

THE GRADUATE STUDENT HANDBOOK

FACTS, INFORMATION AND REQUIREMENTS



DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES

UNIVERSITY OF ROCHESTER

2016-2017

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GREETINGS, GREETINGS, GREETINGS!!!

Welcome to all incoming graduate students, and welcome back to all of you who have been here before. The purpose of this publication is to provide you with answers to some of the more commonly asked questions; to inform you of common deadlines and fees; and to lead you through the department's requirements for M.S. and Ph.D. students. We hope that you will keep your copy of this publication handy throughout your academic career here at the University of Rochester, and that you use it frequently as a guide and reference.

The Graduate Advisors:

For the Department:	Professor Gautam Mitra, Hutchison 208A, 275-5816 gautam.mitra@rochester.edu Graduate Secretary: Anne Marie Redfield, Hutchison 227, 275-5713, aredfiel@ur.rochester.edu
For the College:	Melissa Sturge-Apple, Dean of Graduate Studies Lattimore 216 Director-Graduate Programs: Janice Van Opdorp 275-5762 Administrative Assistant: Joan Dodge 273-5210
For the University:	Margaret Kearney-University Dean-Graduate Studies University Council on Graduate Studies Deb Randle-Manager, University Graduate Studies 259 Wallis Hall, 275-9093

New students should see the department graduate advisor and the graduate secretary when they first arrive in the department. Each graduate student should also meet with his/her research advisor regularly. During these meetings you should talk about your plans, progress and any problems you may be having.

We don't expect first-year students to come here with a defined research plan. You should use the first two semesters here to explore your interests and plans. Because of the time constraints in most programs, use the following rule-of-thumb. Try to determine your advising committee by the end of your second semester. These faculty members (3-4 from within the department) will, in the case of Ph.D. candidates, write your qualifying exams, or for the Masters (2-3 from within the department) will be your defense committee or those responsible for reading your essay. One of these faculty members should be your Thesis Advisor and will be the primary person guiding your research. Keep your Thesis/Program Advisor advised of your progress. This person will guide you through your course work requirements. But we encourage all students to become acquainted with as many of the faculty members as possible during their first two semesters in residence. Remember: The goal of the department is to allow you, in consultation with your advisors, to devise course and research programs which fit your own talents and aspirations. It is primarily your responsibility to consult with your primary advisor and develop a suitable program within the basic departmental guidelines described in this handbook.

REGISTRATION AND DATES, DEADLINES, RULES...

Net ID

This is needed to access university on-line services such as registration, health insurance information and payroll information, and can be obtained through the web site www.rochester.edu/netid/. You will need your Employee ID number (from your paycheck) or your student ID number. Contact the Information Technology Services Center (ITS) if you have any problems getting this set up. Their phone number is 275-2000 and their email address is itsc@its.rochester.edu

STUDENT I.D. CARD

You will need this to identify you as a full-time University of Rochester student. Please see Anne Marie Redfield in the main office to obtain a letter stating that you are a full time student in the department. You can take this letter to the Identification Card Office in Susan B. Anthony Hall to obtain your I.D. card. Their hours are 10:00 a.m.-4:00 p.m. weekdays.

REGISTRATION

The University's registration and related deadlines for the new academic year are posted in the main office or found at the following internet address:

<http://www.rochester.edu/registrar/>

To access on-line registration, click "registration" under Academic Planning. You will need your net ID and password to access this site. Students can register on-line for most courses except for Reading courses. **All students should consult with their advisors before completing their on-line registration.** Remember that you must register before the deadline even if your schedule is not finalized (or you will be fined \$160 for late registration). This is especially important for our international students because it can affect their visa status. "Adds" and "Drops" can be made during the early weeks of all semesters.

HEALTH INSURANCE

All students must have health insurance coverage –either the Aetna Student Health Plan through the University or their own coverage. All students must document their choice each year. Students are responsible for paying for their own health insurance. The university covers the mandatory health fee for PhD students. Health insurance options can be accessed at <http://www.rochester.edu/uhs/>. You will need your Net ID and password. To complete the Health Insurance Enrollment/Waiver process, click on "Health Insurance for Students" in the pink box on the right side of the screen. If you have any questions about health insurance coverage, you can call an insurance advisor at 275-2637 or email them at insurance@uhs.rochester.edu.

To schedule an appointment at the University Health Center, please call 275-2662.

LANGUAGE REQUIREMENTS

The Department requires that all graduate students be fluent in terms of reading, writing and speaking – in only one language, and that language is ENGLISH. There are no other formal foreign language requirements. Students should be aware, however, that lack of knowledge about a particular foreign language does not absolve them from having to know and/or be aware of the contents of pertinent articles published in foreign journals.

Students undertaking field work overseas may want to become familiar with a foreign language. Coursework in certain languages can be taken through the university and can be paid for with your tuition waiver; this requires permission from the Dean of Graduate Studies in the College.

All incoming graduate students whose first language is not English and who will be teaching assistants in the coming year are required to be tested for their English proficiency. Please contact the Office of Special Programs in Lattimore 127, (phone: 275-2345) to schedule this exam. It consists of a written and oral exam. You must pass these exams to receive your financial support. Failure to take these exams will result in loss of your future financial support (this includes your tuition and/or teaching/research assistantships).

DEPARTMENT EQUIPMENT ETC.

ROOM ASSIGNMENTS

In general we try to provide all teaching assistants with office space in which they can meet and work with students, etc. Research assistants and people with fellowships will usually be assigned space in or near the laboratory where most of their work will be done. In all cases, we will do our best to provide adequate desk and office space for all of you.

To get your room assignment and keys, see Anne Marie Redfield (Hutchison Hall 227).

