

Geological Sciences

Graduate Student Handbook

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Iowa State University
College of Liberal Arts & Sciences
Department of Geological & Atmospheric Sciences

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General Information

This handbook is intended to help guide you through the graduate program in Geosciences by providing you with information about the geology program within the Department of Geological and Atmospheric Sciences, requirements related to M.S. and Ph.D. programs, departmental procedures, and deadlines.

Admission Requirements

Requirements for full admission in Geological Sciences are as follows:

1. The Graduate Records Examination (GRE) for the verbal, quantitative and analytical writing sections. GRE scores are required for evaluation of your application.
2. Three letters of recommendation. Letters should be from instructors or employers familiar with your academic abilities, at least two letters should be from persons in your major field.
3. A minimum Test of English as a Foreign Language (TOEFL) total score of 79 (internet-based, with minimum scores of 17 in the speaking and writing sections, 550 for paper-based) for non-English speaking applicants. In lieu of a TOEFL score, a minimum score of 6.5 is required for the International English Language Testing System (IELTS). A minimum PTE Academic score of 53 is also required. Your application will not be processed until the Department receives these scores.
4. Statement of purpose describing your research interests and future plans. Identify faculty with whom you would like to work and state whether you have corresponded with them. Students will be admitted into the graduate program *only* if there is agreement by a faculty member to work with that student.
5. Undergraduate degree with a GPA of greater than 3.00 (on a 4.00 scale) or completion of 9 to 14 credits of graduate coursework with grade B or better in all courses or completed 15 or more credits of graduate coursework with a GPA above 3.00 and no F grades

Graduate English Requirements

Requirements for Native Speakers

There is no formal requirement for native speakers.

Requirements for Non-Native Speakers

Graduate students whose native language is not English and who do not have a bachelor's degree from ISU must take the English Placement Test at the beginning of their first semester of enrollment. This test is required by the Graduate College and is administered by the Department of English. It must be taken in addition to the TOEFL (Test of English as a Foreign Language), which is taken as part of the admissions process, unless the TOEFL score is 270 or above (internet-based) or 640 or above (paper-based). Graduate students who are not native speakers of English and who will serve as a teaching assistant must also take the Oral English Certification Tests (OECT). Students from the English-speaking countries of Australia, Canada, New Zealand, Ireland, or the United Kingdom are exempted from the OECT. Students with sufficient TOEFL, and IELTS scores can also be exempted the OECT (see <http://www.grad-college.iastate.edu/speakteach/homepage.php> for more information).

Expectations of Writing Standards for Dissertations, Theses, and Creative Components

A dissertation, thesis, or a creative component submitted as partial requirement for the M.S. and Ph.D. degrees is expected to be written in a professional manner and should meet a standard equal to that of a leading scientific journal. Students, rather than faculty advisors, are ultimately responsible for ensuring that drafts of the dissertation, thesis, or creative component meet a high standard. The Graduate College offers electronic theses/dissertation (ETD) seminars to clarify Iowa State University's publishing requirements, submission procedures, and common problems for graduate theses, dissertations, and creative components. Information can be found at (<http://www.grad-college.iastate.edu/current/thesis/seminars/>).

Academic Standards

If a graduate student, M.S. or Ph.D. candidate, does not maintain a cumulative 3.0 grade point average on all course work taken, exclusive of research credits, he or she is placed on academic probation. Grades earned by graduate students in undergraduate courses are included in the calculation of the grade point average.

While on academic probation, a student cannot be admitted to candidacy for a degree and usually cannot be appointed to an assistantship. The Graduate College places a hold on future registration to ensure that registration does not take place without a review by the Department. Before the student registers for the next term, it is necessary for the Department to review his or her record and recommend whether the Graduate College should continue to permit registration.

Before graduation is approved, the student must complete all courses listed on the Program of Study with a "C" (2.0) or above and have an overall 3.0 average, unless an exception is recommended by the student's committee and approved by the Graduate College.

In order to remain eligible to receive financial aid from student aid programs, a student must meet both qualitative and quantitative academic standards. Qualitative standards refer to minimum expectations of academic performance in course work; quantitative standards refer to limits on the number of semesters in which enrollment is permitted in combination with a minimum number of credit hours to be earned per year. The Student Financial Aid Office (<http://www.financialaid.iastate.edu/>) can provide more details.

Graduate Learning Goals

1. Demonstrate comprehensive understanding of scholarly literature in the area of study.
2. Form testable hypotheses and articulate research objectives that, when met, will lead to significant contributions to the field of study.
3. Conduct qualitative and/or quantitative research via appropriate acquisition, analysis, and reporting of data.
4. Interpret research results appropriately, integrating them into the existing knowledge in the discipline.
5. Clearly and accurately communicate research findings orally and in writing, and often through the use of images (tables, figures, and other forms of imagery) and electronic or other forms of media.
6. Articulate how the graduate program, including coursework and creative scholarship, fits into life and career goals.
7. Conduct scholarship, in teams or with independence, in ways that consistently demonstrate ethical practice and professionalism.

Financial Support

Assistantships

Teaching assistantships (TA) are available from the Department of Geological and Atmospheric Sciences and other departments including the Department of Chemistry on a competitive basis for students admitted on a full-time basis. Research assistantships (RA) are generally provided from the research grant of an individual faculty member. The current stipend for a 1/2-time RA, TA, or DA is \$18,000 per academic year (i.e. \$2,000/month). Additional RA support may be available during the summer semester. At the beginning of a semester, students supported by assistantships are expected to report to their major professor or to the instructor of record they will be assisting as early as possible in the week prior to when classes begin.

