

# Kansas State University

Department of Geology

Graduate Program Handbook 2016-2017

Policies and Procedures



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Dr. Saugata Datta, Ph.D., University of Western Ontario

Dr. Karin Goldberg, Ph.D., University of Chicago

Dr. Pamela D. Kempton, Ph.D., Southern Methodist University

Dr. Matthew Kirk, Ph.D., University of New Mexico

Dr. Brice Lacroix, Ph.D., University of Barcelona, Spain, and University Franche-Comté, France

Dr. Abdelmoneam E. Raef, Ph.D., The University of Science and Technology, Poland

Dr. Joel Q. G. Spencer, Ph.D., University of Glasgow

Dr. Matthew Totten, Ph.D., University of Oklahoma

**Non-Tenure Track Faculty**

Dr. Aida Farough, Ph.D., Virginia Tech

Dr. Michael W. Lambert, Ph.D., University of Kansas

Dr. Keith B. Miller, Ph.D., University of Rochester

Dr. Sabreen Gad, Ph.D., Saint Louis University

**Emeritus Professors**

Dr. Allen Archer, Ph.D., Indiana University

Dr. Robert L. Cullers, Ph.D., University of Wisconsin

Dr. George R. Clark II, Ph.D., California Institute of Technology

Dr. Charles G. (Jack) Oviatt, Ph.D., University of Utah

Dr. Page C. Twiss, Ph.D., University of Texas at Austin

Dr. Ronald R. West, Ph.D., University of Oklahoma

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## Introduction

Kansas State University Graduate School has established regulations for admission and requirements for the successful completion of graduate degrees (<http://www.k-state.edu/grad/>). This document is based on these guidelines, but provides additional information specific to the graduate program offered by the Department of Geology. It is intended to assist potential applicants considering graduate study at K-State and students currently enrolled in the Geology Graduate Program by providing a source of information on administrative requirements for completion of your degree. It also provides a description of the roles, responsibilities, and expectations for graduate students and faculty.

## Program Overview

The Master of Science degree in geology is the level of professional education needed by today's career geologists in corporate or government employment. It is also a routine stepping stone for geologists continuing their studies for the doctoral degree. At K-State the Department of Geology encourages the student to select an area of interest, guides him or her through 24 (or more) credit hours of course work to develop essential skills in that area (including study in supporting sciences where appropriate), and supervises the completion of 6 credit hours of research that will normally culminate in a written thesis. We maintain active research programs in a wide range of geoscience sub-disciplines<sup>1</sup> focused on three broad areas of the geosciences:

### ***Energy and mineral resources***

Description: research for responsible development of Earth's natural resources including research on petroleum source and migration, evaluation and extraction of mineral resources, the biogeochemistry of unconventional natural gas reservoirs, and geological carbon storage.

Graduate Research Faculty: Brueseke, Chaudhuri, Datta, Goldberg, Kirk, Lacroix, Raef, Totten

Teaching Faculty: Lambert

### ***Earth surface processes and the environment***

Description: research for a sustainable future including studies on sedimentary and geomorphic processes, controls on the quality and quantity of water resources, predicting and managing key processes of Earth's Critical Zone, the response of environments to future stresses, and impacts of natural hazards; includes past and present Earth surface processes

Graduate Research Faculty: Datta, Kempton, Kirk, Spencer

Teaching Faculty: Gad, Miller

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<sup>1</sup> chemical hydrogeology, petroleum geology, exploration seismic and near surface geophysics, igneous petrology, volcanology, isotope geochemistry, structural geology, climate change, tidal sedimentation processes, luminescence dating, and biomineralization

### ***Evolution of the Solid Earth***

Description: research for better understanding the processes that have shaped Earth's crust and mantle; how magmas are generated and evolve; links between tectonism, magmatism and ore deposits; and processes of mantle evolution and geodynamics

Graduate Research Faculty: Adam, Brueseke, Kempton, Lacroix

Teaching Faculty: Farough

The department currently (2015-2016) has 11 full-time graduate faculty members, four non-tenure-track faculty and 32 graduate students. The alumni of the geology department have shown their support and their generosity by endowing more than 20 scholarships. In recent years, the total scholarship funding for geology majors and graduate students has exceeded \$90,000 per year, with individual awards ranging from \$1,000 to \$7,500. The department also currently has 11 graduate teaching assistantships, which include a waiver of tuition. Some department funds are available to support field research and the presentation of student papers at meetings. Scholarship support is also available from several regional societies and organizations.

K-State's Department of Geology has active collaborations through a number of organizations, especially the Kansas Geological Survey and the U.S. Geological Survey. Other collaborations are sometimes available through neighboring universities and the geological surveys of other states. We also encourage our students to take advantage of corporate internships to further their research projects.

## **Requirements for Admission**

Requirements for admission, and other geology program policies, are based on those of the K-State Graduate School (see the K-State Graduate School web site for more detailed information <http://www.ksu.edu/grad/>).

Applicants should have a bachelor's degree in geology or a related field, although students with a strong record and willingness to take additional courses to make up deficiencies in geology and related sciences are encouraged to apply. Few with GPAs below 3.0 (on a scale of 4.0) will be accepted, and grade-point averages of 3.3 or higher are most competitive for financial assistance. Students with GPAs lower than 3.0 may be admitted on a probationary basis in some circumstances. The rules for this are described in detail in the university's Graduate Handbook (<http://www.k-state.edu/grad/graduate-handbook/>).

Prospective candidates must meet both the minimum admission requirements for the Graduate school (<http://www.k-state.edu/grad/admissions/application-process/admit.html>) and for the Geology Department. For example, students with a Geology/Earth Science background must hold a minimum GPA of 3.0 in all Geology/Earth science coursework. All international students admitted must demonstrate the same level of achievement as U.S. students.<sup>2</sup>

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<sup>2</sup> This is described in the university's Graduate Handbooks as: "they must hold a degree from an established institution comparable to a college or university in the United States, have an outstanding undergraduate record, have the

All candidates must complete the online application and submit this electronically, along with the application fee, via the Graduate School website at <http://www.k-state.edu/grad>. The department also requires applicants to submit, via the Graduate School, the information summarized below.

1. Transcripts from all colleges/universities attended
2. Statement of Interests and Objectives
  - Statements should briefly describe your interest in the program, previous experience, research interests and your long-term career goals. In addition, you may want to mention one or more KSU faculty with whom you have an interest in working. We suggest contacting specific members of our faculty and looking at faculty research interests as part of the application process. The Statement of Interests and Objectives should be uploaded as part of the online application.
3. Three Letters of Recommendation.
  - A link will be e-mailed directly to the persons listed as your references in your online application; they will submit their letters of reference directly to the graduate school via that link. As part of the online application process, you will need to provide their name, position, institution/company, and e-mail contact information. These letters may be from current or former professors, advisors, employers, or other people you feel are best able to judge your potential for graduate-level course work and your ability to perform graduate-level research in geology, including your ability to work both independently and in teams. If you are applying for a Graduate Teaching Assistantship (see below), at least one of these letters should be about verifying any teaching experience you may have had or, alternatively, your anticipated ability to teach and to communicate effectively.
4. Application for Graduate Assistantship (optional, but recommended).
  - If you wish to apply for a Graduate Teaching Assistantship (GTA) or Graduate Research Assistantship (GRA) funding, check both boxes in the online assistantship application (not the “no preference” option). You will also need to supply additional information about your teaching and research experiences. The Department of Geology is committed to excellence in research and teaching. If applying for a GTA, describe your career and professional goals and aspirations, and how being accepted for a graduate teaching assistantship would benefit these goals and aspirations. Describe any experiences you may have with teaching in various contexts, past and present (e.g. tutor, coach, teaching assistant), and describe the most rewarding aspect of this/these experience(s). Briefly explain your philosophy of education. If you are interested in a Graduate Research Assistantship, you should communicate directly with the faculty member with whom you wish to work to discuss types of projects and availability of funding and reflect these discussions in your state of interest (#2 above).