TELEPHONE USE

Student offices generally do not have phone service. There are telephones located in each research laboratory. The phones in the laboratories are for use by persons associated with that particular lab. If you need to make long distance calls, please use the pay phones located in the Green lounge on the first floor or use your own cell phone.

The department phone number (275-5713) is only to be given out for emergencies. It is not a message service.

Fax usage is only for business purposes; use of the fax machine to conduct personal business is prohibited. The department fax # is 585-244-5689.

COMPUTERS, E-MAIL ACCOUNTS, ETC.

There are computers (with some graphics and word processing software) and a laser-printer located in the department computer room (227A Hutchison Hall). You may use these for general typing purposes, e-mail, etc. However, do not save ANY files to the hard drives, as the computers will be cleaned regularly and non-essential files will be deleted.

Bring your own CD / flash drive / external storage drive to save your files when you work on these computers. The computers are all virus free – please try to keep them that way. You may use the computers in 227A at any time, as long as there are no classes being held in the room.

You can also use computers in your research lab., if your advisor permits.

To access your e-mail account, you can also use any library computer.

The university provides Outlook 365 e-mail accounts for graduate students. You will be notified when your account has been set up.

Please make sure that you provide Anne Marie Redfield (Hutchison Hall 227; aredfiel@ur.rochester.edu) with your e-mail address, local address and phone number.

MAILBOXES

Each graduate student is assigned a mailbox in the department office (Hutchison Hall 227). Outgoing mail can be put into the blue mailbag near the mailboxes. Mail is delivered and picked up once a day (at approximately 11:00 a.m.)

COPYING

The department copier is meant for copying material related to teaching or research. It is not to be used for personal copying. For copying related to teaching classes, teaching assistants should obtain a copy code from the instructor who is teaching the course. These codes are to be used only for department related copying. For copying related to research obtain a copy code from your research supervisor.

For personal copying, use the copiers at the River Campus Libraries. There are black and white copiers in most river campus libraries and a color copier in Rush Rhees. Black and white copies cost 10 cents/side and color copies are 60 cents/side and can be paid for with a UR ID with Flex Account or you can purchase a visitor card at Value Transfer Station (VTS) machines located in Rush Rhees, Carlson and the ITS center. There is also coin-operated photocopying available in Rush-Rhees library. Printers are also located in all river campus libraries. Costs are the same as with photocopying and can be paid for by the same methods listed above.

LIBRARIES

Geology materials (books, journals, maps) are housed in Carlson Library, located in the Computer Sciences Building next door to Hutchison. Their phone number is 275-4488. Hours for the River Campus libraries can be found at <http://www.library.rochester.edu/> The Carlson Library also houses chemistry, biology, mathematics, statistics and engineering collections. Anyone there can help you with using the online catalog (Voyager), interlibrary loans, finding journals, etc. We strongly recommend that incoming students sign up for the library's informational classes. Our librarian is Lindsey Rae. Her phone number is 275-8829 and her email address is lrae@library.rochester.edu. During the course of your studies/research you may need to visit one or more of several other libraries on campus, such as the main Rush Rhees Library or the Physics-Astronomy Library in Bausch and Lomb Hall.

ROCK STORAGE

The department has rock cases available for graduate students whose research involves collecting significant volumes of rock. In general, cases will be provided to students when they need them. Students in need of rock cases should see Gerry Kloc (Hutchison 508). The case(s) will be yours until you finish your graduate program at the U of R. After you have finished your degree, you are expected to remove any materials which you feel are valuable – either to you or to posterity. If you want your rocks saved, but cannot take them with you when you leave the University, you will have to make special arrangements to have them saved. In any event, all unlabeled specimens go!

ROCK CUTTING ROOM

The department rock cutting room (Hutchison 109) is equipped with rock-cutting saws, a drill press, a band-saw, a rock-splitter and a vibro-lap. Check with Gerry Kloc (Hutchison 508) before using this room to make sure you are familiar with this equipment. Students will be held responsible for broken saws, bent blades, etc. -- so please make sure that you know what you are doing. Keys can be signed out from the department office on an as needed basis.

MICROSCOPES

Research microscopes are available through your advisor. In addition, teaching microscopes are housed in the Optical Mineralogy Lab (Hutchison 205) – these microscopes should not be removed from this room. Talk to Professor Tarduno if you wish to use one of these microscopes.

DEPARTMENTAL GET-TOGETHERS

DEPARTMENT COLLOQUIA

The department has a weekly Seminar Series (Frontiers in Earth and Environmental Sciences –EES 499, 1 cr. hr. each semester) where speakers are invited from other universities to present lectures. Please make sure that you are registered for EES 499 every semester that you are here. ALL students must attend these lectures.

A reception normally follows the lecture, and gives students a chance to meet scientists from other universities and research labs and learn of their research interests.

The department also has a more informally organized Colloquium series where graduate students and faculty talk about their research. You are expected to attend regularly and present at least one talk every year. It is a good place to practice presenting papers for national meetings. Watch for posters.

PICNICS AND GET-TOGETHERS

The Department, with the help of the Undergraduate Student Geology Organization (USGO), holds picnics in the Fall and Spring – all are invited, including families and significant others.

USGO also organizes TGIFs whenever possible. These get-togethers are a good place to get to know everyone in the department – so don't stay away!

STUDENT SUPPORT & TAXES

Financial assistance is allocated on a yearly basis, with separate support for the academic year and the summer months. Although we cannot guarantee continuous support, we are generally able to provide financial support for our graduate students as long as they are in good academic standing and make satisfactory progress toward their degrees. Ph.D. students are initially supported as teaching assistants, typically for the first year of their residence here. Support for the following years and for any summer months generally comes from research grants, administered by the student's research advisor.