Teaching assistantships play a crucial role in the teaching mission of the department and generally involve 20 hours per week in the form of preparation, teaching, and grading for laboratories and courses. To be eligible for a TA, a student must have very good teaching and adequate English-speaking skills, and a background in geology or chemistry. Teaching duties are usually assigned by an appointed faculty member based upon class schedules, previous experience, and at the request of individual faculty members. If you have been given a TA, provide your class schedule to the faculty member in charge of TA assignments as soon as it becomes available prior to the appropriate semester. Before a student can be considered for a TA from the geology program, he/she must have taken physical and historical geology courses (with labs) previously or while enrolled as a graduate student in the Department of Geological and Atmospheric Sciences. A student may petition to teach an upper level geology courses but only after the student has taken the physical and historical geology courses. For a student to be considered for a TA in the Department of Chemistry, he/she must have completed two semesters of university level chemistry with a grade of B+ or better for each course.

Teaching assistantships that involve the use of samples (e.g., minerals, rocks, fossils) and/or equipment for teaching include the responsibility of returning those samples and equipment to where they are stored and in the state they were found. Leaving samples/equipment in disarray at the end of the semester can ultimately result in loss of TA support in future semesters.

For students receiving a TA provided by the Department of Chemistry, the following rules apply:

1. TAs who do not attend the first organizational meeting of the semester will not be paid from the beginning of the TA appointment until the first day that they return to work. In fall, the start date is August 16th; in spring, it is January 1st. TAs are to be back and ready to work on Wednesday morning the week prior to the start of classes. TAs are not be paid for days when teaching responsibilities are missed due to personal travel.
2. TAs who miss teaching responsibilities prior to the end of final's week will not be paid for any days following the missed work through the end of the appointment. In the fall and spring semesters, this means no pay from the date that they leave through December 31st and May 15th, respectively.
3. TAs who miss teaching responsibilities either the week prior to or following Thanksgiving or spring break will not be paid starting from the date of the first missed work assignment and until they return to ISU including the five days of recess or break.
4. When a TA accepts a position, they have a professional obligation to teach for the complete academic semester, including attending the organizational meeting(s) held the week prior to the start of a semester and through the end of final exam week. Teaching assistants do not have paid vacation days. There are circumstances when an individual may not be able to fulfill her or his teaching obligations (illness, funeral, family emergency, etc.); under these circumstances, the TA must work with the course instructor and support staff (laboratory personnel and/or the undergraduate chemistry office) to assure that his/her classes are covered.
5. In cases of illness, a funeral, a family emergency, or other extraordinary circumstances that prevent a TA from fulfilling their teaching responsibilities, he/she shall follow specific course policies for notifying the teaching supervisor and finding a replacement. Teaching assistants in general chemistry must contact personnel in the undergraduate chemistry office (1608 Gilman Hall). It is

critical that TAs keep Renee Harris and Lynette Edsall fully apprised of their situation. If the absence is because the TA will attend a professional meeting, he/she must find a replacement that is acceptable to their teaching supervisor at least two weeks prior to the meeting. The TA must cover all teaching obligations

Research assistantships are assigned in order to allow a student to aid a faculty member in their research. The interests of the student are matched with those of a faculty member, and the work generally leads to thesis or dissertation research.

A departmental assistantship may be offered to assist the Department in a wide variety of non-teaching and non-research related duties (up to 20 hours per week).

Summer assistantships may be available on a part-time or full-time level. Duties vary widely but usually involve assisting faculty in their research. Note that if you receive a summer assistantship you must register for at least one credit.

Additional support is normally provided for graduate students holding an assistantship. A student on full admission with a 1/2-time assistantship receives a Graduate Tuition Scholarship for 50% of resident tuition, with the remainder being covered by the department via a Morehouse Fellowship. Students who are candidates for doctoral degrees receive a scholarship award that pays 100% of the in-state tuition costs. New students wishing to apply for financial assistance for the coming academic year should do so as early as possible but before January 1 of the prior year. Offers of financial assistance will generally be made in February or early March, and acceptance or rejection of the offers by the prospective student is normally required by April 15.

A few appointments may become available during the academic year. If you graduate at mid-year and qualify for financial support, you should begin your graduate study in the Department of Geological and Atmospheric Sciences without delay.

Assistantship Time Limit

The time limit for assistantships will vary depending on the type of support. Teaching assistantships are given on a year-by-year basis at the discretion of the Chair of the Department in consultation with the faculty. Assistantship support will be continued depending on satisfactory evaluations from previous teaching assignments, adequate progress in thesis-related research, and whether departmental deadlines (such as POS meeting or Ph.D. preliminary examinations) have been met.

Graduate assistantships (i.e., teaching assistantship (TA) + research assistantship (RA)) will be for no more than 2.5 years for students seeking M.S., 4 years for a Ph.D. student already with an M.S., and 5 years for a Ph.D. student with no M.S., commencing from the first semester of enrollment. No more than 2.5, 4, or 5 years of support, respectively, can be in the form of a TA regardless of which department is providing the TA. Up to two additional semesters of assistance may be provided to Ph.D. students with support coming in the form of a RA from their major professor.

Benefits

Insurance: All C-base graduate assistants (TAs, RAs, and DAs) receive single-student medical insurance coverage free of charge under the ISU Student Health Insurance Plan. Coverage for hospital, accident expenses, surgical care, and maternity care are included. For more information, please consult the Graduate Student Handbook prepared by the Graduate College and or consult the Human Resource Services Department (benefits@iastate.edu). Graduate assistants will also be eligible for up to six weeks of paid maternity or paternity leave, provided by the Graduate College and the College of Liberal Arts and Sciences. Maternity or paternity leave requires that the remainder of the semester is covered by either teaching or research assistantship to qualify for the paid six-week benefit.