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demonstrated ability to do graduate work, and provide evidence of language proficiency sufficient for the pursuit of a graduate degree.”

5. Graduate Record Exam (GRE) Scores.
  - You should request that the Educational Testing Service send the scores (verbal, quantitative and analytical) directly to the Graduate School (photocopies of scores are not accepted).
6. English Proficiency Requirements (for applicants whose primary language is not English only)
  - Applicants for whom English is not your primary language should review the “Primary Language” section of the university Graduate Handbook at <http://www.kstate.edu/grad/students/international.html> and submit exam scores (e.g. TOEFL) directly to Kansas State University Graduate School.
7. Affidavit of Financial Support (International student applicants only)
  - Where the geology faculty elects to recommend an international student for admission, that student must complete an Affidavit of Financial Support and mail it directly to the Department of Geology. This will need to be completed before the application package is sent to the Graduate School for processing. The affidavit form may be accessed at <http://www.kstate.edu/grad/forms/affidavit.pdf>.

## Deadlines for Graduate Admission Applications

Applications from U.S. citizens will be accepted at any time, although those received by February 1 will be given preference for financial assistance for fall enrollment. The deadline for receipt of international applications is January 1 for fall (August) enrollment. International students should check with the K-State Graduate School for additional deadlines. Questions should be directed to:

<b>U.S. Citizens and Permanent Residents</b>	<b>International Students</b>
Dr. Matt Brueseke brueseke@ksu.edu Department of Geology 108 Thompson Hall Kansas State University Manhattan, KS 66506-3201	Dr. Saugata Datta sdatta@ksu.edu Department of Geology 108 Thompson Hall Kansas State University Manhattan, KS 66506-3201

## Financial Support

Students may receive financial support in the form of Teaching Assistantships, Research Assistantships, or Scholarships for a maximum of two years (or four semesters). Financial assistance after the fourth semester should not be expected, although undergraduate teaching opportunities or funded research projects occasionally become available and provide support beyond the fourth semester. Support is contingent on making good progress towards timely completion of the degree. Continuation of Teaching Assistantships is contingent on satisfactory teaching evaluation reports.

## Teaching Assistantships (GTAs)

The department currently has 11 GTA positions, approximately half of which are available to incoming graduate students each year. A TA for an M.S. student is a nine-month appointment paying about \$18,000, in addition to a waiver of full-time tuition (up to 10 credit hours in the fall and spring semesters and 6 credit hours in the summer), bringing the total value of the support package to over \$27,900 per year if maximum course loads are taken. In return for the stipend and scholarship, the student works about 20 hours per week teaching and/or assisting in undergraduate labs and classes (see **Annex A** for *Duties and Responsibilities of Graduate Teaching Assistants*). Students are responsible for mandatory fees (campus privilege fees, College of Arts and Sciences per-credit-hour fees) totally about \$500 per year.

GTA awards are highly competitive. Although not required, students hoping to obtain a GTA are encouraged to contact one or more members of the graduate faculty, or visit the K-State campus, during fall or winter of the year prior to entry to discuss with the faculty their areas of research interest. The completed application must be received by February 1. Positions are normally filled by April 15<sup>th</sup>.

International applicants desiring GTAs must also pass a K-State language exam. See the university's Graduate Handbook section on *Graduates of Foreign Colleges and Universities* for details on acceptable exams and test scores.

## Research Assistantships (GRAs)

Research Assistantships are positions that support student research under supervision of a faculty member via funded research grants or other forms of external funding. GRAs are competitively awarded. Terms of employment vary and pay is usually commensurate with that of GTAs. If enrolled full time<sup>3</sup>, GRAs qualify for in-state tuition, which may be covered wholly or in part by funded research grants. Normally the research performed is part of the student's thesis or dissertation, but responsibilities may involve assisting with other research efforts in related areas or assisting a faculty member in his or her teaching responsibilities (e.g. assisting with field trips, grading papers, delivering a lecture). Students interested in obtaining GRA support should contact faculty members working in their field of interest.

## Scholarships

The Department of Geology has a number of scholarships made possible by the generosity of K-State alumni. The application process is announced annually in the spring for scholarships that begin the following fall semester. The applications are reviewed by the Geology Graduate Program Committee.

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<sup>3</sup> To be considered full time, a GRA must be appointed for a minimum of 0.4 FTE (Full Time Equivalents) and enrolled in a minimum of six credit hours fall and spring semester. To be eligible to participate in the GTA/GRA/GA Health Insurance, a GRA must be employed 0.5 FTE.

# The Graduate Program

Upon arrival at K-State, each graduate student will be advised initially by one of the graduate program directors, and later by the student's major professor. As soon as the thesis or report topic is selected, the student is responsible for working with the major professor to select a supervisory committee, to plan a program of study, to prepare a thesis or report proposal, and to carry out the necessary research to complete the project and write the thesis or report.

## Departmental Roles and Responsibilities

*It is the mission of the Department of Geology to deliver excellence in teaching, research and service so that our students are equipped with the knowledge to understand and predict how our planet works and to apply that knowledge to the key challenges facing society today: meeting demands for energy, minerals, water, and food, while responsibly managing our environment.*

**Graduate Program Directors** - The Geology Graduate Program Directors provide information to prospective graduate students and coordinate the review process for consideration of applications by the faculty. The graduate program directors help with initial orientation for students upon their admission to the program and arrival at K-State. Graduate Program Directors can also sign and approve the program of study form (in addition to Head of Department).

**Major Professor** - The role of the major professor is to assist the student in selecting a supervisory committee, preparing a thesis proposal, planning a program of study, carrying out a research project, and writing and defending a thesis. In addition, the major professor sees that each student is enrolled for the required number of hours per semester, grants permission for enrollment on the ISIS system, and serves as the chairperson for the proposal presentation and thesis defense.

**Supervisory Committee** - The supervisory committee consists of the major professor and at least two other graduate faculty members, one of whom may be from another department. The supervisory committee should assist the student in preparing a thesis proposal, planning the research program, and conducting the thesis-related research. All committee members must approve the thesis proposal and the thesis draft before the formal thesis defense. Members of the supervisory committee need to be in attendance during the proposal presentation and thesis defense.

**Department Head** - In addition to possibly serving as a major professor or as a supervisory committee member, the department head is required to approve and sign the program of study for most graduate students<sup>4</sup>. Therefore, the department head will need to be well informed on

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<sup>4</sup> The Graduate Program Directors can also approve the program of study.

discussions between the student, the major professor, and the supervisory committee regarding the program of study or its revision.

## Expectations and Responsibilities of the Graduate Student

- Graduate students must maintain a 3.0 G.P.A. Students who fail to maintain grade standards will be dismissed from graduate school after two semesters on probation.
- All incoming graduate students must have a *preliminary* program of study agreed with either their major professor (if known) or a graduate program director within the first four weeks of their first semester. This preliminary plan is an informal document only, intended to begin the discussion on the sequence of courses that would best prepare the student for the planned area of research. The plan may well change before the final Program of Study is agreed and filed with the Graduate School.
- **All graduate students must have a supervisory committee formed and a finalized Program of Study<sup>5</sup> prepared in collaboration with this committee by the end of their second semester in residence and preferably by the end of their first semester.** This is not just a formality; there are important reasons for this requirement. Advance planning for your courses and other responsibilities will enable you to use your time at K-State most efficiently, will help forestall surprises (e.g., a course that you wanted to take is not offered during the semester that you planned to take it), and will involve your committee members from the initial stages of your research all the way to the end.
- The Department of Geology expects high levels of commitment from all graduate students to their coursework, their research and, where supported to do so, their teaching.
- All graduate students are expected to meet with their supervisory committee at least once a year. Although your major professor is the major source of ideas and advice, the other members of supervisory committee can be equally important. They should be involved early and often.
- All graduate students are expected to undertake research and generate data that are publishable in peer-reviewed journals. Publication of research results is one standard by which you will be judged by your peers. Recognizing that different research programs, advisors, and/or grant/contract restrictions may have slightly different expectations, some general guidelines are as follows:
  - i. Present your research findings regularly at regional, national or international meetings.
  - ii. Publish in the highest quality journals in your area in which you are able.
  - iii. An M.S. thesis should have the potential to generate at least one peer-reviewed publication.
- All graduate students are expected to participate in departmental seminars, regardless of whether the topic is related to your area of research. Departmental seminars are generally

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<sup>5</sup> Note that the formal Program of study must be filed with the Graduate School; it requires signatures from all members of your supervisory committee and the Head of Department. The *preliminary* program of study is only an informal document and does not need to be signed or filed with the Graduate School.

scheduled for Thursday afternoon from 4 to 5p.m. so you should strive to keep this time free from other standing commitments during Fall and Spring semesters.

