Graduate Student

Handbook and Guidelines

Academic Year 2014-2015
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I. INTRODUCTION

Updated August 2014

Welcome to the University of Minnesota’s Department of Earth Sciences. We are happy you have chosen to continue your studies in our department, and we hope that you will have a pleasant and productive experience.

This booklet is intended for use as a reference to assist you with the necessary requirements and procedures involved in obtaining an advanced degree.

It has been designed and written to take into account the policies and procedures required by the University, College of Science & Engineering (CSE), and the Department, as well as the philosophy of the Department of Earth Sciences regarding graduate education. Though you may notice a few differences between our Guidelines and what is listed on the Graduate Education Website (e.g. timeline for submission of Graduate Degree Plan), this document defines your requirements as an Earth Sciences graduate student and what is outlined in this booklet will be used to help determine your progress.

Much of your official paperwork and online submissions are done through the Graduate Education Office, here are some links you should bookmark:

• Graduate Education main page: http://www.grad.umn.edu/

• Graduate Education Catalog: http://www.catalogs.umn.edu/grad/

• Information for Masters students: http://www.grad.umn.edu/students/masters/index.html

• Information for PhD students: http://www.grad.umn.edu/students/doctoral/index.html

Of course, you may contact the Director of Graduate Studies at any time if you need clarification or would like further information.
II. General Information and Contacts

A. Contacts

Graduate Student Services and Progress Office (GSSP)
160 Williamson Hall; http://www.grad.umn.edu/students/contactus/index.html

General department contact and mailing address:
Department of Earth Sciences
University of Minnesota
310 Pillsbury Drive SE
Minneapolis, MN 55455
Main phone: 612-624-1333
Fax: 612-625-3819
Email: esci@umn.edu
http://www.esci.umn.edu

Campus mailing address:
108 Pillsbury Hall
Delivery code: 0211

Department Contact Names and Responsibilities
During the 2014-2015 academic year, the Graduate Studies Committee consists of the following faculty members, as well as a graduate student elected by the graduate student body at the beginning of fall semester:

Marc Hirschmann, Director of Graduate Studies
220A Pillsbury Hall, 612-625-6698, hirs022@umn.edu
The DGS is responsible for approval of degree programs and all official graduate education forms, and administration of examinations.

Max Bezada 218 PillsH; 612-626-3697 mbezada@umn.edu
Larry Edwards, 427 ShepLab; 612-626-0207; edwar001@umn.edu
Christian Teyssier, 210 PillsH; 612-624-6860; teyssier@umn.edu
Brandy Toner, 450 BorH (St. Paul campus); 612-624-1362; toner@umn.edu

Department Staff
Ms. Sharon Kressler, Department Administrator
104B Pillsbury Hall, 612-625-5068, kress004@umn.edu
- Office assignments.
- Departmental administrative issues.
- Committee Assignments.
- Awards.
- Alumni Relations.
- Keys.

Ms. Jennifer Petrie, Student Personnel Coordinator/Graduate Plan Level Coordinator
104A Pillsbury Hall, 612-301-1197, japetrie@umn.edu
- Registration information and materials.
- Graduate student progress.
-Travel and summer support applications.
-Seminars.
-Keys.
-General inquiries.

Mr. Doug Johnson, Accountant
108 Pillsbury Hall, 624-2012, johns231@umn.edu
-Payroll issues and paychecks.
-Financial aid.

Mr. Greg Gambeski, Accountant
108 Pillsbury Hall, 624-3820, gambe001@umn.edu
-Travel and supply reimbursement.
-Questions on payment to vendors.
-Purchase Order processing.

Mr. Tony Gambeski, Accountant
108 Pillsbury Hall, 624-9407, gambe010@umn.edu
-Expense reimbursements.
-Purchasing Cards.
-Deposits.

Mr. Mark Griffith, Laboratory Machinist
10 Pillsbury Hall, 624-4069, griff062@umn.edu
-Machine and Rock shops.
-Vehicles.
-Building maintenance concerns.

Mr. Rick Knurr, Senior Scientist and Chemical Safety Officer
4 Pillsbury Hall, 624-8084, knurr001@umn.edu
-Chemical and Lab Safety

Dr. Kent Kirkby, Introductory Courses Coordinator
103 Pillsbury Hall, 624-1392, kirkby@umn.edu
-Coordinates 1xxx level courses including TAs for these courses.

B. University ID Card (UCard)
To obtain a UCard, bring your driver's license, state ID, or passport to the UCard office- G22 Coffman Union. Among other benefits, this card will allow you access to the University library system, the recreation center, and the department's copy machine.

C. Office Space
Office space in Pillsbury Hall will be assigned to active graduate students. Please see Sharon or Jen for your office assignment. Refer to Appendix 5 for Office Space Policy. If your research lab is in a different building, talk with your advisor about office space at that location.
D. **Keys**
   At the minimum, you will be issued one key for Pillsbury Hall, a “submaster” that allows access to your office, the main offices, and classrooms. A $10.00 cash deposit is required for each key. This deposit will be refunded when you return your keys. In the case of lost keys your deposit will be forfeited. An additional $10.00 deposit is required before a replacement key is issued. Our office is also authorized to issue keys for the labs in Koltthoff Hall and Shepherd Labs. In order to request key-card access to Pillsbury or Shepherd, please copy and paste this form into your browser.
   
   https://docs.google.com/a/umn.edu/forms/d/1-jATkK17hfEnmN--6y72U6exvTcl0HY1saAU6qBF4ps/viewform

E. **E-mail, Mailbox and Notices**
   You will receive a University e-mail address (x500), which you must activate via the web here. Once this is activated, please notify Jen of your email address so it can be updated on the Graduate Student email listserve. This mailing list is the primary means of communication within the department and your University x500 is considered to be your official email contact address. Some people choose to have their UMN email forwarded to their own gmail or other external account to do this go to the web page.
   
   http://onestop.umn.edu/u_resources/computing_and_technology/index.html; click on “Internet account management”.

   You will be assigned a mailbox in Pillsbury Hall room 108, where you will receive any mail or intercampus notices. If you will be a TA for a course, please be sure to tell your students that the mailboxes are in room 108.

F. **General Office (copies, fax, supplies)**
   **Copier**
   The copier located in room 108 is for departmental use and, not the general University populace. The machine has the capability for scanning documents to .pdf format. For instructions on use of this machine or if it is broken down, seek help from personnel in room 108.

   **Fax Machine**
   There is a fax machine in Pillsbury Hall room 104. Use of this machine is free of charge, however we ask that you keep personal faxes to a minimum. Instructions for use of this machine are posted on the bulletin board on the wall behind the machine.

   **Supplies**
   The supplies in room 108 are available for teaching use only. Personal supplies can be purchased at the bookstore in Coffman Union.

G. **Security**
   On weekdays, Pillsbury Hall is unlocked from 7 a.m. to 7 p.m., and is locked at 7pm, and on weekends. For after hours access 7p.m.-6a.m during the week, and weekends, please fill out the key card access request form. Please copy and paste this form into your browser.
   
   https://docs.google.com/a/umn.edu/forms/d/1-jATkK17hfEnmN--6y72U6exvTcl0HY1saAU6qBF4ps/viewform

   As this is a public building, people are free to walk in and out at will. We have had some thefts in the past (bikes, computers, wallets), so please be aware of this and keep your belongings secure, and office doors shut and locked when not occupied. **Do not leave the doors to Pillsbury Hall propped open at night or on the weekends for any reason.** If you work in the department at night or on weekends, you may contact an escort service to walk you to your car or the bus at 612-624-WALK (9255).
H. **Phones**
Each of the grad office areas (100 and 200 wings, room 125A) are equipped with a common phone. Campus and local phone calls are free of charge, however you will need a calling card to call long distance. As these phones are common to several students, please be respectful and courteous in their use and in taking messages for others.

When calling from one campus phone number to another, you simply dial the last 5 digits of the number. To get an outside line, dial 8 first.

I. **Computer Lab**
The Computer Lab in Pillsbury 204B is designed for the use of undergraduate and graduate students, researchers, staff, and faculty in or related to the Department of Earth Sciences.

In order to use the lab, you must obtain the key code from someone in the front office (room 104), and sign an Acceptable Use Policy to insure that you are aware of what is acceptable and unacceptable use of the computer lab. You also need to be aware of the rules governing all use of computer facilities related to the University.

The department has a group of IT tech students for help with the computer room and other technical help as needed. There should always be someone in the computer room during regular office hours, a schedule is posted on the door; and/or they can be reached at escihelp@lists.umn.edu.

J. **The Rock Shop**
The rock shop (PillsH room 10) is available for your use and is normally open during the weekdays. Should you need a key, you will need to obtain this from Mark Griffith in room 10. As the rock shop is a common area, it is vital that the room be kept clean. Please report any equipment malfunctions or needed repairs to Mark. Abuse or neglect of the equipment in the rock shop may lead to suspension of your access.

