

Earth & Environmental Science Masters Programs

Student Handbook

Master of Science in Applied Geosciences

University of Pennsylvania



College of Liberal and Professional Studies
Academic Year 2020-21

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Introduction

The purpose of this handbook is to provide students in the Earth and Environmental Science Master of Science in Applied Geosciences (MSAG) Program with information vital to the successful completion of the program. In this handbook you will find information on academic requirements, recommended courses, program and University policies, and resources both inside and outside of Penn. This handbook is designed to provide general information and does not supplant official publications, University web pages, or regular meetings with your adviser. *You should plan to meet with your academic adviser at least once per term to discuss your progress and course selection.* In addition, should you have questions that are not answered here or problems that you cannot resolve, you should consult your adviser or the MSAG Director immediately.

Student Responsibility

While advisers, faculty, and staff will assist the student in every aspect of their graduate study, it is the **responsibility of the student** to ensure that all steps and necessary paperwork have been completed and submitted to the Program Director and or LPS as appropriate. Grant proposals, awards, accepted publications and other records of achievement should be reported to the Program Director.

I. Program Overview

The Master of Science in Applied Geosciences (MSAG) at the University of Pennsylvania is a 12-CU, graduate program designed to prepare students to enter various geoscience professions.

The MSAG program is designed to prepare students to enter into careers as professional geologists or technical specialists. Students take courses specific to their field of interest. As a culminating exercise, students must complete a Project Design capstone that demonstrates their ability to define a project, develop appropriate methods, complete research, and present the results in a clear and concise manner. Most MSAG students select a format for this project that represents the geoscience sector in which they currently work or in which they aspire to work.

Students can study in the MSAG program part-time or full-time and can take either day or evening courses, provided the courses are pre-approved by the student's academic adviser. All required courses and the most popular electives are offered in the evening. All students are expected to complete their degree in no more than four years.

Relationship within the University

The Masters Programs in Earth and Environmental Science are housed in the School of Arts and Sciences (SAS), are overseen by the Director of Professional Masters Programs in Earth and Environmental Science, and located in the Department of Earth and Environmental Science. The programs are administered through the College of Liberal and Professional Studies (LPS), SAS's division of continuing education. The program schedules specially designed courses in the evenings that are taught by members of Penn's standing faculty, affiliated Penn faculty, and experienced environmental professionals from the Philadelphia region. Occasionally students in the program may take graduate courses from other departments or schools within the University with the approval of a program academic adviser and permission of the department offering the course.

MSAG students are eligible for Penn services available to other graduate students with the same enrollment status (part-time or full-time). Full-time students are enrolled in three or four courses per semester while part-time students are enrolled in one or two courses per semester. Students are permitted to change their status from full to part time and vice versa at any point in their career without seeking prior permission. However, international students should be aware that they must maintain their full-time status to meet visa requirements.

II. Curriculum

Students are required to complete at least 12 CUs of graduate level course work for the MSAG program. Students must take nine required courses, three electives, and complete a Masters level Project Design or “Technical Paper” positively evaluated by two readers in order to earn an MSAG degree.

Required Courses

- GEOL 620 Applied and Environmental Geophysics
- GEOL 653 Introduction to Hydrology
- DYNM 619 Organizational Project Management

One course must be taken in each of the following five areas

1) Geocomputations

- GEOL 651 Geocomputations I
- GEOL 658 Geostatistics
- ENV5 541 Modeling Geographic Objects
- ENV5 681 Modeling Geographic Space

2) Geochemistry

- GEOL 418 Geochemistry
- GEOL 421 Elemental Cycling in Global Systems
- GEOL 528 Aqueous Geochemistry
- GEOL 618 Fundamentals of Air Pollution

3) Geomechanics

- GEOL 654 Geomechanics: Solids
- GEOL 668 Geomechanics: Fluids

4) Engineering Geology

- GEOL 670 Engineering Geology: Rock Mechanics
- GEOL 671 Engineering Geology: Surficial Materials & Processes
- GEOL 680 Interpretation of Near-surface Geologic Structure for Engineering & Environmental Geology

5) Ground Water Hydrology

- GEOL 656 Fate and Transport of Pollutants
- GEOL 661 Environmental Groundwater Hydrology

Three Elective Courses

Students choose three electives within their area of concentration. A description of the concentrations in the MSAG program follows and specific courses that fulfill each concentration are described in the Appendix. The development of a concentration should be done in consultation with a program academic adviser (assigned when the student enters the program). You can find your academic adviser by going to Penn InTouch (Fig 1). If no name appears there, your academic adviser is Dr. Bordeaux (bordeaux@sas.upenn.edu).

