Department of Geology & Environmental Science

University of Pittsburgh

Graduate Student Handbook 2016

Welcome to the Department of Geology & Environmental Science!

Information in this handbook applies to all students admitted for study in all Graduate Programs of the Department of Geology & Environmental Science at the University of Pittsburgh. This manual supplements information provided online. Additional useful information can be found online at the Kenneth P. Dietrich School of Arts and Sciences web site (http://www.as.pitt.edu) and the Dietrich School Graduate Studies web site (http://www.asgraduate.pitt.edu). The Graduate Studies Office offers information, help, and troubleshooting for many areas pertaining to graduate student life, including many important forms and policies you will require during your time here (http://www.asgraduate.pitt.edu/forms-policies). You should be familiar with these sources of information and use this manual for subjects specific to Geology & Environmental Science.

During your residence in our program, you should remain in contact with the Department Office about all deadlines and milestones. In addition, the Department Graduate Administrator and/or Director of Graduate Studies should be consulted regarding such matters as transfer of credits, tuition, fees, residency requirements, thesis credit requirements, and taxes on assistantships.

More information is available in the Dietrich School of Arts and Sciences Graduate and Professional Bulletin (http://www.bulletins.pitt.edu/graduate/FASinfo.htm).

This handbook was updated September 2016.

The information in this handbook and other University catalogs, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes.

Contents

Geology & Environmental Science Administration

GES Department Office
The Geology & Environmental Science Department office is located in room 200 of the Space Research Coordination Center (SRCC) Building, 4107 O'Hara St., Pittsburgh, PA 15260. The office is open from 8:30 – 5:00 daily.

The ***Graduate Administrator*** facilitates all aspects of graduate study. She is here to help you with your academic career from admission to graduation. Be sure to keep her up to date with your progress or any changes in your program, either in person or via e-mail.

Annemarie Vranesevic
Graduate Administrator
Phone: 412-624-8779
Email: gpsgrad@pitt.edu

The ***Director of Graduate Studies*** oversees academic aspects of graduate study, and is available to all graduate students in the G & ES Department for advice related to study. The DGS, in consultation with the Graduate Committee and Department Chair, also approves graduate student program plans and committees, and oversees annual reviews of all graduate students.

Josef Werne
Director of Graduate Studies (DGS)
Phone: 412-624-8775
Email: jwerne@pitt.edu

The ***Department Chair*** oversees all aspect of departmental operations and is available to all graduate students who have questions or concerns.

Mark Abbott
Department Chair
Phone: 412-624-8783
Email: mabbott1@pitt.edu

The ***Department Chemical Hygiene Officer*** oversees all aspect of laboratory and chemical safety.

Daniel Bain
Department Chair
Phone: 412-624-8766
Email: dbain@pitt.edu

Graduate student records are maintained by the Graduate Administrator in the Department office. All forms are available either through the G & ES Department website (http://www.geology.pitt.edu) or the Dietrich School Graduate Studies website

(http://www.asgraduate.pitt.edu/forms-policies). Examples of common required forms are included in the back of this handbook.

The ***G & ES Graduate Committee***, in consultation with the Department Graduate Faculty, establishes and enforces requirements within the graduate programs of the Department. These include setting policy, determining the direction of the programs, approving courses within the programs, and monitoring graduate student progress in fulfilling required milestones for their degree. The Committee conducts annual reviews of all Department graduate students.

There is a ***Graduate Student Representative*** who attends all Faculty meetings of the Department. Any issues affecting graduate students can be brought to the attention of the faculty through this venue.

There is a ***Graduate Teaching Assistant Mentor*** who works with graduate teaching assistants to improve their instruction and overcome challenges common in teaching.

The ***Graduate Student Committee*** is an informal group that works to improve academic and social life for G & ES graduate students, and fosters a sense of community. Activities they support include a post-Colloquium reception, an annual department research fair, and other gatherings.

The ***Graduate Student Organization*** of the University of Pittsburgh Dietrich School of Arts & Sciences is an official university student organization that advocates the interests and concerns of the graduate students of the Arts & Sciences. The GSO provides the primary avenue of communications between graduate students and the administration as well as other university entities. The A&S GSO is also responsible for dispersing 50% of the student activity fees that A&S graduate students pay each semester.

Grievance Policy: Any grievance arising during graduate study should be resolved through consultation with your advisor or your Advisory Committee. Should a matter not be resolved at this point, or should the issue be inappropriate for discussion with your advisor, you should consult with the DGS. For employment and departmental issues, consulting the Department Chair may be more appropriate. If the DGS or Department Chair is not able to resolve the grievance, they will direct you to formal procedures.

Safety and Training Requirements

Safety requirements, training, and rights and responsibilities for a safe workplace should be covered by your advisor. Be advised that the University requires training for laboratory safety and hazardous waste, research involving human and animal subjects, and other topics. Check with your advisor for further details. If you observe safety risks in your laboratory and your supervisors are not responsive, you can contact the department's chemical hygiene officer.

Facilities

University ID Card
Your University ID card is important for many aspects of life on campus, and also gets you free use of public transportation in the area. You can get your ID card at Panther Central located in the lobby of the Litchfield Towers. Your ID card is your access to the building between 10pm and 7am. You should formally request access for your card via Lou Lane (facilities coordinator—100 Allen Hall).

