advisor in consultation with the student's research committee.

Transfer of credit

Up to 8 credit hours of graduate classes can be transferred from another institution, provided the classes meet the requirements of equivalency of graduate classes offered at IU and a grade of 'B' or higher was achieved. Pass/Fail or 'S' graded classes cannot be transferred. Requests for transfer of credit hours originate with the student and advisor. Students are required to highlight the specific courses they request for transfer on a copy of their transcripts and submit these documents to the Graduate Office GY107. Transfers require approval by the University Graduate School and courses must have been completed within 5 calendar years prior to awarding the Masters degree.

Minimum Grade Point Average

All Masters students must maintain a 3.0 (B) grade point average. Students with a GPA less than 3.0 can be placed on academic probation until the student's GPA increases to above 3.0. While on academic probation, the student cannot be supported as an Al, RA, or Fellow. If the GPA does not reach 3.0 after two semesters of probation, the student will be dismissed from the graduate program.

Primary Advisor

An advisor (and co-advisor if necessary; see page 4) should be chosen during the first semester and no later than March 1 of the first year in the degree program.

Research Committee

A three-person research committee must be formed for each Masters student, consisting of the primary advisor and two other members. Two of the members of this committee must be graduate faculty of the Department (see page 4). The composition of the research committee and signatures from each of the members must be filed with the Departmental Graduate Office by March 1 of the first year of the degree program. Any change in committee membership must be communicated immediately to the Graduate Office.

Completion of Written Thesis

The thesis should be prepared in a form that is essentially ready to submit for publication in an appropriate journal(s). Publication and public presentation of research results is strongly encouraged but not required. The format of the thesis must conform to the University's official policy on the production of theses (Appendix 4).

Timeframe

Master's degrees must be completed within five years of enrollment, or six years for Dual Masters degrees. Students who exceed this time frame must revalidate all coursework taken outside this timeframe.

M.S. Requirements

Students in the M.S. degree program who apply successfully for admission into the Ph.D. program in our Department must complete all formal requirements for the degree no later than one semester after entering the Ph.D. program.

Application for Advanced Degree Form

This form is on the Graduate School website (http:// graduate.indiana.edu/forms/index.shtml), and must be completed and submitted a minimum of 60 days prior to the desired graduation date, regardless of whether you will attend the commencement ceremony.

Commencement ceremony

If you wish to attend the commencement ceremony, necessary forms must be filled out in advance. To attend the December commencement, the forms must be completed around mid-September; for the May commencement, they must be completed around mid-February. Further information can be found at the Indiana University Ceremonies website (http:// universityevents.iu.edu/). Consult with the Department Graduate Office GY107 for further information.

M.S. Thesis Presentation

Students are encouraged to present their final M.S. research results at a regional or national meeting (e.g., AGU, GSA, AAPG, etc.). A departmental defense is not formally required but is strongly recommended and should be announced to the department with title, date, time and location.

MASTER OF SCIENCE 'REPORT OPTION' OVERVIEW

This degree option is not recommended for most students because it may limit future educational and professional goals. An exception is students who plan to continue in the Ph.D. program in our Department, building directly on research begun in the M.S.

program. In such circumstances the report route can streamline that transition when appropriate but the formal decision to pursue this option should only

be taken after admission to the Ph.D.

The degree requirements include:

- Total of 30 credit hours
- 27 of the 30 hours must be graduate-level courses; the remaining 3 can be G810. 400-level courses from the Department of Earth and Atmospheric Sciences that can be taken for graduate credit are listed in Appendix 6. 500- to 700-level Earth and Atmospheric Sciences courses, and lowerlevel courses from other departments that count toward graduate credit can be found in the University Graduate School Academic Bulletin (see the

section entitled "Graduate Credit-General" in the Academic Regulations section of the University Graduate School Academic Bulletin).

- 20 of the 27 hours must be in Earth and Atmospheric Sciences.
- At least three 3-credit hour courses of 500 level or above must be taken from the Department of Earth and Atmospheric Sciences.
- Selection of courses to be taken should be discussed with the primary advisor and research committee.
- Transfer of credit
- As above in M.S. overview.
- Minimum Grade Point Average
- As above in M.S. overview.
- Report

The precise format and content of the report are determined in collaboration with the student's advisor and research committee. The report must be signed by the entire research committee. It is recommended that the report be in a format suitable for publishing, but it is not required.

Primary Advisor

An advisor (and co-advisor if necessary; as above in M.S. overview) should be selected no later than March 1 of the first year in the degree.

Research Committee

As above in M.S. overview.

Timeframe

As above in M.S. overview.

Application for Advanced Degree Form

As above in M.S. overview.

Commencement Ceremony

As above in M.S. overview.

M.S. Report Option Presentation

Students are encouraged to present their final M.S. research results at a regional or national meeting (e.g., AGU, GSA, AAPG, etc.) or as a departmental defense with title, date, time and location announced to the department.

MASTER OF SCIENCE DEGREE: GEOLOGICAL SCIENCES-ATMOSPHERIC SCIENCES

Admission Requirements

Undergraduate major in Geological Science, Atmospheric Science, Mathematics, Physics, Chemistry, Biology, or equivalent. Applicants not meeting this requirement may be expected to complete additional coursework.

FIELD OF STUDY - ATMOSPHERIC SCIENCES

Course Requirements

Requirements are the same as the M.S. degree (thesis or report option) with one additional requirement. At least 12 credit hours must be from the list of courses specific to Atmospheric Sciences defined by the Department of Earth and Atmospheric Sciences.

M.S./M.S.E.S.

MASTER OF SCIENCE IN GEOLOGICAL SCIENCES MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE

This degree program is appropriate for students from a wide range of undergraduate science programs interested in a career in environmental sciences. This dual masters' program is a 51-credit hour (two year) program that gives the student greater depth and breadth than is possible in a single degree.

Admission Requirements

A student must apply to and be accepted by both the Department of Earth and Atmospheric Sciences and SPEA.

Course Requirements

Course requirements are a minimum of 21 credits from each program distributed as follows:

- Earth and Atmospheric Sciences core (12 cr.)
- Environmental Science core (12 cr.)
- Courses in economics, policy, and law competencies (6 cr.)

- A tool skill (3 cr.)
- Other Earth and Atmospheric Sciences or SPEA courses recommended by advisory committee and
- 9 Credits of research divided between Earth and Atmospheric Sciences and SPEA.

The distribution of credits across these requirements can be modified with the approval of the research committee. This committee, with a minimum of three members, will supervise the student's research program. At least one member of the committee must have a primary affiliation with the Department of Earth and Atmospheric Sciences and at least one member must have a primary affiliation with SPEA. Two members of the advisory committee must be named as co-advisors with one advisor from each program.