The screenshot shows the Penn InTouch website interface. On the left is a navigation menu with categories like Registration & planning, Academic records, Financial aid, Student loans, Student employment, Profile, privacy & emergency, Course absence reports, and Verify my information. The main content area is titled 'Front page' and includes sections for Announcements, Class schedule for Fall 2015, Important dates and deadlines, and Protect your privacy. On the right is a 'Quick links' sidebar with buttons for Registration and planning, Academic Records, Student billing account, Financial aid, Student loans, and Student employment. A student profile box is visible, containing the following information:

Division	LPS	Degree	MES
Major	RMAN	Concentration	
Exp grad	Fall 2016	Spec pgm	CES
Academic Advisor, LPS Willig, Sarah A			

A red arrow points from the 'Academic Advisor, LPS Willig, Sarah A' text in the profile box to a larger, detailed view of the same information shown in a separate box below:

Fall 2015	
Division	Degree
LPS	MES
Major	Concentration
RMAN	
Exp grad	Spec pgm
Fall 2016	CES
Academic Advisor, LPS Willig, Sarah A	

Figure 1. Finding your academic adviser on the Penn InTouch screen. Arrow points to where academic adviser name is listed. Click on name to email your adviser to set up a meeting or ask a question.

Electives:

Engineering Geology

- GEOL 411 - Soil Science
- GEOL 654 - Geomechanics: Solids
- GEOL 658 - Geostatistics
- GEOL 668 - Geomechanics: Fluids
- GEOL 670 - Engineering Geology: Rock Mechanics
- GEOL 671 - Engineering Geology: Surficial Materials & Processes
- GEOL 680 - Interpretation of Near-surface Geologic Structure for Engineering & Environmental Geology
- ENVS 541- Modeling Geographic Objects
- ENVS 681- Modeling Geographic Space

Hydrogeology

- GEOL 528 - Aqueous Geochemistry
- GEOL 656 - Fate and Transport of Pollutants
- GEOL 661 - Environmental Groundwater Hydrology
- GEOL 663 - Geochemical Modeling
- GEOL 668 - Geomechanics: Fluids
- ENVS 507 - Wetlands

Environmental Geology

- GEOL 411 – Soil Science
- GEOL 421 - Elemental Cycling in Global Systems
- GEOL 528 - Aqueous Geochemistry
- GEOL 658 - Environmental Statistical Analysis
- ENVS 507 - Wetlands
- ENVS 541 - Modeling Geographic Objects
- ENVS 681 - Modeling Geographic Space

Note: Other courses may be used in any elective if pre-approved by the student's academic adviser.

Individualized Concentration

For this concentration, the student meets with the Director of the MSAG and creates a program that consists of a coherent set of courses that aid the student in reaching their academic and professional goals.

Project Design Course

GEOL 699 Project Design Seminar is a required course for all students and must be taken in the first Spring semester of the student's academic career. This course will help define a student's Project Design capstone project, develop the methodology to complete the project, and guide the student in the writing of the capstone proposal. The proposal is the final product of the course and sets the student up for success in their research.

Project Design Capstone Requirement

The Capstone research is the culmination of the MSAG student's career. The Capstone draws on methodology from the student's area of concentration and directly relates to the student's goals for the program. It is not necessary that the work be publishable in a scholarly journal, although this is highly encouraged. Students are expected to submit their capstone proposal and reader candidates as part of the Project Design capstone course (GEOL 699) in the first year of their program. Students should plan to spend a minimum of one year on the research and writing of the capstone.

The Capstone topic, methodology, and scope of work is developed in the Project Design Seminar (GEOL 699) and the final product is a Capstone Proposal. The proposal and selection of readers must be approved by a faculty committee before the student begins the research project. Approval by capstone readers and/or the student's academic adviser is not sufficient to begin research. Final capstone papers submitted without a faculty committee approved proposal will not be considered as fulfilling the final requirement for graduation.

Once the capstone proposal is approved, the student will be placed in a Capstone Group based on planned graduation date and regular check-ins will be required. Failure to complete check-ins on time will result in academic warnings and a delay of graduation.