- All graduate students are expected to participate in thesis proposal presentations and thesis defenses, regardless of whether the topic is related to your area of research. Every effort will be made to schedule these activities well in advance so that you can plan to participate. These seminars and presentations by other graduate students should have high priority in a graduate student's life, both because of the scientific knowledge that can be gained by participants, but also because they provide opportunities to develop presentation and networking skills which will be useful both during and after graduate school.
- Participation in relevant national organizations, such as the Geological Society of America, American Geophysical Union or the American Association of Petroleum Geologists (and the associated K-State student AAPG chapter) is strongly encouraged. These organizations offer opportunities for scientific as well as networking interactions. AAPG also has an option for membership sponsorship so that member dues are paid for active graduate students.
- All graduate students are responsible for reviewing the specific K-State policies and degree requirements, including the payment of necessary fees, found on the K-State Graduate School website and in the K-State Graduate Handbook (<http://www.k-state.edu/grad/>).

## Some Advice for the Successful Graduate Student

A successful graduate student. . .

- is creative and broad-minded;
- sets clear research priorities and career goals;
- plans their research and thesis in detail, ensuring that it is question/hypothesis driven;
- acquires the information and skills necessary to fulfill research and other goals;
- takes the initiative in setting goals and takes responsibility for meeting those goals;
- is productive in the currency needed for meeting career goals (e.g. publishing refereed papers, giving presentations at national conferences, securing external funding, securing internships, etc.);
- is task-oriented rather than time-oriented (understands that science is a career, and is not an hourly job);
- strives to integrate different ideas, concepts, and bodies of knowledge;
- realizes that it is scholarship (broadly defined) and not just credit hours and data collected, that earns one a degree;
- works well with others and in teams;
- develops excellent communication skills;
- views graduate school from the prospective of professional development, which is different from the undergraduate student's perspective of college (there is always something you can be doing to develop your professional skills, such as scan the literature, discuss new theories and ideas with colleagues, look for available grants and fellowships);

- recognizes that enthusiasm, optimism and dedication towards achieving their goals, along with satisfying the above criteria, are critical aspects that help provide him/her with the best opportunity for success;
- offers help to others, regardless of discipline, in order to foster networking, outreach, and inclusion.

## Selecting a Major Professor

The selection of a major professor is one of the most critical decisions facing a new graduate student. The professor under whose guidance you will carry out your graduate research may have a significant influence on your future. Consequently, considerable thought should be given to the choice of a major professor.

In order to expose new graduate students to the breadth of research being done by the faculty in the Department of Geology, and to aid in the selection of a research advisor, all first-year graduate students are required to meet individually with each graduate faculty member within their first month in residence (see schedule below). Students will be expected to meet with all graduate faculty members in the department, even if they have already identified a major professor. We make this stipulation, because this may be one of the few opportunities some students have to meet faculty members they may not otherwise work with or take classes from. Students should use these discussions to share their ideas and goals for graduate study in Geology at K-State and gain advice and feedback from a perspective they may not have considered that could enhance their program of graduate study.

Students following the report option are not required to conduct interviews with the faculty, although this is still strongly recommended if the scheduling is practical, because they will still need to identify a major professor to oversee their report writing.

When the student has completed all of the interviews, he/she should consult with the Head of the Department of Geology concerning his/her choice of major professor.

## Selecting the Supervisory Committee

Within the first year of study the student and major professor should identify other members of the supervisory committee who will advise in developing a program of study and act as the committee for the final examination.

A committee of at least three Graduate Faculty members shall supervise the program of study of candidates for the master's degree. The candidate's major professor shall be a committee member and serve as chairperson. No master's supervisory committee may include more than one person who is not a full-time regular member of the Graduate Faculty. Thus, no more than one visiting, adjunct, part-time, or emeritus professor may serve on a master's supervisory committee. All members of a student's supervisory committee participate as peers and have the responsibility for planning the program of study, advising the student, evaluating the thesis, ensuring that the University regulations and program requirements are met and ensuring that the student's master's program is of high quality.

## Program of Study

Every master's student must file with the Graduate School a Program of Study—a formal list of the courses the student intends to take to fulfill the requirements of the degree. The program of study should consist solely of courses directly related to the master's degree. **The formal requirement is for full-time students to have filed their programs before the end of their second semester of graduate study**; part-time students must do so upon the completion of 9 credit hours.

However, this timeframe clearly means that a full year of course work will have passed before the Program of Study is formally registered. Therefore, it is important that each new graduate student works closely with their major professor (if they have one at this time) or a graduate program director to draft a *preliminary* Program of Study within the first four weeks of their first semester (see section on Orientation below). This draft Program of Study can be the basis for discussion between the student and his/her supervisory committee later in their first semester. All members of the supervisory committee must indicate their approval by signing the Program of Study form provided by the Graduate School. The Head of Department must then endorse the Program of Study, after which the Program of Study is forwarded to the Dean of the Graduate School, whose approval must be received within the first two semesters of graduate work. General guidelines for preparing a program of study are posted on the Graduate School website.

## Programs, Course Levels and Hours of Enrollment

The MS degree requires between 30 and 32 credit hours of the geosciences (including study in supporting sciences where appropriate), depending on the degree track chosen. We offer two tracks toward the degree. Most common is the thesis option, where a student will research and report an original project, earning 6 credit hours toward the total 30 credit hours required for the degree, with 24 credit hours of course work.

Less commonly, a student will complete a report option, i.e. the Professional Studies option, which requires a shorter, 2-credit-hour project but additional course work (30 credit hours). The total required for the Professional Studies option is 32 credit hours.

Students in residence holding assistantships are required to follow the thesis option, while students commuting from full-time professional employment may use the report option. Students in residence and fully supported by their employers or foreign governments may select either option, although the thesis option is typically recommended.

Of the 30 to 32 credit hours required for the Master's degree in geology (depending on degree track), at least 18 credit hours should be at the 700 level or above, including the thesis/research and the report/problems hours required by the thesis and report options. Courses at the 600-level may be included, but 500-level courses in the student's major area are expected to have been completed as undergraduate prerequisites to graduate study or as undergraduate deficiency courses assigned upon admission. Courses at the 500-level outside a student's major area (e.g. Geology) can be applied toward the program of study, provided they do not exceed six credit hours in total. Unless specifically approved by the graduate school, no more than 3 credit hours of problems courses or other individualized courses may be applied to the master's degree, and no more than 3 credit hours of credit/no credit or pass/fail (exclusive of research credit hours) may

appear on the program of study. Note that while GEOL 790 courses may be used for individualized study (Independent Study), they are not intended as an alternative or extension to the thesis research (GEOL 899 or GEOL 898).

Relevant graduate-level courses in other departments may be taken by Geology graduate students, subject to approval by their supervisory committee.

Students entering the Master's program are expected to have completed, or intend to complete, equivalents of the science (geology, chemistry, physics) and mathematics (calculus) courses required for the Geology Bachelors of Science degree at K-State. If a student did not take these courses formally, they will normally be required to make them up while at K-State (deficiency).