Anyone planning to use the saws, thin section machine, or rock crushing equipment must attend a training session, even if you have previous experience with this type of equipment. A specific training session for the rock shop is yet to be scheduled but can be conducted on an as-needed basis.
III. REQUIREMENTS AND PROCEDURES FOR ALL EARTH SCIENCES GRADUATE STUDENTS

A. Student Responsibilities/Progress

All students should choose one of the five tracks in the Earth Sciences program (Geology, Geophysics, Biogeology, Hydrogeology, or Earth Sciences). Plan C MS students only have the option of Hydrogeology. This choice will influence the course program, the selection of minor/supporting field, the composition of examining committees, and focus area(s) of the preliminary written exam. Once a new student is registered, changing from one track to another requires a formal Change of Status Application through the Graduate Admissions Office.

The Department of Earth Sciences expects its graduate students to be self-motivated, conscientious, and professional. Students are encouraged to develop a broad interest in the Earth Sciences by reading current Earth Sciences journals and attending departmental seminars and professional meetings.

Choice of Advisor: It is a condition for acceptance to the program, and for continuation in good standing that a faculty member agrees to serve as a student advisor (students may have more than one advisor). Students may change advisors at any time by obtaining the consent of the new advisor and notifying the former advisor and the Director of Graduate Studies (DGS). Program staff can make official changes only. The Graduate Studies Committee (GSC) will examine individual cases in the event that an advisor chooses to terminate an advisor-advisee relationship.

Course Compact (2-year Plan): Students entering the Earth Sciences Graduate Program meet with their advisor, the DGS and other members of the GSC to construct a course "compact" (or 2-year plan). The compact consists of a list of required coursework, designed to best prepare the student for his/her field of research, while also satisfying College of Science & Engineering (CSE) requirements and leaving as much time for research as possible. Students are expected to complete coursework in a timely fashion. Changes to the compact/2-year plan necessitated by changes in course offerings, timing conflicts and/or changes in research focus can be made at any time with GSC and DGS approval. This course compact is an internal department document; the official Graduate Program Plan is born from this document but submitted a bit later in the student’s career.

Research Work: It is your responsibility to formulate and focus your own research project(s). This should occur by discussion and mutual agreement with your advisor(s). You should become involved in research as soon as possible after entering the graduate program.

Satisfactory Progress: The term “satisfactory progress” includes, but is not limited to:

- Taking and successfully completing the appropriate number of credits, considering other (RA/TA) responsibilities;
- Passing courses with satisfactory grades;
- Successfully completing the required examinations in a timely manner;
- Satisfying the course compact requirements/Graduate Program Plan;
- Satisfying the English competency requirement for non-native English speaking students; and
- Making satisfactory progress in research.

University policy has established time limits for degree completion, from initial enrollment to degree clearance: 5-years for MS and 8-years for Ph.D. The DGS and GSC
will review students' progress annually, however, it is the ultimate responsibility of the student to stay on schedule.

B. Registration

*ALL* graduate students must register every fall and spring semester to maintain their active status. Spring registration carries active status through the summer.

Before initial registration, you must meet with your advisor to determine coursework and to construct a proposed course compact/2-year plan. You will discuss this compact when you and your advisor meet with the DGS and Graduate Studies Committee (GSC) just before the start of Fall Semester 2014. For further details, please refer to section C below.

Graduate students with financial aid must be registered full-time which is a minimum of 6 credits each semester. You will lose your benefits if you do not register. In addition, any student whose *initial* registration occurs after the deadline (for Fall 2014, after Sept 2) will pay a late fee.

For graduate students who must register solely to maintain active status, a limited-use, free, zero-credit, non-graded registration mechanism has been established - GRAD999 (see Appendix 4 for department policy).

The University does not supply printed copies of the semester Class Schedule. All course information is available on-line through the Student One Stop page:

[http://onestop.umn.edu/](http://onestop.umn.edu/)

You can register via the web or in person.

- **Web address**: [http://onestop.umn.edu/registrar/registration/index.html](http://onestop.umn.edu/registrar/registration/index.html)
- **In Person** (three locations): 333 Science & Technology & Student Services Building (East bank and closest to Pillsbury), 130 West Bank Union Skyway (West Bank), or 130 Coffey Hall (St. Paul Campus).

When you register, you will be asked about your insurance - be sure to check the appropriate box whether you register via the web or in person. If you will be covered by the Graduate Assistant Insurance, check the box for Grad Assistant Health-Care Plan (first year students must fill out forms for this insurance). If you will not be covered by the Grad Assistant Health-Care Plan, you must provide your insurance company or HMO and the policy number.

To help assure proper registration and avoid hassles, please use this checklist each time you need to register:
Earth Sciences Graduate Student Registration Checklist

BEFORE YOU REGISTER

Every semester, to help you determine for what and how to register:

1. Talk with your advisor(s).
2. Asking these questions will help you determine for what & how to register:
   a. What is my financial support?
      i. How will I be paid?
      ii. Am I full-time or part-time?
      iii. What if I am ABD and/or get no support?
   b. How is my progress in the program?
      i. What milestones have I completed?
         1. Graduate Degree Plan on file?
         2. Written Exam (PhD)?
         3. Oral Prelim (PhD)?
         4. Thesis Credits Complete? (24PhD; 10MS)
         5. Do I have Advanced Status?
      ii. What courses, if any, do I still need to take?
3. For each class, ask yourself, “Do I need to take this on A-F or S/N grading basis; or audit?”
4. Complete your initial registration before the first day of classes. You have two weeks after the start of classes to make changes.

REMINDERS:

- Make ANY course changes (drop, add, grade basis change) within the first two weeks of class. Refer to the drop/add calendar on OneStop: http://onestop.umn.edu/calendars/cancel_add_refund_deadlines/index.html
- You must be registered full-time in order to receive full-time benefits. This means at least 6 course credits or the 1-credit full-time equivalent for students in advanced status.
  o Advanced MS students have taken all their coursework, have taken at least 10 thesis credits, and have a Graduate Degree Plan on file. MS students MUST apply for advanced status, adhering to the application deadlines: Full-Time Status with One Credit Registration Application. Once approved, register for ESCI 8333.
  o Advanced PhD students have taken all their coursework, have taken at least 24 thesis credits, have a Graduate Degree Plan on file, and have passed both written and oral prelim examinations. This form should be filled out every semester in advanced standing: Full-Time Status with One Credit Registration Application. Register for ESCI 8444.
- Full-time benefits will pay for only up to 14 credits. Tuition for any credits exceeding 14 is the student’s responsibility. (Note: the 1-credit full-time equivalent is the same as registering for 14 credits).
- Auditing a course is billed as regular tuition, so counts in the 14, but you do not get credit for it.
- To maintain active status, you must register for both fall and spring semesters.
- Unless otherwise discussed with your advisor, you do not have to register in the summer.
- If you have no financial benefits but need to be registered in order to stay active, register for GRAD 999.

If you and/or your advisor are unsure of what is your standing and how to register, please ASK Jen.
C. **Coursework Requirements**

You and your advisor will meet with the Graduate Studies Committee just before the start of Fall Semester. The Fall meeting is very important for outlining a plan of courses for the first two years (referred to as the "course compact") and for discussing any gaps in your Earth Sciences or general background. **Fill in the 2-year plan form provided, and indicate course names, numbers, and credits.** Make sure that your plan satisfies course distribution and credit requirements and that you meet all track requirements. You must bring this plan to the student-advisor meeting with the Graduate Studies Committee. This plan is **just a draft.** During the first week of fall semester of the student’s second year, the student, DGS, GSC, and advisor, will meet again to review the student’s progress to-date.

Ph.D. students should plan on completing their required coursework by the term in which they take their oral exam. Plan A MS students should complete their required course and thesis credits by the end of the fall term of their second year.

When making your initial course plan, consult course catalogs ([https://webapps-prd.oit.umn.edu/courses/index.jsp](https://webapps-prd.oit.umn.edu/courses/index.jsp)), the Graduate Catalog to determine likely course offerings in 2014-2015 ([http://www.catalogs.umn.edu/grad/](http://www.catalogs.umn.edu/grad/)), and sections II and III of this booklet for specific information related to the MS and Ph.D. programs respectively.

All students should have **one year each of college calculus, physics, and chemistry.** There may be situations where one of more of these cognate sciences may not be needed, but these will be few and highly specific to the student’s research.

All students are required to complete **ESCI 8001**, Introductory Graduate Seminar preferably in the first year.

D. **Progress Toward Degree**

Normal progress toward the degree entails taking an appropriate number of classes/credits with satisfactory results and within the schedule of the coursework compact, as well as making satisfactory progress in research. **As per University policy minimum GPA requirements for coursework included on the student’s degree program plan are 2.8 for MS students, and 3.0 for Ph. D. students.**

Details on specific milestones and procedures for each degree can be found in the section for those degrees, MS (II) and PhD (III), however the general list is

- Coursework requirements
- Graduate Degree Plan
- Committee Selections
- Written Exam (PhD)
- Oral Prelim Exam (PhD)
- Request Graduation Packet
- Final Exam

E. **Safety Training**

It is required of all personnel working with scientific equipment and chemicals to attend safety training. This year, training is scheduled during the department orientation on August 25, 2014. Students who will be driving a university and/or departmental vehicle for any reason must be registered with the Department. This subject will be discussed in more detail at the main safety training.
F. **Seminar Attendance**

All graduate students are expected to attend departmental seminars (Thursdays at 3:30 p.m.) on a regular basis as part of their graduate education. Students have the option of registering for one credit for attending these seminars (ESCI 8980). Attendance is required regardless of whether or not the student registers for credit. Please see Appendix 3, “Departmental Seminar Attendance Requirements for Graduate Students in Earth Sciences”.