All full-time graduate students should register for a minimum of 9 credit hours if they are a teaching or research assistant, and no more than 12 credit hours per semester. Ph.D. candidates will, when possible, receive tuition waivers for no more than 90 credit hours. After that point, PhD candidates are charged a continuation fee (presently about \$1,035 per semester) to maintain their full-time enrollment.

M.S. (plan A, B and 3/2 students) will, in most cases, only receive partial to full tuition waivers. Generally, Masters candidates will receive a 50% to 100% tuition waiver (based on 16 credit hours a semester). All first year Masters students are expected to serve as teaching assistants as part of their departmental degree requirements; however, Masters students do not receive stipends as teaching assistants. But they can be supported as research assistants if their advisor has such funds available.

Tuition Waivers...Students should register for no more than 12 credit hours per semester. Tuition waivers are now becoming hard-to-get. If your tuition award says 12 credit hours, you must not register for more than 12 credits or you will be responsible for the additional credits. Summer school courses are not covered by tuition waiver unless prior approval of the Associate Dean has been granted. Students covered by a partial tuition waiver will receive that percentage of tuition coverage for the number of credits in which they are enrolled, up to a maximum of 12 credits for PhD students (16 credits for M.S. students). For example, if you are granted a 75% tuition waiver, you will pay 25% of the tuition up to 12 credit hours and 100% of the tuition above 12 credit hours.

PAYROLL, TAXES AND FORMS

Teaching and research assistantship income is taxable (a W-4 form has to be filed at the Payroll office). The W-4 for can be accessed at the HRMS site under "employee self-service". For non-resident aliens, an online tax compliance system know as "GLACIER" has been implemented to help expedite filing of tax related paperwork. New international students will automatically be enrolled in the system. They will receive an email from support@online-tax.net when they arrive on campus explaining the GLACIER system and which will contain a passcode that they can use to access the system. Once the passcode and instructions are received, the student can enter information and update it as needed (for example, when your funding changes). Failure to provide adequate information could result in taxes being withheld at the maximum withholding rate. To contact a UR Nonresident Alien Tax Specialist for assistance or questions, send an email to glacier@hr.rochester.edu or call the International Student Office at 275-2866 or the Payroll Office at 275-3483.

The University is required to have an I-9 form-Employment Eligibility Verification on file for every new graduate student admitted to our department. You cannot be paid as a graduate student until this form is on file with our payroll office. Section 1 of this form must be completed by you on-line. You can access this form at: <http://www.newi9.com/> Attached to this form is a list of acceptable documents which can be used to verify your eligibility for

employment. Please note that these must be unexpired documents. This form will ask you to provide the following information:

Employer/Company Code: 11968 (This indicates the University of Rochester)

Location Number: 210560 (This indicates the Dept. of Earth and Environmental Sciences)

Your date of hire: Use the start date of your assistantship (usually September 1)

Once you have completed and electronically signed this document, you should bring your document(s) to Anne Marie Redfield in Hutchison 227 for verification. All questions regarding this process should be addressed to Anne Marie Redfield in Hutchison 227.

Direct deposit to your savings/checking accounts in local banks is also available. This can be done on-line with your Payroll Net ID by accessing the HRMS system at www.rochester.edu/working and clicking on the HRMS icon on the left side of the screen.

Every student must also sign an “Intellectual Property Agreement”.

FINANCIAL AID

The university provides only a limited amount of money for graduate stipends. The rest of the graduate student support comes from research grants. If you are supported on a research grant, make sure that you and your advisor are clear about the work you are doing; the grant and your future support depend on it. Do not take support for granted; it is limited and only guaranteed for one year at a time. While there is very little that you can do to change the situation regarding university money, there are several things that you can and should do to help us with the funding for your research.

NEW YORK STATE TUITION ASSISTANCE PROGRAM (TAP)

All New York State residents are eligible for and must apply for the New York State Tuition Assistance Program. You can access their web site at www.hesc.ny.gov to determine if you qualify as a New York State resident.

OTHER FINANCIAL ASSISTANCE

Scholarships and awards offered to graduate students by various federal and private organizations. Some helpful web sites are www.studentaid.ed.gov and our own University Financial Aid web site <http://enrollment.rochester.edu/financial/related.shtm>.

Information is also available in the College Dean’s office in Lattimore 218.

RESEARCH GRANTS FOR GRADUATE PROJECTS

If you are going to be doing a field-based project, either for your master's thesis or essay or for a PhD dissertation, there are several sources of funding available to you which will help to pay some of the bills. These include:

1. Sigma Xi Grants-in-Aid of Research – deadlines – March 15 and October 15. Applications can be downloaded from the Sigma Xi web site at <http://www.sigmaxi.org/about/news/giarOct.shtml>
2. Geological Society of America Research Grants – deadline February 1. Applications can be downloaded from the GSA website at <http://geosociety.org/grants/gradgrants.htm>
3. AAPG Grants-in-Aid – deadline January 31. Application materials can be downloaded from the AAPG website at <http://www.aapg.org/explorer/foundation/2009/01Jan.cfm>
4. NSF graduate research fellowships (for US citizens only). Application materials can be downloaded from the NSF website at <http://www.fastlane.nsf.gov>

Most of these programs do not pay stipends, but they are good for covering field travel, field supply and small equipment expenses. As with all things having to do with money, we encourage you to check out these programs. Talk to your advisor(s) about whether you should apply.