Specific undergraduate prerequisites include the following:

- ✓ MATH 220, Analytical Geometry and Calculus 1
- ✓ PHYS 113 and 114, General Physics I and II
- ✓ CHEM 210 and 230 Chemistry I and II
- ✓ GEOL 100 and GEOL 103 Earth in Action and Geology Laboratory
- ✓ GEOL 502 Mineralogy
- ✓ GEOL 503 Petrology
- ✓ GEOL 530 Structural Geology
- ✓ GEOL 630 Sedimentation - Stratigraphy

Students may apply to the Geology Graduate Program for waivers to the stated deficiencies and / or consideration of alternative classes. For example, students interested in pursuing a geology master's degree to complement or further develop a strong background in another STEM area may find that a modified program of study is more appropriate to their career goals. In such cases, the student can apply for a waiver of some deficiencies, if supported by the student's supervisory committee and approved by the Director of the Geology Graduate Program or the Head of Department.

**The Graduate School requires that graduate degree candidates be enrolled during the semester in which the requirements for the degree are completed.** Students working on any stage of their thesis or report projects should be enrolled in research hours reflecting their use of university and departmental resources, regardless of the hours of course work they are doing. The appropriate number of hours in which to enroll should be discussed with the major professor.

### Specific Enrollment Requirements for GTAs and GRAs

Geology graduate students who are enrolled in the thesis option, and who are employed as GTAs, or GRAs, must enroll in at least **9** credit hours per semester for their first two semesters, and in at least **6** credit hours for their second two semesters. These hours may include research hours (see below). **It is a requirement of the Graduate School that graduate students on assistantships be enrolled for a minimum of 6 credit hours in any semester for which they receive support.** Any student who was employed as a GTA during the academic year (fall and spring semesters) for at least 0.4 FTE, qualifies for a tuition waiver for the following summer. Any student who was

employed as a GRA during the academic year (fall and spring semesters) for at least 0.4FTE qualifies for in-state tuition.

## Course Requirements for the Professional Studies Report Option

Our Department supports a non-thesis research opportunity for students in the K-State Geology M.S. program. This option, known as the ***Professional Studies Option***, is for students who have a specific professional goal in mind and who do not intend to continue for a doctorate. In particular, we envisage this option as being suitable for students who:

1. are employed full- or part-time and who wish to pursue an advanced degree while working;
2. are coming from engineering or other STEM fields and who wish to acquire geologic knowledge to become registered geologists; and/or
3. wish to study advanced geology for any reason, but feel that thesis research is not a requirement for attaining their career goals<sup>6</sup>.

The Professional Studies Option requires completion of a research project totaling 2 credit hours, leading to completion of a research report, which is presented publicly. In addition, at least 30 credit hours of formal graded graduate courses, from at least four different graduate instructors, must be completed. As outlined above, 18 credit hours or more must be at 700-level or above. Up to 12 credit hours may be from outside the geology department. No more than three of the 30 credit hours may be from directed independent study (GEOL 790 or equivalent). The university also permits transfer of up to 10 credit hours from another institution, provided that certain criteria are met (see University Graduate Handbook, Section D.6 Transfer of Credits). Further details on the requirements, deadlines and milestones for the Professional Studies option are given below.

## Orientation

Prior to the first week of classes, the Graduate School will hold an orientation for all new and continuing graduate students (<http://www.k-state.edu/grad/admissions/campus-orientation/>). Following this, during the first week of classes in August, the Geology Department will hold a separate orientation or colloquium for new geology graduate students. The orientation will introduce new students to the department and to returning graduate students, and will include discussions about departmental policies and expectations. In addition, each student will meet individually with the department head, one of the graduate program directors, and/or the student's likely major professor to discuss their Master's program. The purpose of the meeting will be to review the student's background and to formulate a preliminary plan of study that includes a schedule of possible coursework for the upcoming two years. Changes to the plan are possible, but need to be reviewed and discussed by the student's supervisory committee. By the end of the first academic year, the plan must be formalized, agreed by the student's supervisory committee and head of department, and submitted to the Graduate School as the student's Program of Study.

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<sup>6</sup> Because non-thesis Masters is intended for professional development, students following this option are not eligible for GTA or GRA funding from the Department of Geology.

## Teaching and Learning Center Orientation

Each year, the Center for Teaching and Learning hosts an orientation session for GTA's with *teaching responsibilities* (lab or classes). This year, the session is on August 18<sup>th</sup> at 9:00-12:00 pm. To register follow this link: <http://www.k-state.edu/grad/admissions/campus-orientation/fall.html>

## International Student Orientation

International Students are **REQUIRED** to attend the International Orientation session. Information can be found at this link: <http://www.k-state.edu/iss/orientation/>. The Graduate School Orientation is separate, but international students are highly encouraged to attend both as they deal with different information crucial to International Graduate Students at K-State

## Thesis Work

A master's thesis presents the results of an original investigation of a problem or topic approved by the candidate's supervisory committee. Its purpose is to demonstrate the candidate's ability to conduct original research of a type appropriate to the academic discipline, to analyze the information obtained from the research and to present the results in a form acceptable to the supervisory committee.

## The Thesis Proposal

Once the thesis topic has been identified, the student must prepare a thesis proposal. This document should explain the nature of the problem to be address and why it is important to work on it. What are the scientific and societal benefits of addressing this particular problem? The aim is not to produce a first draft, or even an outline, of the thesis. Rather, it should be an exposition of the hypotheses to be tested, methods to be employed, resources required and the time frame for delivery. It is, in part, an exercise in project planning. It should include a brief statement of the background to the problem and a summary of *relevant* previous research. It also needs to include a budget and budget justification: What resources do you have available? What resources do you need? Where will you apply for additional funding? A typical outline might be as follows:

- Abstract
- Hypothesis / statement of the problem(s) to be addressed
- Objectives of the research (what you hope to achieve)
- Potential for impact (scientific or societal benefits)
- Background / regional context / previous research
- Methods / Approach
- References
- Timeline
- Budget
- Funding sources

The whole document should be no more than 10-15 pages long, including all figures and references. Once prepared, the thesis proposal should be circulated electronically to the

supervisory committee and to the Head of Department. A hard copy should be lodged in the departmental office for at least 10 working days prior to the scheduled proposal defense date. The thesis proposal, and the oral presentation of the proposal, must be completed by the end of the second semester of residence (see Milestones and Deadlines below).

*Expenditures related to student research and use of departmental resources*

Upon acceptance of the thesis proposal, the Department of Geology agrees to assist the student in the completion of their proposed project, providing that the student enrolls in the appropriate number of research hours and the student makes the appropriate effort towards completion of research. The student must, however, make reasonable efforts to obtain thesis-research funding from non-departmental sources (GSA, AAPG, Sigma Xi, Kansas Geological Survey, university or A&S college opportunities, etc.)

**Departmental resources** available to the student include departmental research equipment, computers, plotters, etc. (see **Departmental Facilities, Annex B**). Costs for the operation of research instruments, and associated consumables, will vary and the costs should be confirmed with the major professor and / or relevant graduate faculty as part of preparing the thesis proposal.

The departmental **copying machine** is primarily for course-related copying and departmental business. GTAs may make copies related to their teaching, but should consult with Angelina Butler for help with the machine. Graduate students may make thesis-related copies, including copies of research-related journal articles and thesis drafts, but prior permission should be obtained from the student's major professor and Angelina Butler. The copy machine is not to be used to build personal libraries or reprint collections. GRAs should make arrangements with the faculty member in charge of the project prior to making copies on the departmental copy machine.

Departmental **telephones** located in the main office and in the Mudge conference room are provided for departmental business, and provide phone access after normal office hours in case of emergency. Long-distance calls are to be made only for thesis-related business and should always be kept to a minimum. Students should receive permission from their major professors before making any long-distance calls. Departmental phones should not be used for personal long-distance calls.

All expenditures related to thesis research, including travel—particularly out-of-state travel—must be approved in advance by the major professor and the department head. This requirement is not intended to limit student research, but rather to assist the departmental office with book keeping and budgetary planning. Please consult Angelina Butler well in advance on financial procedures and use of required forms.