Example	credit hour distribution for an M.S.	student
Classes	Credi	t Hours
G583	Isotopic Systematics	3.0
G572	Basin Analysis and Hydrocarbons	3.0
G601	Clay Mineralogy	3.0
G571	Principles of Petroleum Geology	3.0
G451	Hydrogeology	3.0
G554	Fundamentals of Plate Tectonics	3.0
G590	The Art of Geological Sciences	1.0
G637	Seminar in Tectonics (taken twice)	2.0
A597	Introduction to Programming 1	3.0
Total		24.0
Researc	h Hours:	
G810	Research Hours	6.0
Total		30.0

Courses that satisfy the 12 credit hour requirement:
G534 Dynamic Meteorology 2
G537 Synoptic Meteorology and Climatology
G538 Air Pollution Meteorology
G540 Physical Meteorology
G547 Atmospheric Instrumentation
G556 Wind Power Meteorology
G564 Dynamic Meteorology: Boundary-Layer Meteorology
G570 Micrometeorology
G574 Topics in Micro-and Boundary-layer Meteorology
G576 Climate Change Science

DOCTOR OF PHILOSOPHY DEGREE OVERVIEW

The requirements are:

Total of 90 credit hours

- 35 of the 90 hours must be graduate-level courses.
- 20 of the 35 hours of coursework must be in Earth and Atmospheric Sciences. The remaining credit hours may include electives and coursework required to fulfill the minor.
- 12 of these 35 hours must be graduate courses from the Indiana University Department of Earth and Atmospheric Sciences. In exceptional cases (e.g., when a student enters the Ph.D. program with a strong background in the Earth and Atmospheric Sciences from another university and finds few courses in the department that will support their doctoral research program), a candidate may petition the Graduate Studies Committee in writing to waive this requirement.
- Up to 30 credit hours of graduate classes can be transferred from another institution, providing a grade of 'B' or higher was earned. Pass/Fail or 'S' graded classes cannot be transferred without a letter of clarification from the instructor that a B or higher equivalent would have been awarded. Courses to be transferred must be approved by the University Graduate School and must have been completed within the 7 calendar years prior to passing the Qualifying Exam.

Minimum Grade Point Average

All Ph.D. students must maintain a 3.0 (B) grade point average.

G901 Advanced Research

Dissertation credits as G901 can be taken when the student has fulfilled all the course requirements detailed above, completed 90 credit hours of graduate-level coursework and passed the qualifying examination (see below). A maximum of 6 semesters of G901 is permitted. G901 is currently 6 credit hours per spring and fall semester. Summer enrollment is not required unless the student intends to receive the degree during summer, which necessitates enrollment in 1 credit of G810.

Primary Advisor

An advisor (and co-advisor if necessary; see page 4) should be selected and agree to fulfill this role no later than December 1 of the first year of the degree.

Advisory Committee

The advisory committee shall approve the student's program of study and counsel the student until the passing of the Qualifying Exam. The advisory committee must include at least two members from the major area and one from the minor. The name of the primary advisor and two other members of the committee must be confirmed in a signed letter to the Graduate Services Coordinator.

Example credit hour distribution for a Ph.D. student

Classes	: Cr	edit Hours
G513	Seismology	3.0
G583	Isotopic Systematics	3.0
G514	Geophysical Signal Analysis	3.0
G612	Inverse Methods in Geophysics	3.0
G572	Basin Analysis and Hydrocarbor	is 3.0
G601	Clay Mineralogy	3.0
G571	Principles of Petroleum Geology	3.0
E451	Hydrogeology	3.0
G554	Fundamentals of Plate Tectonics	3.0
G589	Geomicrobiology	3.0
Total		30.0

Minor:	Cre	edit Hours
A597	Introduction to Programming I	3.0
A598	Introduction to Programming II	3.0
P573	Scientific Computing	3.0
P673	Advanced Scientific Computing	3.0
Total		12.0
Total al	I Graduate Courses:	42.0
Researc	ch Hours:	
G810	Research Hours	48.0
Total Ci	redit Hours for Ph.D.	90.0

Research Committee

Following the qualifying exam, a research committee must be selected, consisting of the primary advisor and 3-4 other members. The research committee can include all of the members of the Advisory Committee, supplemented by other IU faculty or individuals from other institutions connected to the research. Three of the members of this committee must be graduate faculty in the Department. The composition of the research committee and signatures from each of the members must be provided on the annual review form; any change must be communicated to the Graduate Office immediately.

Selection of a Minor

Selection of a Minor is also a requirement of the degree. Minors in allied science and mathematics are normally desired to broaden the student's background. The minor can also be in an area within the geosciences distinct from the chosen major. Formal external and internal minors are approved by the University Graduate School (http://bulletins.iu.edu/iub/college/2016-2017/ degree-requirements/index.shtml).

An individualized minor option with a minimum of 12 credit hours from at least two different Departments is also possible through petition to the University Graduate School. An individualized internal minor, which also requires coursework from at least two Departments, must be approved by the Graduate Affairs Committee and by the Graduate School Dean's office prior to completing the proposed course work.

Minors typically require between 6 and 12 credit hours of coursework. The precise requirements and courses needed will be determined by the Minor Advisor, who must be a faculty member in the minor department. The minor advisor normally becomes a member of the student's research committee (see below).

Students electing an internal minor must complete a minimum of 6 credit hours of course work in an area of Earth and Atmospheric Sciences distinct from their major research area. Courses taken for the minor may count toward the requirement of 35 credit hours of graduate course work. The objective of the Ph.D. minor is to broaden the student's background. To assure that this objective is achieved, any students who are planning an internal minor must have their study plan approved by their advisory committee and the Director of Graduate Studies. Internal minors must be approved in advance by the University Graduate School as an individualized minor.

ADMISSION

Students are admitted to the Ph.D. program through one of three mechanisms:

- Direct admission to the Ph.D. program following completion of an undergraduate degree program. (Students who enter the Ph.D. program with a baccalaureate degree will be encouraged to complete an M.S. degree.)
- Admission after completion of an M.S. degree at another institution.
- Current Indiana University students enrolled in our M.S. program may apply for admission to the Ph.D. program early in their second year of graduate study. The early review process is used to evaluate a student's suitability for the Ph.D. program.
- The expectations of progress toward the Ph.D. degree and the timelines for review of student progress, as described in Figure 1 (page 16), are different for each of these groups.

EARLY REVIEW

Objectives

The early review is an extension of the department annual review process. The primary purpose of this requirement is to provide a departmental assessment of each student's level of preparation to complete the Ph.D. degree in an early stage. The aim is to (i) ensure that students are actively developing a viable research project, and (ii) identify aspects of students' academic background that need strengthening early in their course of study.