Holidays: All employees, regardless of appointment base, are not required to be at school during official holidays, which include New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day

and the Friday after Thanksgiving, Christmas, and two additional days each year determined by the President and ISU Administration.

Travel to meetings

Students who are traveling to a professional meeting are eligible to receive direct support from the Department (\$300 from alumni funds) if they are giving a presentation at the meeting and have applied for a PAG (see below).

Research Grants

Although in most instances your major professor will be able to provide funds to cover research costs associated with your research project, this may not always be the case. Students should attempt to support the costs by applying for research grants from various sources. Grants that have been commonly awarded to students in Geosciences are listed below. Application forms for these grants can be obtained, as noted, on-line. Always talk to your major professor about grants that are specific to your field before applying.

Graduate Student Professional Advancement Grants (PAG)

PAGs are provided for ISU graduate students by the Graduate College and the Graduate Student Senate (GSS). Funds may be granted for attending a professional meeting, defined as a gathering of an organized society of professionals for the purpose of presenting research papers. PAGs may also be provided for attending professional workshops that provide "hands-on" experience not available at ISU. If at a professional meeting the student is presenting results of research generated at ISU, the travel grant is \$200.

Each graduate student is eligible to receive one PAG per fiscal year (July 1 through June 30). Each request must be approved by the major professor, Department Chair, and academic dean. Applications should be submitted as early in the Fall and Spring semesters as possible as funds are usually depleted by November 15 for the Fall funding period and April 1 for the Spring funding period. The forms are found at <http://www.gpss.iastate.edu/professional-advancement-grants>.

Geological Society of America Research Grant

Grants from GSA are to provide partial support of master's and doctoral thesis research. A maximum of \$2500 per award can be provided to an individual student. A new application is submitted each year. In general, grants can be used for cost of travel, for room and board and travel in the field, for cost of materials and supplies, and for other expenses directly related to the fulfillment of the research project. Applications must be submitted on-line by February 1. Guidelines and the application form can be found at http://www.geosociety.org/GSA/Education_Careers/Grants_Scholarships/Research_Grants/GSA/grants/grdgrants.aspx.

Sigma Xi, Grants-in-Aid of Research

Sigma Xi provides partial support of master's and doctoral thesis research. Awards range from \$400 to \$1,000. In general, grants can be used for cost of travel, for room and board and travel in the field, and for other expenses directly related to the fulfillment of the research project. There are March 15 and October 1 application deadlines. Information can be found at <https://www.sigmaxi.org/programs/grants-in-aid>.

Society of Economic Geology Foundation Research Grants and Graduate Student Fellowships

The Society of Economic Geologists (SEG) provides partial support of master's and doctoral thesis research for graduate students involved in the study of ore deposits. Individual grants are for one year and typically range from \$1,000 to \$5,000. These grants support graduate student research projects leading to masters or doctoral degrees. The application deadline is February 15. Information can be found at the SEG web site: http://www.segweb.org/SEG/Students/Student_Research_Grants/SEG/_Students/Student_Research_Grants.aspx. In addition, Graduate Student Fellowships, ranging from \$2,500 to \$15,000 are also provided. The

deadline for this one-year fellowship is February 1. Information about the fellowship is given at http://www.segweb.org/SEG/Students/Graduate_Student_Fellowship_Program/SEG/_Students/Graduate_Student_Fellowship_Program.aspx?hkey=22f4e3e5-43b2-4fe1-8785-83ce723dc82f.

American Association of Petroleum Geologists, Grants-in-Aid of Research

AAPG provides grants to those students whose studies relate to the search and development of hydrocarbons and economic sedimentary minerals and/or to environmental geology as it pertains to the petroleum industry. Applications are judged partly on merit and partly on the financial need of the applicant. Grants are to be applied to selected expenses of graduate study such as field work. Grants range from \$500 to \$3000 and applications must be submitted by February 15. Information about the grant application process can be found at <http://foundation.aapg.org/students/graduate/giaprogram.cfm>.

American Geophysical Union Travel and Research Grants

AGU's travel grants provide financial assistance to students who are presenting for the first time an oral/poster presentation as first author at an AGU meeting. Application requirements and funding amounts vary by the meeting attended. More information about travel grants can be found at <http://education.agu.org/grants/travel-grants/>. AGU also provides grants to aid student research that are specific to different sub-disciplines of the geosciences (<http://education.agu.org/grants/>).

Guidance for New Students

Registration

Graduate students should register on AccessPLUS as soon as the time period opens for them. This will ensure that courses are not cancelled due to low enrollment. A reference number is required for all courses. General course numbers are listed on the Registrar's website. DeAnn can give you the reference numbers for research and special topics. These reference numbers stay the same for semester to semester.

Office Space

New students are generally assigned a desk in one of many office spaces in Science Hall and should expect to share space with one or more students.

Photocopying and Printing

Students may be given a code by their advisor for research copying. Students will be assigned codes for teaching-related copying and personal use by DeAnn. The photocopier has scanning capability. DeAnn will provide the password for LaserJet TA printing in the computer lab (room 255, Science Hall).

Add/Drop Slips

Students can use Web Registration to process drops until the fifth day of classes. After the fifth day of classes, a Request for Schedule Change or Restriction Waiver (Add/Drop Slip) form is needed for any changes to the class schedule. A class is **not** automatically dropped if a student does not attend lectures or laboratories. Add/Drop Slips require the signatures of the major professor, instructor, and the Department Chair/Graduate Dean. A pass/no pass grading option is also offered. The Add/Drop Slip is used to designate this option. The pass/no pass option requires the signature of only the major professor. The forms are available in room 253, Science Hall.

Mail Boxes

All students will have an assigned mailbox located in the departmental copy room (room 252 Science Hall).