## The Thesis Document

A typical outline for the structure of a thesis is summarized in **Box 1**. Templates that demonstrate the expected structure and formatting are available from the graduate school website: <http://www.k-state.edu/grad/etdr/template/>

Note that it is possible to incorporate draft manuscripts for publication into the thesis as thesis chapters. This has the advantage of saving time and effort in terms of achieving both the written thesis and publication(s) from a lot of the same effort. However, when a manuscript prepared for publication is to be used, the terseness or page restrictions required by professional journals may prevent the student from meeting the requirement of a thesis that it is “sufficiently complete to allow an independent investigator to repeat or verify all of the work leading to the author's results and conclusions” with the publishable manuscript alone. In such cases, the thesis must include additional materials that ensure independent reproducibility such as tables, descriptions of unproductive or unsuccessful explorations, derivations, and so forth, typically as appendices to the thesis.

The major professor will assume the responsibility for having the candidate prepare the thesis in acceptable English. The thesis should represent the best writing possible by the student and is not to be written or extensively edited by the major professor, supervisory committee members, or the Head of Department. The thesis will be defended by the student at the final examination, when the supervisory committee will act as an examination committee.

A master's report is generally shorter than a thesis, and it may present the results of a more limited original investigation. Alternatively, it may review the state of a particular scholarly or scientific problem

### Box 1. Typical Thesis Format

- Title page
- Copyright page (Optional)
- Abstract—no more than 350 words
- Table of Contents
- List of Figures
- List of Tables
- List of Symbols & Abbreviations
- Nomenclature
- List of Supplemental Files
- Acknowledgements
- Dedication (Optional)
- Preface (Optional)
- Introduction (Optional)
- Text/Chapters (could be a paper)
- Conclusion
- References and/or bibliography
- Appendix or Appendices, as needed

## The Professional Studies Option

The Professional Studies option is designed to develop problem-solving skills essential to a working geoscientist. Projects undertaken should attempt to simulate the “real world”, where geoscientists must find and report the answer to a well-defined question within a strict timeframe. In contrast, the traditional M.S. thesis option is comprised of more open-ended research with fewer fixed deadlines.

Specific goals of the Professional Studies option are:

- to gain experience in supervised investigation of a single topic or problem, in more depth than a formal course permits;
- to gain discipline and experience in meeting deadlines;
- to gain experience in summarizing and presenting results in oral and written form; and

- to provide solutions to well-defined problems of academic, societal, economic, or environmental importance.

Each student must have sufficient background to solve the problem within the agreed timeframe, and, if not, steps should be identified to provide this background. Sufficient resources must be available to solve the problem on schedule. The problem design must not require more work than credit hours justify or deadlines permit.

Requirements for completion and filing of the Program of Study are the same as for students following a thesis option. The student must consult with their major professor and develop a plan that is acceptable to the supervisory committee (see page 12, this document). Professional Studies M.S. project committees must consist of no fewer than three members, at least one of whom must be a regular graduate faculty member. No more than one person may be a non-graduate-faculty member, and a non-member cannot be chair (primary advisor). Involvement of industrial or other non-academic partners is encouraged.

It is envisaged that the research project will be completed over two consecutive semesters, Semester One and Semester Two. *[NB: Timeframe for completion of the graded course work is agreed separately from that of the research project.]* Students should enroll in GEOL 898 (MS Report Studies) for 1 credit during both the first and second semester of the project execution. The first semester should be devoted to literature review, problem identification and definition, and research proposal formulation, presentation, and defense. Preparation of the research proposal should follow the guidelines for a thesis proposal (see pages 15-16, this document), although the precise format may differ depending on the nature of the research project selected. The second semester should be devoted to execution of the research plan, preparation of a final research report, and a successful public project defense. The format for the final report will depend on the nature of the project undertaken and will be agreed with the major professor.

The deliverables for Semester One include a complete workplan and proposal, approved by the student's committee. The proposal must be defended before the end of Semester One or, with permission from all the Committee, within the first 2 weeks of Semester Two.

The deliverables for Semester Two include a completed project report, approved by the student's committee, and a successful oral defense of the report. The defense must be completed before the end of Semester Two. Barring unforeseen circumstances, it is expected that all projects leading to a master's report will be completed over consecutive (back-to-back) academic terms.

Scheduling the defense of both the report proposal and master's report will follow the same guidelines as those for the thesis option (see below)

*Summary of requirements to graduate via the Professional Studies Option:*

- 30 credits from formal graded courses taught by at least four different faculty members
- 2 project credits (*GEOL 898*)
- An approved report

## Scheduling the Thesis or Report Defense

The thesis or report defense cannot be scheduled until the supervisory committee confirms that a satisfactory copy of the thesis or report has been prepared. To schedule the defense, the candidate will need to file an Approval for Final Examination Form with the Graduate School signed by each member of the committee. Note that signing the form does not imply that the content of the thesis or report is satisfactory, only that it is acceptable for examination. At least two weeks prior to the scheduled defense date, the thesis must be circulated electronically to the supervisory committee and to the Head of Department (see Milestones and Deadlines below), and a hard copy lodged in the departmental office.

## Monitoring Progress

At the end of each semester the faculty will review each graduate student regarding their performance in courses, research, departmental citizenship, and if applicable, their teaching assistantship. The intent of this review is to provide faculty the opportunity to praise hard work and good performance, and to inform students of any areas that need improvement. Funding in the graduate program is conditional on satisfactory performance, so an evaluation also provides an avenue for faculty to forewarn students of perceived problems. Students will receive feedback from the department head that summarizes the faculty evaluation of their performance.

Admission to and continuation in the Graduate School depends upon a satisfactory level of achievement. Accordingly, students who do not maintain satisfactory progress in their graduate studies are placed on probation or denied the privilege of continued enrollment in the University or in a specific graduate curriculum and, in either case, will be so notified by the Dean of the Graduate School.

### Actions that lead to automatic placement on probation

Graduate students will be placed on probation when:

- at the time of admission, the student's prior academic record does not meet the regular, published admission standards;
- the cumulative grade point average is less than 3.0 in courses taken for graduate credit; or
- upon recommendation of the major professor or student's committee that satisfactory progress toward a degree is not being maintained.

### Actions that lead to a return to regular status

- Students placed on probation at the time of admission will be reviewed after completing 9 hours of course work taken for graduate credit at Kansas State University. A student who has achieved a GPA of 3.0 or higher for the first 9 hours of graduate credit, exclusive of individualized study, and removed all deficiencies specified at the time of admission, will be placed in good standing.
- Students placed on probation after their first semester will be removed from probation if they have a cumulative GPA of 3.0 in all courses taken for graduate credit (exclusive of individualized study such as research, problems courses, etc.). Normally this goal must be

achieved within two semesters for full-time students and within 12 credit hours for part-time students.

## Conditions that must be met to be awarded a graduate degree

In order for a student to be awarded a graduate degree:

- the student must not be on probation,
- all requirements of the Graduate School, the student's academic program area and the student's supervisory committee must be met, and
- the student must be enrolled during the semester in which the degree requirements are completed.

## Conditions that may lead to a student being denied continued enrollment in the University or in the graduate program

A graduate student may be denied continued enrollment in the University or in his/her graduate program in the following cases:

- Failure to satisfy conditions necessary for removal from probationary status
- Failure to meet published departmental or University requirements
- Demonstrable lack of diligence in meeting published degree requirements, or in maintaining satisfactory progress toward a graduate degree
- Failure to acquire mastery of the field (its concepts, methodologies, etc.) sufficient to complete a successful thesis

Mechanisms for petitioning the graduate school for reinstatement are explained in detail in the University's Graduate Handbook.

## Milestones and Deadlines<sup>7</sup>

### First Academic Year

**Summary of general requirements:** Take area course work, enroll in and complete any remedial courses, choose major professor during first semester, attend seminars. Consult major professor concerning appointment of a supervisory committee and formulation of a program of study, and submit these through the Department Head to the Graduate School by required deadline.

#### **Schedule:**

*On Arrival:* The student attends the University Graduate School orientation, normally held in the first week before classes start, and registers for classes for their first semester. Selection of classes for the first semester will either be done in consultation with the student's likely major professor, one of the graduate program directors or the head of department. During the first week of classes, the student attends the Geology Department Colloquium/Orientation.