Administration and Timetable

The Graduate Affairs Committee administers this review procedure. Figure 1 (page 15) is a graphical representation of the timeline for this review for the three different groups outlined above. A key aspect of this process is that students entering the program with a baccalaureate degree are required to go through this process in the fall of their second year of residence, whereas students entering the program with an M.S. degree will be reviewed in the spring semester of their first year of residence.

Step 1: Study Plan

As illustrated by the timelines in Figure 1 (p. 15), students are required to complete a preliminary Ph.D. research and study plan comprised of three parts:

Research Statement

A brief (less than one page) summary of a student's research plan. The format should be comparable to the "Intellectual Merit" section of the project summary for a standard proposal to the National Science Foundation written for a non-specialist in the research area.

Personal Statement

An assessment by the student of their perception of individual strengths and weaknesses pertinent to their research goals. This should address three areas:

- (i) academic background (e.g. coursework and field experiences)
- (ii) research skills (e.g. talents in writing, mathematics, computing, laboratory work, etc.) and
- (iii) personality characteristics important to professional success (e.g. tenacity, flexibility, commitment, ability to work in a team, etc.).

Students should view this task as an opportunity for objective professional self-assessment that can help the committee identify appropriate topics for discussion during the oral exam. An honest assessment will be most beneficial in this regard because it will facilitate recognition of areas of academic background that need strengthening and thereby aid ultimate success.

Intellectual Development

A bulleted list of specific targets in academic preparation and research skills that require strengthening in order to complete your Ph.D.

Step 2: Feedback and Review of Study Plan

The Graduate Affairs Committee and the student's advisor will provide written feedback to the student two weeks after the deadline for submission of the study plan. This response will be in the form of a review that the student should use as a guide in preparation for the oral exam. It will focus on topics that will constitute the principal points for discussion in the oral exam, especially areas that students identify as strengths, rather than weaknesses.

Step 3: Oral Exam

The Graduate Affairs Committee will schedule an oral exam for individual students. The examination committee will consist of two or members of the graduate committee, the student's advisor, and (optionally) one or more members of the student's research committee. Question topics will focus on areas of knowledge described in the individual review guide given to each student and centered on their strengths. Students should recognize, however, that the broad objective of the exam is to identify areas that need strengthening; hence, the Committee may ask questions regarding any aspect of geosciences.

Step 4: Results of Exam

There are three possible outcomes of this exam:

Unconditional Pass

This pass recognizes that a student has a background without deficiencies, a viable research plan, and is suitably prepared for success in the Ph.D. program, which includes completion of all requirements for the M.S. degree when applicable.

Deferred Decision

When the student's self evaluation or the exam reveals a need to augment their academic background there may be a requirement to complete one or more courses, or fulfill other specific conditions, as determined by the Graduate Affairs Committee and advisor. The result of the exam may be deferred pending the student's fulfillment of the conditions imposed by the Committee. Students in this category are required to demonstrate significant progress by their annual review or they may enter the probation process described above.

Fail

A student can fail this exam. The primary reason for failure will be a student's inability to convince the committee that he/she can successfully complete the Ph.D. program. For example:

- (i) an inability to provide coherent answers during the oral exam,
- (ii) the absence of a viable research plan,
- (iii) evidence of a lack of commitment to the profession or to the Ph.D. program.

There is no possibility for retaking the exam for students who fail. For students entering the program with an outside M.S. degree (group 2 above) the 'fail' result is reserved for those exceptional circumstances when a student is disengaged from their intended research program.

QUALIFYING EXAMINATION

This is a three-stage process and can be undertaken only after minimum course requirements have been fulfilled. It should be taken no later than the 6th semester in the program:

1) The candidate will prepare a research proposal of approximately 15 pages excluding figures and references. The proposal will be reviewed by the student's advisory committee and used as part of the exam assessment. The proposal must demonstrate that the proposed research consists of a suitable topic in terms of feasibility and importance. Preliminary results and familiarity with the field and literature are necessary before writing the proposal. Once revisions are made and the proposal is accepted by the advisory committee, the second stage can be initiated.

2) A written examination based on the research proposal is prepared by the advisory committee. This is a closed-book examination taken on a day chosen by the student, spanning approximately 3 hours in the morning and 3 hours in the afternoon. The examination is meant to evaluate familiarity with the chosen research area. to assess the relation of this field of research to others in the Earth and Atmospheric Sciences, and to alert the student to potential weaknesses in the research proposal. The advisory committee will evaluate responses to the examination. If responses are deemed sufficient and satisfactory, the third part of the process occurs. Students who fail the examination will be asked to leave the graduate program at the end of the semester, retake the examination, or complete specified remedial classes within 6 months of the examination date.

3) The oral portion of the exam takes place within a 2 week window after the written exam. The format normally consists of an oral presentation of the research proposal to the advisory committee, and responses to committee members' questions regarding both the proposal and the examination answers. This examination takes approximately 3 hours. A room within the department must be booked for this purpose and presentation equipment reserved (see the Office Assistant in GY129).

Possible outcomes of this exam are: pass (admission to 12

formal Ph.D. Candidate status), fail with permission to retake the exam, fail without permission to retake the exam, or a conditional pass (the candidate may need to satisfy some requirements set by the committee, which may involve further classes or research).

4) If a candidate passes, the Committee should forward a signed and dated form, on the day of completion, to the Graduate Coordinator for the student's records.

Nomination to Candidacy

After the Qualifying Exam the Nomination to Candidacy form must be completed online at http://graduate. indiana.edu/forms/index.shtml prior to the Qualifying Examination.

Appointment of Research Committee

After approval of the Nomination to Candidacy form, the candidate must complete the form for Nomination to Research Committee, which is on the University Graduate School's website (http://graduate.indiana. edu/index.shtml). It is important that the candidate file this paperwork promptly as nine months must elapse between the time of submission of this form and defense of the dissertation. In the past students have had their graduation delayed by failure to act on this requirement.

Completion of Written Dissertation

The dissertation should be prepared in a form that is essentially ready to submit for publication in appropriate journals. Publication of results is strongly encouraged. The format of the dissertation must conform to the University's official policy on the production of Ph.D. dissertations (Appendix 4).

Dissertation Defense

The dissertation defense can be scheduled no sooner than eight months from the date of completion of the Qualifying Examination and appointment of the Research Committee The Research Committee and student must come to an agreement that the dissertation is at a stage that is suitable for defense, based on drafts of the dissertation submitted to the committee.