Travel Authorization

Students on assistantships must fill out a Travel Authorization Form if leaving the state of Iowa during normal school session. The form is available on the department's web page at <https://iastate.app.box.com/s/7ahii00ztgn5xbkline39/file/15180694561>.

Laboratory Safety Training

If you will be working in one of the Department's laboratories, it will be necessary for you to undergo training through the Environmental Health and Safety (EH&S) Office on campus, prior to beginning your work. Students should visit the EH&S Learning Center (<http://www.ehs.iastate.edu/my-eh-s/training>) to see what training will be required before they begin working in a lab.

Each departmental laboratory may have a slightly different set of safety rules, which is to be followed explicitly. No unauthorized experiments will be allowed in any Department lab, and proper protective equipment (safety glasses, lab coats, etc.) should always be worn. See the supervisor of the lab in which you wish to work for specific details.

Some laboratory operations may require that you use some sort of a respirator to ensure your safety. See your laboratory supervisor to be sure. Special training is required in this instance, as well (see EH&S). If you have any additional concerns about laboratory usage or safety, please contact Alison Whale in Geological Sciences.

Policy on Racial/Ethnic and Sexual Harassment

The Department of Geological and Atmospheric Sciences emphasizes and reaffirms its commitment to maintaining a working and learning environment free from racial/ethnic and sexual harassment. Anyone who believes that she or he has been subject to racial, ethnic, or sexual harassment may elect to proceed informally by bringing the complaint directly to the attention of an appropriate administrator, or by filing a complaint with the Affirmative Action Office. Students may obtain information about the University's harassment policy and resolution procedures in several offices (Dean of Student's Office, Student Counseling Services, and the Sloss Women's Center). The university policies on discrimination and harassment can be found at <http://policy.iastate.edu/policy/discrimination/>. Resources for students who may be victims of sexual misconduct can be found at <http://www.dso.iastate.edu/sexualmisconduct/>.

The Department requires all admitted graduate students to take a web-based Racial/Ethnic and Sexual Harassment Training, available through the AccessPlus System. To start, login to AccessPlus, click on the Employee tab, click on Web-based Training, and click on an appropriate training tab (Racial/Ethnic Harassment Prevention or Sexual Harassment Prevention). Follow training instructions.

Internet/E-Mail

Information on setting up your ISU email account can be found at <http://www.it.iastate.edu/services/category/email>.

Keys

Keys will be issued upon request of the major professor. The application for building, room, and laboratory keys is completed in 253 Science Hall. Processing of key applications may take up to two days. Keys must be returned to the Key Issue Desk, Facilities, Planning and Management Building, prior to graduation. There is a \$25 fine per lost key.

F-1 and J-1 Credit Requirements

Information for international students can be found on the International Students and Scholars website. <https://www.isso.iastate.edu/>.

Graduate-Level Geology Curriculum

Course #	Course Title	Sem. of Offering
502	Watershed Hydrology	F
506	Geology Field Course	Alt. S (even years)
507*	Midwestern Geology Field Trip	F
509	Field Methods in Hydrogeology	Alt. Sum. (even years)
511	Hydrogeology	F
512	Micropaleontology	Alt. F
514	Applied Groundwater Flow Modeling	Alt. S
515	Paleoclimatology	Alt. S
516	Hydrologic Modeling and Analysis	Alt. S
519	Aqueous and Environmental Geochemistry	F
520	Mineral Resources	Alt. F (even years)
526	Stable Isotopes in the Environment	Alt. S
530X	Principles of Radiometric Dating	Alt. F
544	Petroleum Geoscience and Engineering	Alt. S
551	Applied and Environmental Geophysics	Alt. S
552	GIS for Geoscientists	F
555/555L	Environmental Soil Mineralogy/Laboratory	Alt. F
557	Seismic Methods in Geology, Engineering, and Petroleum Exploration	Alt. S
558	Introduction to the 3D Visualization of Scientific Data	
559X	Quantitative Methods in Geology	Alt F
568	Applied Geostatistics for Geoscientists	F
574	Glacial and Quaternary Geology	Alt. S
579	Surficial Processes	F
583X	Environmental Biogeochemistry	Alt. S
587	Microbial Ecology	F
588	GIS for Geoscientists II	Alt. S
589/589L	Survey of Remote Sensing Technologies/Laboratory	F
590	Special Topics*	F, S, Sum.
595A	Graduate Seminar: Presentation Required	S
595B	Graduate Seminar: Attendance Only	F
599	Creative Component	F, S
699*	Advanced Seminar Research	F, S F, S, Sum.

*Topic varies. May be taken more than one time.

Seminar Requirements

All full-time students are required to enroll in Geol 595 [*Graduate Seminar*], which has two parts: Geology 595A, which must be taken every spring semester (1 Cr.) and Geology 595B (R cr.), which must be taken every fall semester. Speakers in the departmental seminar series are lecturers invited from outside of the Department across the full spectrum of the geosciences. All graduate students are expected to attend seminars; lack of attendance will result in a failing grade for the semester. Geol 595B during fall semester requires only attending the seminars. Geol 595A requires both attending the seminars and participating in the Geology Graduate Student Seminar. A maximum of two credits from Geol 595A can count toward a graduate degree.

Geology Graduate Student Seminar

During the spring semester, a day, usually the Friday afternoon and Saturday before the week prior to the spring break, is devoted to the presentation of meeting-style talks by graduate students. The goals of this seminar day are twofold. Graduate students gain experience in public speaking in front of their peers and the entire faculty. This experience provides useful practice for the presentations that students are required to give at a scientific meeting. Also, these talks acquaint everyone in the Department with everyone else's research. This exchange of information is vital to any scientific mission. Cash prizes are awarded for the best student papers presented at the seminar program. All graduate students are also required to give at least one presentation at a scientific meeting prior to graduation.