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<sup>7</sup> This section primarily summarizes the milestones and deadlines for students undertaking the thesis option. Milestones and deadlines for the Professional Studies report option are detailed on page 18.

*Within Four Weeks of the Start of Fall Semester:* The student will complete interviews with all the faculty. These interviews allow incoming students to meet the faculty, to learn about the research and teaching programs in the department, and to share ideas and goals for graduate study in Geology at K-State.

*By Mid-November:* The student finalizes selection of a major professor. At this time, the student and major professor should select a thesis topic.

*By End of Fall Semester:* The student and major professor finalize selection of a supervisory committee and discuss this selection with the Head of Department who then signs off on the selection.

*By End of Fall Semester:* The student consults with the committee to finalize the program of study and develop a schedule to complete the thesis proposal and its defense by mid-April (second academic semester).

*By End of April:* An oral presentation of the thesis proposal will be made, and the Program of Study is finalized; the student turns in the program of study to the Graduate School by the stipulated deadline. NO SCHOLARSHIPS OR GTA STIPENDS WILL BE AUTHORIZED FOR THE THIRD SEMESTER UNTIL THIS IS DONE.

***Note that all other first-year graduate students will be trying to schedule the oral presentation of their thesis proposal on the same timeframe. Therefore, in order to achieve the stipulated deadlines, it is strongly recommended that students begin the process early. Ideally a draft of the thesis proposal should be presented to the major professor and approved by the supervisory committee by early March at the latest. Liaise early in the semester with the office administrator and seminar coordinator, Angelina Butler, so that your presentation can be scheduled for a date and time that is convenient to you and your supervisory committee. At least one week prior to the presentation, an electronic copy of the thesis proposal must be sent to the Head of Department, your committee members, and a hard copy made available in the departmental office for examination by faculty and graduate students.***

### *Summer Term*

Undertake field work (if required), analytical work at other laboratories or facilities, internships, etc.

### *Second Academic Year*

**General Requirements:** take advanced course work (complete required credit hours), attend seminars, continue/complete thesis research, write thesis. Complete all M.S. requirements.

*By End of Fall Semester:* The student will present a first draft of the thesis to the major professor.

*By Early February:* Drafts of the thesis are presented to the other members of the supervisory committee.

*By Early March:* Revised copies of the thesis are presented to committee members for their approval.

*By Mid-April:* The thesis defense will be held.

*By End of April:* Final copies of the Master's thesis will be submitted to the Graduate School per deadlines set by the Graduate School

***Note that all other second-year graduate students will be trying to schedule their thesis defense on the same timeframe (and first-year students will be trying to schedule their thesis proposal presentations!). Therefore, in order to achieve the stipulated deadlines, it is strongly recommended that students begin the process early. Liaise early in the semester with the office administrator and seminar coordinator, Angelina Butler, so that your defense can be scheduled for a date and time when you can ensure that all members of your supervisory committee can attend. At least two weeks prior to the presentation, an electronic copy of the thesis must be sent to the Supervisory Committee and to the Head of Department, and a hard copy made available in the departmental office for examination by faculty and graduate students.***

Students are strongly discouraged from trying to defend their theses during the summer, because most university faculty will be on leave without pay or in the field and will not be available to read thesis drafts or to attend defenses. However, should you fail to submit the final thesis copy to the Graduate School by the end of term, the Graduate School will grant M.S. degrees in August, provided the thesis has been successfully defended during the previous Spring semester. Furthermore, if the final copy of the thesis is turned in to the Graduate School before the start of Summer Session, the student does not have to enroll for Summer term.

## Annex A

### Duties and Responsibilities of Graduate Teaching Assistants

Graduate Teaching Assistants are a vital part of the Geology Department at Kansas State University. GTAs can expect to commit to at least 4 and no more than 8 contact hours of teaching per week. Lab or class preparation, office hours, and other responsibilities are in addition to this commitment, with total work commitment not exceeding 20 hours / week. Instructional efforts for GTAs will be evaluated at least once a year; results of these evaluations will be used to improve teaching effectiveness and in documenting excellence (as part of the application for some teaching awards). To help you become the very best teaching assistant, and to make your class environment good for students, we have developed some performance criteria and requirements for all GTA's in the Geology Department. You will be evaluated each semester based upon these criteria. General performance criteria include the following:

- You must be on time for all of your teaching duties, particularly your assigned labs, GTA meetings, exam proctoring, and office hours. You should never leave a teaching laboratory room while you are scheduled to teach.
- Know your material. Prepare in advance. Don't expect to just turn up and "wing it".
- Use the weekly GTA meetings as an opportunity to discuss strategy and novel approaches for conveying complex information. Share best practice.
- Your actions and judgments affect your students and their grades. Keep good records. Be fair and professional in your judgments and be prepared to defend your evaluations of the students. Simply giving a perfect score to everyone does not reflect good judgment. Consult the Head GTA or the Head of Department if you are unsure of your strategy for grading.
- You have an ethical responsibility to watch the students in your classes and to encourage them to uphold the ethical principles that they are sometimes tempted to violate.
- You must not, in any way, sexually harass any student, either implied or actual. Please read carefully the sexual harassment policy from the Affirmative Action Office ([www.ksu.edu/uauuc/fhbook/fhxi.html](http://www.ksu.edu/uauuc/fhbook/fhxi.html) )
- Students have a right to privacy of their grades and performance evaluations in class. Graded papers must be given to the students directly. They are not to be put in a box where any other student can see another student's score.
- An evaluation of your teaching will be done the fourth week of class the first semester you teach and again at the end of each semester by your students. The results of the student evaluations are compiled by the office of Assessment on campus, and if you do not perform well you may be removed from teaching duties. This could mean a loss of your GTA.
- Teaching with English as a second language: You are expected to improve your language skills as you teach. You should be patient with students if they ask you to repeat a phrase or instruction. You should write as many instructions as possible on the board as you discuss them. Speak clearly and distinctly, speak directly to the students and not to the blackboard.

## Annex B

# Departmental Facilities

The department has a range of research instrumentation and Thompson Hall has recently been upgraded to include a suite of new geochemistry research labs (see below).

**Computer laboratory:** the Thompson Hall computer laboratory is available to all geology students and contains computers, scanners, and printers. Computers with industry software in the laboratory are used for research and training in geophysics, petrology, petroleum geology, and geochemical modeling courses. Software packages available include Petrel from Schlumberger, Kingdom Suite and Petra from HIS, rock doc from Ikon Science, OpendTect from dGB Earth Sciences B.V. and Geochemists Workbench. A 44" plotter is also available and is used to print posters for presentation.

**Research laboratories:** Thompson Hall laboratories contain equipment used for cutting and crushing rock, sectioning and polishing, and other rock sample preparation tasks. Binocular and petrographic microscopes, which include fixed digital cameras, are available for collecting sample images. Facilities for analysis of micro- and small-scale fabric of shales are available, including computer-based image analysis (mostly using MatLab) to enhance fine-scale lithofabric. Fume hoods, analytical balances, drying ovens, centrifuges, an anaerobic chamber, and two ultra-pure water systems are also available.

**Analytical instruments:** instruments available in Thompson Hall currently include a gas chromatograph (Gow Mac 580 series) used for gas compositional analysis; a state-of-the-art, fully automated luminescence dating system (model no. Risø TL-DA-20C/D); an ion chromatography system (Dionex ICS-1100) capable of analyzing a wide range of solutes in water samples; UV-VIS spectrophotometers also used for water chemistry analyses; digital inverted fluorescence microscope (EVOS) for capturing multi-channel fluorescence images at high resolution; a Picarro water stable isotope analyzer; a Bruker III hand-held X-ray fluorescence spectrometer used to analyze the chemical compositions of rocks and minerals; and two UV-Vis spectrophotometers. We have also recently acquired a new PANalytical Empyrean X-Ray Diffractometer (XRD) that can analyze both amorphous and crystalline solid-phase samples using numerous techniques.