The Capstone length varies depending on the scope and format agreed upon by the student and the Capstone readers. Although there are no set guidelines for Capstone projects, the capstone should document the student's ability to:

- Identify a geotechnical, hydrologic, or environmental problem or issue that would be encountered in professional practice
- Design a protocol to address this question
- Acquire the data necessary to clarify, if not resolve, the question
- Critically assess the quality of the data acquired
- Draw defensible conclusions from those data
- Communicate this process and conclusions to professional colleagues with clarity and precision

In addition to the final written Capstone, students are required to create a poster detailing their work. Capstone readers must evaluate and approve both the capstone paper and poster in order to complete the requirements for graduation.

Field Opportunities

Field trips and site visits are incorporated into several core courses. Students in the program also have access to other earth science research projects within the Department of Earth and Environmental Science. Students who plan to apply for Professional Licensure in Pennsylvania are required to take a field methods-based course during their academic career. Students who did not take a field course in their undergraduate career can take GEOL 596 *Geologic Field Methods* to fulfill this requirement.

III. *Special Programs and Certificates*

Sub-matriculation

Sub-matriculation allows students to take graduate-level courses while still undergraduates; allowing most to complete their bachelors and masters degrees in five years. Undergraduate students in their *junior year or before the end of their 7th semester* at the University of Pennsylvania may apply for sub-matriculation into the MSAG. Second semester seniors are **NOT** eligible for this option, but they may apply for regular admission to the program. Students should discuss sub-matriculation with the Director of the MSAG and then apply for sub-matriculation at their undergraduate academic office.

Students sub-matriculated into the MSAG may double count up to four graduate level courses toward both their undergraduate and graduate degrees. These courses must be pre-approved by the student's MSAG academic adviser and undergraduate major adviser. The remaining eight courses must be taken after the student has graduated from their undergraduate program.

Students should download a "Request for Sub-matriculation Course Double Counting" form from the [Canvas Online Community](#) (found under "Forms") to apply for course approval for double counting **prior** to taking the course. All College student requests for double counted courses must be made no later than eight weeks into the student's 8th semester at Penn. LPS students should contact the LPS Office for deadlines specific to their program of study. Additional information on sub-matriculation can be found in the *Dual Degree Handbook* or on the [College website](#).

Certificates

Students have the opportunity to pursue a number of certificates offered throughout the university while completing their MSAG degree. Most of these certificates require separate applications and students should meet with the certificate contact person early in their MSAG program to make sure that all requirements can be met by graduation. The number of courses required for a certificate vary but most are five courses. Students may double count up to **two courses** toward the certificate and their MSAG degree **IF** those two courses are appropriate for the MSAG curriculum. Consult with your MSAG academic adviser early to determine which courses can be used for the MSAG degree.

Dual Degrees

There are two Dual Degree options with the MSAG degree: MSAG and Master of Law and the International Environmental Management program. Each dual degree has a set of approved courses and order in which courses are taken. Students in Dual degree programs should meet with their academic adviser in each program every semester to ensure that they are meeting the requirements of both degrees. Consult the *MSAG Dual Degree Handbook* for additional information about the specifics of each dual degree. If you are interested in applying to a dual degree program contact the MSAG program Director as soon as possible.

IV. Program Policies

Academic Standards

Students in the MSAG are expected to maintain the highest possible academic standards. To assure that students are making satisfactory progress toward their degree, the program reviews student performance every semester, but it is the student's responsibility to ensure that courses taken count toward the degree. Thus, it is vital that students meet with their Academic Adviser every semester to ensure that they are on track to graduation. The Earth & Environmental Science Faculty Advisory Committee (FAC) has adopted the following requirements for MSAG students as they progress toward their degrees:

- Students must take all courses that will count towards the MSAG degree requirements for a letter grade. Pass/Fail or Audited courses are not counted toward the degree. The letter grades of "S" or "U" also do not count toward the degree.
- Students must maintain a 3.0 cumulative average in order to be in good standing and to graduate.
- Only one grade below a "B-" and no grade below a "C" will be accepted toward fulfillment of the 12 CUs required to complete the program.
- Students must make satisfactory progress on the capstone project including: obtaining approval for their capstone project proposal in the first year of the program, completing scheduled check-ins, submitting drafts on schedule, attending/presenting a poster at the annual EES Capstone Research Conference, and obtaining a positive evaluation on the final capstone paper and poster from two approved readers.

Students who receive a grade below a "C+" or have more than one grade below a "B-" will be reviewed by the FAC and placed on academic probation.