Each graduate student enrolled on a full, provisional, or restricted basis is expected to present a professional quality presentation, which is generally of 15 minutes length with 5 minutes for questions (20 minutes total) at each Geology Graduate Student Seminar. Students are expected to give a presentation on the results of their current research project unless they are in the first year of enrollment in the Department. First-year M.S. students may give a presentation on any geological topic, whereas first-year Ph.D. students may give a presentation on a previous research project. Non-thesis M.S. students must present a minimum of two seminars during their program.

The following exceptions to presenting a seminar may be made to students:

1. whose defense date has been approved by the Graduate College at least two weeks prior to the seminar.
2. who have medical emergencies.
3. who have other legitimate emergencies (subject to approval from the Chair). Students should not request an exemption unless they have discussed the matter with their adviser and have their adviser's approval to petition the Chair.

Any student who is granted an exception for reasons 2 or 3 above must give a seminar in the Department at the earliest possible time following the Geology Graduate Student Seminar or at the latest possible time prior to it.

Program of Study (POS)

A POS Committee guides the graduate program of the graduate student and suggests courses necessary for a student's area of specialization. A student with deficiencies in his or her training will be required to correct them by taking appropriate courses recommended by the POS Committee. The POS Committee assures departmental requirements are met before signing the POS form. Students are encouraged to establish a POS Committee as soon as the major professor is selected. A Recommendation for Committee Appointment must be approved by the Graduate College at least two weeks before the POS meeting. The student forms a POS Committee and schedules a POS meeting by the end of the second semester of graduate study. The student must notify the Graduate College of the results of the meeting by filing the appropriate forms, in order to remain in consideration for financial support from the Department in following semesters. The Recommendation for Committee Appointment form and other important forms can be found at <http://www.grad-college.iastate.edu/forms/forms.html>.

The POS form is filled out by the student, and approved by committee members, and the Director of Graduate Education (DOGE) before being submitted to the Graduate College.

All changes to an approved POS must be done electronically and resubmitted to the Graduate College with the agreement of the student, major professor, and the DOGE. Major changes, such as course substitution, changing from thesis to non-thesis, or vice versa, and deletion or addition of a declared minor, require POS Committee concurrence and the signature of the DOGE on a resubmitted POS form before approval from the Graduate College is sought.

The following requirements have been established by the Graduate College and the Department for the makeup of a POS Committee:

M.S.

- a. The POS Committee has at least three members.
- b. Two members, including the major professor, must be from the Geology Program of the Department. The committee must also include one or more members from different fields of emphasis, although these committee members may be from the Geology Program.
- c. All committee members must belong to the Graduate Faculty of the University.
- d. If a minor is being pursued by the student, a member of the advisory committee associated with the minor (see ISU General Catalog) must also be on the POS Committee.

Ph.D.

- a. The POS Committee has at least five members.
- b. All committee members must be members of the Graduate Faculty.
- c. At least three POS Committee members must be from the Geology Program. The committee must also include one or more members from different fields of emphasis, although these committee members may be from the Geology Program.
- d. If a minor is being pursued by the student, a member of the advisory committee associated with the minor (see ISU General Catalog) must also be on the POS Committee.

Graduate Degrees in Geological Sciences

M.S. Program

The Geology Program of the Department of Geological and Atmospheric Sciences offers M. S. degrees in Geology and in Earth Science, and acts as a home department for the interdepartmental M.S. degree in Environmental Sciences. The faculty work with students enrolled in each of these programs to assure that their Programs of Study will have appropriate breadth in the Earth sciences while permitting suitable specialization. Students in any of the M.S. degree programs are encouraged to take relevant course work outside of the Department and to take additional elective courses beyond the minimum specified in this document.

Candidates for the M.S. degree in Geology and for some degrees in Earth Science complete a thesis based on the candidate's original research. Candidates for M.S. degrees with a non-thesis option must prepare a scholarly paper (a "creative component") based on the candidate's interpretation of observations or ideas in the geologic literature. A thesis or creative component may also include requirements established by the Graduate College, and must be written in a form that, with only minimal modification, can be submitted for publication in a scientific journal, book, field guide, or other appropriate portion of the professional literature.

The candidate must defend the thesis or creative component before the Program of Study Committee and other faculty members who desire to attend. The date, time, and place of the defense must be publicly announced. Copies of the thesis or creative component must be given to committee members at least two weeks in advance, and the candidate must place a review copy of the thesis or creative component in the

departmental office at least one week before the defense. The major professor presides at the defense and gives all interested faculty members the opportunity to question the candidate. After a thesis defense, the Program of Study Committee determines whether the thesis represents the results of original research, is a worthy contribution to the field, and has been adequately defended. Affirmation of these three conditions constitutes acceptance of the candidate's thesis. In a similar way, the Program of Study Committee determines whether a creative component is the candidate's individual accomplishment, is a worthy contribution to the field, and has been adequately defended. A creative component is acceptable if it meets those criteria.

All candidates for M.S. degrees in the Geology Program must participate in giving and attending departmental seminars. This requirement is met by enrolling in Geology 595 [*Graduate Seminar*] fall and spring semesters (one credit awarded in spring). Candidates must also participate in the Department's Annual Geology Graduate Seminar by making a formal presentation and engaging in the critical evaluation of research results (see earlier guidelines).

The requirements outlined above have been designed to permit completion in approximately four semesters. The Department discourages programs requiring a longer time span, as financial support for M.S. degrees is no longer than five semesters.

Students are responsible for seeing that the requirements for a graduate degree are satisfied and that they have met the appropriate deadlines for filing forms with the Department or the Graduate College. Students should read the Graduate College Handbook (<https://www.grad-college.iastate.edu/handbook/>) and be aware of the Graduate College's guidelines for theses and dissertations (<http://www.grad-college.iastate.edu/current/thesis/>).