Research Facilities
Numerous research laboratories and support facilities exist in the Department and elsewhere at Pitt and the surrounding region that are potentially available to you as a Graduate Student. Arrangements to use these facilities may be facilitated by your advisor, or by approaching faculty/staff directly.

Office & Desk Space
Full-time graduate students typically are assigned a desk in shared office space. They also typically have research space in the lab(s) of their advisors.

Keys
As a full-time graduate student, you may be assigned keys or key codes to various rooms in the building(s) in which your office, lab, or teaching classroom(s) are located. The department office will issue the keys and codes, and will require you to sign a form or pay a deposit.

Computer Facilities
Computer facilities vary according to departments. The G & ES Department maintains some student computer facilities, primarily SRCC 212. Computers and programs for general Graduate student research are considered the responsibility of the students and their faculty advisors. The department has a limited number of laptop computers that can be temporarily checked out for instructional use in a class or lab. For computer-related technical support submit a help ticket through http://techforms.pitt.edu/helprequest/.

Electronic Mail
All University students receive an e-mail account, internet access and 50 Gb of cloud storage space. You may access your account from a networked machine on campus, through a wireless connection, or through the University's web site from anywhere in the world with a web browser. More information on University of Pittsburgh computing and technology facilities available can be found at http://www.technology.pitt.edu.

Email is widely used for individual, Department, University, and professional communications. For this reason, you must access your University account regularly. All class related E-mails and many general distribution G & ES memos are sent via your university e-mail. The Department uses a listserv to notify students of seminars, job opportunities, student group meetings, and other items of interest. Additionally, many job postings, calls for papers for conferences around the country, and other nationwide professional messages are distributed via e-mail. You are responsible for regularly checking your University e-mail messages.

If you decide to forward your University mail to another provider such as gmail, be aware that other providers may not allow large attachments. Remember, your University email is your official address for University correspondence.

All University student and staff email addresses are available online by searching at http://find.pitt.edu. All University Department contact information is available online at http://www.technology.pitt.edu/Documents/telephone/directory/PITTDeptListings.pdf.

G & ES Web Site
The Department web site at http://www.geology.pitt.edu has information about the program, including web pages for current faculty and students, degrees and course descriptions, and information about graduates (alumni) of the program.

Mail
Campus mail is another method of communication with students. Graduate students receive both campus and U.S. mail in SRCC 201. Check with the Graduate Administrator about your mailbox arrangements. Boxes for outgoing campus mail and U.S. mail are also located in the Department office, but outgoing U.S. mail is faster if you take it to the U.S. Postal Service blue mailbox on the corner of Parkman Ave. and Bigelow Blvd. Be sure to regularly check your campus mail.

Telephones
Most graduate student offices have telephones or telephone access. All University student and staff phone numbers are available online by searching at http://find.pitt.edu. All University Department contact information is available online at http://www.technology.pitt.edu/Documents/telephone/directory/PITTDeptListings.pdf.

Copy/Fax Machine
A photocopier, scanner, and fax machine is available in SRCC 201. See the Graduate Administrator for assistance or to receive the copier code.

Conference Room
The Department conference room (SRCC 213) and other rooms are available for Graduate student activities. It can be reserved for meetings, exams, and other appropriate gatherings. Reservations must be made through the Department office.

Facility Repairs and Emergencies
In case of emergency, notify Dolly Chavez (412-624-8780; chavez@pitt.edu) or Mat Romick (412-624-9064; romickm@pitt.edu). To report problems with facilities, contact Dolly Chavez or Lou Lane (412-624-0360; lol17@pitt.edu). In case of laboratory accidents, please contact the person in charge of that particular lab and the Department chemical hygiene officer.

Health & Dental Insurance and Services

The University provides individual health insurance to graduate students with eligible academic appointments (UPMC Health Plan). The specific terms and conditions and the time period of the coverage can be accessed on-line at http://www.hr.pitt.edu/benefits/student-in. An option to purchase family coverage under this plan is available at a cost, which is the difference between the family coverage and the individual coverage. Options are also available to elect dental and vision coverage.

The Student Health Services Clinic is staffed by board-certified physicians, licensed nurse practitioners, and physician assistants, registered nurses and medical assistants providing the highest quality medical care to the students of the University of Pittsburgh. They generally offer routine primary care type services that provide care and treatment of minor illnesses and injuries. For more information, see the Student insurance website http://www.hr.pitt.edu/benefits/student-in or the Student Health Services Website http://www.studentaffairs.pitt.edu/shshome.

Graduate Program Information

Degree Options
Both M.S. and Ph.D. degrees are available through the Geology & Environmental Science Department, as well as a professional M.S. degree in Geographical Information Systems (GIS) & Remote Sensing (RS). Details of individual graduate programs are included below; here you can find information that is common to all degree programs.

Admission
Prospective graduate students must fulfill the requirements for admission to graduate study in the Graduate Programs of the Faculty of Arts and Sciences, described in the sections on Admission and Registration regulations in the Faculty of Arts and Sciences Bulletin.

- A cumulative grade point average of at least 3.0 on a 4.0 scale
- The minimum TOEFL score TOEFL score is 90 (with at least a score of 22 in all of the four sections of speaking, listening, reading and writing)
- The minimum IELTS score is 7.0 (with at least 6.5 in each of its four sections)

Successful applicants to the Department of Geology and Environmental Science may be admitted with full graduate status or with provisional status, depending on the undergraduate major area of study and grade point average (GPA). Full graduate status may be offered to students who have completed an appropriate undergraduate program in one of the natural or physical sciences related to Geology and Environmental Science and who have received satisfactory grades (generally B or higher) in science and mathematics courses. Students who have received a Master of Science degree from the Department of Geology and Environmental Science at the University of Pittsburgh and who wish to enter the Ph.D. program are encouraged to discuss this with the DGS, Chair, and Graduate Administrator. Typically, they should submit a standard application to the Department.