IF YOU ARE APPLYING, YOU WILL NEED RECOMMENDATION LETTERS FROM MORE THAN ONE FACULTY MEMBER. GET YOUR PROPOSAL AND OTHER NECESSARY FORMS TO THE APPROPRIATE FACULTY MEMBERS AT LEAST 2 WEEKS BEFORE THE DEADLINE – DON'T EXPECT THEM TO WRITE LETTERS FOR YOU ON SHORT NOTICE!

DEGREE REQUIREMENTS

PH.D. CANDIDATES - DEGREE REQUIREMENTS

The Department of Earth and Environmental Sciences offers the degree of Doctor of Philosophy (Ph.D.) in Geosciences “which is awarded primarily for completion of scholarly work, research... satisfactorily described in a dissertation” - to cite from the official Bulletin for Graduate Studies. The main emphasis of the Ph.D. program is on creative research that asks, however, for a solid and broad understanding of the field or fields that research is to be conducted in.

As a general guideline, we expect incoming students to have a background equivalent to a graduate of our B.S. program. If an incoming student lacks some of the basic courses in geology or in the natural sciences, we will urge him/her to enroll in these courses as soon as possible. Requirements to take qualifying exams are: completion of at least 5-7 graduate courses; of these, 1-2 graduate courses may be taken outside the department in some field that is directly related to your research. We expect that one of your graduate courses within the department will be in a field that is completely unrelated to your field of research interest. This is meant to broaden your horizons and introduce you to a field of research that is completely different from your own. We also ask you to participate actively and regularly in the department-wide graduate seminars.

For the Ph.D. degree, university regulations require **90 hours** of credit for students coming in with a Bachelor's degree. We expect that approximately **36 hours** of these 90 hours are taken up with formal course work, with the remainder coming from Ph.D. research or reading credits. Of the required 90 credit hours, no more than 30 credit hours may be accepted as transfer credit (on approval of the associate dean of graduate studies) for work previously taken at the University of Rochester or at another university. In other words, for students entering with an approved Master's degree, the pertinent figures are **60 hours** of total credit and approximately **24 hours** of formal course credit. The actual course program will be put together by the student in close cooperation with his/her advising committee.

Because the course work should be the basis for your research, we expect course work to be finished in the first 4 semesters if you hold a Bachelor's degree, and 3 semesters if you already hold a Master's degree. The end of the course work will be marked by the **Qualifying Examination** which, in our department, has two parts. First comes a **Written Examination** that takes two days and will be offered once every semester. In this examination, you will be asked to answer questions from four fields (typically related to the courses of the Department, with no more than 2 exams from your primary research advisor) which, again, will be identified by you and your advising committee. One of the four exams may be written by a professor outside the department but within the university. The exams will test if you have a solid knowledge and understanding of the principles in four fields of the Geosciences. If the exam indicates weaknesses in one or more fields, the advising committee will decide whether the candidate has passed but has to enroll in a particular course, has failed but is allowed to repeat the exam after a given time and a particular program, or should leave the university. On passing this examination you will receive the degree of “Master of Science” if you don't already hold one from this department.

Once you have passed the written qualifying examination, we ask you to prepare a written outline of your proposed doctoral research. This outline should take the form of a research proposal, i.e. it should describe the main problem you want to study, the reason why you think it worthwhile to do, the present understanding of the problem based on a literature review, and the way and means you plan to address the

problem. This proposal should follow the basic guidelines of an NSF proposal and be prepared in close cooperation with the faculty member you intend to work with. The second part of the qualifying examination (which should come 1 to 6 months after the first part) is an **Oral Examination** and will be administered by three or more members of the faculty, usually your advising committee (which may include one faculty member from another department). This exam starts with a talk about your proposed research that is open to the public. This is followed by a closed-door exam which will start out as a defense of your proposal, but will also test your understanding of your proposed field of research. If you do not pass the exam, at the discretion of the examining committee, this exam can be repeated once after a period of at least five months.

On passing the oral qualifying examination, you will be promoted by the Associate Dean of Graduate Studies to the status of “Ph.D. candidate”. During your time as a Ph.D. candidate, you will be guided by a new advising committee, which by now will also include a faculty member from another department. Once your research is completed and the results reported in your dissertation (to the satisfaction of the faculty) the **Final Ph.D. Examination (Ph.D. defense)** is the only step left between you and the Ph.D. degree. This examination consists of an oral presentation of your research – open to the public – which is followed by a closed oral examination administered by a faculty committee appointed by the Dean of Graduate Studies, usually your advising committee plus an outside chairperson.

DEPARTMENT CURRICULUM REQUIREMENTS

Students entering the graduate program in the department are expected to fulfill certain minimum course requirements.

I. PREREQUISITES:

These are courses you are expected to have taken as an undergraduate. If you have not had these courses, the sooner you take care of these deficiencies the better it is for you. But, if you have to take care of certain deficiencies, remember that graduate students cannot take 100-level courses for credit, and 200-level courses carry only three credit hours. There is also a limit of two 200-level courses that can be taken within the normal course of a graduate student curriculum. Additional 100-level and 200-level courses can be taken as bridging courses with the permission of the Associate Dean; bridging courses are covered by your tuition waiver, but do not count toward your total required 90 hours of graduate credits. Talk to your primary advisor and the department graduate advisor to work out a program.

2 semesters of Calculus

Differential Equations or Statistics or Linear Algebra

1 or 2 semesters of Physics

1 or 2 semesters of Chemistry

1 or 2 semesters of Biology

For a total of at least 4 semesters of Physics, Chemistry, or Biology

Students entering the program with a Geology BS degree are expected to have completed a program equivalent to a BS in Geology from the University of Rochester. This would include courses in:

Physical Geology

Historical Geology

Mineralogy (including Optical Mineralogy)

Sedimentology and Stratigraphy

Structural Geology

3 elective (upper level) courses e.g. Geochemistry, Geophysics, Petrology, Paleontology or Paleomagnetism

Students entering with a Geology BA degree are expected to meet Geology BS requirements with review of the department graduate advisor. Any deficiencies can be taken care of through bridging courses.