Course Requirements: M.S. in Geology

The Department requires for the M.S. degree in Geology a minimum of thirty (30) credits of graduate-level courses distributed as follows:

- I. Fourteen (14) credits in formal Geology courses numbered 500 or above.
- II. Ten (10) credits of elective courses in Geology or in other disciplines relevant to the student's field of interest.
- III. 6 credits of research [*Geology 699*]*.

*A student may take more than 6 credits of research, but may not apply more than 6 credits of research toward the 30 credit total required for graduation.

In addition to these requirements, a student in the M.S. program is required to register for Geology 595 [*Graduate Seminar, parts A and B, see explanation on page 9*] each time it is offered, including participating in the Annual Geology Graduate Student Seminar, and must do at least one presentation at a scientific meeting.

M.S. Degree in Earth Science (Non-Thesis Option)

The objective of the non-thesis option is to provide non-traditional students with M.S. degrees that require coursework and a Creative Component.

Degree Requirements for Earth Science

1. Requirements for the M.S. degree, non-thesis option (30 credits). Of the total 30 credits, at least 24 credits of Geology and/or supporting coursework and 3 to 6 credits of Creative Component (Geology 599). The Program of Study (POS) Committee and the student's research will determine the coursework.

2. At least two semester of Geology 595A [*Graduate Seminar*], which includes participation in the Annual Geology Graduate Student Seminar Day. Two seminars will be given during the course of the degree.
3. Candidates will produce a Creative Component that represents substantial evidence of individual accomplishment in the form of a written report. The Creative Component will be defended orally before the POS committee. A final copy of the Creative Component will be filed with the Geology program office with a copy being sent to the Graduate College.

Additional Rules

1. Students that apply for the non-thesis option in Earth Science will not be considered for a teaching assistantship. Individual advisors may provide funding for a research assistantship.
2. Students pursuing the regular M.S. in Geology or Meteorology may switch to the M.S. in Earth Science degree during their stay at ISU; however, this will be allowed only under unusual circumstances. The switch of a major requires approval of the Major Professor, the members of the POS Committee, and the Department Chair.
3. Students that are pursuing the M.S. in Earth Science may be admitted later to the M.S. degrees in Geology or Meteorology, provided that the student shows research promise and identifies an advisor. Granting of a teaching assistantship is dependent on the availability of departmental funding.

Ph. D. Program

Statement of Philosophy

The Ph.D. degree program emphasizes independent scholarly research; it prepares a graduate for leadership in the scientific community. A creative and productive scholar must have a good comprehension of basic principles, a capacity for critical and independent thought, and strong intellectual curiosity. In the evolution of a scholar, there is a transition from the stage where the primary concern is that of building a foundation to that in which the primary concern is extending knowledge through original research. The transition is a function of intellectual development and is different for each individual. The transition occurs when an individual has mastered sufficient knowledge to allow critical evaluation of material in the field of study. The extent to which an individual develops and exercises intellectual curiosity determines the ultimate success of that individual as a scholar.

Graduate study for the Ph.D. degree is intended to develop scholars. In the early stages of the program, a firm comprehension of basic principles should be of primary concern. As graduate study progresses, the student should develop a disciplined skeptical mind and a strong intellectual curiosity. These skills should be honed during the latter stages of graduate study by the development of a dissertation that will be a significant contribution to the field chosen.

Students who are granted admission to the Ph.D. program in the Geology Program normally hold a master's degree. However, students without a master's degree but with particularly strong qualifications, as assessed by the departmental Graduate Application Evaluation Committee, can be admitted directly to the Ph.D. program. Students who enroll as candidates for the M.S. degree can later continue, with no break in residence, for the Ph.D. In such a case, a student may petition the Department for waiver of the M.S. degree; such a petition may not be made until the student has successfully completed 18 credits of graduate-level course work, and can be no later than the end of the third semester of residence. The petition involves a statement (approximately 1 page in length) concerning the reasons why an M.S. degree should be waived and the nature of the proposed project. Waiver of the M.S. requires approval by the departmental faculty. For student's without an M.S. degree, formal coursework equivalent to the requirement for a Master's degree in the department must be completed.

Stages of the Ph.D. Program

The Ph.D. program has two stages: pre-candidacy and candidacy. The pre-candidacy stage is largely a program of course work designed to broaden and strengthen the student's fundamental knowledge, particularly in areas related to the dissertation topic. The candidacy stage consists mainly of research for the dissertation.

At the conclusion of each stage of the program there is a formal oral examination. The Preliminary Examination is taken at the end of the pre-candidacy stage with the goal of assessing the student's research potential and knowledge of related basic principles. The Final Examination is taken at the end of the candidacy stage and is concerned with the subject of the dissertation.

A. The Pre-Candidacy Stage

1. Residence Requirements

A student must be in continuous residence at the university during the pre-candidacy stage, except for interruptions such as the summer months or at other periods approved by the POS Committee. Part-time residence or transfer of credits from another university requires approval of the departmental Graduate Application Evaluation Committee.

2. Preliminary Examination

The student takes the preliminary examination for admission into the candidacy stage by the end of the fourth semester of residence if admitted directly into the Ph.D. program with a bachelor's degree, or by the end of the third semester of residence if admitted into the Ph.D. program with a master's degree. For those students who enrolled originally as M.S. candidates, the preliminary exam is taken by the end of the semester following admission into the Ph.D. program and approval of the POS form. The preliminary examination cannot be taken during the same semester that the POS form (for the Ph.D.) is approved by the Graduate College. The preliminary examination is oral and is intended to evaluate the breadth and depth of knowledge in the field of study and to assess the student's potential to become a creative research scientist.