An Announcement of the Dissertation Defense must be submitted to the University Graduate School a minimum of 30 days prior to the defense date, but they recommend you start the process 6 weeks before the planned defense date. An example of the format required is included in Appendix 4. Two weeks prior to the defense a copy of the dissertation must be placed in the front office of the department for public perusal. The defense itself consists of a public presentation of the dissertation research that any interested faculty and students may attend, followed by an open session of questions and discussion, after which the student's Research Committee conducts a rigorous closed-session, oral examination of the student.

The result of the defense is determined as a pass, conditional pass, a deferred decision, or a failure without the option to retake. The conditional pass usually requires revisions of the dissertation as recommended by the research committee, and a deferred decision indicates that the opinion of the research committee was not unanimous, a circumstance that requires reports from the research committee detailing the differing opinions to the Dean of the Graduate School.

After a successful defense, the Graduate Office needs to receive (i) one signed copy of the dissertation abstract, and (ii) one signed dissertation. Students should plan to submit the final version of their dissertation electronically to the University Graduate School as soon as possible.

Timeframe

The Ph.D. dissertation must be accepted by the student's research committee and a copy must be submitted to the University Graduate School within seven years of passing the Qualifying Examination. Failure to do so will result in termination of Ph.D. candidacy. Reinstatement of candidacy is possible and involves obtaining permission of the department chairperson, fulfilling any reinstatement requirements from the Department, passing the Qualifying Examination again, and then requesting reinstatement from the Dean. Once reinstated, the degree must be completed within three years.

Ph.D. Commencement Participation Application

Paperwork must be completed in advance to attend the commencement ceremony. To attend the December commencement, forms must be completed in mid-September; for the May commencement, forms must be completed in mid-February. Further information can be found at the Indiana University Ceremonies website http://universityevents.iu.edu/ or the Grad Services office.

DOCTOR OF PHILOSOPHY DEGREE: GEOLOGICAL SCIENCE-ATMOSPHERIC SCIENCES

Course Requirements

Requirements are the same as the regular Ph.D. degree with one additional requirement. At least 12 credit hours from a list of courses specific to Atmospheric Sciences defined by the Department of Earth and Atmospheric Sciences.

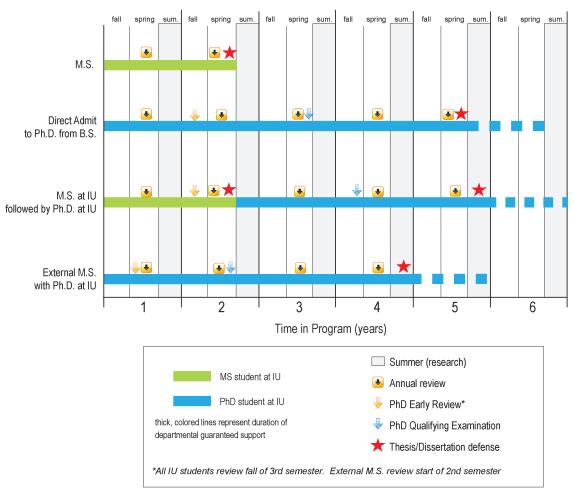
DOCTOR OF PHILOSOPHY DEGREE WITHOUT PRIOR M.SC. DEGREE IN GEOLOGICAL SCIENCES

The requirements below presume that the student begins the program having completed a Bachelor's degree. The requirements include:

- Total of 90 credit hours
- 35 of the 90 hours must be graduate-level courses.
- 20 of these 35 hours must be graduate courses related to the student's major research area.
- 12 credits must be taken in the Indiana University Department of Earth and Atmospheric Sciences.
- Credits for the minor count toward the 35 total hours of coursework.
- Transfer of credit as specified for Ph.D.
- The following items have the same requirements as those specified in the Ph.D. Overview:
- A 3.0 (B) grade point average
- G901 Advanced Research
- Primary Advisor
- Research Committee
- Selection of a Minor
- Ph.D. students are subject to annual and early review procedures described above
- Qualifying Examination
- Completion of Written Dissertation
- Dissertation Defense

Courses that satisfy the 12 credit hour requirement:

G534 Dynamic Meteorology: Synoptic to Global Scale
G537 Advanced Synoptic Meteorology and Climatology
G540 Physical Meteorology and Climatology
G556 Wind Power Meteorology
G564 Dynamic Meteorology: Boundary-Layer Meteorology
G570 Micrometeorology
G576 Climate Change Science



Geological Sciences Degree Timelines

Figure 1: Illustrates a timeline for completing Ph.D. and M.S. degrees in Geological Sciences at IU.

graduate handbook APPENDICES 2019-2020

TABLE OF CONTENTS

Appendix 1: Faculty Directory	17
Appendix 2: Annual Report Forms for the Masters Degree	.20
Appendix 3: Annual Report Forms for the Ph.D. Degree	.24
Appendix 4: Example Forms Required by the University Graduate School	.28
Appendix 5: Outside Courses Applicable to the Degrees	.33
Appendix 6: 400-Level Courses Applied Toward Graduate Credit	.36

APPENDIX 1 FACULTY DIRECTORY 2019-2020

APPENDIX 1: FACULTY, EMERITUS, AND ADJUNCT FACULTY

Title	Name	Specialty	Phone	Room	Email	Department
Professor	Simon Brassell	Biogeochemistry, Organic Geochemistry	5-3786	MSBII 404	simon	EAS
Professor	James Brophy	Igneous Petrology, Geochemistry	5-6417	G309	brophy	EAS
Assoc. Professor	Douglas Edmonds	Sedimentary Geology	5-4512	G425	edmondsd	EAS
Professor	Michael Hamburger	Geophysics, Seismology and Tectonics	5-2934	G415	hamburg	EAS
Professor	Claudia Johnson	Geobiology	5-0646	G501	claudia	EAS
Professor	Kaj Johnson	Geophysics	5-3612	G401	kajjohns	EAS
Asst. Professor	Chanh Kieu	Atmospheric Science	6-5704	G517	ckieu	EAS
Asst. Professor	Ben Kravitz	Atmospheric Science	5-4334	G303A	bkravitz	EAS
Assoc. Professor	Jackson Njau	Geoanthropology	6-3170	G513	jknjau	EAS
Asst. Professor	Travis O'Brien (1/20)	Atmospheric Science	TBD	TBD	taobrien@lbl.gov	EAS
Professor	David Polly	Paleontology, Geobiology	5-7994	G524a	pdpolly	EAS
Professor	Ed Ripley	Isotope Geochemistry, Economic Geology	5-1196	G329	ripley	EAS
Professor	Juergen Schieber	Geology of Shales and Mudstones	5-5322	G523	jschiebe	EAS
Asst. Professor	Paul Staten	Atmospheric Science	6-5135	MSBII 302	pwstaten	EAS
Asst. Professor	Brian Yanites	Geomorphology, Surface Processes, Geophysics		G429	byanites	EAS
Professor	Chen Zhu	Hydrogeology, Mass Transport, Water-Rock-Gas-Microbe Interactions	6-1884	MSBII 424	czhu	EAS
Research Fact (The following peo	-	h committees, and the Senior Scientists c	an supervis	se Ph.D./Mast	ers students)	
Senior Lecturer	Bruce Douglas	Tectonics and Structural Geology	5-3848	G423	douglasb	EAS
Senior Lecturer	Erika Elswick	Geochemistry, Sedimentology, Sedimentary Ore Deposits	5-2493	MSBII 428	eelswick	EAS
Research Scientist	Ed Herrmann	Geoarchaeology	6-0587	G417	edherrma	EAS
Lecturer	Cody Kirkpatrick	Atmospheric Science	5-3481	MSBII 305	codykirk	EAS
Senior Scientist	Chusi Li	Petrology, Geochemistry, Mineral Deposits	5-1558	G217	cli	EAS
Research Scientist	Peter Sauer	Biogeochemistry, Paleoclimatology	5-6591	MSBII 410	pesauer	EAS
Senior Scientist	Arndt Schimmelmann	Organic Geochemistry, Chemical Oceanography	5-7645	G321	aschimme	EAS