An applicant with a GPA below 3.0 may be admitted with provisional status. Students admitted with provisional status are not eligible for a teaching assistantship. Transfer from provisional to full status may occur upon formal recommendation of the Department following satisfactory completion of four courses (twelve credits) for which graduate credit is earned with at least a 3.0 (B) average. To initiate change of status, the student's Initial or Major Advisor must complete a formal request to the Associate Dean of Graduate Studies that the student be transferred to full graduate status.

Readmission
A student who has not registered for at least one credit during a twelve (12) month period (without obtaining a formal leave of absence) will be transferred automatically to inactive status and must file an application for readmission to graduate study (and pay the application fee) before being permitted to register again. While on inactive status, a student is not eligible to use University facilities and should not expect to receive counseling by the faculty or active supervision by her/his advisor.

Registration
Registration is completed online through the Student Center Web Portal at http://my.pitt.edu. Students are encouraged to register as early in the process as possible, as space is limited and some courses fill up quickly. You should meet with your faculty advisor to discuss your schedule and fill out the Release of Registration Hold Form. If you do not have a permanent advisor, the DGS will serve that role until one is assigned. If difficulties arise during the registration process, consult the Graduate Administrator or your advisor.

To be considered a full time student, you must register for 9-15 credits.

PhD students who have completed all 72 credits, all course requirements, and Comprehensive Exams should register for Full-Time Dissertation Study (FTDB 3999) in addition to GEOL 2015 Colloquium.

Some classes require a permission number. This can occur when

- a class is closed
- a prerequisite has not been satisfied
- a class is set with department/instructor consent
- a class in a career (department) other than the student's

To acquire a permission number for a G & ES course, you will need to contact the faculty member by email requesting permission. The faculty member will forward your request to the Graduate Administrator either granting or denying the request. It is helpful to include your "Peoplesoft number" in this request. Permission numbers from other departments must be obtained by following that department's procedure.

Student Advisement
Graduate students have a much closer working relationship with their advisors than undergraduate students. Regularly scheduled meetings to discuss your program and progress are recommended, and all students must complete an annual review with their adviser during spring semester. Further, beginning in the second year, students should meet with their committee on an annual basis. Most students meet with their advisors weekly or bi-weekly, especially if they receive support as research assistants.

Situations occasionally arise in which a change of advisor is appropriate and desirable. You may find that your research interests match more closely with another faculty member. Occasionally, personality conflicts can also arise. You should not feel locked into your initial choice. At the same time, you should recognize that changing advisors is a major decision that should not be taken lightly, especially if you have been in the program for several semesters. In some cases, your advisor may have invested substantial time and research support into your development. Before requesting a change, you must consider whether another faculty member is available to supervise your research and whether assistantship funds will be available. Except in rare circumstances, you should discuss the proposed change with your advisor. If that is not possible, you should meet with the DGS for advice and approval. When a change has been approved, you should notify your former advisor, your new advisor and the DGS in writing.

Major Advisor

The student should select a faculty member to become her/his Major Advisor in the area of specialization they have chosen to pursue. The Initial Advisor may be selected as the Major Advisor. It is recommended that this decision be made prior to the student beginning their curriculum. The student should meet with the faculty member to discuss possible research projects, and request that the faculty member become her/his Major Advisor. Following the student's choice of an area of specialization and Major Advisor, the Major Advisor should indicate to the Graduate Administrator in writing acceptance of this role. If the student wishes to change advisor, he/she should gain agreement from the new advisor, inform the former advisor, and submit a written notification to the Graduate Administrator.

Thesis/Dissertation Committee

The Department requires all graduate students to establish an advisory committee, preferably before the end of their first year, but definitely before the end of the second year, and to meet regularly with the committee thereafter, at least annually. The advisory committee consists, at minimum, of the student's advisor(s) plus additional GES faculty member(s). Generally, the advisory committee will become the examining committee for a Thesis (M.S.) or Dissertation (Ph.D.), but the initial role of the advisory committee is to provide oversight and advice early in the graduate student's study.

Preliminary Exam

An initial evaluation is required of all advanced degree candidates. The initial evaluation is designed to explore the student's basic knowledge of the geological and environmental sciences and to identify areas in which improvement may be required. The initial evaluation will therefore guide future coursework. Within the Department of Geology and Environmental Science, the initial evaluation takes the form of a written test administered simultaneously to all new graduate students at the beginning of the first term of residence (during Orientation). New Ph.D. students previously awarded the Master of Science degree from the Department are exempt from this requirement. In order to pass, a student much achieve an 80% or better on 4 of the 5 core subject areas.

The Initial (or Major) Advisor will meet with the student within one (1) week after the examination and, if deficiencies are noted, will determine what course of action is required. The advisor will prepare a written assessment summarizing the results of the examination and the meeting with the student. One copy of this report will be given to the student and another to the Graduate Administrator. Deficiencies are typically addressed by taking an undergraduate or graduate class that has an appropriate curriculum to address that deficiency, though other options are available in some cases. In each case a specific plan is developed by the student and his/her advisor. This written plan will be approved by the Graduate Committee and DGS. Coursework suggested in this plan must be completed with grades of B or higher prior to the comprehensive examination.