The Graduate College requires that all active Ph.D. students have an annual review of their progress. The Ph.D. student will meet annually with the POSC to review the following: 1. Milestones or accomplishments reached (this should include academic performance, research activities, publications, presentations, professional improvement activities, institutional or professional service, or other); 2. Challenges (this should include any obstacles that have presented or hindered your ability to achieve your goals for the year); and 3. Discussion of goals for the coming year. Unsatisfactory progress during the previous year may result in assistantship support not being given in the following year. The form to be filled out by the committee and signed by the student after the annual meeting can be found on the Graduate College web page (see geology program)..

With advice of the POS Committee, the student selects a topic in which to prepare a research prospectus for the examination. The prospectus is a carefully prepared document not to exceed 30 (double-spaced) typed pages, in which the problem and techniques to be used in solving the problem should be discussed in detail. The current status of the proposed field of investigation should be surveyed and important literature cited. The student should also discuss the relationship between the proposed research and broader aspects of earth sciences. The research prospectus should be in the general area of intended dissertation research. In addition, a realistic estimate of expenses necessary for completion of the proposed research should be included. The prospectus need not contain results of original research by the student but must be discussed if data have been collected. The examination committee shall consist of the members of the POS Committee. One copy of the prospectus must be given to each member of the examination committee **at least two weeks prior to the oral exam.**

Content and Form: The examination normally tests general knowledge as it pertains to the student's research prospectus, such as the principles and techniques on which the proposed research is based and on the relationships between the proposed research and other areas of study. Another goal is to evaluate, through questioning based on the prospectus, those attributes--originality, creativity, independent thought, awareness of significant problems in the field--which are important to success in research. Questions concerning other areas of general interest shall also be asked.

Evaluation: Two or more negative votes from the POS Committee constitute failure of the exam. Only one retake of the exam will be allowed; this retake must be done prior to the end of the following semester.

B. The Candidacy Stage

1. Admission

Passing of the Preliminary Examination, plus completion of the university requirements, constitutes admission to candidacy for the Ph.D. degree.

2. Residence and Course Requirements

The total course credit requirement for the Ph.D. is 72 semester credit hours. Credits earned for the M.S. degree may be applied if approved by the POS Committee, with the restriction that no more than 36 semester credits, and no research credits, may be included in the Ph.D. program of study. At least 36 semester credits, including all dissertation research credits, must be earned in residence at the university. A minimum of 18 semester credits of dissertation research must be applied to the 72 credits required for completion of a Ph.D. degree program. A student in the Ph.D. program is required to register for Geology 595 [*Graduate Seminar, parts A and B, see explanation, p. 9*] each time it is offered, including participation annually in the Geology Graduate Student Seminar, and must do at least one presentation at a scientific meeting. A minimum of 12 credits of course work is required for a Ph.D. student. This can include up to 6 credits of Graduate College courses (designated GR ST), as well as Geol 590 and Geol 595 courses.

3. Dissertation

A doctoral dissertation must be completed on a topic in the major field of study and written in a form that is suitable for publication. To be acceptable, it must constitute a significant contribution to knowledge within the field of study and be approved by the student's POS Committee. Final acceptance of the dissertation is dependent upon the donation and cataloging of dissertation specimens or their duplicates and good quality copies of maps, computer programs, etc. used in support of the research in the Department under the supervision of the major advisor. Copies of the completed dissertation must be in the hands of the POS Committee **two weeks prior to the date of the final oral examination**. The Graduate College needs the approval of the committee and program before it can review the final copy of the dissertation. A "Thesis/Dissertation Submission Request" form available from the Graduate College's Web site at <http://www.grad-college.iastate.edu/common/forms/index.php> must be completed and mailed, emailed with an attachment, faxed, or hand carried to the Graduate College office in 1137 Pearson Hall by the deadline published each term. After the form is received, the student is given approval to sign on to ProQuest's Web site and submit their dissertation electronically for review and final deposition. One printed copy of the dissertation needs to be provided to the Department. A copy of the dissertation should be provided for each of the committee members if so requested.

4. Final Examination

A final oral examination will be taken after acceptance of the dissertation by the POS Committee and completion of all other work described for the degree including the presentation of dissertation related work at a regional, national, or international symposium. The final oral examination will be administered by the POS Committee with the major professor serving as chairman. The examination is intended to be a defense of the dissertation. The final examination is open to all interested persons.

5. Revocation of Candidacy

A candidate who has not completed a dissertation within four years after admission to candidacy must submit a written petition to the Departmental Chair for renewal of candidacy. The petition will be presented by the Chair to the full faculty for review. Otherwise, candidacy will be revoked, and the student must terminate work toward the Ph.D. If there is insufficient evidence of progress, the petition may be denied, and the student will be advised to discontinue work.

Geology Graduate Student Organization (GGSO)

The Geology Graduate Student Organization serves to foster academic and social activities among graduate students in geology and Earth sciences within the Department. GGSO oversees the student lounge in Room 176, which includes an eating area, refrigerator, and microwave oven. In addition, GGSO organizes the Annual Geology Graduate Student Seminar day, and helps sponsor outside guest speakers, computer facilities, field trips, and attendance at professional meetings. It also participates in organizing the annual VEISHA concession along with the undergraduate organization, Geology Club.

Geology Computer Lab Guide

General Rules and Suggestions

1. No food or drink is allowed in the lab under any circumstances.
2. Please keep the lab clean and orderly. Anything left lying around is subject to arbitrary removal or disposal.
3. Please keep the door shut at all times. Do not use anything to prop it open, as the lab has been left unsecured and unoccupied on many occasions. Please help keep the lab cooled by leaving the air conditioners running.
4. **IMPORTANT:** Please conserve printer paper by editing your work on-screen. Paper prices are high, and toner cartridges are expensive. Save a tree by editing electronically and by recycling any wasted printouts. If you need to print draft copies of your work, you can conserve paper by using a small font size and narrow margins.