APPENDIX 1: FACULTY, EMERITUS, AND ADJUNCT FACULTY

Emeritus Facul	ty				
Abhijit Basu	Sedimentary and Planetary Petrology	5-6654	G507	basu	EAS
David Bish	Clay Mineralogy; X-ray Diffraction	5-2039	G209	bish	EAS
Robert Blakely	Geophysics			blakely	EAS
J. Robert Dodd	Geobiology	5-4957	G119	dodd	EAS
David L. Dilcher	Geobiology	6-0618	S209	dilcher	EAS
Jeremy Dunning	Structural Geology			dunning	
Brian Keith	Sedimentology, Stratigraphy	5-4213	S117	keithb	IGS
Enrique Merino	Geochemistry and Petrology	5-5088	G117	merino	EAS
Greg Olyphant	Hydrogeology, Quaternary Geology and Geomorphology	5-1351	S423	olyphant	EAS
Gary Pavlis	Geophysics, Seismology and Tectonics	5-5141	G409	pavlis	EAS
Lisa Pratt	Biogeochemistry, Sedimentology/Stratigraphy	5-9203	MSBII 416	prattl	EAS
Lee J. Suttner	Sedimentology and Stratigraphy	5-4957	G119	suttner	EAS
Robert Wintsch	Metamorphic, Structural, Sedimentary Petrology, Tectonics and Geochronology	5-4018	G325	wintsch	EAS

Adjunct Faculty: (The following people can supervise a Ph.D./Masters student, but require a co-advisor from the Faculty or Research Faculty. They can also serve on research committees)

Professor	Chris Craft	Wetland Ecology	5-5971	MSBII 408	ccraft	SPEA
Professor	Jim Handschy	Petroleum Systems, 3D/4D analysis, structural geology, field methods			jwhandsc@ iu.edu	EAS
Assoc. Professor	Adam Maltese	Science Education/Adjunct Faculty Geological Sciences	6-8059	Wright Ed Bldg 3054	amaltese	School of Education
Research Scientist	Maria Mastalerz	Coal Petrology, Coal Geochemistry, Coalbed Gas	5-9416	S225	mmastale	IGS
Senior Researcher	Pat McGlaughlin	Chemostratigraphy, sequence stratigraphy, regional Paleozoic geology, geologic mapping, and sedimentary diagenesis.	5-1350		pimclaug@ iu.edu	IGS
Distinguished Professor	Peter Ortoleva	Geochemistry	5-2717	CH203E	ortoleva	Chemistry
Professor	Kathy Schick	Anthropology	6-0080		kaschick	Anthropology
Director, IGS	Todd Thompson	Clastic and carbonate sedimentology, lake level, shoreline behavior, Indiana Dunes	5-7428	IGS	tthomps	IGS
Professor	Nicholas Toth	Anthropology Cognitive Science	6-0080		toth	Anthropology
Asst. Professor	Adam Ward	Watershed Hydrology and Engineering	6-4820	MSBII 430	adamward	SPEA
Professor	Jeff White	Geochemistry	5-0731	MSBII 412	whitej	SPEA

¹ Only the listed phone number is needed when calling from on-campus; add 85 to the front to reach them from off-campus locations.

²Add @indiana.edu to each of these emails to contact the person.

Please note that this list changes every year – please consult the updated directory information placed in student mailboxes at the beginning of the fall semester.

APPENDIX 2 ANNUAL REPORT FORMS FOR THE MASTERS DEGREE

APPENDIX 2: EXAMPLE ANNUAL REPORT FORM FOR THE M.S. DEGREE (page 1)

INSTRUCTIONS: Download this form from http://earth.indiana.edu/education/handbook html It should be completed and sent to the Graduate Services Coordinator no later than March 15th.

NAME:___

ANNUAL REVIEW OF M.S. DEGREE PROGRESS

Students are required to organize a brief meeting with their Advisory Committee at least once a year (before March 15) to ensure that they share a common understanding of course selections, and research activities, plans and goals.

To assist in this process, students should provide copies of the form, duly completed, to all committee members at least 24 hours prior to this progress meeting. After the meeting, a PDF of the completed and signed form should be submitted to the Graduate Services Coordinator (room 107). Information on this form and in the summary statement of research progress will be used by the Committee on Graduate Studies to help rank students for academic awards and financial support.

COURSEWORK CHECKLIST

Graduate requirements:	Completed ?	Comments
$1. \ge 9$ credit hours ≥ 500 level		
$2. \ge 12$ of the 22 hours of graduate course credits in Geological Sciences		
$3. \leq 8$ credit hours graduate transfer credit		
$4. \geq 30$ credit hours total graduate credit		

Annual course load is 30 credit hours: 12 in Fall & Spring Semesters, 6 in Summer Session

RESEARCH PLANS

Program Options:

M.S. students must complete:

- □ Either a thesis (strongly recommended),
- $\hfill\square$ Or a research report

Provisional Thesis (or Report) Title:

Brief Outline (max, 1 page) of Research Objective & Strategies: Aims, field work, sampling, analytical methods, etc.

Summary of Immediate (3-6 months) Research Plans: Future activities, especially during the summer months

APPENDIX 2: EXAMPLE ANNUAL REPORT FORM FOR THE M.S. DEGREE (page 2)

PROPOSED LONG-TERM RESEARCH PLANS AND TIMETABLE:

ANTICIPATED PHASES OF RESEARCH ACTIVITIES AND CONTINGENCIES

Timetable and Dates:

- 1. Annual Review: Date, time, and venue
- 2. Thesis Completion: Target dates for draft and final version. Provisional date for thesis defense.