With the permission of the FAC, students may take additional courses in order to increase their GPA or to fulfill requirements in courses where the student received a grade below a "C". In the case where the same course is taken again to meet the academic requirements of the program, both courses and grades appear on the transcript, but only the second course's CU contributes to the total number of CUs and only the grade for the second course is included in the cumulative GPA. Students should work with the Program Director to develop an academic plan and facilitate student success; students will not be allowed to register for courses during their academic probation without an approved plan in place.

Program Dismissal

Students who do not meet the terms of academic probation are subject to dismissal from the program. At the end of each semester, the FAC will review the academic progress made by candidates for academic dismissal and decide whether to remove the student from academic probation, continue academic probation, or dismiss the student from the Program. If the Committee decides that the student is unlikely to successfully complete their degree program, the student will be sent an academic dismissal letter via email and U.S. mail.

Inactive Status

Students who do not enroll in courses for four consecutive terms, including summer, will be considered inactive and will be automatically withdrawn from the program during the fourth term. Students who are withdrawn will be required to apply for readmission to the program. Standard application fees will apply.

Incomplete Grades

An incomplete grade indicates that a student has not completed all the work in a course and has done so with the instructor's permission. An instructor who chooses to grant an extension to a student who has not completed a course by the end of the term may grant either an Incomplete (I), an Extended Incomplete (II), or choose not to submit a grade (NR or GR). An Incomplete (including I, GR, and NR) must be made up within the first four weeks of the start of the next term, and an Extended Incomplete must be made up by the end of the next term (including the summer term). In either case, if the Incomplete is not made up by the deadline, it will become an F. An Incomplete is made up only when the official grade is received by the LPS Office and recorded by the Registrar's office on the student's official transcript. Once an Incomplete grade is converted to an F, the instructor may not change the grade even if the student has completed all required work. Students with two or more Incomplete grades are subject to registration hold and are required to meet with the MSAG Director to explain the circumstances of the Incompletes and develop a plan to resolve them. Students with two or more outstanding grades of incomplete will not be allowed to register for courses; students with two or more outstanding grades of incomplete who have already registered will be dropped from courses.

The student's eligibility for student loans will be affected by Incomplete grades and students may not be eligible for additional loans or aid until the Incomplete grades are cleared.

Academic Grievances

Evaluation of a student's performance in a course is the responsibility of the course instructor. Should a final grade in a course be disputed, the student must submit a written appeal to the instructor within the first two weeks of the academic semester immediately following the semester in which the grade was received. The instructor must respond in writing to the student within two weeks of receiving the written appeal. If, after receiving the written response from the instructor, the student still believes that the grade has been unfairly assigned, the student must submit a written appeal to the EES Faculty Advisory Committee. If the Committee believes the appeal demonstrates evidence of negligence or discriminatory behavior, a sub-committee will be

formed to review the student's appeal and make a recommendation to the full Academic Committee. The School of Arts & Sciences and the Provost's Office have policies governing academic grievances. Students should consult these for additional information about the grievance procedure.

SAS policy for graduate students' grievances:

<https://www.sas.upenn.edu/graduate-division/resources/academic-grievance-procedure>

Penn Provost's information on Academic Grievances:

<https://catalog.upenn.edu/pennbook/student-grievance/>

Leave of Absence

Students take time away from their studies for a wide variety of reasons that include:

- Manage a medical concern
- Fulfill a family obligation
- Pursue career-related opportunities
- Complete military service
- Work on a political campaign

While interrupting your studies to take time away may seem intimidating, a leave is a means to the successful completion of a degree, not a barrier to graduating. More than three quarters of students who take a leave return to complete their degree within two years.

If you are considering a leave, take time to think carefully about your goals for your time away and for when you return. Speaking with the MSAG program director is an important first step. Depending on your circumstances you should get advice from other sources as well. Students taking time away in order to manage a medical condition should discuss the leave with their healthcare provider. Your MSAG program director will help you connect with other campus resources as you prepare to take a leave of absence, such as Student Financial Services, Housing, and International Student and Scholar Services.

Students typically take a leave for a full academic year. Individual circumstances may require more or less time. Students on leave should remain in contact with their MSAG program director and update them about changes in plans. The return from leave process supports students in a successful re-entry to academic life at Penn. When preparing to return, students must consult their MSAG program director to develop a plan that includes connection with appropriate resources.