**Field equipment:** field equipment available in the department include the usual hand-held transits, GPS devices, water level meter, and water quality monitoring devices, as well as a suite of geophysical equipment including a Topcon GTS-229 laser total station, a proton precession magnetometer, a ground-penetrating radar system with antennae for two different depth ranges, a Worden gravimeter, an electromagnetic sensor, and a 1000-channel 3-D seismic reflection/refraction system. These instruments are used for both undergraduate and graduate thesis research.

**Other research facilities available on campus**

Numerous other research facilities are also available on campus. On-campus facilities used regularly by Geology students and faculty include the TRIGA Mark II pulsing reactor (Neutron Activation Analysis), the Stable Isotope Mass Spectrometer Lab and Microscopy Lab in the Division of Biology, the Integrated Genomics Facility and Soil Testing Lab in the Department of Agronomy, and the Electron Microscopy Lab in the College of Veterinary Medicine.

## Annex C

### Geology Graduate Courses

Some of our classes are taught on a regular basis while others are only taught occasionally. This is partly to maximize the availability of appropriate courses for our graduate students, partly due to development of new courses, and partly in response to faculty retirements, sabbaticals and new appointments. Please consider the following list to be approximate and always ask if you have a question. Our students also take classes from other departments at K-State. To find out what geology (and other) courses are offered in Fall, Spring and Summer terms, search the online schedule of classes. When in doubt – check with individual faculty.

**GEOL 602 — Mineral Exploration.** Geological, geochemical, and geophysical prospecting techniques and their application in the exploration for metallic mineral deposits.

**GEOL 605 — Introduction to Geochemistry.** Introduction to the use of inorganic geochemistry in the investigation of geologic processes in the crust, mantle, and surface environment

**GEOL 611 — Hydrogeology.** Origin, geologic occurrence, and migration of subsurface water; laws governing ground water flow and yield of aquifers.

**GEOL 620 — Volcanology.** Examines processes associated with active volcanoes as revealed by volcanic deposits. Emphasis on influence of volcanoes on human civilizations including economic deposits, climate change, or volcano monitoring

**GEOL 630 — Stratigraphy – Sedimentation.** Description, classification, correlation, chronology, and paleogeography of sedimentary rock systems and the depositional environments in which they formed

**GEOL 640 — Introduction to Geophysics.** Used in studies of the earth's interior, its utility of illuminating subsurface geological features, and its applications in fields such as groundwater studies and the development of energy resources.

**GEOL 642 — Field Geophysics.** Description, classification, correlation, chronology, and paleogeography of sedimentary rock systems and the depositional environments in which they formed

**GEOL 650 — Geomicrobiology.** Study of microorganisms in geological environments. Topics include: geochemical controls on microbial activity and impacts of microbial activity on geological environments.

**GEOL 680 — Field Geology.** Field projects in the Rocky Mountains designed to give students practical experience in apply geologic knowledge and skills

**GEOL 702 — Economic Geology.** Geology and origin of metallic mineral deposits and of some nonmetallic deposits.

**GEOL 704 — Paleoenvironments.** Application of biological, physical, and chemical factors in modern marine environments to the understanding of ancient marine environments

GEOL 705 — **Biom mineralization.** Discussion and critique of current and classic research in biomineralization.

GEOL 708 — **Sedimentary Geochemistry.** Geochemical principles and processes in deposition and diagenesis of sediments; different chemical pathways in the exogenic cycle.

GEOL 711 — **Water Resource Geochemistry.** Geochemistry of ground and surface waters; emphasis on mineralogical, biochemical, and hydrologic controls on inorganic and organic interactions in natural waters.

GEOL 712 — **Advanced Geochemistry.** Application of chemical principles to igneous, metamorphic systems; emphasis on equilibria, oxidation-reduction, crystal chemistry, and thermodynamics.

GEOL 714 — **Rock Microstructures and Geologic Processes.** Examination of mineral shapes, orientations and assemblages (rock fabric) as a record of geologic processes.

GEOL 715 — **Dating Earth Materials.** Discusses how ages are measured for rocks, minerals, waters, and sediments by analysis of isotopes produced by radioactive decay or cosmic rays

GEOL 720 — **Quaternary Geology.** Quaternary stratigraphy as the framework for studying the geomorphic, climactic, archaeological, and biological changes of the last two million years, with emphasis on the North American record.

GEOL 730 — **Petroleum Geology.** Origin, migration, and accumulation of petroleum; stratigraphy and structure of important fields.

GEOL 735 — **Fossil Fuel Sedimentology.** An introduction to organic matter and fossil fuels as components of sedimentary rocks.

GEOL 738 — **Formation Evaluation.** Investigates projects on well log interpretation, petro-physical calculations, log corrections, and post-drilling decision workflows through lectures, discussions, laboratory exercises, or field trips.

GEOL 740 — **Regional Geology.** Interpretations of structural, stratigraphic, igneous, and tectonic history of selected sites in North America.

GEOL 741 — **Seismic Data Processing.** Principles of seismic data analysis and the application of industrial software package(s) to convert data from seismic arrays into a form useful for geophysical interpretation

GEOL 742 — **Seismic Data Interpretation.** Principles of seismic data interpretation and the application of industrial software package(s) to convert processed data into 3D and 4D (time lapse) visualizations of subsurface geological feature

GEOL 745 — **Exploration Geophysics.** Principles and applications of seismic, gravity, magnetic, and other geophysical methods used in energy, mining, and other industries to locate subsurface targets of interest.

GEOL 747 — **Computational Geophysics.** Computer skills and techniques used in geophysical data processing and analysis such as linear and nonlinear inversion, forward modeling of gravity, magnetic, and seismic data, seismic tomography, seismic anisotropy, and seismic wave attenuation.

GEOL 750 — **Geologic Evolution of Planet Earth.** Integration of the various geologic disciplines into a broad-based understanding of the history and dynamics of the earth. Specific regions, such as the western U.S., will be selected each year for detailed study. Guest lectures will make up a significant part of the course.

GEOL 760 — **Geochemical and Biogeochemical Modelling.** Use of geochemical modeling to examine geochemical and biogeochemical processes in aqueous environments.

GEOL 770 — **Subsurface Methods.** Principles and applications of subsurface geology

GEOL 790 — **Problems in Geology.** Work is offered in mineralogy, paleobiology, paleoecology, stratigraphy, structural geology, igneous, metamorphic, and sedimentary petrology, geomorphology, planetary geology, hydrogeology, geochemistry, and isotope geology.

GEOL 800 — **Graduate Seminar in Geology.** Topics in geology, geochemistry, and geophysics.

GEOL 801 — **Advanced Paleobiology.** Detailed study of the functional morphology, ecology, biogeography, evolution, and classification of selected groups.

GEOL 804 — **Igneous and Metamorphic Petrology.** Selected problems in the petrogenesis of igneous and metamorphic rocks.

GEOL 805 — **Advanced Igneous and Metamorphic Petrology.** Field and laboratory study of selected problems in the origin of igneous and metamorphic rocks.

GEOL 806 — **Sedimentary Petrology.** Petrography, classification, and origin of terrigenous and chemical sedimentary rocks

GEOL 807 — **Advanced Sedimentary Petrology.** Field and laboratory study of selected problems in the origin of sedimentary rocks.

GEOL 810 — **Isotope Geology.** Principles, techniques, and applications of natural radioactive isotopes to geochronology; application of isotopes to problems of petrogenesis

GEOL 830 — **Geotectonics.** Origin and history of major tectonic elements of the earth, especially their interaction through time.

GEOL 835 — **Advanced Petroleum Exploration, Imperial Barrel Award Competition.** Evaluation of exploration prospects in frontier and underdeveloped petroleum provinces using borehole-derived and geophysical data. Team taught courses that uses industry provided datasets and current data management and interpretation software to reach drill or no-drill decisions based on science, risk analysis, and economics.

GEOL 840 — **Planetology.** Geologic principles applied to a study of the solar system.