Summary of Financial Support:

Indicate sources of support, e.g. AI (provide course #), RA (note funding agency & PI), Fellowship (give source, self, other grants (e.g. GSA, Sigma XI, etc.)

	Semester 1	Semester II	Summer
Year 1			
Year 2			

RESEARCH PROGRESS

Summary of Progress

A summary statement, preferably a one-page synopsis, which documents the following items, should be appended to this form. Several of these details would typically be compiled for inclusion in a full curriculum vitae, which may also be appended to this report.

- 1. Research Activities: Summarize achievement during the past year in field work, in laboratory analyses, in data collection, and written reports.
- 2. Proposals and Contributions to Proposals: Document grant applications submitted for research or fellowship support, including title, funding agency, date of submission, duration, purpose, and amount of funding sought/awarded, and the current status (whether pending, accepted, or declined). A copy of the proposal should be provided. Comparable information should also be given for grant applications submitted by others, for example an advisor or collaborator, to which you contributed. In such cases a copy of the proposal summary should be provided.
- 3. Conferences and Short Courses: Give details of meetings, short courses or workshops attended, including their title(s), sponsoring organizations (e.g. GSA, AAPG), dates, location, and the source of any financial support enabling attendance.
- 4. Presentations: Provide a summary of any contributions to oral presentations or posters with information on the title, authorship, venue, date, and speaker (if applicable). Include a copy of the abstract, if available.
- 5. Publications: List all abstracts and papers, giving title, authorship, journal or book (e.g. conference proceedings or symposia), volume, pagination, and date of publication. Separately list comparable information for other manuscripts in preparation, submitted, under revision, accepted, or in press. Denote whether publications are peer-reviewed and provide copies of abstracts
- 6. Other Academic or Career Activities: Comment on any other relevant activities (e.g. internships) and on any awards received.

APPENDIX 2: EXAMPLE ANNUAL REPORT FORM FOR THE M.S. DEGREE (page 3)

COMMITTEE REVIEW AND REMARKS

Coursework Status

Based on details documented in Coursework Summary.

- 1. Required Course. As determined by Advisory Committee:
- 2. General Requirements. Enter accumulated credit hours within each category.

 ≥ 500 level Earth and Atmospheric Sciences (≥ 9h)

 Transferred grad. Credit (≤8 h)

 Total graduate credit (≥ 30 h)
- Options. Specify credit hours accumulated within chosen option. Option A: Research (≤ 8 h) □
 Option B: Research (≥ 3h) □

COMMITTEE COMMENTS

- 1. Assessment of Degree Progress and a numerical ranking of research progress on a scale of 1-5 (1 = unsatisfactory; 2 = minimal; 3 = satisfactory; 4 = good; 5 = outstanding). Contents based on coursework & research activities:
- 2. Recommendations. Specific suggestions or requirements regarding degree progress.
- 3. Approval. Signatures designate agreement on course selection and research programs.

	Signature	Date
Research Advisor		
Advisory Committee member:		
Advisory Committee member:		

INSTRUCTIONS: Download this form from <u>https://earth.indiana.edu/student-portal/forms.html</u> It should be completed and sent to the Graduate Services Coordinator no later than March 15th. APPENDIX 3 ANNUAL REPORT FORMS FOR THE PH.D. DEGREE INSTRUCTIONS: Download this form from https://earth.indiana.edu/student-portal/graduate/grad-handbook/index.html It should be completed and sent to the Graduate Services Coordinator no later than March 15th.

NAME:

ANNUAL REVIEW OF Ph.D. DEGREE PROGRESS

Students are required to organize a meeting with their Advisory Committee at least once a year (by March 15) – more frequent meetings are encouraged - to ensure that they share a common understanding of course selections, and research activities, plans, and goals.

To assist in the annual review process, students should provide copies of the form, duly completed, to all committee members at least 24 hours prior to this progress meeting. After the meeting, a PDF of the completed and signed form should be submitted to the Graduate Services Coordinator in the Graduate Services Office (room 107). Information on this form and in the summary statement of research progress will be used by the Committee on Graduate Studies to help rank students for academic awards and financial support.

COURSEWORK CHECKLIST

te Requirements:	Completed?
\geq 12 credit hours formal graduate credits in Earth and Atmospheric Sciences	
≥35 credit hours total formal graduate coursework	
≤30 credits of transferred graduate credit	
≥90 credit hours total graduate credit	
Specified credit hours in minor (determined by minor advisor)	
	 ≥ 12 credit hours formal graduate credits in Earth and Atmospheric Sciences ≥ 35 credit hours total formal graduate coursework ≤ 30 credits of transferred graduate credit ≥ 90 credit hours total graduate credit

Annual course load is 30 credit hours: 12 in Fall and Spring Semesters, 6 in Summer Session

RESEARCH PLANS

Provisional Thesis (or report) Title:

Brief Outline of Research Objectives and Strategies: Aims, field work, sampling, analytical methods, etc.

Summary of Immediate (3-6 months) Research Plans: Future activities, especially during the summer months

Proposed Long-term Research Plans and Timetable: Anticipated phases of research activities and contingencies

APPENDIX 3: EXAMPLE ANNUAL REPORT FORM FOR THE PH.D. DEGREE (page 2)

Timetable and Dates:

- 1. Annual Review: Date, time, and venue
- 2. Qualifying Examination. Proposed date and time
- 3. Thesis Completion: Target dates for draft and final version. Provisional date for thesis defense.

Summary of Financial Support:

Indicate sources of support, e.g. AI (provide course #), RA (note funding agency & PI), Fellowship (give source, self, other grants (e.g. GSA, Sigma XI, etc.)

	Semester 1	Semester II	Summer
Year 1			
Year 2			
Year 3			
Year 4			

RESEARCH PROGRESS

Summary of Progress

A summary statement, preferably a one-page synopsis, which documents the following items, should be appended to this form. Several of these details would typically be compiled for inclusion in a full curriculum vitae.