II. CURRICULUM FOR PH.D. (AND M.S.) STUDENTS

A broad range of skills and expertise is represented within the Earth Sciences. The curriculum is designed to ensure that students gain background not only in their own specialty, but are also familiar with concepts in some other aspects of the Earth Sciences. By choosing appropriate courses (from the list below) the curriculum will allow a student to prepare for qualifying exams in either (1) four fields within the EES department (with no more than two exams from any particular field of specialization, and the other 2 exams from at least two other fields of specialization) or (2) three fields within the EES department (with no more than two exams from any particular field of specialization) and one exam outside the department (for example, Physics, Chemistry, Biology, Engineering or Computer Science).

In addition, a student must complete one 2-4 course sequence in his/her area of specialty (in consultation with his/her research advisor). **In other words, students will typically have completed a total of at least 4-6 courses within the department that will represent the general areas in which they will be tested for their qualifying exams. Additional courses may be required to prepare the student for research and to fulfill total course credit requirements.**

If a student chooses a specialization outside the department, the course sequence for that specialization must be agreed upon in advance with an external advisor and the student's EES research advisor. The external advisor will write the qualifying exam in that field, in consultation with the student's research advisor. For example, a student may choose a specialization in Numerical Modeling, and take graduate level course(s) in Mechanical Engineering, then take a written qualifying exam in Numerical Modeling. The student will take written qualifying exams in 3 other fields (of which only 2 can be from the primary advisor) within the department.

(A) Courses within the Department: Students must complete any 3-4 courses from the list below. The list includes essential courses taught by each faculty member (and their specialty) and are also recommended for students outside of that specialty. For each specialty please note that there may be additional graduate level courses that are required; talk to your research advisor about additional courses that are not listed here.

Prof. Mauricio Ibanez-Mejia (Petrology, Geochemistry, Geochronology)

Chemical Evolution of the Earth
Geochronology, Thermochronology, Geospeedometry

Prof. Dustin Trail (Earth Materials, Experimental Petrology)

Earth Materials (EES 404)
Introduction to Thermodynamics and Kinetics (EES 463)

Prof. Robert Poreda (Low-Temperature Geochemistry)

Chemical and Isotopic Hydrology (EES 468)
Environmental Geochemistry (EES 416)

Prof. John Tarduno (Geophysics and Planetary Science)

Paleomagnetism and Global Plate Tectonics (EES 456)
Planetary Science (EES 455)

Prof. Gautam Mitra (Structural Geology and Tectonics)

Geometry and Mechanics of Thrust Faults (EES 488)
Microtectonics (EES 481)

Prof. Carmala Garziona (Surface Processes)

Sedimentary Basin Analysis (EES 483)
Paleoenvironmental Reconstructions using Light Stable Isotopes
(EES 464)

Prof. Vasilii Petrenko (Climatology)

Paleoclimate (EES 465)
Ice Core Records of Climate and Environmental Change (EES 466)

Prof. Lee Murray (Climate Modeling)

Atmospheric Geochemistry (EES 418)
Atmospheric Chemistry Modeling

Prof. John Kessler (Oceanography)

Chemical Oceanography (EES 412)
Stable Isotope Geochemistry (EES 461)

Prof. Tom Weber (Ocean Modeling)

Marine Ecosystem and Carbon Cycle Modeling (EES 433)
Physical Oceanography

(B) Courses outside the Department: For students who wish to take one of their Qualifying Exams outside the department, the following are some examples of courses you can take. Talk to your advisor to find out what is most suitable for your own research program.

Thermodynamics (CHM 252 or equivalent)
Fluid Dynamics (ME 225)
Ecology (BIO 463)
Finite Elements (ME 441)
Non-linear Finite Element Analysis (ME 458)
Continuum Mechanics (ME 444)

Electron Microscopy (ME 452)
Crystallography and X-Ray Diffraction (ME 451)
Digital Signal Processing (ECE 446)
Signals (ECE 241)
Advanced Statistics (BST 416 or equivalent)

(M.S. students need only satisfy the “Within the Department” course requirements)

(C) Other courses: Additional courses as required by your dissertation/thesis advisor.

III. OTHER REQUIREMENTS

To satisfy teaching requirements, students should register for EES 490 (Supervised College Teaching: 1 credit) for at least 1 semester and no more than 2 semesters.

Students should register for EES 499 (Research Frontiers in Geoscience) for 1 credit every semester.

DEPARTMENT POLICY ON Ph.D. QUALIFYING EXAMINATIONS

I. STUDENTS ENTERING WITH A MASTER’S DEGREE

Students should take the written qualifying exams by the end of the THIRD semester in residence and their oral exams the following semester.

II. STUDENTS ENTERING WITH BA/BS DEGREE

Students should take the written qualifying exams by the end of the FOURTH semester in residence, and their oral exams the following semester.