G. **Ethics Training**

The University requires training in responsible and ethical behavior when conducting scientific research. This year's session will be part of the department orientation on August 25, 2014.

H. **TA Training**

The Center for Teaching and Learning Services provides assistance to those who teach at the University. For a list of workshops and how to sign up for them, go here: [http://www1.umn.edu/ohr/teachlearn/index.html](http://www1.umn.edu/ohr/teachlearn/index.html)

Kent Kirkby holds a special training session for students who will TA the department's introductory courses.

I. **Requesting Change of Status**

Formal application through the Graduate Admissions Office and DGS approval are required if you wish to:

- Re-enter the program after a lapse in 'active status'.
- Change desired degree inside the department (either MS to PhD or PhD to MS).
- Change from one track to another.
- Change to another department.

Change of Status/Readmission Application includes an application fee:

- Change of Status: [http://www.grad.umn.edu/admissions/cos/index.html](http://www.grad.umn.edu/admissions/cos/index.html)
- Readmission: [http://www.grad.umn.edu/admissions/readmission/index.html](http://www.grad.umn.edu/admissions/readmission/index.html)

J. **Exemptions and Appeals/Grievance Procedures**

All of these guidelines should be considered to have a certain flexibility to accommodate special cases. It is the Department's desire to meet every student's particular situation, whenever possible and to provide guidance through a program best suited to individual needs. If any questions arise in regard to these matters, they should be directed to the Director of Graduate Studies.

An all-University Student Academic Grievance Policy exists to resolve "complaints brought by students regarding the University's provision of education and academic services affecting their role as students." Copies of the policy and information about its implementation are available from the Office for Conflict Resolution, 662 Heller Hall, West Bank, Twin Cities Campus (612-624-1030). [http://www1.umn.edu/ocr/](http://www1.umn.edu/ocr/)
IV. Requirements and Procedures Specific to Masters Students

Use these Guidelines in tandem with
http://www.grad.umn.edu/students/masters/index.html
and
http://www.catalogs.umn.edu/grad/gen/masters.html

A. **Credit Hour Requirements**

| Plan A Masters                  | • Minimum of 30 credits consisting of: at least 14 course credits in the major field and a minimum of 6 course credits in a related field, outside the major, and a minimum of 10 MS thesis credits. Required course and thesis credits should be completed by the end of the fall of the second year. |
| Plan B Masters                 | • Minimum of 30 credits consisting of: at least 14 credits in the major and 8 credits in the supporting program. The remaining 8 can be from either inside or outside the major field. |
| Plan C Masters                 | • Minimum of 30 credits consisting of: at least 14 credits in the major and 9 credits in a minor or supporting field. The remaining 7 can be from either inside or outside the major field. This is a coursework only option with emphasis in hydrogeology and environmental science. |

At least two-thirds of the course work in the major field at the 4xxx level and above must be taken on an A/F basis. The minimum GPA for coursework on the MS degree plan is 2.8.

B. **MS Coursework and Tracks**

All MS students (except Plan C students whose only option is Hydrogeology) should choose one of the five tracks in the Earth Sciences program (Geology, Geophysics, Biogeology, Hydrogeology, or Earth Sciences). Tracks carry coursework requirements (see Appendix A) that are part of the student's course compact. All students must complete ESCI 8001 (Introductory Graduate Seminar), preferably in the first year.

C. **Official Graduate Degree Plan Form**

MS students should file the Official Graduate Degree Plan by September 30th of their second year.

This is the official follow-up to the course compact/two-year plan declaring the courses that you have or will take in order to fulfill coursework requirements toward your degree. Once signed by the student's advisor and the DGS, the form needs to be reviewed by the Plan Level Coordinator (Jen) who will review, sign then submit the form to the Graduate Student Services and Progress Office (GSSP).
E. **MS Thesis Credits**

Plan A MS candidates must enroll for a minimum of 10 Master’s thesis credits (ESCI 8777) before receiving the degree. These credits are not graded, and therefore cannot be used to meet course credit requirements. MS thesis credits can and should be taken concurrently with course credits, therefore, students should begin taking thesis credits right away.

D. **MS Final Examination Committee Selection**

At the time the student submits the Official Graduate Degree Plan Form, but no later than one month prior to the final exam, the student submits, online, his/her selection of faculty members to serve on the final examination committee.

Go to FORMS at [http://www.grad.umn.edu/students/forms/masters/index.html](http://www.grad.umn.edu/students/forms/masters/index.html)

Click on Assign/Update Examination Committee. This online request will be routed to the student's advisor and subsequently the DGS and CSE for final approval.

Formation of the Committee: This examining committee consists of at least three members. At least two representatives must come from the track's faculty list and one from the minor or related field. Committee members cannot represent more than one field simultaneously (e.g., track and minor field).

At least one member of the committee must be a Senior Member of the graduate faculty in the Earth Sciences department. All tenured or tenure track faculty in the Twin Cities department are Senior Members. For the MS defense, the advisor may act as committee chair.

If you wish to have someone from outside the University on your committee, you need to coordinate this well in advance of the examination:

- Advisor and student submit the proposed committee member’s CV and a cover letter justifying the request to the Plan Level Coordinator (Jen);
- If DGS approves, then DGS will forward that request to the College of Science & Engineering (CSE) Dean's office for approval;
- If CSE approves, DGS notifies our payroll accountant (Doug) so that an ID# can be created which the student will need when submitting the online request for committee members.

(updated 08/29/2014 jap)

F. **Advanced Status -- Full-Time Equivalent Credits**

MS students reach Advanced Status only after all milestones have been met: Graduate Degree Plan on file and all coursework and thesis credits have been completed.

Advanced MS students have an option of registering for a one-credit full-time equivalent (ESCI 8333) which allows the student to remain at full time status and register for only one credit, resulting in a significant cost savings in tuition and fringe benefits to whoever pays for your assistantship.

For each term in which you wish to be considered for this full-time equivalent benefit, you must submit to the GSSP Office an Application for Advanced Masters Status, according to the deadlines: August 15 for full term; December 15 for spring term, and May 15 for the following summer term (Obtainable from the Graduate Education web site: [http://policy.umn.edu/forms/otr/otr194.pdf](http://policy.umn.edu/forms/otr/otr194.pdf))
F. **Request Graduation Packet and Preparing the Thesis**
   Once your Degree Program has been approved and the thesis is ready to go to the reviewers, request your Graduation Packet. This packet will include the Graduate Application for Degree form and Reviewer's Report form. You can request it in person or online up to one semester before your master's final exam. Consult your Graduation Packet for formatting guidelines.

   The student must request a 'Masters Graduation Packet Request'
   https://apps.grad.umn.edu/secure/gradpacket/

   The examining committee must have at least two weeks to review the thesis. The entire committee must be unanimous in certifying that the thesis is ready for defense as indicated by their signatures on the Thesis Reviewers form.

F. **Submit Thesis Reviewer's Report Form**
   Once each committee member signs this form, you must return it to the GSSP Office, at which time you will be provided with the Final Examination Report form.

F. **Schedule Final Exam**
   It is the responsibility of the student to assure that all appropriate forms are filed in the GSSP Office and all requirements have been met before scheduling the exam.

   Confer with committee to select a date and time frame for defense. If necessary, remote participation by committee members or the student is allowed, provided certain conditions are met. This policy can be found at
   http://www.policy.umn.edu/Policies/Education/Education/DOCTORALPERFORMANCE_APPA.html

   The exam must take place in Pillsbury Hall. Once the exam date and time have been determined, check with Jen to schedule a room. Notify the GSSP Office of your defense schedule (likely done when you submit your Reviewer's Report form). Provide Jen with thesis title so as to advertise the defense.

F. **Submit Graduate Application for Degree**
   Submit to One Stop by the first business day of anticipated month of graduation.

H. **MS Exams**
   The only formal examination in the Master's program is the final examination. The Plan A program requires the thesis and the final examination, which consists of the student's oral defense of the thesis. At the option of the examiners, the exam may cover other material relevant to the program. Plan B program may include either one or two research papers, depending on depth of coverage, and a final exam (either oral or written). There is no final exam for the Plan C Masters.

   The oral exam consists of a public presentation (30-45 minutes) by the student, followed by questions and answers. The remaining question and answer period is closed, attended by only the student and examining committee.

F. **Submit Final Examination Report**
   Upon completion of the final exam, the Final Examination Report form, with signatures, must be submitted to the GSSP Office no later than the last business day of anticipated month of graduation.
F. **Submit Thesis or Project**
Submit by the last business day of anticipated month of graduation. Consult your Graduation Packet for formatting guidelines.