Use of the Computers

The computer labs are intended primarily for class- and research-related work. Anyone using a computer for recreational purposes (e. g., E-mail, web surfing, etc.) should surrender the computer upon the request of anyone wishing to do legitimate work.

All user-generated and personal files must be stored in the D:\USER directory present on each machine (Example: D:\USER\Smith or D:\USER\Joe). Any personal files stored elsewhere on the hard drives are subject to deletion by the system administrators. To ensure that your work is always safe from computer crashes or accidental deletion, be sure to back up your files. Backing files up is your responsibility.

Every semester, all computers will have their hard drives purged of user files. This will always be done with ample warning. Again, be sure to back up your files.

Do not install software on the computers without permission. Since much of the funding for the lab comes from the University, the appearance of software piracy could jeopardize future funds. Any unauthorized software will be deleted.

Please leave the computers running at all times. The computers will enter a power saving state after a prescribed period, so it is best to leave them running.

Please ensure that the doors to the computer labs are locked if you are the last person to leave the labs. Also, please do not provide the lock combinations to anyone. You must sign a computer-lab access agreement in the departmental office before receiving the combination to the doors.

Faculty and Their Research

Beresnev, Igor A., Professor, (515) 294-7529, beresnev@iastate.edu, Ph.D., 1986, Moscow State University, USSR. Earthquake seismology, earthquake source physics, earthquake ground motions, applied geophysics, signal processing, acoustic stimulation of fluid flow in porous media, nonlinear waves.

Caissie, Beth, Assistant Professor, (515) 294 7528, bethc@iastate.edu, Ph.D. 2012, UMass Amherst. Marine sedimentation, paleoclimate, diatoms, Arctic sea ice change during interglacials.

Cervato, Cinzia, Morrill Professor, (515) 294-7583, cinzia@iastate.edu, Ph.D., 1990, ETH – Swiss Federal Institute of Technology. Geoscience education, geoarcheology.

Dawson, Jane, P. Associate Teaching Professor, (515) 294 6302, jpdawson@iastate.edu, Ph.D. 1995, New Mexico. Metamorphic petrology, Proterozoic tectonics.

Franz, Kristie J., Professor and Smith Family Foundation Departmental Chair, (515) 294-7454, kfranz@iastate.edu, Ph.D., 2006, University of California, Irvine. Surface-water hydrology, snow- and rainfall-runoff modeling, ensemble streamflow prediction, and hydrologic applications of remote-sensing data.

Harding, Chris, Associate Professor, (515) 294-4868, charding@iastate.edu, Ph.D., 2001, University of Houston. Human-computer interactions (multi-sensory interfaces), scientific visualization, computational geology, Geographic Information Systems (GIS).

Iverson, Neal R., Professor, (515) 294-8048, niverson@iastate.edu, Ph.D., 1989, University of Minnesota. Geomorphology, glaciology. engineering geology.

Johnson, Ben, Assistant Professor, bjw@iastate.edu, Ph.D. 2017, University of Victoria. Earth history, stable isotopes, numerical modeling.

Reber, Jacqueline E., Assistant Professor, (515) 294-7513, jreber@iastate.edu, Ph.D., 2012, University of Oslo. Structural geology, physical and numerical modeling, experimental studies, tectonics.

Simpkins, William W., Professor, (515) 294-7814, bsimp@iastate.edu, Ph.D., 1989, University of Wisconsin, Madison. Hydrogeology, hydrogeochemistry, and biogeochemistry of till; agricultural water quality, field instrumentation, isotopic dating of groundwater, groundwater/surface water interaction.

Spry, Paul G., Professor, (515) 294-9637, pgspry@iastate.edu, Ph.D., 1984, University of Toronto. Economic geology/mineralogy/geochemistry, stable-isotope and fluid-inclusion chemistry and mineralogy of gold deposits, genesis and conditions of formation of metamorphosed massive sulfide deposits.

Swanner, Elizabeth D., Assistant Professor, (515) 294-5826, eswanner@iastate.edu, Ph.D., 2011, University of Colorado. Geobiology, aqueous geochemistry, geomicrobiology, stable Fe isotopes.

Wanamaker, Alan, Jr., Associate Professor, (515) 294-5142, adw@iastate.edu, Ph.D., 2007, Maine. Climate change, paleoclimate, stable isotope geochemistry.

Wood, Aaron R., Assistant Teaching Professor and Director, Carl F. Vondra Geology Field Station, (515) 294-8862, awood@iastate.edu, Ph.D., 2009, University of Michigan. Vertebrate paleontology, stratigraphy, sedimentology, paleoclimate change.

Zhou Y., Assistant Professor, (515) 294-2842, yuyzhou@iastate.edu, Ph.D., 2008, Physical geography, application of geospatial technologies, geographical information systems, remote sensing, geovisualization, environmental sustainability, environmental change.

Important Items to Remember

1. The POS meeting for M.S. and Ph.D. students must be held before or during the second semester of enrollment in the Department.
2. The Preliminary Exam for Ph.D. students must be taken before the end of the third semester.
3. Admission from the M.S. degree into the Ph.D. program will be by the end of the third semester (after 18 credits of classes have been taken). For those students who enrolled originally as M.S. candidates, the preliminary examination will be taken by the end of the semester following approval of the Ph.D. POS.
4. Notice of announcement of M.S. and Ph.D. defenses will be circulated by the examinee to graduate students and faculty members in the Department at least two weeks prior to the defense.
5. Ph.D. students need to have an annual evaluation of progress with the POSC.