Leave of absence policy and process:

Requesting a Leave of Absence:

- Students must meet with the MSAG program director to discuss a leave request.

- The student must submit a written request for leave of absence, detailing the reasons for the desired leave.
- The leave request will be evaluated by the Program. If the request is approved, the Program will stipulate conditions that must be met by the student before returning from leave.
- The student will be notified with the result of the leave request. The Program may deny any request for leave. In granting leaves, the decision of the Program is final.
- A student on leave may not be enrolled in Penn classes or “sit-in” on Penn classes and will not receive credit for classes taken elsewhere during the leave. Students on leave may not live in University-owned housing during the term of their leave. In addition, a student may not participate in and/or hold a leadership position in a registered University organization.
- Discontinuance of study without permission from the University does not constitute a leave of absence. Students who have requested a leave of absence for a given semester may still be dropped from the University rolls if their previous term's grades qualify them for this action.

Checklist: Leave of Absence or Withdrawal

Once a leave of absence or withdrawal has been approved, or you have been dropped, that action will be posted to your transcript. Your PennCard will be deactivated as soon as the leave, drop, or withdrawal has been processed.

Notifications

Be sure to notify all relevant offices of your leave or drop. These offices may include the following, if applicable:

- [Student Registration and Financial Services](#)
- [Housing and Conference Services](#)
- [International Student and Scholar Services](#) (ISSS)
- [Student Health Service](#)
- [Office of Student Conduct](#)

While Out

During the term of your leave or drop, you may call the MSAG program office if you have any questions. Please be aware of the conditions for return outlined in your leave of absence letter, since you will be required to fulfill them before you may re-enroll.

Applying to Return

You must apply to return from leave by the relevant deadline (for the fall semester, July 15; for the spring semester, November 15; for the summer, April 15). At that time, you must fill out a request to return from leave form and show that you have fulfilled all of the conditions for return as outlined in your original letter from the MSAG program. To begin this process,

contact the MSAG program Director well in advance of the deadline. Any return request submitted to the program director later than the above deadlines may be denied. Timely submission of requests and documentation is a condition of all leave returns.

The standard length of an LPS leave of absence is one year. Students may request an early return from leave after one full semester on leave, but should bear in mind that this request may be denied.

Deferred Enrollment

Students who are admitted to the MSAG may defer their matriculation for one year. Students who wish to defer should notify the MSAG office in writing of their intentions as early as possible. It is not necessary for deferred students to reapply. However, students must inform the MSAG program if they enroll at any other institution prior to their matriculation at Penn, and they must submit final official transcripts of any coursework completed prior to their enrollment at Penn.

Transfer Credit

Students who enter the MSAG from Penn's Post-Baccalaureate Undergraduate Studies or Non-Traditional Graduate program may count *up to 4 graduate level* courses towards their MSAG degree. These courses must be submitted to the Faculty Advisory Committee for approval during the first semester of matriculation in the MSAG. Only courses appropriate to the student's degree program will be considered for approval.

Students who enter the MSAG from another graduate program at the University of Pennsylvania for which they did not complete the program may count up to 4 graduate-level courses toward their MSAG degree. These courses must be submitted to the committee for approval during the first semester of matriculation in the MSAG program. Only courses appropriate to the student's degree program will be considered for approval. Courses from completed degrees are not eligible for transfer.

Students who enter the MSAG from an incomplete graduate program at another university may *count up to 2 graduate-level* courses towards their MSAG degree. These courses must be submitted to the committee for approval during the first semester of matriculation in the MSAG program. Only courses appropriate to the student's degree program will be considered for approval.

Additional Notes:

- Students may not transfer a course that they have taken as part of a completed degree program.
- No course taken as part of an undergraduate program may be transferred into the MSAG unless the student is a Penn sub-matriculate.
- Transferred courses must have been taken in the last 5 years.

Courses taken outside of the University of Pennsylvania during a student's matriculation in the MSAG program are not eligible for transfer credit.

Financial Aid

Tuition Support

MSAG students are not eligible for University-based fellowships or scholarships. United States citizens or permanent residents are eligible to apply for loans through Penn's Office of Student Financial Services, <http://www.sfs.upenn.edu/>. Full-time students (students taking 3 or more courses in a semester) and part-time students (students taking two courses in a semester) are eligible for loan support. International students are not eligible for loans through the University. Students may seek outside scholarship support.