I. **Plan C MS**
The Plan C Masters was created as an option to provide a curriculum in which people with bachelor degrees in the Earth Sciences or related fields, as well as working professionals, are able to further their education in areas of hydrogeology and environmental geosciences. The Director of Graduate Studies is the default advisor, however, it is in the best interest of the student to have an advisor in either hydrogeology or environmental geosciences so that an appropriate coursework compact can be determined.

The Plan C Masters is a coursework only option in Hydrogeology, and there are no committees or examinations necessary for completion of this degree.

There is no financial aid available from the department for students entering into the Plan C Masters.

J. **Check-out Procedures**
Congratulations, you’re done! Well, almost. Before you leave the department, please do the following:

- Hand in a bound copy of your thesis to Sharon Kressler.
- Return all keys.
- Thoroughly clean out your office area and desk.
- Coordinate with your advisor and clean out rock samples, lab area, etc.
- You are now an alumnus/alumna! Please, provide Sharon Kressler (esci@umn.edu) with your new contact information, and keep us up-to-date on what you are doing!
V. Requirements and Procedures Specific to Ph.D. Students

Use these Guidelines in tandem with

http://www.grad.umn.edu/students/doctrinal/index.html
and
http://www.catalogs.umn.edu/grad/gen/phd.html

A. Credit Hour Requirements

<table>
<thead>
<tr>
<th>Ph.D.</th>
<th>Minimum of 24 course credits, to include at least 12 credits in the minor or supporting field.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Up to 40% of the credits can be transferred from other graduate institutions. The transfer is arranged by entering the courses/credits to be transferred onto the Official Graduate Degree Plan, which is submitted to the Graduate Student Services and Progress Office (GSSP) for final approval.</td>
</tr>
<tr>
<td></td>
<td>Although the Graduate Ed Office will allow A, B, C, and S grades on a Degree Program, A/F coursework must be completed with an average grade of B or better.</td>
</tr>
<tr>
<td></td>
<td>Only credits taken at the 4xxx and 5xxx levels, with several formal courses to be included at the 8xxx level count toward graduate requirements.</td>
</tr>
<tr>
<td></td>
<td>Minimum of 24 thesis credits are required.</td>
</tr>
</tbody>
</table>

At least two-thirds of the course work in the major field at the 4xxx level and above must be taken on an A/F basis. The minimum GPA for coursework on the PhD degree plan is 3.0.

B. PhD Coursework and Track Requirements

All students should have one year of college calculus, physics, and chemistry. There may be situations where one or more of these cognate sciences may not be needed, but these will be few and highly specific to the student's research. In addition, most students will be required to have or take two semesters of mathematics or statistics beyond first-year calculus.

Students may have taken some or all of these required courses before entering the University of Minnesota graduate program. These courses may be eligible for transfer and suitable toward fulfillment of this requirement. The appropriateness of equivalencies will be discussed at the first meeting with the Graduate Studies Committee.

In cases where these courses have not yet been taken, students can make-up these deficiencies while here at Minnesota. Depending upon the level taken these courses may or may not count on the official Graduate Degree Plan. Courses may be taken at the 2xxx or 3xxx level to meet the above requirement; however, courses on the Graduate Degree Plan must be at 4xxx level and up.

Ph.D. students should choose one of the five tracks in the Earth Sciences program (Geology, Geophysics, Biogeology, Hydrogeology, or Earth Sciences). Tracks carry coursework requirements (see Appendix A) that are part of the student's course compact/2-year plan. All students must complete ESCI 8001 (Introductory Graduate Seminar), preferably in their first year.

For the doctoral degree, a minimum of 12 credits must be completed in the minor field or supporting program. If a minor is to be declared it must be done before the student passes the
preliminary oral examination. Courses offered through the department, but not listed as required or recommend for the student’s track may be counted toward supporting program credit requirements. For more details on the minor or supporting field, refer to the Graduate Education Catalog: http://www.catalogs.umn.edu/grad/gen/phd.html

C. Official Graduate Degree Plan
Ph.D. students entering without a MS should file the degree program by September 30th of their second year.

Ph.D. students entering the program with a Masters should file the degree program by March 1 of their first year.

This is the official follow-up to the course compact/two-year plan declaring the courses that you have or will take in order to fulfill coursework requirements toward your degree. Once signed by the student’s advisor and the DGS, the form needs to be reviewed by the Plan Level Coordinator (Jen) who will review, sign then submit the form to the Graduate Student Services and Progress Office (GSSP).

D. Preliminary Written Examination
A written examination is administered by the Department of Earth Sciences, and requires each student to demonstrate breadth of knowledge of work fundamental to their major field of research. This is a document that describes and discusses the student’s primary field of research in the context of the Earth Sciences, in a broad manner.

The written examination should not explain in detail the methods, preliminary data, and/or expected outcome of the student’s research; instead, these aspects of the research should be included as part of the proposal written immediately prior to the oral examination. See Jen to view examples of successful written exams.

TIMING
Incoming students in possession of an MS degree must submit the written examination during the Spring Semester of their first year of doctoral studies. By November 30 of their first year, students submit the names of four faculty examiners to the DGS for approval, via email.

Ph.D. students entering without an MS will take the examination in the Fall Semester of the second year. By April 30 of their first year, students submit the names of four faculty examiners to the DGS for approval, via email.

Any request to deviate from this timeline must be presented in the form of a petition (email) to the Director of Graduate Studies no later than the end of the semester before the written exams are to be taken. Significant delays in this schedule will not be accommodated except in extenuating circumstance.

THE COMMITTEE
The examining committee consists of four faculty members from the Graduate Faculty of the Department of Earth Sciences (Twin Cities) or the Department of Geological Sciences (Duluth) At least one member must be a Senior Member of the Graduate Faculty. (All tenured or tenure track faculty in the Twin Cities department are Senior Members.) Two of the four faculty examiners will serve as examiners in the primary sub discipline (or track). The other two faculty members will serve as examiners in two different disciplines of the Earth sciences considered outside the candidate’s Ph.D. thesis research. Committee members from outside the Dept. of Earth Sciences are permissible, subject to the prior approval of the DGS.
The student and advisor(s) are responsible for assembling a committee and requesting approval of the proposed committee by the Director of Graduate Studies. Email is acceptable. Please copy Jen. It is the student’s responsibility to arrange the committee meeting once the DGS has approved said committee.

**THE MEETING**

Students must meet with their committee at least two months before the planned submission date of the examination, and no later than the last week in January/September (respectively).

At the initial meeting with the student, committee members will advise the student on general topics or questions to be addressed in the written examination. These topics will involve the student’s primary field of research and other fields of Earth Sciences that relate directly or indirectly to the primary field. At this meeting, the student is responsible for explaining his/her general field(s) of interest in an informal way to the committee. The meeting should not be used for a formal presentation by or questioning of the student.

Within one week after this meeting, the student should circulate a short (no longer than one page) summary of the meeting for review, modification, and approval by the committee members.

**THE DOCUMENT**

The final written document should be presented as a coherent paper rather than isolated sections of text that address various aspects of the topic independently of each other. The topics discussed should be used to place the research in a disciplinary and interdisciplinary context.

There are no strict limits on length or format (font, font size, margins) of the written examination, but the expected length is in the range of 10-15 pages of typed, double-spaced text. A written examination that is shorter than 10 pages of text will likely be unacceptable. In addition to the text, the document should have a list of references cited and may include figures/tables. Supplementary material can be in any format, including multi-media.

The submitted work must be an original document created by the student without substantive assistance from others. Input from the advisor and committee members may involve guiding the direction of the topics to be addressed and answering general questions. Students cannot submit preliminary drafts prior to the final submission.

**SUBMISSION TO COMMITTEE AND EVALUATION**

Students may submit their completed written examination at any time, but no later than 4:30 p.m. of the last Monday in March/November, respectively. The student submits the final documents to each committee member, either hard copy or electronically, with a copy to Jen for the student’s file.

The committee should meet as soon as possible after submission of the written examination, preferably within 2 weeks of the examination submission.

Committee members will meet to evaluate the quality of the document and the degree to which the student demonstrates his/her breadth of knowledge of the subjects addressed in the examination. It is the responsibility of the advisor to arrange this meeting. The committee will decide whether the student has passed or failed the examination. If the committee consists of faculty at both the Twin Cities and Duluth campuses, the meeting may take place via conference call or teleconference at the discretion of the committee members.

If the student has done an adequate job in some respects but needs to fix deficiencies in knowledge or other skills tested by the written examination, the committee will specify in writing what steps the student must take to remove these “reservations” and pass the exam. These steps may include taking

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a class, doing assigned readings, and/or rewriting part of the examination. A specific time-frame/deadline must be indicated in which these steps are to be completed.

If the written examination does not adequately demonstrate that the student has sufficient knowledge and abilities to pursue a Ph.D. degree, the committee may decide on two options: (1) the student cannot pursue a Ph.D. degree; the option of switching to an MS program can be evaluated in discussion with the student, advisor, and the DGS; (2) the student may retake the exam once, in the semester that follows the first attempt.

The advisor will relay the final result of the exam to the student, as well as to the Plan Level Coordinator (Jen) who will submit the official result online.