A student who enters the M.S. program and then decides to pursue a Ph.D. degree here (or would like the option to do so) can follow one of two paths:

- 1) Take the Ph.D. written qualifying exam by the end of the third semester. If he/she passes, he/she can follow the regular route to the Ph.D. If he/she fails, he/she will continue in the M.S. program and leave upon its completion. The Masters Plan A program is recommended.
- 2) “Reapply” to the graduate program (to pursue a Ph.D. degree) by the normal February 1 deadline. This does not have to be a formal application with application fee etc. It should be an application to reactivate the file, and should include updated transcripts and letters of recommendation. The student will then be evaluated together with applications from incoming students. If the student is accepted into the Ph.D. program we will notify him/her by April 1. He/she should then finish a M.S. thesis or M.S. essay before the beginning of the fifth semester and take the Ph.D. written qualifying exams by the end of the fifth semester in residence. Failure to do so will indicate that the student is not interested in pursuing a

Ph.D. degree here, and the student will be asked to leave with a Master's degree. There is, of course, the option of taking the written qualifying exam at the end of the fourth semester in residence.

III. WRITTEN QUALIFYING EXAMINATIONS

All students who wish to take Ph.D. Written Qualifying Exams must do so within the following time slots:

- Week before the start of the Spring Semester
- Week after regular exam period ends (Senior Week) in the Spring Semester
- Week before the start of the Fall Semester

The student must choose **four** of the following twenty fields for the Qualifying Examinations, and notify the graduate advisor of his/her choices at least four weeks before the examination. Questions in no more than two fields should be from the student's primary advisor. The other two exams should be from two different examiners. Questions (in any of the chosen fields) may be asked by more than one faculty member. If you are to take the written qualifying exam, it is critical that you consult with faculty (often more than one per field) in your four chosen fields early in the semester to find out what material you are expected to know.

1. Early Earth Geology (written by Trail)
2. Mineralogy, Crystal Chemistry and X-Ray Crystallography (written by Trail)
3. Petrology and Geochemistry of Igneous and Metamorphic Terranes (written by Ibanez)
4. High Temp Isotope Geochemistry, Geochronology and Thermochronology (written by Ibanez)
5. Isotope Geology (written by Poreda)
6. Environmental Geochemistry/Low Temperature Geochemistry (written by Poreda)
7. Mountain Belts and Thrust Tectonics (written by Mitra)
8. Stress and Strain in Rocks/Microtectonics (written by Mitra)
9. Sedimentary Basin Analysis (written by Garzione)
10. Paleoenvironments and Stable Isotopes (written by Garzione)
11. Paleomagnetism and Global Plate Tectonics (written by Tarduno)
12. Planetary Science (written by Tarduno)
13. Atmospheric Geochemistry (written by Petrenko)
14. Paleoclimate (written by Petrenko)
15. Physics of Climate (written by Murray)
16. Atmospheric Chemistry (written by Murray)
17. Isotope Geochemistry (written by Kessler)
18. Chemical Oceanography (written by Kessler)
19. Ocean Biogeochemical Cycles (written by Weber)
20. Physical Oceanography (written by Weber)
21. Physics, Chemistry, Biology, Engineering or Computer Science (written by external professor)

IV. ORAL QUALIFYING EXAMINATIONS

A student who passes the Ph.D. Written Qualifying Examination will then have to take an Oral Qualifying Examination at which he/she will have to defend a Ph.D. thesis proposal. This exam should be taken within a semester of the Written Qualifying Exam and in no case later than the beginning of the second semester after the Written exam. (Beyond that the student may be asked to retake the Written Qualifying Exam). The exact date for this exam is more flexible, and should be decided on by the student in consultation with his/her advisor and examining committee.

V. FINAL ORAL THESIS COMMITTEE

The committee for the final oral examination for the Ph.D. (i.e. PhD. thesis defense) “shall consist of at least 2 current full-time faculty members of the rank of assistant professor or higher (one of those being the student’s advisor) who hold their primary appointment in the candidate’s major department, and one full-time faculty member, assistant professor rank or higher with a primary appointment in a department other than the candidate’s major department (usually referred to as the outside reader)”. (Paraphrased from Regulations Concerning Graduate Studies [Red Book]). The thesis must be approved by the entire committee before it can be registered for a thesis defense. The final oral examination committee is presided over by the University dean of graduate studies or an appointed representative, who serves as Chair; nominations for the chair of the committee must be submitted by the department to the Associate Dean for Graduate Studies within the College (ASE).

Should a person with the rank of assistant professor or higher, from another university be required on the committee, that person, after permission has been granted by the Associate Dean’s Office, will constitute a member of the committee above and beyond those outlined in the previous paragraph.

Permission to add a committee member from outside the university requires submission of a “Petition for a Non-Standard Member of the PhD Examination Committee” form along with a complete copy of the curriculum vitae from the committee-member-to-be. This form must be submitted and approved by the Dean’s office before the registration paperwork can be submitted.

VI. TIME LINE FOR PH.D. STUDENTS

End of second semester in residence – candidates should have selected an advisor

End of third semester in residence – (if you already have a Masters degree from elsewhere)
Written Qualifying Examination. The oral examination should be completed by the end of your fourth semester.

Fourth semester –File proposed program for doctoral studies with Dean’s Office. By the end of the semester you should also have your core course requirements completed, as well as any additional coursework your advisor has required. Students that entered the program with B.A./B.S. degrees should be ready to take Written Qualifying Examination by the end of this semester.

After this semester you should register for Ph.D. research credits until you complete 90 credit hours, although you can continue to take additional formal courses if necessary (check with your primary advisor and/or the graduate advisor)

End of fifth semester in residence – (if you entered the program with B.A./B.S. or equivalent) Finish the Oral Qualifying Examination by the end of the semester (and in no case later than the beginning of the sixth semester).

After third year – the tuition waiver you receive covers 90 credit hours, and runs out in less than 8 semesters (if you register for 12 credits per semester) or extends to 10 semesters (if you register for 9 credits per semester). Students continuing enrollment after 90 credit hours must register for EES 999 (Continuation of doctoral enrollment) and will be responsible for the \$1,035 continuation fee. These fees are not covered by a tuition waiver.