GEOL 870 — **Groundwater Contaminant Remediation.** Identification and mensuration of groundwater contaminants and consideration of means for their remediation strategies.

GEOL 872 — **Biogeochemistry of Soils and Sediments.** Review and discussion of current understanding of the chemical, biological, and mineralogical interactions of groundwater, soils, shallow and deep sediments. This course will deal with biotic controls on chemistry of the environment [and] with the geochemical control of the structure and function of ecosystems

GEOL 880 — **Clay Mineralogy.** Geologic occurrences, physical properties, atomic structures, and the identification of clay minerals, including thermal analytical methods and the study of X-ray diffraction patterns.

GEOL 890 — **Advanced Seismology.** Mechanics of faulting and earthquakes; seismotectonics; advanced data analysis; seismic wave propagation in three-dimensionally inhomogeneous media; earthquake prediction and hazard analysis.

GEOL 898 — **Master's Report Research.** Research or practice of geology summarized in a scholarly report

GEOL 899 — **Master's Thesis Research.** Research in geology culminating in a master's thesis

## Annex D

## Graduate Faculty Vitae

**Claudia Adam, Ph.D. Institut de Physique du Globe de Paris (IPGP), 2003**

*Courses taught at KSU during last five years:* Introduction to Geophysics (GEOL 640)

*Research interests:* geophysical modelling of plate tectonics, volcanism emplacement, mantle dynamics, hot spot volcanism, and processes shaping the surface of the Earth.

**Matthew E. Brueseke, Ph.D., Miami University, 2006**

*Courses taught at KSU during last five years:* Earth in Action, (GEOL 100); Earth in Action First Year Seminar (GEOL 100); Mineralogy (GEOL 502); Petrology (GEOL 503); Economic Geology (GEOL 702), Regional Geology (GEOL 740); Advanced Igneous Petrology (GEOL 790); Advanced Igneous and Metamorphic Petrology (GEOL 805); Advanced Igneous Petrography (GEOL 790), X-ray Techniques (GEOL 790)

*Research interests:* Igneous petrology, volcanology, and tectonics. Interests are focused on understanding: [1] how magmas form and are modified; [2] relationships between volcanism and tectonism; [3] temporal, spatial, and mass relationships between magmatism and ore deposits; [4] physical volcanology of silicic magmatic products and their eruptive systems; [5] volcanic stratigraphy, including tephrostratigraphy

**S. Chaudhuri, Ph.D., Ohio State University, 1966**

*Courses taught at KSU during the last five years:* Earth in Action (GEOL 100), Environmental (GEOL 115), Geology and Environment (GEOL 506), Sedimentary Geochemistry (GEOL 708), Isotope Geology (GEOL 810), Clay Mineralogy (GEOL 880), Problems in Geology (GEOL 790)

*Research interests:* river, ocean and rainfall geochemistry; oil-field brine and crude oil geochemistry; clay, shale-carbonate-phosphate-evaporite geochemistry; plant, termite, and earthworm geochemistry; isotope geochemistry

**Saugata Datta, Ph.D., University of Western Ontario, 2001**

*Courses taught at K-State:* Introduction to Geochemistry (GEOL 605); Hydrogeology (GEOL 611); Earth in Action (GEOL 100, onsite and online both) and Water Resources Geochemistry (GEOL 711)

*Research Interests:* Hydrogeology, Environmental Geochemistry, Physical and Chemical Hydrology, Aqueous Chemistry and Metal Cycling in Natural Waters and Sediments, Geochemistry of CO<sub>2</sub> Sequestration, Geology and Health

**Karin Goldberg, Ph.D., University of Chicago, 2001**

*Courses taught at KSU during last five years:* Earth through Time (GEOL 102); Stratigraphy-Sedimentation (GEOL 630)

*Research interests:* Paleogeography and Paleoclimatology, Sedimentology and Stratigraphy, Petroleum Geology, Sedimentary Petrology and Reservoir Characterization

**Pamela D. Kempton, Ph.D., Southern Methodist University, 1984, Head of Department**

*Courses taught at K-State:* Petrology (GEOL 503); Advanced Igneous and Metamorphic Petrology (GEOL 805); X-Ray Techniques in Research (GEOL 790); Advanced Igneous Petrography (GEOL 790)

*Research Interests:* petrology and geochemistry of oceanic basalts and gabbros, lower crustal granulites, ultramafic peridotites and continental volcanism, focussing on problems of mantle geodynamics, petrogenesis of basaltic magmas, and the evolution of the lower crust and upper mantle; Cu isotopes in mantle peridotites; Critical Zone processes

**Matthew F. Kirk, Ph.D., University of New Mexico, 2008**

*Courses taught at K-State:* Geomicrobiology (GEOL 650); Geochemical and Biogeochemical Modeling (GEOL 760); Earth in Action (GEOL 100)

*Research interests:* geochemistry and geomicrobiology; current studies examine impacts of agricultural activities on the water quality and microbiology of the High Plains Aquifer, environmental controls on interactions between aquifer microorganisms, and the biogeochemistry of coalbed methane reservoirs

**Brice Lacroix, Ph.D., University of Barcelona, Spain, and University Franche-Comté, France, 2011**

*Courses taught at K-State (from Fall 2015):* Structural Geology (GEOL 530), Field Methods (GEOL 560)

*Research Interests:* Development of faults, shear zones, fractures and veins during deformation, evolution of orogenic belts, structural control of ore-deposit emplacement, processes of fault weakening, determination of P-T-t paths of individual samples

**Abdelmoneam E. Raef, Ph.D., AGH-University of Science & Technology, 2001**

*Courses taught at K-State:* Intro to Geophysics (GEOL 640); Field Geophysics (GEOL 642); Seismic Data Processing (GEOL 741); Seismic Data Interpretation (GEOL 742); Earth in Action (GEOL 100)

*Research interests:* 3D and 4D (time lapse seismic) interpretation in hydrocarbon exploration and development; seismic characterization of rock formations for carbon dioxide sequestration; neural networks and wavelet applications to seismic data interpretation and processing; remote sensing image processing

**Joel Q. G. Spencer, Ph.D. University of Glasgow, 1996**

*Courses taught at K-State:* Earth in Action (GEOL100); Oceanography (GEOL105); Geomorphology (GEOL 520); Intro to Optical Dating (GEOL790); Hot Topics in Geoscience (graduate seminar) (GEOL790)

*Research interests:* timing of Earth-surface processes; Late Quaternary and geoarchaeological chronology; luminescence dating research & technique development; luminescence thermometry

**Matthew W. Totten, Sr., Ph.D. University of Oklahoma, 1992**

*Courses taught at K-State:* Petroleum Geology (GEOL 730); Subsurface Methods (GEOL 770); Formation Evaluation (GEOL 738); Advanced Sedimentary Petrology (GEOL 807); Advanced Petroleum Exploration, IBA (GEOL 835)

*Research interests:* Petroleum Geology; Sedimentary Petrology

# New Graduate Student—Faculty Interviews

Name: \_\_\_\_\_

Instructions: Please make an appointment (~30 minutes) with each member of the graduate faculty of the Department of Geology to discuss your goals and experience. This is also an opportunity to learn the interests and research activities of the faculty. Interviews with those faculty on sabbatical are optional. These interviews and this form need to be completed and returned to the Head of Department no later than 18 September 2015.

Faculty member	Date of Interview	Signature of Faculty
Claudia Adam		
Matt Brueseke		
Sam Chaudhuri		
Saugata Datta		
Karin Goldberg		
Pamela Kempton		
Matt Kirk		
Brice Lacroix		
Abdelmoneam Raef		
Joel Spencer		
Matt Totten		

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## Student Declaration

*This section is to be signed and detached from the handbook after you have read the sections on Expectation and Responsibilities of a Graduate Student and understand the Milestones and Deadlines for obtaining your graduate degree. Return the sheet to the Head of Department.*

I acknowledge that I have read and understand my responsibilities and duties as a graduate student in the Department of Geology as outlined in this document.

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Student Name

Date