E. Preliminary Oral Examination

Timing

For Ph.D. students entering with an MS degree, the preliminary oral examination is expected to be taken before the start of the Spring Semester of the second year (i.e. late fall semester of the 2nd year or during the summer) following the Written Preliminary Examination.

For Ph.D. students entering without an MS degree, the preliminary oral examination is expected to be taken before the start of the Fall Semester of the third year (i.e. late Spring semester of the 2nd year or during the summer) following the Written Preliminary Examination.

The Committee

At the time the student submits the Official Graduate Degree Plan form, the student must submit his/her selection of faculty members to serve on a prelim exam committee. This is done online, and must be done no later than one month to the oral preliminary examination. Go to FORMS at http://www.grad.umn.edu/students/forms/doctoral/index.html Click on Assign/Update Examination Committee. This online request will be routed to the student's advisor and subsequently the DGS and CSE for final approval.

Formation of the Committee: The preliminary oral examining committee includes a minimum of four members: three (including the student's advisor) from the student’s track or major field and one from the minor field or supporting program. Committee members cannot represent more than one field simultaneously (e.g., track and minor field).

At least one member of the committee must be a Senior Member of the graduate faculty in the Earth Sciences department. All tenured or tenure track faculty in the Twin Cities department are Senior Members. For the MS defense, the advisor may act as committee chair.

If you wish to have someone from outside the University on your committee, you need to coordinate this well in advance of the examination:

- Advisor and student submit the proposed committee member's CV and a cover letter justifying the request to the Plan Level Coordinator (Sharon);
- If DGS approves, then DGS will forward that request to the College of Science & Engineering (CSE) Dean's office for approval;
- If CSE approves, DGS notifies our payroll accountant (Doug) so that an ID# can be created which the student will need when submitting the online request for committee members.

The Proposal

The research proposal will outline the background, methodology, any preliminary results, and anticipated implications of the proposed research. The Department insists that one fundamental trait of the proposal must be originality in ideas and authorship. The format of the proposal should
conform to the standard suggested by most funding agencies. For example, it should be a maximum of 15-pages and single-spaced. It should have a one-page abstract, figures, and a reference list (a hard-copy example is available from Sharon). In addition, the student will attach to the front of the proposal, a one-page resume, an up-to-date Graduate Degree Plan form, and any papers or abstracts published, accepted, or submitted for publication.

Simultaneously with the scheduling of the oral prelim exam, (no less than two weeks before the exam) the student will provide this research proposal to each member of his/her Ph.D. committee. It is also strongly suggested that each student distribute a one-page abstract of the research proposal to faculty and graduate students in the Department of Earth Sciences in order to enhance communication and provide a feedback mechanism to the student.

Schedule the Exam
Once the student is ready for the exam, he/she must schedule a date and time with the committee, and find a room for the exam. The student must notify the Graduate Student Services and Progress office. The GSSP office will, in turn, supply the chair of the committee with the necessary evaluation form.
Notify the GSSP office: http://www.grad.umn.edu/current_students/preschedule/
Click on Preliminary Oral Examination Scheduling

Both the proposal and examination will be judged on the basis of creativity, originality, depth of understanding of the topic, and the student’s ability to formulate a problem in the Earth sciences and to define a logical research strategy aimed at solving this problem.

The Exam
This is a closed examination attended only by the student and the examining committee.
The student will present his/her research proposal orally for a maximum of 20 minutes, with questions to follow. Although questions may range rather widely, a significant part of the examination will focus on discussion of the student’s research proposal.

Evaluation and Submission of Preliminary Oral Report
The grading scale is
PASS
PASS WITH RESERVATION
FAIL
In a four-member committee, the student must receive at least 3 passing votes in order to pass the examination. A vote of PASS WITH RESERVATION constitutes a passing vote.

If the exam is passed with reservations, the student is informed immediately, but the committee is permitted one week in which to convey its reservations to the student in writing, informing the student of the steps that must be taken to remove them. A copy of this letter must be sent to the GSSP Office and should accompany the signed oral examination report form. When the student has satisfied the committee’s reservations, a second letter informing the student and the GSSP Office that the reservations have been removed is required. The final oral examination may not be scheduled until the GSSP Office has received a copy of the letter indicating that the reservations have been removed. (This letter must also be on file in the GSSP Office should the student wish to be considered for a Doctoral Dissertation Fellowship).

Students who fail the examination may be excluded from candidacy for the degree or may be allowed, on unanimous recommendation of the examining committee, to retake the examination, provided that the original preliminary oral examining committee conducts the re-examination. In no case may the reexamination take place before 10 weeks have passed. No more than one re-examination is allowed.
If necessary, remote participation by committee members or the student is allowed, provided certain conditions are met; this policy can be found at
http://www.policy.umn.edu/Policies/Education/Education/DOCTORALPERFORMANCE_APPA.html

F. **Pre-Thesis, Thesis, and Full-Time Equivalent Credits**

Doctoral **Pre-Thesis** credits are available to Ph.D. students who have *not* yet passed their preliminary oral examination but need to be registered to meet requirements of agencies or departments outside the University (e.g. loan agencies). These credits are not graded and therefore cannot be used to meet any Graduate Program Plan requirements (ESCI 8666).

Ph.D. candidates must enroll for a minimum of **24 thesis credits** while writing the doctoral thesis. Students may not register for these credits until the semester after they have passed their preliminary oral examination. These credits are not graded and therefore cannot be used to meet course credit requirements (ESCI 8888).

Ph.D. students reach **Advanced Status** only after all these milestones have been met: Graduate Program Plan on file; written and oral prelim exams passed; all course and thesis credit requirements fulfilled. After reaching this status, students should register for the Advanced Status One-Credit Full-Time Equivalent ‘course’ (ESCI 8444). Generally, Ph.D. students entering with an MS should have advanced status by the beginning of the spring term of their third year. Those entering without an MS should have advanced status by the end of their 3rd academic year. For each term you wish to register for these credits, you must submit to the department an **Application for Advanced Doctoral Status** form which has been signed by your advisor and the DGS (obtainable from the Graduate Education web site: http://policy.umn.edu/forms/otr/otr195.pdf)

G. **SET UP FINAL COMMITTEE**

At least one month prior to the final exam, the student submits, online, his/her selection of faculty members to serve on the oral prelim exam committee.

Click on **Assign/Update Examination Committee**. This online request will be routed to the student's advisor and subsequently the DGS and CSE for final approval.

Go to FORMS at http://www.grad.umn.edu/students/forms/doctoral/index.html

Formation of the committee:

The final oral examining committee must consist of at least four members: three (including the student's advisor) from the major field and one from the minor field or supporting program. The chair of the committee cannot be the student's advisor, but must be a Senior Member of the graduate faculty from either the major or minor field. All tenured or tenure track faculty in the Twin Cities department are Senior Members.

All members of the final oral examining committee read the thesis, however only those designated as **thesis reviewers** sign the Reviewer’s Report form certifying that the thesis is ready for defense.

**Designated thesis reviewers** consist of the advisor, representing the major field, and at least two other members of the final oral examining committee, including one representative from the major field and one representative from the minor or supporting program. Reviewers cannot represent more than one field simultaneously (e.g. Earth Sciences and minor field).

If you wish to have someone from outside the University on your committee, you need to coordinate this **well in advance** of the examination:

- Advisor and student submit the proposed committee member’s CV and a cover letter justifying the request to the Plan Level Coordinator (Sharon);
H. REQUEST GRADUATION PACKET
After the final oral exam committee has been approved and up to one semester before the doctoral final examination, the student must request a Graduation Packet in person or online: http://www.grad.umn.edu/students/doctoral/index.html

I. SUBMIT THESIS TO COMMITTEE
Once the student and advisor are confident that the thesis is ready to defend, the student submits a draft of the thesis to members of the final exam committee, including a thesis abstract. The examining committee must have at least two weeks to review the thesis.

J. SCHEDULE FINAL EXAM
Once the student has established a date and time with the committee, the student must schedule a room in Pillsbury Hall. Check with Jen to schedule a room. Then, the student must assure that the defense is advertised in the department- via email- at least one week in advance of the defense, and provide Jen with title, date, time, and place.

At least one week in advance of the final exam, the student must notify the GSSP Office: http://www.grad.umn.edu/students/finalschedule/index.html
Once cleared to take the exam, the Final Exam Report form will be forwarded to the chair of the examining committee.

K. SUBMIT GRADUATE APPLICATION FOR DEGREE
Submit the Graduate Application for Degree form (found in the Graduation Packet) to the One Stop Office by the first business day of anticipated month of graduation.

L. SUBMIT THESIS REVIEWERS REPORT
The Reviewers must be unanimous in certifying that the thesis is ready for defense, whether as presented or with minor revisions. If this is the case, and all other requirements have been met, the student submits the completed and signed Reviewer's Report form to the GSSP Office, who in turn, authorizes the final oral examination. In any instance where revisions are required, the committee must inform the student in writing of the revisions required, and all questions concerning such revisions must be resolved before the final copies of the thesis are submitted and the degree is conferred. It is the advisor's responsibility to ensure that revisions required by the reviewers are made satisfactorily.