Research Support

The MSAG program has limited funding available to support costs incurred during the conduct of student research. These funds are awarded on a competitive basis and are available for equipment and lab fees associated with the student's research. Awards are typically on the order of a few hundred dollars. In addition, MSAG students may apply for funds to present their research at a conference or scientific meeting.

To be eligible for research funds through the MSAG program, students must identify an adviser who will work with them on the research project. Students must be in good academic standing. Students with Incomplete (I or II) or unreported course grades (NR or GR) are not eligible for these funds. Proposals (including a detailed budget) are accepted on an ongoing basis. *Forms are available on the Online Community under "Forms."*

Students applying for funds to cover expenses associated with an oral or poster presentation at a conference or meeting must submit a copy of the accepted abstract, the notice of acceptance of that abstract, and a budget of the costs associated with travel to the conference. *There are no deadlines for these requests, but students must submit materials at least 4 weeks prior to travel to allow for processing of such requests.*

V. Designing Your Program

Student Advising

Each student entering the MSAG program will be assigned an academic adviser. That academic adviser will guide the student through the initial course registration and program introduction as well as throughout their academic career in the MSAG. Student's will meet with their adviser during the 1st Year Retreat and define a plan for the remainder of their MSAG career. Attendance at the 1st Year Retreat is mandatory.

Students should meet with their academic adviser at least once a semester (usually during Advance Registration) to discuss their program progress and choose courses for the following

semester. Students should use the student planning worksheet available on Penn InTouch (https://portal.apps.upenn.edu/penn_portal/intouch/splash.html) as well as the plan developed at the Retreat to choose courses each semester and ensure that all degree requirements are fulfilled for graduation.

Course Selection

Prior to Advance Registration each semester approved lists of courses from the MSAG program will be posted on the *Canvas MES and MSAG Online Community*. Departmental web pages often include course descriptions as well. The Course Timetable appears in March and October and may be viewed online at <http://www.upenn.edu/registrar/timetable>. Finally, Penn InTouch allows students to search for courses online using keyword searches. If a student selects a course that does not appear on the approved lists on the *MES and MSAG Online Community*, they must seek approval from their adviser as it may not be acceptable for the program.

VI. Course Registration Procedures

Advance Registration

The course registration process involves two registration periods. The first is *Advance Registration* during which students enter their requests for courses they wish to take. Students are encouraged to register during this period so that they have the best chance of getting into the courses they prefer. At the end of Advance Registration, a scheduling program processes all registration requests at the same time to determine who is enrolled in the courses that have been requested. Students will then be able to view their courses in which they have actually been enrolled. Students may advance register during a two-week period starting in late March for the following summer and fall terms and during a two-week period in early November for the following spring term. Check the LPS website (<http://www.sas.upenn.edu/lps/calendar>) and/or the Registrar's website for the exact dates for Advance Registration.

Regular Registration

The regular registration add/drop period opens approximately three weeks after the advance registration request period has closed and students have been notified of their schedules. During the regular registration period students know immediately whether or not they will be able to enroll in the course they are requesting. Students must register for courses through Penn InTouch (online registration). Registering through Penn InTouch requires the use of a personal computer and access to the web and is the only method of registration.

In order to access the system, students must have a PennKey. To establish a PennKey, go to <http://www.upenn.edu/computing/pennkey/> and follow the steps there. [Note: A Set-Up Code will be emailed to each new student to set up a PennKey.] The Penn InTouch web address is: https://portal.apps.upenn.edu/penn_portal/intouch/splash.html

Some important information to remember when registering for courses:

- Check with your academic adviser to be sure the course for which you are registering fulfills a requirement for your degree.
- Courses must be taken for a normal letter grade in order to count toward the MSAG degree. “Pass/Fail” or “Audit” are not acceptable options.
- Only courses numbered 400 and above (the first set of three digits after the course subject is the course number -- e.g., GEOL 420 001 but **not** GEOL 001 601) may count toward the degree.
- As a masters student, permission may be needed from the instructor or department to register for some graduate courses in other departments or schools (permit procedures can be found on the [Canvas MES and MSAG Online Community](#)).
- Full-time students should enroll in 3 or 4 courses. Students are not permitted to enroll in more than 4 courses per semester.
- Part-time students should enroll in 1 or 2 courses per semester.

Permits

Courses that require special permission from the instructor are indicated in the Course Timetable as “Permit Required.” Instructions for how to obtain a Permit from various departments can be found on the Canvas [MES and MSAG Online Community](#) under “Course Planning.” Please check this list before emailing the instructor or random offices at Penn.