- 1. Research Activities: Summarize achievement during the past year in field work, in laboratory analyses, in data collection, and written reports.
- 2. Proposals and Contributions to Proposals: Document grant applications submitted for research or fellowship support, including title, funding agency, date of submission, duration, purpose, and amount of funding sought/awarded, and the current status (whether pending, accepted, or declined). A copy of the proposal should be provided. Comparable information should also be given for grant applications submitted by others, for example an advisor or collaborator, to which you contributed. In such cases a copy of the proposal summary should be provided.
- 3. Conferences and Short Courses: Give details of meetings, short course or workshops attended, including their title(s), sponsoring organizations (e.g. GSA, AAPG), dates, location, and the source of any financial support enabling attendance.
- 4. Presentations: Provide a summary of any contributions to oral presentations or posters with information on the title, authorship, venue, date, and speaker (if applicable). Include a copy of the abstract, if available.
- 5. Publications: List all abstracts and papers, giving title, authorship, journal or book (e.g. conference proceedings or symposia), volume, pagination, and date of publication. Separately list comparable information for other manuscripts in preparation, submitted, under revision, accepted, or in press. Denote whether publications are peer-reviewed and provide copies of abstracts
- 6. Other Academic or Career Activities: Comment on any other relevant activities (e.g. internships) and on any awards received.

APPENDIX 3: EXAMPLE ANNUAL REPORT FORM FOR THE PH.D. DEGREE (page 3)

COMMITTEE REVIEW AND REMARKS

Coursework Status

Based on details documented in Coursework Summary

- 1. Required Courses. As determined by Advisory Committee
- 2. General Requirements. Enter accumulated credit hours within each category.
 - □ Total Earth and Atmospheric Sciences (≥ 12 h) □ Total Graduate Credit (≥ 90 h) □ Minor □ Graduate Course Credit (≥ 35 h) □ Transferred Grad Credit (≤ 30 h) □ Research

COMMITTEE COMMENTS

 Assessment of Degree Progress and a numerical ranking of research progress on a scale of 1-5 (1 = unsatisfactory; 2 = minimal; 3 = satisfactory; 4 = good; 5 = outstanding). Comments based on coursework and research activities.

2. Recommendations. Specific suggestions or requirements regarding degree program.

3. Approval. Signatures designate agreement on course selection and research progress.

	Signature		Date
Research Advisor:			
Advisory Committee member:			
Advisory Committee member:		• ·	
Advisory Committee member:			
Minor Advisor:			
Student:			

INSTRUCTIONS: Download this form from https://earth.indiana.edu/student-portal/graduate/grad-handbook/index.html It should be completed and sent to the Graduate Services Coordinator no later than March 15th.

APPENDIX 4

FORMS REQUIRED BY THE UNIVERSITY GRADUATE SCHOOL

The University Graduate School has a comprehensive website informing students on the requirements for preparing theses and dissertations. Please review materials provided for completion of the research degree at: https://graduate.indiana.edu/index.html

These forms are available online:

M.S. APPLICATION FOR ADVANCED DEGREE

Ph.D. NOMINATION OF RESEARCH COMMITTEE

Ph.D. NOMINATION TO CANDIDACY

Ph.D. SCHEDULE AND ANNOUNCEMENT OF FINAL EXAMINATION (on OneIU)

Ph.D. COMMENCEMENT PARTICIPATION APPLICATION (on OneIU)

A GUIDE TO THE PREPARATION OF THESES AND DISSERTATIONS (on Graduate School website)

INSTRUCTIONS: Go to the Graduate School website to complete and submit the required forms. https://graduate.indiana.edu/forms/index.shtml

AND

https://graduate.indiana.edu/theses-dissertations/deadlines.shtml

APPENDIX 4: EXAMPLE FORM FOR THE MASTERS DEGREE

APPLICATION FOR ADVANCED DEGREE UNIVERSITY GRADUATE SCHOOL

STUDENT:					
Month in which you wish degree to Please note that if this date chang (please initial here)	o be conferred ges you must notify th	e Recorder for yo	our name to a	appear in the Co	ommencement program
Diplomas are mailed by	the Office of the Regi	strar approximat	ely three mo	nths after the d	egree is conferred.
CAMPUS ID NUMBER:		DATE OF BIRTH:			
NAME					
Current Address		Permanent Add	ress		
Street		Street			
(City, State) (Zip)		(City, State)	(Zip)		
Local Telephone number ()		Email Address _			
If yes, where and when Will you be transferring credit from If yes, from where and how many Have you ever been a Continuing Will you be continuing work for the	credit hours Non-degree Student?		No	No	
<u>Check appropriate boxes</u> Master of Arts () with thesis () with research skill (() with language (spec () with essay, internsh () with exam (date con	specify courses) cify language and how	fulfilled)			_
() with essay, internsh	specify courses) cify language and how	r fulfilled)			
Master of Fine Arts () date of thesis show () with thesis		nent/Program		Major	
Master of Arts for Teach	ers* Departm	nent/Program		Major	

* Copy of Public Instruction Teacher's License <u>must be subject</u> to the Master's Recorder, Kirkwood Hall 111. Diploma will be sent to address on official University records. Please check your address at the Office of the Registrar, 408 N. Union Street, Bloomington, IN 47405

APPENDIX 4: EXAMPLE FORMS FOR THE Ph.D. DEGREE

THE UNIVERSITY GRADUATE SCHOOL NOMINATION OF RESEARCH COMMITTEE FOR THE Ph.D.

Name of Student	Campus I.D	_
Department	Birth Date	
Major	Minor(s)	
Date of Qualifying Examination		
Date of Enrollment in University Graduate School		
Proposed Dissertation Title		

Dissertation Prospectus: Please attach a one-to-two page summary of the proposed research. If the research involves human subjects, animals, biohazards, biosafety, or radiation, please also attach an approval from the appropriate committee. Note: Your signature below indicates that you have read the attached prospectus and agree to serve, if appointed, on a committee to supervise this research.

NAME	SIGNATURE	DEPARTMENT (Please type)	EMAIL
(Co-Chair of Committee)			
(Co-Chair of Committee)			

(Minor representative)

ALL COMMITTEE MEMBERS MUST BE MEMBERS OF THE UNIVERSITY GRADUATE SCHOOL FACULTY AND AT LEAST HALF MUST BE FULL MEMBERS.

I certify that I have examined the attached prospectus and that this committee is appropriate to supervise research in this area.

Signature/Department Chairperson	Date
----------------------------------	------

*To be used only by students who have passed the qualifying examinations and who have previously been admitted to candidacy.

APPENDIX 4: EXAMPLE FORMS FOR THE Ph.D. DEGREE

THE UNIVERSITY GRADUATE SCHOOL NOMINATION TO CANDIDACY FOR THE Ph.D. DEGREE

Name of Student	Stu	dent I.D#			
Current Mailing Address					
DepartmentDate	of Enrollment in Grad	duate School		Birth Date	
Date of Qualifying Exam	(mo/day/yr) Date Ca	andidacy Expire	es		
Total Graduate Credits Earned (Including T	ransfer Credits*)				
REQUIREMENT COMPLETION DATES					
Academic Plan					
Academic Sub-Plan					
Minor	Date	/	/		
Minor	Date	/	/		
This certifies that the above named studer the Ph.D. degree. Advisory	it has passed the Qua			hereby nomina	
Committee Signatures					
	Outside Minor	(Outside Min	nor Examina	tion Passed)	
	OR	(Outside Min	nor Examina	tion Waived)	
Chair or Graduate Advisor/Major Dept		Date			
Information Verified/PhD Recorder University Graduate School		_Date			
Approved/Dean University Graduate School	Da	te			

*Do not submit this form to the University Graduate School until the transfer of credits from other institutions has been approved.