M. THE FINAL ORAL EXAMINATION
The exam itself consists of a public presentation (30-45 minutes) by the student, followed by questions and answers. The general audience is dismissed and the remaining question and answer period is closed, attended by only the student and examining committee.

If necessary, remote participation by committee members or the student is allowed, provided certain conditions are met; this policy can be found at http://www.policy.umn.edu/Policies/Education/Education/DOCTORALPERFORMANCE_APPA.html

N. SUBMIT DOCTORAL FINAL EXAM REPORT
It is recommended that the student submit to the GSSP Office the Final Exam Report the same day in which the exam is passed, but certainly no later than the last business day of anticipated month of graduation.

0. **SUBMIT DISSERTATION**
   Student must submit the thesis dissertation by the last business day of anticipated month of graduation. Consult Graduation Packet for formatting guidelines.

P. **Check-out Procedures**
   Congratulations, you’re done! Well, almost. Before you leave the department, please do the following:
   - Hand in a bound copy of your thesis to Sharon Kressler
   - Return all keys.
   - Thoroughly clean out your office area and desk.
   - Coordinate with your advisor and clean out rock samples, lab area, etc.
   - You are now an alumnus/alumna! Please, provide Sharon Kressler (esci@umn.edu) with your new contact information, and keep us up-to-date on what you are doing!
VI. Additional Information for Ph.D. Students Based in Duluth

The University of Minnesota's Duluth campus does not have a doctoral program, therefore students who wish to pursue a Ph.D. with a faculty member at the Department of Geological Sciences in Duluth must apply to and be admitted through the Twin Cities' Graduate Admissions Office and Department of Earth Sciences. Because the degree is awarded through the TC campus, all students must follow the same requirements and procedures for progress.

Students based in Duluth may experience confusion in certain areas (e.g., registration, financial aid). Many thanks to alumni Isla Castaña and Kristin Riker-Coleman for their help in straightening out some of these procedures. Isla has composed a "Survival Guide for Twin Cities Students on the Duluth Campus" for both Earth Sciences and Water Resources students. Please use this resource in conjunction with these guidelines for all Ph.D. students.

A. Coursework, Exams, and General Progress

All requirements and procedures for progress, including forms, coursework, exams and committee formation are the same for Duluth-based and Twin Cities students, with the following additions/notes

• Students studying in Duluth are required to spend at least one semester of study at the Twin Cities campus. (It is strongly recommended that UMD students reside in the Twin Cities while completing this portion of the requirement). Non-native English speaking students completing their Twin Cities residency requirement must have an ESL score of 1 or be supported on GSR or fellowship. Students with an ESL score of 2 may be awarded a TA given and concurrent CTLS course enrollment with any necessary tuition paid the responsibility of the student, their advisor or the Duluth program.

• The student's examining committees must have at least one Senior Member of the graduate faculty from the TC campus.

• As the degree is awarded through the Twin Cities campus, it is required that the final defense be conducted on the TC campus, however, if necessary, remote participation by committee members or the student is allowed, provided certain conditions are met. This policy can be found at http://www.policy.umn.edu/Policies/Education/Education/DOCTORALPERFORMANCE_APPA.html

• Many of the forms can be faxed back and forth or sent through the mail for signatures-it is recommended that you keep copies of all submitted forms.

B. Financial

Financial support is the responsibility of the Department of Geological Sciences in Duluth, up to and including tuition, employment, and any summer or travel support. However, Ph.D. students studying in Duluth are eligible for certain Graduate School and other fellowships.

C. General

Important Contacts

Twin Cities Campus:

Marc Hirschmann, Director of Graduate Studies
hirsc022@umn.edu; 612-625-6698
Jennifer Petrie, Student Personnel Coordinator  
japetrie@umn.edu; 612-301-1197

Duluth Campus:  
John Goodge, Duluth Director of Graduate Studies, Liaison to TC  
jgoodge@d.umn.edu, 218-726-8486

Claudia Rock, Executive Secretary in Geosciences  
crock@d.umn.edu, 218-726-7238

Tami Vatalaro, Student Personnel Coordinator, UMD Graduate School  
tvatalar@d.umn.edu, 218-726-7523

Registration
If you are taking classes in Duluth, be sure to register through the Duluth one-stop web site as this will assure your use of the UMD recreation center, libraries, and will, hopefully, keep financial aid from getting mixed up (as well as the bonus of smaller student fees). Things can get tricky with 'multi-institutional' students, so if you have problems registering, first check Isla's Survival handbook for options, and if that still doesn't help, contact Jennifer Petrie

UCard
Students in Duluth can obtain their UCard at 140 Darland Administration Building. Along with access to the libraries and recreation centers, your card allows you to ride any bus in Duluth for free.

Email
Because you are admitted through the Twin Cities but will register in Duluth, you may be issued two email addresses. Although it does not matter which email you use, it would be wise to have one forwarded to the other. But be sure to activate both. The TC email address allows you access to the TC library system. To initiate your email account here. To forward your email, go to this web page:  
http://onestop.umn.edu/u_resources/computing_and_technology/index.html; click on "Internet account management".
VII. Financial Support

The following applies to Twin Cities based Earth Science program graduate students. The Department normally admits PhD and Plan A MS students with guaranteed support. Under rare circumstances, students may be admitted to the programs without financial support. Requirements regarding progress toward the degree are the same for students admitted without financial aid as students admitted with financial aid. Typically there is no financial aid available for Plan B and Plan C Masters students.

A. Maximum Level of Support
The Department normally does not grant more than ½ time support (20 hours per week). This includes teaching assistantships, research assistantships, and non-service fellowships. The main exceptions are summer assistantships, night school teaching assistantships, and support primarily from a research assistantship following completion of the Ph.D. preliminary oral examination.

B. Time Limits for Support
The number of academic years of support and conditions are specified in your original offer letter. Typical limits are outlined below.

For Plan A MS candidates, financial support through the Department is normally limited to two years.

For Ph.D. candidates, departmental support will normally be limited to four years, including any support provided while working for an Earth Science program MS degree.

Support may be extended beyond these limits, but when this is done, it may be at reduced rates. In the case where candidates are supported by research assistantships, the faculty member holding the research grant may, at his/her discretion, extend support beyond these limits.

C. Guarantee of Financial Support
Earth Science program students who have received written offers of support may expect that support to continue up to the relevant maximum listed above, as long as performance on assigned tasks and progress toward a degree are satisfactory. Support may be terminated if these conditions are not met. The Graduate Studies Committee must discuss premature termination of support.

Students who have not received written offers of support may be hired on a semester-to-semester basis as necessary to carry out the teaching and research functions of the Department.

D. Assistantship/Fellowship Opportunities
Teaching Assistantships
A teaching assistant helps teach students in a specified course or courses under the general supervision of the academic staff and may be assigned primary responsibility for an entire course. Typically, these positions are half time (20 hours per week) and include full tuition benefits and a health care package. Generally, first year graduate students will TA the lab portion of the introductory geology course (ESCI 1001). You will work closely with Kent Kirkby, the ESCI 1001 coordinator. As soon as your registration is complete for a semester, please be sure to notify Kent of your schedule so he may create the lab TA schedule.
After the first year, if you are not assigned to a research assistant position, you will need to notify the Graduate Studies Committee of your need to TA. At that time you can request to TA a specific course, but be aware that the greatest need lies with the introductory course.

There are additional policies for non-native English speaking International Students. Please refer to section VII of this booklet.

**Research Assistantships**

Research assistants are paid from the advisor’s research grants, and the duties of an RA are determined by mutual agreement with the advisor. In general, the duties coincide with degree research activities. When this is not the case, the RA is expected to spend no more time on his/her duties than does a TA appointed at the same percent time. Prompt, cooperative, and quality job performance is expected. Typically, these positions are half time (20 hours per week) and include full tuition benefits and a health care package.

**Fellowship Opportunities**

There are numerous fellowship opportunities available through the Graduate Education Website (http://www.grad.umn.edu/fellowships/index.html) and the Department (http://www.esci.umn.edu/dept/programs/Grad-sch.html). As these are subject to change, it is best to check the respective web sites for updates. Several students have also obtained funding from sources outside the University community (e.g. NSF, NASA).

**E. Salary and Benefits**

**Salary/Paychecks**

The Department pays teaching and research assistants the same hourly wage. The salary for those on fellowships will vary according to the fellowship itself. Paychecks are issued bi-weekly and you have the option of picking up your paycheck or having it directly deposited into an account through the Employee Self Service website: http://hrss.umn.edu/ (where you can do other tasks, too, such viewing your pay statement, or reprinting a W2 form).

**Tuition and Fees**

In addition to a salary, the financial support package includes full tuition benefits. Students must reach the minimum qualification for eligibility and receive a tuition benefit equal to twice the percentage of time worked. For example, a 50% time (half time) appointment includes a 100 percent tuition benefit, which applies only to tuition costs. The maximum benefit is 100 percent and applies to a maximum of 14 credits each academic term. The minimum number of credits to be considered a full-time student is 6.

The tuition benefit does not cover course, student services, or late fees. Students are responsible for paying these fees.