Colloquium

All students must register for and attend the weekly departmental colloquium (GEOL 2015) during each term of residence.

Language Requirement
There is no language requirement for graduate degrees within the Department of Geology and Environmental Science.

Statute of Limitations
Requirements for graduate study must be fulfilled within a period of four (M.S.) or seven (Ph.D.) calendar years (within five years if the Ph.D. student has received credit for a Master of Science degree appropriate to the field of study). Extensions may be granted upon approval of the faculty. Extension of the statute of limitations will be granted only for exceptional circumstances. The request must be approved by the student's Dissertation Committee and the Graduate Committee Chair and submitted to the dean for final action.

Expected Rate of Progress through Graduate Milestones (MS & PhD)

Year	**1**			**2**			**3**			**4**			**5**			**6**			**7**		
Term	F	Sp	Su	F	Sp	Su	F	Sp	Su	F	Sp	Su	F	Sp	Su	F	Sp	Su	F	Sp	Su
Preliminary Exam																					
MS Thesis Committee																					
MS Thesis Defense																					
Pro-MS Final Project																					
Pro-MS 41 credits																					
PhD Thesis Committee																					
PhD Comp. Exams																					
PhD Overviews																					
PhD Candidacy																					
PhD 4th Year Comm. Mtg.																					
PhD Meeting Presentation																					
PhD Dept. Colloquium																					
Paper submitted																					
PhD Defense																					

Annual Review
The Dietrich School requires annual evaluations of all graduate students. Students will complete the G & ES Annual Student Review form, which provides a brief self-evaluation and report of

accomplishments, and discuss it with their advisors. Note that a grade point average of 3.0 ("B") must be maintained at all times to remain a graduate student in good standing.

- Students should supply a completed electronic copy of the form and a current curriculum vitae (CV) to their advisor.
- Advisors will review the forms and provide a brief summary assessment, then email the form to the Graduate Administrator and the DGS.
- The DGS and Graduate Committee will review each student's self-evaluation and advisor's comments and provide a summary assessment to each student. If a student is failing to make satisfactory progress, the student will be required to arrange a meeting with the Graduate Committee, where they will identify and discuss where the student is failing to make satisfactory progress; help the student to create a plan to remedy the deficiency; and provide encouragement and outline essential steps needed for a successful continuation.
- The information you provide will allow us to assess support of students and also enable us to highlight your accomplishments in graduate school reports and in other efforts to promote the program. These evaluations should also serve to provide feedback on milestones and help ensure timely completion of your degree.
- Failure to complete the annual review will result in a hold on your registration.
- Students should be sure to keep an electronic copy of your annual review, as it will facilitate completing the form for the next year and may also be useful in resume and job application assembly. Keeping hard copy of your review for your records is also recommended.

A copy of the Annual Student Review is at the end of the handbook. Because it should also serve as a guide to your progress, you should review it before you complete your first semester. The most recent version of the Annual Student Review is available on the department website. We recommend that you use the latest version for each annual review.

Ethics and Academic Integrity
The University of Pittsburgh has established policies regarding the high integrity with which all students, faculty, and staff are expected two conduct themselves and their research. These are available at http://www.asgraduate.pitt.edu/forms-policies.

Thesis/Dissertation Copies
Follow University of Pittsburgh requirements for electronic submission, http://www.pitt.edu/~graduate/etd/

Funding
The Department attempts to provide financial assistance to graduate students in good standing through teaching and research assistantships. Teaching assistantships typically require half-time service (~20 hours per week including teaching, preparation, office hours, and grading). Research assistantships are offered by individual faculty members from supported research funds. Students with teaching or research assistantships have their tuition paid by the University. However, Departmental financial assistance is generally not available for students in the Pro-MS degree program. Several graduate fellowships and scholarships are also available at the University level. Additional information on these and other programs may be found on The

Kenneth P. Dietrich School of Arts and Sciences page (http://www.asgraduate.pitt.edu/financial-assistance). These include, but are not limited to, the following:

Andrew Mellon Predoctoral Fellowships
These fellowships are awarded to students of exceptional promise and ability either when they first enroll in the PhD program or when they have advanced to the dissertation stage. They carry a stipend plus payment of tuition. No service is required. Mellon Fellowship applications are generally due the first week of January.

K. Leroy Irvis Fellowships
These multi-year fellowships are designed to enhance the diversity of the University of Pittsburgh's graduate student population and, eventually, the professorate. They generally include a stipend and tuition coverage. K. Leroy Irvis Fellowships are used primarily to recruit new graduate students to Pitt.

Provost's Development Fellowships
These University fellowships are awarded to U.S. citizens on the basis of need and merit to provide development opportunities for women, minorities, and disadvantaged students pursuing doctoral degrees. They generally carry a stipend and full tuition for two terms. Both incoming and continuing students are eligible to apply.

Dean's Tuition Scholarships
A limited number of tuition scholarships are available for students who are either not funded by Departmental teaching assistantships or University fellowships or who have fellowships through national funding agencies such as NSF or NASA (see below). Priority is given to students who have completed all course requirements, are working on their dissertations, have exhausted all departmental support, and need to be minimally registered in order to use University facilities.