APPENDIX 4: EXAMPLE FORMS FOR THE Ph.D. DEGREE

Announcing the Final Examination of

For the Degree of Doctor of Philosophy in Geological Sciences Thursday, December 7th, 2012, 1:00 p.m. Room GY338, Geology Building

Dissertation: Open System Magmatism, and the emplacement of the Partridge River Intrusion, Duluth Complex, Minnesota.

The Partridge River Intrusion (PRI) is one of several large, tholeiitic bodies that occur along the Western portion of the Duluth Complex in northern Minnesota. Mafic magmatism developed in response to intercontinental rifting at approximately 1.1 Ga. The intrusion is host to several Cu-Ni sulfide deposits that are found near the basal contact with metapelitic footwall (the Proterozoic Virginia Formation). The upper portion of the PRI is characterized by thick, unlayered, monotonous sequences of troctolite and augite troctolite. Thin (usually less than 5 meters in thickness) layers of melatroctolite and picrite occur at irregular intervals. Cu-Ni mineralization, and iron-rich units of ferrogabbro occur near the base of intrusion. The ferrogabbro units are also enriched in incompatible elements (P, Y, Ti), and are intercalated with troctolite.

Previous researchers have suggested genetic mechanisms to explain the chemical variations in the PRI that range from differentiation of a single magmatic pulse, to multiple inputs of chemically distinct magma. This study was conducted to evaluate and model the magmatic process involved during the emplacement of the PRI. Samples were selected from a drillcore located to the northwest of the major Cu-Ni sulfide body at the Babbitt deposit. The site was chosen to avoid discontinuities caused by the presence of metapelitic xenoliths of the Virginia Formation, which are common in the vicinity of the mineralization.

Ferrogabbro at the bottom of the intrusion was derived from an evolved melt of ferrodioritic composition, emplaced early in the history of the PRI. A later, more primitive troctolitic melt intruded the ferrogabbro. The main massive Cu-Ni mineralization is distinct, isotopically and compositionally, from the overlying disseminated mineralization, and was emplaced as a separate body, also early in the history of the PRI. Both the differentiated, ferrogabbroic melt and the sulfide melt which formed the massive mineralization evolved in one or more staging chambers in the shallow crust.

Outline of Studies Major: Geology Minor: Geochemistry Educational Career BS, Indiana University, 1983 MS, Indiana University, 1989

Committee in Charge Professor Edward Ripley, Chair, Earth and Atmospheric Sciences (855-1196) Dr. Lisa Pratt Dr. Robert Wintsch Dr. James Brophy

Approved:

Edward Ripley, Chair

(Any member of the Graduate Faculty may attend. As a courtesy, please notify the Committee Chair in advance).

APPENDIX 5 OUTSIDE COURSES APPLICABLE TO THE DEGREES

Outside Courses

(Note: This is not an exhaustive list, other subjects may be taken with permission of the Graduate Committee and the Graduate School.

All students are advised to consult the Director of Graduate Studies if you want a course at the 400 level or below to count for graduate credit.)

	Mathematics	
Applied N	lathematics	Cr hr
M301	Linear Algebra and Applications	3.0
M303	Linear Algebra for Undergraduates	3.0
M311	Calculus III	3.0-5.0
M312	Calculus IV	3.0
M343	Introduction to Differential Equations w. Applications I	3.0
M344	Introduction to Differential Equations w. Applications II	3.0
M415	Elementary Complex Variables w. Applications	3.0
M441	Introduction to Partial Differential Equations w. Applications I	3.0
M442	Introduction to Partial Differential Equations w. Applications II	3.0
Statistics	and Probability	Cr hr
K310	Statistical Techniques	3.0
M360	Elements of Probability	3.0
M365	Introduction to Probability and statistics	3.0
M366	Elements of Statistical Inference	3.0
M463	Introduction to Probability Theory I	3.0
M464	Introduction to Probability Theory II	3.0
M466	Introduction to Mathematical Statistics	3.0
M467	Advanced Statistical Techniques I	3.0
M468	Advanced Statistical Techniques II	3.0
E538	Statistics for Environmental Science	3.0

APPENDIX 5: OUTSIDE COURSES

	Computer Science	
A304	Introductory C++ Programming	2.0
A306	Object oriented programming in C++	2.0
A346	User Interface Programming	3.0
C201	Introduction to Computer Science	4.0
C202	Introduction to Software Systems	4.0
C311	Programming Languages	4.0
C335	Computer Structures	4.0
C343	Data Structures	4.0
M371	Elementary Computational Methods	3.0
M471	Numerical Analysis I	3.0
M472	Numerical Analysis II	3.0
	Physics	
P302	Elementary Electronics	2.0
P421	Digital Electronics and Microprocessors	3.0
P422	Analog Electronics and Semiconductor devices	3.0
P431	Electronic Laboratory I	2.0
P432	Electronic Laboratory II	2.0
	Chemistry	
C315	Chemical Measurements Laboratory I	3.0
C317	Equilibria and Electrochemistry	2.0
C318	Spectrochemistry and Separations	2.0
C364	Introduction to Basic Measurements	3.0
C501	Chemical Instrumentation	3.0
5515	SPEA	3.0
E515	Vector-based Geographical Information Systems	3.0
E526	Applied Math for Environmental Science	
E536	Environmental Chemistry Statistics for Environmental Science	3.0
E538	Statistics for Environmental Science	3.0

APPENDIX 6

400-LEVEL COURSES THAT CAN BE APPLIED TOWARD GRADUATE CREDIT

EAS 400 Level Courses that Count for Graduate Credit Within the Department of Earth and Atmospheric Sciences

E404, Geobiology

E406, Introduction to Geochemistry

E411, Invertebrate Paleontology

E413, Introduction to Earth Physics

E415, Geomorphology

E416, Economic Geology

E417, Optical Mineralogy

E418, Igneous and Metamorphic Petrology

X420, Regional Geology Field Trip

E423, Methods in Applied Geophysics

E427, Introduction to X-Ray Mineralogy

X429, Field Geology in the Rocky Mountains

E451, Hydrogeology



FULFILLING the PROMISE