**Health Insurance**

University-subsidized health insurance is available to most graduate students who hold an appointment as a TA, RA or Fellow. For these students, the University pays 50-95% percent of the insurance premium during the academic year (fall through spring), the percentage depending on the level of appointment. To receive this coverage, eligible students must submit the appropriate paperwork by the end of the second week of classes. To apply, and for more information, contact the Graduate Assistant Insurance Office, N-323 Boynton Health Service, 612-625-6936. http://www.shb.umn.edu/twincities/graduate-assistants/graduate-assistant-health-plan.htm
Health Insurance for International Travel
University policy states that international health insurance is mandatory for most students going abroad. Details on requirements and how to get this coverage is available through the Learning Abroad Office:
http://www.umabroad.umn.edu/students/healthsafety/intlhealthinsurance.php

Family Medical Leave: All types of University faculty and staff members, including graduate assistants and student employees, are eligible for FMLA leave if they have worked at the University for at least 12 months. Please read the University's policy for more information: <http://www.policy.umn.edu/categories/hr/policy/FMLA_pol.cfm>.

Parental Leave: is also open to graduate assistants who have worked at the University for at least 9 months. <http://www.policy.umn.edu/Policies/hr/Leaves/PARENTALLEAVE.html>

Graduate Assistant Employment Office
For questions pertaining to your employment as a TA or RA, the Graduate Assistant Employment Office is located at the Donhowe Building; phone is 612-624-7070; web site: http://www.umn.edu/ohr/gae.

F. Summer Support
New students in the 2014-2015 academic year may receive summer support for 2015 (please refer to your offer letter). For students in their second year and beyond, there is a limited amount of money allotted from the Department for summer field and/or research expenses. You will be notified in the spring when applications are to be submitted. As these funds are limited, summer support is not guaranteed.

G. Travel Support
The Department provides partial support for students traveling to professional meetings to present papers or posters based on thesis research. Upon approval from the DGS, a student may receive up to $300 in travel monies. Applications are available in room 104 or online at http://www.esci.umn.edu/programs/currentgrads

Some fellowships (e.g., Doctoral Dissertation Fellowship) have additional funds available for travel and other research-related expenses (see terms of individual fellowship). These resources should be sought first.

H. Tracking Your Support
Although the department retains some information about students after they graduate, it is best that the student maintain a log of the funding support and awards received throughout their graduate career.
VIII. International Students

**International Student and Scholar Services (ISSS)**

Upon arrival, all international students must go to International Student and Scholar Services (ISSS, 190 Humphrey Center) so they may review immigration documents and schedule a time for the mandatory International Student Orientation Program (ISOP).

ISSS web site for new students: <http://isss.umn.edu/new/default.html>

ALL international students will be charged an ISSS Administrative Cost Fee of $125 per semester. This will show on the fee statement and the student is responsible for paying this fee.

**Language Requirements**

The Department of Earth Sciences, in consultation with the Center for Teaching and Learning Services, and in compliance with the requirements of the University of Minnesota, has determined that the following shall be the departmental policy for non-native-English-speaking students entering the graduate program and expecting to be supported financially by the Department at any time during their academic career.

All non-native-English-speaking Teaching Assistants (TAs) must demonstrate proficiency in spoken English appropriate to the demands of their teaching assistantship. This proficiency will be assessed by 1) conversion of TOEFL ‘speaking’ score; 2) the SETTA test (Spoken English Test for Teaching Assistants); and/or 3) an English Language Proficiency rating earned through coursework with the Center for Teaching and Learning Services.

**CSE: TALK**

*(College of Science & Engineering Teaching And Language Kickoff)*

This intensive summer course is designed for newly arriving College of Science & Engineer (CSE) graduate students. The goals of the course are to aid students in their adjustment to life in the US, and to acquaint them with the language and teaching skills necessary for a TA position. An English Language Proficiency (ELP) Score will be determined at the conclusion of the course. Those students obtaining a "1" will be cleared for all TA duties and those obtaining a lower score will be recommended for further coursework and/or limited TA duties appropriate to their rating. The CSE Dean’s Office pays for all expenses relating to the teaching of this course, and in addition provides a modest stipend (typically $400) to assist these newly entering graduate students with living expenses incurred due to their arrival several weeks prior to the start of the academic year.

**SETTA Test**

Levels of proficiency are rated on a 1 to 5 scale. The chart below illustrates the various TA duties appropriate to each level.

1 - Eligible for all Teaching Assistant duties. No coursework required.

2 & 3- Eligible for all instructional responsibilities.

   Enrollment in [GRAD 5105](GRAD%205105) required if teaching (e.g., a class, lab, recitation, discussion, etc.)

   No coursework required if grading, tutoring, holding office hours, or proctoring.
4 - Eligible only to tutor, hold office hours, grade, proctor. Not eligible to teach.

Enrollment in **GRAD 5102** is required.

5 - Not eligible for any TA position.

**Foundations** course is required.

A minimum recommendation of **3** is necessary to pursue graduate studies in the Department of Earth Sciences, *regardless of the type of appointment (Teaching Assistantship, Research Assistantship, or Fellowship)*. In the event that this minimum grade is not achieved at the conclusion of the pre-academic English training session, the Department will cover the cost of the TA English Program up *to a maximum of two semesters* during the first academic year. If the student has not achieved the minimum performance level required, he/she must enroll a third time without direct departmental assistance until the SETTA test has been successfully passed at the 3 level. If this level of English proficiency is not achieved by the end of the first academic year, the Graduate Studies Committee will re-evaluate the student's graduate status.

This requirement of passing the English training program stems from an interest in ensuring that all graduate students in the Department have the language skills necessary to benefit from departmental seminars and satisfactorily communicate during the various written and oral exams taken to fulfill University and departmental requirements. In addition, it is expected that graduate students should be proficient not only in writing about their academic work but also in presenting their research orally at national and international meetings.
IX. Appendixes – A-E

Appendix A: Track Requirements

Note: regardless of your track, all Earth Science program graduate students are required to take ESCI 8001 and either attend or register for the department seminars.

**Geology Track:** Geology is the study of the earth and planets. Geologists use field and laboratory observations, laboratory experimentation, analog and computer modeling, chemical and biological probes and measurements to understand interactions among the solid, liquid, gaseous, portions of the planet, and biological systems, the underlying processes, and their history of interaction as evidenced in the record of rocks, water, and sediments.

*Required Coursework:*
Any two of the following courses: (6 credit minimum)
- ESCI 5302 Isotope Geology (3 credits)
- ESCI 5351 Geochmical Modeling of Aqueous Systems (3 credits)
- ESCI 5353 Electron Microprobe Theory and Practice (3 credits)
- ESCI 5502 Advanced Structural Geology (3 credits)
- ESCI 5503 Advanced Petrology (3 credits)
- ESCI 5601 Advanced Sedimentology (4 credits)
- ESCI 5602 Depositional Mechanics (3 credits)
- ESCI 5705 Limnogeology and Paleoenvironment (3 credits)

**Geophysics Track:** Geophysics is the study of the earth and planets, with a focus on the application of physical principles. Geophysicists use remote sensing probes (seismic waves, potential fields, etc.), laboratory experimentation and computer modeling of fluid and continuum mechanical dynamics to investigate the structure, composition, history and dynamics of solid Earth and other planets.

*Required Coursework: (6 credit minimum)*
- ESCI 4211 Solid Earth Geophysics I (3 credits)
*Plus at least one of the following:*
- ESCI 4212 Solid Earth Geophysics II (3 credits)
- ESCI 5201 Time-Series Analysis of Geological Phenomena (3 credits)
- ESCI 5203 Rock and Mineral Physics (3 credits)
- ESCI 5204 Geostatistics and Inverse Theory (3 credits)
- ESCI 8203 Principles of Geophysical Exploration (3 credits)
- ESCI 8204 Geomagnetism and Paleomagnetism (3 credits)

**Hydrogeology Track:** Hydrogeology is the study of groundwater. Hydrogeologists use direct observation and remote sensing, computer modeling and laboratory experimentation
to constrain the interaction of water and rock in Earth's shallow subsurface. This track requires a baseline curriculum for hydrogeology. The compact process will identify additional appropriate coursework.

**Required Coursework: (6 credit minimum)**
ESCI 4702 General Hydrogeology (3 credits)

**Plus at least one of the following:**
ESCI 5205 Fluid Mechanics in Earth and Environmental Sciences (3 credits)
ESCI 5713 Tracers and Karst Hydrogeology (3 credits)
ESCI 5971 Field Hydrogeology (2 credits)

**Biogeology Track:** Biogeology is the study of life on earth, the history of life on earth, and the interactions among life forms and the solid, liquid, and gaseous portions of the earth. Some students may enter from biology undergraduate programs and require coursework in the Earth Sciences. Such courses will be identified during the design of the student’s compact.

**Required Courses: (6 credit minimum)**
ESCI 8402 Biogeochemical Cycles in the Ocean (3 credits)
ESCI 8801 Geobiology (3 credits)

**Highly Recommended:**
BIOC5001 Biochemistry, Molecular and Cellular Biology (3 credits)

The compact process will fill out the remainder of required courses, which will frequently include offerings from outside programs.