You should have at least one paper submitted for publication by the end of your fourth year. The typical length of time for completion of a Ph.D. is between 5 and 6 years. Students are generally expected to have between one and three papers submitted or in press in the leading journals in their field by the time of their defense.

VII. GRADUATING WITH FORMS

1. *Complete Program for the Master's Degree.* This is a statement of your intended program. It must be filed with the Office of the Associate Dean for Graduate Studies before the end of the second semester. See the Graduate Calendar for deadline dates.

(www.rochester.edu/college/gradstudies/gcalendar.html)

2. *Complete Program for the Ph.D. Degree.* This is a statement of your intended program, and gets filed with the office of the Dean of the College. This form must be filed by the fourth semester in residence, and must be approved by the Department Chair before it is submitted.

3. *Examination Appointment Forms.* These forms must be completed prior to and in preparation for your Ph.D. Oral Qualifying Exam, and for M.S. (Plan A) or Ph.D. defenses.

The appointment form for the Masters Plan A defense must be registered with the Office of the Associate Dean for Graduate Studies and copies given to members of the examining committee at least one week prior to the oral examination.

The office of the Associate Dean for Graduate Studies must be notified at least 2 weeks before a Ph.D. Oral Qualifying Exam is to be held.

The University Graduate Dean's Office requires that the appointment form for the Ph.D. final oral examination be turned in along with a final copy of your thesis, no later than 20 full working days prior to your defense (for summer defenses it must be turned in at least 25 working days ahead of the defense).

Your advisor and all of your committee members must sign this form to verify that they have seen and read your PhD thesis in its final form (i.e. they should not find any errors in it).

When you are ready to begin writing your final Ph.D. thesis, please see Kathy Lutz to obtain a copy of the "Preparation of Doctoral Theses" manual also known as the "Blue Book". This is your guide to formatting and arranging your thesis. It is important that you follow these guidelines in the preparation of your thesis.

4. *Proquest/UMI Dissertation Publishing Form.* The University of Rochester requires all graduate students submitting a Ph.D. thesis to access the online University of Rochester Proquest web site to complete and submit a publishing form. There is no fee for this submission. After the Ph.D. defense is passed, each student will attach a pdf of their final corrected dissertation to the ProQuest site. Students can access this site before their defense. However, you will not be able to complete the form until after your defense is in its final form. To download the pdf of the information booklet, go to:

www.il.proquest.com/dissertationagree Please see Anne Marie Redfield to obtain the username and password and also if you have any questions regarding this process.

5. *Other.* At 5-6 weeks before your defense, a copy of your advising record needs to be requested by Anne Marie to be included with your thesis when you register it for the Ph.D. final oral examination. There must be no incompletes or missing grades on your transcripts. Failure to clear up missing grades, etc will delay scheduling of your final oral exam. (i.e. Ph.D. defense)

Also, an appointment form needs to be completed and signed by the Chair. This form requires exact dates, times and members of your committee. Therefore, it is important to give Anne Marie as much advance notice as possible in order to prepare the paperwork necessary to register your defense.

PLEASE DON'T WAIT UNTIL THE LAST MINUTE TO TRY TO SCHEDULE YOUR DEFENSE.

After your defense and all other formalities have been completed (and any final corrections have been incorporated into your thesis) all students need to provide a final copy of their essay/thesis (bound) to the department secretary (Anne Marie Redfield), for display in Hutchison 229.

VIII. OTHER FACTS YOU SHOULD KNOW

1. You are expected to earn A's and B's in all your course work. Grades of C or below are not considered satisfactory. Incompletes (I) are not looked upon favorably either. Two grades of "C" or lower can result in dismissal from the program. Failure to pass (i.e. B or higher) at least 9 credits/semester can lead to probation/dismissal.
2. Math and/or statistics and/or computer courses are good for you.
3. Course loads – all students should be carrying 12 credit hours (or 9 credit hours minimum if you are a teaching or research assistant). This means 2 - 3 graduate level courses and/or one 200 level course during your first semester (plus EES 490 and EES 499), and 2 - 3 graduate level courses during subsequent semesters.
4. The Department does not have a foreign language requirement.
5. After your first year, you are expected to present at least one talk per year in the Earth and Environmental Sciences Colloquium.
6. We strongly encourage you to apply for outside funding for summer research as soon as you have a well-defined research project.

MASTER'S CANDIDATES – DEGREE REQUIREMENTS

The Department offers two different and distinct programs by which a student can work toward a Master of Science degree. The two plans are known as Plan A and Plan B. Plan A is a research and thesis track; Plan B is essentially a course work plus essay track. The decision to follow Plan A or Plan B is a matter for you and your advisor to discuss. In any event, you will need to decide which plan to follow by the end of your first semester as you are required to submit a program plan to the Dean of Graduate Studies at that time. Common requirements for both plans include:

Complete 30 graduate credit hours of correlated graduate work.

Complete a minimum of 18 credit hours in formal class work (or 4-5 4-credit courses) in the subject areas listed below.

I. CURRICULUM FOR M.S. STUDENTS

Of the 18 credit hours of course work required by the University, the Department requires students to complete three courses (from at least three different sequences), plus at least two courses from your advisor's sequence (TOTAL OF 5 COURSES).

For a list of COURSES see the section on CURRICULUM requirements for Ph.D. students.