In addition, funding for graduate degree programs is available through a number of federal sources, including but not limited to:

NSF Graduate Research Fellowship Program
EPA Science to Achieve Results (STAR) Graduate Fellowships
NASA Earth Systems Science Graduate Fellowships
NDSEG National Defense Science and Engineering Graduate Fellowships

The Department of Geology and Environmental Science also provides small awards for graduate research and fieldwork from the Henry Leighton memorial Scholarship Fund. These awards are based on a combination of merit and need. Additional funds to support field-work and other graduate student research activities are available at the university level.

Graduate Student Research and Teaching Assistant Appointments
University of Pittsburgh Policy Statements for Graduate Student Researchers and TA, TF, and GSA, as well as the TA/TF handbook are available online at http://www.asgraduate.pitt.edu/forms-policies.

Please note that ALL reappointments depend on the graduate student making appropriate progress towards his/her degree as identified in the Annual Student Review.

Master of Science (M.S.)

The Master of Science degree requires completion of a minimum of 30 credits, of which 18 must be formal lecture classes.

The student must present a thesis showing marked accomplishment in some part of the field of his or her major subject as well as competency in the methods and techniques of scientific investigation. The thesis is to be the result of an independent investigation conducted by the student with an oral defense conducted at the end of the project. All MS theses shall serve as sources of published material.

Course Requirements

The minimum requirement for the M.S. degree is thirty (30) credits beyond the baccalaureate. These include lecture, laboratory, seminar, and topics courses, and research credits. A minimum of eighteen (18) credits must be from formal courses. At least twelve (12) of these credits must be taken within the Department of Geology and Environmental Science. A maximum of eight (8) credits numbered below 2000 may be applied toward graduation requirements with prior approval. No course numbered below 1000 may be applied toward graduation requirements.

A minimum grade point average of 3.0 must be maintained for all formal courses taken. Students with full graduate status will be placed on probation if the cumulative grade point average falls below the 3.0 level.

Up to six (6) formal course credits may be applied toward graduation requirements for graduate course work completed in a graduate program at another accredited institution. However, courses taken at the University of Pittsburgh while not enrolled in a graduate program do not count toward M.S. graduation requirements.

Thesis Committee

The student's Thesis Committee will consist of at least three persons responsible for scientific guidance and research oversight. The chair of the Thesis Committee is the Major Advisor of the student, and at least two other members must be graduate faculty from the Department of Geology and Environmental Science. Membership of the Thesis Committee is approved by the Department Chair and the Associate Dean of Graduate Studies by submitting the appropriate form to the Graduate Administrator. The membership of the committee may be changed if appropriate or necessary, subject to the approval of the Department Chair and the Associate Dean of Graduate Studies.

A meeting with the Thesis Committee should be scheduled by the student for the end of the Spring term of the student's first year, and at least once a year thereafter. At the meeting, the student will provide a short overview of the research goals and objectives of her/his research. The presentation will be followed by a discussion of research directions and progress.

Thesis

Each M.S. candidate must prepare a thesis demonstrating successful completion of the research project as well as competency in the methods and techniques of scientific investigation in the field of her/his area of specialization. The thesis must be clearly, logically, and carefully written. The thesis should contain an introductory statement, including appropriate justification of the research, a description of methods and observations of the investigation, evaluation of the significance and meaning of the results, and a final summary. The Major Advisor must approve the content, format, and grammar prior to submission of the thesis to the Thesis Committee. The Major Advisor should also ensure that the thesis is in acceptable form before requesting review by the Thesis Committee members. The thesis must be submitted to each member of the Thesis Committee at least two weeks prior to the thesis defense date. The members of the Thesis Committee will review and edit the thesis prior to the final thesis defense. The thesis should serve as a source of publishable material.

All M.S. students must also present research their results at a meeting of a national or international scientific organization prior to the thesis defense.

Application for Graduation

Each candidate for graduation must file an official Application for Graduation with the Office of Graduate Studies early in the term in which graduation is expected. Students are required to register for at least one credit in the term of graduation.

Thesis Defense

Each M.S. student must formally defend her/his submitted thesis. The student must provide notification of the defense at least two (2) weeks prior to the scheduled date to the Graduate Administrator, the Major Advisor, and each Thesis Committee member. The Graduate Administrator will then advertise the defense and notify the Assistant Dean of Graduate Studies. The defense is a public meeting, and the notice should therefore list the title of the thesis and the time and location of the event.

The Thesis Committee conducts the defense of the thesis. The student will begin the defense with a presentation summarizing her/his research topic and the results, which shall not last more than thirty (30) minutes. Following the oral summary and a general question-and-answer period, visitors will be asked to leave and the student will then defend her/his research by answering questions posed by the Thesis Committee. Questions need not be confined to materials within and related to the thesis. The thesis will be formally accepted or rejected by the Thesis Committee at the time of the defense and the committee will decide what, if any, revisions should be made. A report on the results of the defense and on acceptance of the thesis, signed by each member of the Thesis Committee, must be submitted to the Associate Dean of Graduate Studies. Prior to submitting the report of the thesis defense to the Office of the Dean, the Major Advisor must ensure that the student has secured the necessary signatures on the form entitled "Checklist for Students Completing Requirements for an Advanced Degree" that will then should be placed in the student's permanent file.