**Earth Sciences Track:** Students who do not choose any of the 4 specific tracks may choose this broader track. This track has no mandatory courses in the major apart from ESCI 8001 and the departmental seminar requirement, a minimum of six additional graduate-level credits in the major program, 12 supporting program credits or completion of all requirements for a minor, and thesis credits. A curriculum specific to the student will be set through the compact process.
Appendix B: Sample Curricula
Courses tagged with a "*" indicate supporting program

GEOPHYSICS Ph.D.
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4211 Solid Earth Geophysics I (3)
ESCI 4212 Solid Earth Geophysics II (3)
ESCI 5203 Rock and Mineral Physics (3)
PHYS5041* Mathematical Methods for Physics (4)
PHYS5042* Analytical and Numerical Methods of Physics II (4)
CHEM5501* Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3)
MATS4212* Ceramics (3)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2, 2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3, 3)

ESCI 8888 Thesis Credit: Doctoral (24)

GEOPHYSICS M.S. Plan A
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4211 Solid Earth Geophysics I (3)
ESCI 5203 Rock and Mineral Physics (3)
ESCI 8980 Current Topics in Geology and Geophysics (1)
ESCI 5204 Geostatistics and Inverse Theory (3)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2)
CHEM5501* Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3)
MATS4212* Ceramics (3)
ESCI 8777 Thesis Credits: Masters (10)

GEOPHYSICS M.S. Plan B
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4211 Solid Earth Geophysics I (3)
ESCI 4212 Solid Earth Geophysics II (3)
ESCI 5203 Rock and Mineral Physics (3)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 5204 Geostatistics and Inverse Theory (3)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2)
CHEM5501* Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3)
MATS4212* Ceramics (3)
MATH4457* Methods of Applied Mathematics I (4)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3)

GEOPHYSICS M.S. Plan C
Not available as a track

GEOPHYSICS M.S.
Not available as a track

GEOPHYSICS M.S.
Not available as a track

GEOPHYSICS M.S.
Not available as a track

GEOLOGY Ph.D.
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 5203 Mineral and Rock Physics (3)
ESCI 5302 Isotope Geology (3)
ESCI 5351 Geochemical Modeling of Aquifer Systems (3)
ESCI 5503 Advanced Petrology (3)
CHEM5501 Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3)
CHEM8152 Analytical Spectroscopy (4)
MATS5517 Electron Microscopy (3)
MATS8001 Structure and Symmetry of Materials (3)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3, 3)

**ESCI 8888 Thesis Credit: Doctoral (24)**

**GEOLOGY M.S. Plan A**
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 5302 Isotope Geology (3)
MATS5517 Electron Microscopy (3)
ESCI 5502 Advanced Structural Geology (3)
ESCI 8243 Principles of Rock Magnetism (3) (supporting program)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
CHEM5501 Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3)
ESCI 8777 Thesis Credits: Masters (10)

**GEOLOGY M.S. Plan B**
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4401 Aqueous Environmental Geochemistry (3)
ESCI 4403 Atmosphere, Oceans, and the Climate System (3)
ESCI 5201 Time-Series Analysis of Geological Phenomena (3) (supporting program)
EEB5009 Quaternary Vegetation History and Climate (3)
ESCI 5302 Isotope Geology (3)
ESCI 5351 Geochemical Modeling of Aqueous Systems (3)
ESCI 5601 Advanced Sedimentology (4)
ESCI 8402 Biogeochemical Cycles in the Ocean (3) (supporting program)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3)

**GEOLOGY M.S. Plan C**
Not available as a track
BIOGEOLOGY Ph.D.
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4801 Geobiology (3)
ESCI 5302 Isotope Geology (3)
ESCI 5351* Geochemical Modeling of Aqueous Systems (3)
ESCI 5705 Limnogeology and Paleoenvironment (3)
ESCI 8402 Biogeochemical Cycles in the Ocean (3)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2, 2)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3, 3)
BIOC5001* Biochemistry, Molecular and Cellular Biology (3)
CHEM5501* Thermodynamics, Kinetics, and Statistical Mechanics (3)
EEB5221* Molecular and Genomic Evolution (3)

ESCI 8888 Thesis Credit: Doctoral (24)

BIOGEOLOGY M.S. Plan A
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4801 Geobiology (3)
ESCI 5351 Geochemical Modeling of Aqueous Systems (3)
ESCI 8402 Biogeochemical Cycles in the Ocean (3)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3)
BIOC5001* Biochemistry, Molecular and Cellular Biology (3)
EEB5221* Molecular and Genomic Evolution (3)
ESCI 8777 Thesis Credits: Masters (10)

BIOGEOLOGY M.S. Plan B
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4702* General Hydrogeology (3)
ESCI 5351 Geochemical Modeling of Aqueous Systems (3)
ESCI 5705 Limnogeology and Paleoenvironment (3)
ESCI 8402 Biogeochemical Cycles in the Ocean (3)
ESCI 8801 Geobiology (3)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2, 2)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3)
BIOC5001* Biochemistry, Molecular and Cellular Biology (3)
EEB5221* Molecular and Genomic Evolution (3)

BIOGEOLOGY M.S. Plan C
Not available as a track
HYDROGEOLOGY Ph.D.
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 4702 General Hydrogeology (3)
ESCI 5205 Fluid Mechanics in Earth and Environmental Sciences (3)
ESCI 5713 Tracers and Karst Hydrogeology (3)
ESCI 5971 Field Hydrogeology (3)
ESCI 5351* Geochemical Modeling of Aqueous Systems (3)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3,3)
MATH4242* Applied Linear Algebra (4)
MATH4512* Differential Equations with Applications (3)

CHEM5501* Introduction to Thermodynamics, Kinetics and Statistical Mechanics (3)
ESCI 8888 Thesis Credit: Doctoral (24)

HYDROGEOLOGY M.S. Plan A
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 4702 General Hydrogeology (3)
ESCI 5205 Fluid Mechanics in Earth and Environmental Sciences (3)
ESCI 5713 Tracers and Karst Hydrogeology (3)
ESCI 5971 Field Hydrogeology (3)
MATH4242* Applied Linear Algebra (4)
CHEM5501* Introduction to Thermodynamics, Kinetics and Statistical Mechanics (3)
ESCI 8777 Thesis Credits: Masters (10)

HYDROGEOLOGY M.S. Plan B
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 4702 General Hydrogeology (3)
ESCI 5713 Tracers and Karst Hydrogeology (3)
ESCI 5971 Field Hydrogeology (3)
ESCI 4401 Aqueous Environmental Geochemistry (3)
CHEM5501* Introduction to Thermodynamics, Kinetics and Statistical Mechanics (3)
MATH4242* Applied Linear Algebra (4)
FR5114* Hydrology and Watershed Management (3)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (8)
HYDROGEOLOGY M.S. Plan C
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 4702 General Hydrogeology (3)
ESCI 5205 Fluid Mechanics in Earth and Environmental Sciences (3)
ESCI 5713 Tracers and Karst Hydrogeology (3)
ESCI 5971 Field Hydrogeology (3)
ESCI 4401 Aqueous Environmental Geochemistry (3)
CHEM5501* Introduction to Thermodynamics, Kinetics and Statistical Mechanics (3)
MATH4242* Applied Linear Algebra (4)
FR5114* Hydrology and Watershed Management (3)
CE5541* Environmental Water Chemistry (3)

Earth Sciences Ph.D.
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 5203 Mineral and Rock Physics (3)
ESCI 5302 Isotope Geology (3)
ESCI 5351 Geochemical Modeling of Aqueous Systems (3)
ESCI 5503 Advanced Petrology (3)
CHEM5501 Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3)
CHEM8152 Analytical Spectroscopy (4)
MATS5517 Electron Microscopy (3)
MATS8001 Structure and Symmetry of Materials (3)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3, 3)
ESCI 8888 Thesis Credit: Doctoral (24)

Earth Sciences M.S. Plan A
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 5302 Isotope Geology (3)
MATS5517 Electron Microscopy (3)
ESCI 5502 Advanced Structural Geology (3)
ESCI 8243 Principles of Rock Magnetism (3) (supporting program)
ESCI 8970 Current Topics in Geology and Geophysics/Earth Sciences (2)
ESCI 8980 Current Topics in Geology and Geophysics/Earth Sciences (1)
CHEM5501 Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3)
ESCI 8777 Thesis Credits: Masters (10)
Earth Sciences M.S. Plan B and C
ESCI 8001 Introductory Graduate Seminar (2)
ESCI 4401 Aqueous Environmental Geochemistry (3)
ESCI 4403 Atmosphere, Oceans, and the Climate System (3)
ESCI 5201 Time-Series Analysis of Geological Phenomena (3) (supporting program)
EEB5009 Quaternary Vegetation History and Climate (3)
ESCI 5302 Isotope Geology (3)
ESCI 5351 Geochemical Modeling of Aqueous Systems (3)
ESCI 5601 Advanced Sedimentology (4)
ESCI 8402 Biogeochemical Cycles in the Ocean (3) (supporting program)
ESCI 8994 Research in Geology and Geophysics/Earth Sciences (3)