II. CURRICULUM FOR M.S. 3/2 (or 4 + 1) STUDENTS:

All 3/2 (or 4+1) Master's students are required to complete at least 3 of the following core courses:

- Geophysics (EES 405)
- Igneous and Metamorphic Petrology (EES 441)
- High Temperature Geochemistry (EES 448)
- Geodynamics (EES 453)
- Paleomagnetism and Global Plate Tectonics (EES 456)
- Sedimentology and Tectonics (EES 486)
- Geometry and Mechanics of Thrust Faults (EES 488)
- Paleoclimate (EES 465)
- Climate Change Perspective to Chemical Oceanography (EES 412)

III. RESEARCH, READING AND DISSERTATION COURSES FOR M.S. STUDENTS

EES 491: Reading (and Research) courses credit hours may NOT exceed a total of 6 credit hours of the 30, and all reading courses must be approved by the Associate Dean of Graduate Studies. You may obtain the form for reading course approval from the Department office.

EES 495: Master's Research in Geology. Credit hours are assigned by the instructor, specific to each student's needs. Note: you do not need to be enrolled in Master's research in order to actually be doing research.

EES 493: Master's Essay. Enroll in this course during your final semester; that is the last semester before you graduate. Satisfactory completion of this course is based on the final decision of your advising committee (at least 2 faculty members).

EES 899: Master's Dissertation. Enroll in this course during your final semester. Satisfactory completion of this course is based on the final decision of your advising committee (at least 3 faculty members).

A completed, corrected copy of the final dissertation is to be turned in to the Department office and one additional copy to each member of the committee. It is the student's responsibility for production costs.

EES 895: Continuation of Master's Enrollment: Once you are finished with the minimum requirements for the degree (i.e. 30-32 credit hours), if you plan to complete your degree off campus you must register for Master's Continuation of Enrollment (EES 895) and you will be responsible for the continuation fee at that point onward (\$1035 per semester). This registration is "X" time status (less than part time).

IV. OTHER REQUIREMENTS

DEADLINES: *First year in residence* – Proposed Master's Program of Study Plan must be submitted to the Associate Dean for Graduate Studies before the end of the second term. Check the Graduate Calendar (at www.rochester.edu/college/gradstudies/gcalendar.html) for actual dates.

Fourth semester in residence – expected to have finished your essay/thesis

MINIMUM RESIDENCY REQUIREMENT: Master's students must remain in residence at the University until they have completed a minimum of 20 graduate credit hours (or 2 semesters at 12 credit hours each).

REQUIREMENTS FOR MASTER'S PLAN A (THESIS)

INCLUDE:

1. Complete a minimum of 18 credit hours from courses numbered at the 400 level or higher (see previous page). Credits from EES 499 cannot be used to satisfy this requirement, although students are expected to register for EES 499 (1 credit) for each semester that they are in residence.
2. Completion of EES 495 (Research) and EES 899 (Master's Dissertation). The dissertation and associated research must provide a combined total of no less than 6 credit hours and normally no more than 12 credit hours. Under special circumstances, with prior approval of the Associate Dean for Graduate Studies, the combined credit for dissertation and research may exceed 12 credit hours.
3. The Master's dissertation must be submitted according to a predetermined format. A booklet describing details of the preparation is available from the Associate Dean. Copies are available in the department office.

4. The candidate's thesis must be registered with the office of the Associate Dean at least one week prior to the oral examination (defense). Copies must be given to members of the examining committee at least one week before the oral examination and at least three weeks before Commencement.
5. You must pass a final oral examination (defense). The examining committee will be appointed by the Associate Dean, and it will consist of two faculty members from your major department (Earth and Environmental Sciences) and one faculty member from another department within the University. The department recommends an oral presentation of your research -- open to the public -- before the closed oral examination.
6. Once the thesis is accepted by your committee, one printed copy (using the proper format, see No. 3 above), containing all of the required corrections and revisions, must be filed at the office of the Associate Dean for the Graduate School; one copy should also go to the Department and another to your advisor. Additional copies for your own personal use should also be made.
7. If you take more than three (3) years to complete your dissertation, you may be required to take a written comprehensive examination. There are certain provisions available for students who do not pass their comprehensive (final) examination. These are described in the Graduate Bulletin. However, since we expect much better of all of you, we won't waste the space describing them here.

REQUIREMENTS FOR MASTER'S PLAN B (ESSAY)

1. Complete a minimum of 18 graduate credit hours from courses numbered at the 400 level or higher (see previous page). Credits from EES 493, EES 495 and EES 499 cannot be used to satisfy this requirement, although students are expected to register for EES 499 (1 credit) for each semester that they are in residence.
2. Completion of a Master's Essay, EES 493. Total credit hours for EES 493 may not exceed 4. The completion of the essay is a department requirement, not a college requirement. Satisfactory completion of this course is based on the final decision of your advising committee (at least 2 faculty members).
3. EES 495 (Master's Research) normally is not part of a Plan B program. With the approval of the Associate Dean, however, up to 6 credit hours for EES 495 may be granted but the total of EES 493 and EES 495 may not exceed 6 credit hours.
4. Students are required to pass a comprehensive examination in their field of specialization. This is an oral examination conducted by 2 members of the faculty from the Department of Earth and Environmental Sciences. Normally, the examination will be given on completion of your Master's essay. Topics covered in the examination are not limited to the subject of your essay.

THE LAST WORD

This handbook is intended to cover general information and regulations which are of particular interest to the graduate students in the Department of Earth and Environmental Sciences. However, we have neither the space nor the inclination to include all regulations which may be pertinent to you during your tenure at the University. If a question arises which is not dealt with in this handbook, then consult the current issue of the Graduate Bulletin that is on-line at <http://www.rochester.edu/GradBulletin/>. It is the official “law” of the university, and as such, except for department requirements, its contents take precedence over any other source of information within this institution.