The Major Advisor is responsible for final approval of the revised thesis. After completion of the revisions, one electronic copy of the thesis must be submitted to the University Library System according to the specific requirements of the University's Electronic Theses and

Dissertations Online System (http://www.pitt.edu/~graduate/etd/). Students must also submit all required forms and documents as specified in the Arts and Sciences graduation packet (available within the Graduate Studies Office, 5141 Sennott Square).

Doctor of Philosophy (Ph.D.)

The Ph.D. is a research degree that represents the highest level of academic accomplishment in any field. Persons with this degree are expected to have demonstrated the ability to conduct independent research and also should have the level and breadth of knowledge about their field that one could reasonably expect of someone who has attained the highest academic degree in their field. Research performance, evidenced by preparation of a dissertation on an independently pursued research topic, is the primary requirement for the Ph.D. degree. Each program is designed in consultation with a faculty advisor to meet the needs of the student.

The Doctor of Philosophy degree requires completion of 72 credits, of which 36 must be formal lecture and laboratory courses. Completion of a preliminary assessment examination is required in order to guide selection of remaining courses.

After selecting a research focus, each student takes a comprehensive exam that shows the breadth of knowledge needed to accomplish a Ph.D. and an overview exam that outlines the research scope of the dissertation. Each student must write and present a dissertation embodying an extended original investigation of a problem of significance in his or her field of specialization. The dissertation must add to the general body of knowledge or understanding in its field and be of sufficient importance to merit publication. The student will give an oral defense of his or her dissertation as well as a formal departmental seminar and a presentation at least one national or international conference. All Ph.D. dissertations shall serve as sources of published material.

Course Requirements

The minimum requirement for the Ph.D. degree is seventy-two (72) credits. These include lecture, laboratory, seminar, topics courses, and thesis research credits. A minimum of thirty-six (36) credits must be from formal courses and at least eighteen (18) of the credits must be taken within the Department of Geology and Environmental Science. A maximum of eight (8) credits numbered below 2000 may be applied toward graduation requirements with prior approval. No course numbered below 1000 may be applied toward graduation requirements.

A minimum grade point average of 3.0 must be maintained for all formal courses taken. Students with full graduate status will be placed on probation if the cumulative grade point average falls below the minimum grade point level.

If a Master of Science degree is awarded from the Department prior to admission, then at least forty-two (42) additional credits are required.

Transferring Credits

The University of Pittsburgh may allow the transfer of some credits into a doctoral program, dependent upon approval by the Associate Dean of Graduate Studies. Up to 24 credits of master's level work can be transferred toward the Ph.D. If a student has completed relevant graduate work beyond the master's level at another institution, up to 12 additional credits may be accepted for transfer. No more than 36 credits can be accepted for transfer from all other graduate institutions, subject to the restrictions set out in the Graduate and Professional Bulletin.

As deemed appropriate, some or all of these credits may be used to satisfy formal course requirements. The student must consult with her/his advisor in order to determine the appropriate number of transferable credits.

All petitions for transfer of credits earned at another institution should be made within the first year of graduate study at the University of Pittsburgh. Transfer credits come under the same statutes of limitations as other degree requirements. Requests for the transfer of credits that are older than 10 years for a doctoral degree must be accompanied by a clear justification addressing the current relevance of the credited material relative to the graduate degree sought at the University of Pittsburgh.

Dissertation Committee

The student's Dissertation Committee will consist of at least five persons responsible for scientific guidance and research oversight. The chair of the Dissertation Committee is the Major Advisor of the student, and at least three other members must be graduate faculty from the Department of Geology and Environmental Science. At least one additional committee member must be from another department within the University of Pittsburgh or from an appropriate program at another academic or research institution. It is not necessary to identify the external member at the initial evaluation, but the external member must be identified well prior to the time of the Dissertation Overview, as they are part of the Overview and time is required to obtain approval for external committee members. The external member is expected to participate in person during the overview and dissertation defense. Under extenuating circumstances and with prior approval, a committee member can participate in the Overview or the Defense electronically rather than in person. Membership of the Dissertation Committee must be approved by the Department Chair and the Associate Dean of Graduate Studies by submitting the appropriate form to the Graduate Administrator. The membership of the committee may be changed if appropriate or necessary, subject to the approval of the Department Chair and the Dean. Students are required to schedule annual meetings with the Dissertation Committee.

Comprehensive Examination

The graduate student seeking the Ph.D. degree must complete a comprehensive examination administered by the Departmental members of her/his Dissertation Committee in order to demonstrate sufficient mastery of the field of interest and the ability to conduct dissertation-level research. The comprehensive examination should take place no later than the Fall term of the student's third year of enrollment, although students are encouraged to complete the examination as soon as possible following completion of most required coursework and after beginning dissertation research. The student is responsible for scheduling the examination. A student who is unable to complete all degree requirements within a three (3) year period after passing the comprehensive examination may be re-examined at the discretion of the Dissertation Committee with the approval of the Department Chair.

The comprehensive examination for the Ph.D. degree consists of both a written examination and an oral examination. The written comprehensive will take the form of a two (2) day examination consisting of questions provided by the Dissertation Committee members. The principal focus of the questions will be material directly related to the major field of research. The Major Advisor will solicit and review questions from Dissertation Committee members. Day one of the written

examination (scheduled for a continuous 8-hour period) will include only questions contributed by the Major Advisor. The second day of the examination will consist of questions solicited from the other Dissertation Committee members. The examinee shall neither interact with other students or colleagues with regard to the examination, nor consult books or online resources not explicitly authorized by the Dissertation Committee. Grading of the written examination by the relevant faculty members will occur on a scale of one (1) through five (5) where 1 = Fail, 2 = Poor, 3 = Good, 4 = Very Good, and 5 = Excellent. Students must receive a majority of "good" to "excellent" grades to pass the written examination. Successful completion of the written component of the comprehensive examination permits the scheduling of the oral examination. Students failing the written comprehensive must arrange a meeting with the Dissertation Committee to discuss the deficiencies and to propose a date for retaking the examination. Only one retake of the written comprehensive is allowed.

The oral comprehensive will be taken no more than three (3) weeks after successful completion of the written examination. Oral examination questions will focus primarily on the student's written comprehensive responses as well as the planned dissertation research and related fields, but may extend to additional subjects. The examination will be judged on the basis of the student's depth of understanding and knowledge of relevant scientific materials and her/his potential to conduct appropriate research activities. Grading of the oral comprehensive is pass/fail. Any student that fails the oral examination must arrange a meeting with the Dissertation Committee to discuss the deficiencies and to propose a date for retaking the examination. Only one retake of the oral comprehensive is allowed.

Dissertation Overview

Each Ph.D. student must prepare a written dissertation proposal for presentation to the Dissertation Committee at a formal dissertation overview meeting. The dissertation proposal will provide a concise statement of the purpose and scope of the student's dissertation, a detailed plan and timeline of research, and the expected significance of the work. The combined text and figures (excluding bibliography) for this proposal are not to exceed 15 pages. Formal presentation of the proposal should take place no later than six (6) months after the successful completion of the written and oral comprehensive examination. During this meeting, the Dissertation Committee will critique the research plan and proposed methodology and approve or reject the dissertation topic. Approval of the proposed research and the research design does not imply either the final acceptance of a dissertation prepared in accordance with the outlined plans, or restriction of the dissertation to the original proposal. Even after successful completion of the overview meeting, the student should keep the committee members informed of continued progress and provide all members additional formal opportunities to suggest possible improvements in research methodology or analysis. The student should also maintain frequent informal contacts with all members of the Dissertation Committee and meet annually with the entire committee.

Admission to Candidacy

Following successful completion of the comprehensive examination, and completion of the dissertation overview, the student may apply to the Dean for Admission to Candidacy. Admission to candidacy constitutes a promotion of the student to the most advanced stage of

graduate study and provides formal approval to devote exclusive attention to research and writing of the dissertation. Admission to Candidacy must occur at least eight (8) months before the dissertation defense.

Dissertation

Each Ph.D. candidate must prepare a dissertation demonstrating successful completion of the research project as well as competency in the methods and techniques of scientific investigation in the field of her/his area of specialization. The dissertation must be clearly, logically, and carefully written. The Major Advisor must approve of the content, format, and grammar prior to submission of the dissertation to the Dissertation Committee. The dissertation should contain an introductory statement, including appropriate justification of the research, a description of the methods and observations of the investigation, evaluation of the significance and meaning of the results, and a final summary.

The Major Advisor should ensure that the dissertation is in acceptable form before requesting review by the Dissertation Committee members. The dissertation must be submitted to each member of the Dissertation Committee at least two (2) weeks prior to the dissertation defense. The members of the Dissertation Committee should review and edit the dissertation prior to the final dissertation defense.

Each Ph.D. student must submit at least one manuscript to a peer-review journal prior to graduation and present research results at both a departmental colloquium and at a meeting of a national or international scientific organization.

Application for Graduation

Each candidate for graduation must file an official Application for Graduation within the Office of Graduate Studies early in the term in which graduation is expected, deadlines are announced each term. Students are required to register for at least one credit in the term of graduation.

Dissertation Defense

Each Ph.D. candidate must formally defend her/his submitted dissertation. The student must provide notification of the defense at least three (3) weeks prior to the scheduled date to the Graduate Administrator, the Major Advisor and each thesis committee member. The Graduate Administrator will then advertise the defense and notify the Assistant Dean of Graduate Studies. The defense is a public meeting, and the notice should therefore list the title of the dissertation and the time and location of the event.

The Dissertation Committee conducts the defense of the doctoral dissertation. The student will begin the dissertation defense with a presentation summarizing her/his research topic and results that shall not last more than thirty (30) minutes. Following the oral summary and a general question-and answer period, visitors will be asked to leave and the student will then defend her/his research by answering questions posed by the Dissertation Committee. The dissertation will be formally accepted or rejected by the Dissertation Committee at the defense and the committee will decide what, if any, revisions should be made. A report on the results of the defense and on acceptance of the dissertation, signed by each member of the Dissertation Committee, must be submitted to the Dean of Graduate Studies for approval.

The Major Advisor is responsible for final approval of the revised dissertation. After completion of the revisions, one electronic copy of the thesis must be submitted to the University Library System according to the specific requirements of the University's Electronic Theses and Dissertations Online System (http://www.pitt.edu/~graduate/etd/). Students must also submit all required forms and documents as specified in the Arts and Sciences graduation packet (available within the Graduate Studies Office, 5141 Sennott Square).

Professional Master's (Pro-M.S.) in Geographic Information Systems (GIS) and Remote Sensing (RS)

Specific Goals of the Pro-M.S. Degree in GIS/RS:

The goal of this program is to train a new class of professionals with strong scientific and geospatial qualifications, as well as managerial and business skills. These future leaders and skilled professionals require analytical skills beyond what is offered by traditional curricula at the bachelor's or Master's level. The curriculum has been carefully designed to reflect the real-world requirements needed for careers in the geospatial sciences. The specific goals of the Program are:

- to take coursework across a wide range of disciplines in order to provide all skills needed for a professional position
- to solve a challenging problem using GIS/RS tools and data, becoming proficient in the software and analysis techniques
- to prepare and edit a working project document
- to present this history verbally
- to digitally-publish these data/results

General Information

The GIS/RS Professional-M.S. program in the Department of Geology & Environmental Science is a multi-disciplinary, multi-departmental, non-research degree. Designed to be completed in two academic years (plus one summer), the required courses are centered in the Geology and Environmental Science Department and focus on GIS and RS core proficiencies. Students are also required to take at least one course in the Schools of Business, Law, and Information Sciences. Flexibility is designed into the 41-credit program so that the student can tailor his/her coursework to fit specific future career goals and personal interests.

Curriculum

First Semester:

Skill Set Development: GIS and Remote Sensing fundamental principles & software use; communication proficiency; exposure to geospatial professionals

- GEOL 2449: Introduction to GIS and Computer Methods
- GEOL 1460/2461: Introduction to Remote Sensing
- COMMRC 1102: Organizational Communication
- GEOL 2015: Colloquium

Total Credits: 10

Second Semester:

Skill Set Development: advanced GIS/RS proficiency; computer programming; personalized elective expertise

- GEOL 2446: Advanced GIS
- GEOL 3946: Advanced ArcObjects Programming
- GEOL 2460: Applied Remote Sensing -- OR --
- FIRST FOCUSED ELECTIVE: *See below for detailed options*

Total Credits: 9

Summer Semester:
Skill Set Development: independent project experience utilizing geospatial analysis tools; compilation of digital dossier; oral/written presentation experience

- GEOL 3902: Directed Study: Summer Internship

Total Credits: 4

Third Semester:
Skill Set Development: statistical data analysis; methodology of information science; introduction to business administration

- PSYED 2014: Statistical Methods I
- INFSCI 2000: Introduction to Information Systems #
- BUSINESS: Busines Elective
- SECOND FOCUSED ELECTIVE: *See below for detailed options*

Total Credits: 9

Fourth Semester:
Skill Set Development: advanced GIS/RS proficiency; awareness of comparative law; personalized elective expertise; data mining & database management

- LAW: Law Elective
- PSYED 2015: Statistical Methods II #
- GEOL 2460: Applied Remote Sensing -- OR --
- FIRST FOCUSED ELECTIVE: *See below for detailed options*

Total Credits: 9

an appropriate equivalent course may be substituted depending on the career goals of the student. See possible options.

Focused Electives:
These two elective courses should be used to further focus the student's particular interests and career goals. The sequence must be approved by one of the Pro-M.S. Program Directors and should be focused in one specialization area (i.e., in one Department or School). Students are encouraged to create their own sequence, but several example sequences and courses are listed below:

- Geological Sciences: Exploration Geophysics (GEOL 1410); Advanced Geohazards and Risk Management (GEOL 2640), Volcanology (GEOL 2750)

- Information Sciences: Statistics in Information Sciences (INFSCI 2060); Information Systems (INFSCI 2510); Software Tools and Techniques (TELECOM 2300)
- Advanced GIS Theory: Geographic Information Systems (INFSCI 1068); Advanced GIS (INFSCI 2720); Arcview Programming (GEOL 2447)
- Computer Programming: Visual Languages (INFSCI 2650); Programming for Web Applications (COE 1520)

Internship:

During the summer of Pro-M.S. student's first year, a 4-credit Internship (GEOL 3902) will be completed. With the assistance and approval of the Program Directors, the student will work in the business environment and utilize his/her geospatial skills. During this internship a digital dossier will be compiled and include the final published report, database dictionary, and georeferenced workspace. The written report must include: an executive summary, introduction, description of GIS/RS/GPS methodology, spatial and tabular analysis, conclusions, references and any appendixes. The database dictionary must include all images, spatial, map, and attribute metadata in a standard format. The student must also present an oral summary and description of project during the semester following their internship.

Law Elective:

One mandatory course centered in comparative or electronic law is required for the Pro-M.S. degree. There are a large number of possibilities including courses offered at the University of Pittsburgh Law School, as well as several other Universities in the Pittsburgh area.

- University of Pittsburgh: Intellectual Property (LAW 5260); Copyright Law (LAW 5328); Cyberspace and the Law (LAW 5404)
- Duquesne University: Intellectual Property: Trademark and Copyright Law (C208)
- Carnegie Mellon University: Ecommerce Law and Regulation

Substitutional Electives:

Depending on the skill set of the student, times of scheduled offerings within other schools at the University, and permission of the Program Directors, students may substitute certain courses for those designated.

- INFSCI 2000: Statistics in Information Sciences (INFSCI 2060); Information Systems (INFSCI 2510); Database Management (INFSCI 2710)
- PSYED 2015: Data Mining (STAT 2270); CMU: Mining Data for Decision Making (45-963)

Examples of Commonly-Used Graduate Forms

Forms below are examples, the latest versions will be kept on the department or other university website.

Form
Departmental Annual Graduate Student Review
Forms from A&S Graduation Packet
Hold Release form