Once a permit is obtained, students must “claim” the permit by actually enrolling in the course through Penn InTouch. After both Advance Registration and Regular Registration are complete, the Registrar’s Office removes unused permits from students’ records. However, out of courtesy, if you have decided not to take the course, please inform the office that issued the permit so they might release your seat to others who might be on a wait list.

Independent Study Courses

Students interested in pursuing an individualized study project should obtain a “Request for Independent Study” form from the [Canvas MES and MSAG Online Community](#). The student should then approach a faculty member and obtain agreement from them to direct their project. It is the responsibility of the student to define the individualized project. Students should not approach a faculty member and request that they define a project for the student. Students must obtain the appropriate signatures from their adviser and the Director of the MSAG program. Independent Study Courses may not duplicate other courses offered during the same semester. Students should bear in mind that faculty members are not required to supervise an Independent Study course. MSAG students may register for up to 2 Independent Study courses during their career. **NOTE: Internships cannot be counted for Independent Study credit.**

Auditing Courses

MSAG students may audit courses. However, they will be charged tuition and fees at the MSAG tuition level. Audited courses will appear on the student’s transcript, but no grade will be issued

and the course will not count toward the 12 cu's needed to complete the program. Most courses are open to auditors on a space-available basis.

Registering for Non-MSAG Courses (also see “Permits”)

MSAG students may register for graduate courses (numbered 400 or above) in other Penn departments and schools, if those courses are appropriate to the student's program. Students should consult with their academic adviser to determine if the course is appropriate to their program before registering. MSAG students may need permission to register for courses outside the Department of Earth & Environmental Science. In such cases, students should consult the “Obtaining Course Permits” document on the [Canvas MES and MSAG Online Community](#) for the specific procedure for obtaining a permit. Students wishing to take courses outside of EES may not be able to register until all students in the home department or school have had a chance to register. Permits will then be issued on a first-come-first-served basis. Students should be aware that Law School courses often begin the week before the official start of the semester.

Course Changes

MSAG students are subject to LPS registration and drop/add deadlines which may be different than deadlines for other schools and departments. Students should consult the current LPS Course Guide or the LPS website for deadlines for making registration changes and for the corresponding financial obligations (<http://www.sas.upenn.edu/lps/calendar>). Students are able to make these changes in Penn InTouch. Adherence to LPS deadlines is strictly observed. Should students need to drop or withdraw from a course beyond the deadline, they should download the petition form from the Canvas [MES and MSAG Online Community](#). It may be necessary to provide documentation of the situation that necessitates the drop or withdrawal, particularly if the student is requesting a refund of tuition.

Adding a Course

Students may add a new course through the second week of the term. After that it is not possible to add a course. Students may add a course during the first two weeks of the semester via Penn InTouch.

Dropping a Course

Students may drop a course with no financial obligation until the published Add/Drop deadline posted on the LPS Website (<http://www.sas.upenn.edu/lps/about/academic-calendar>) (approximately two weeks into the term). Students may also drop a course between the second and fourth weeks of the term, but in so doing they will incur a 50 percent financial obligation for the tuition and fees for the dropped course. Absence from class does not constitute a drop, nor does notifying the instructor. Students can officially drop a course through Penn InTouch through the second week of the term. After the second week of the semester, students must submit a Withdrawal Form to LPS. When making registration changes via Penn InTouch, it is always advisable to double check to make sure the changes have taken effect before logging-out. Students may also want to contact the MSAG office or their academic adviser to confirm that the

dropped courses are no longer on their schedules. Students who fail to drop a course officially may receive a grade of F and will be required to pay the full tuition rate.

Changing Grade or Credit Status of a Course

All courses taken to fulfill requirements in the MSAG program must be taken for a letter grade. However, students may register for courses that they do not want to count for their program on an audit or Pass/Fail basis. Before doing so, however, they should discuss this with their academic adviser. Once they have done so, students may change their status in a course from credit to audit, from a letter grade to Pass/Fail or from Pass/Fail to a letter grade until the published deadline in the current LPS Academic Calendar (approximately four weeks into the term). No change is permissible after the published deadline. Auditors pay full tuition and fees.

Withdrawing from a Course

Students may withdraw from a course after the deadline to drop a course has passed (approximately four weeks into the term). To withdraw, students must submit a petition to the LPS office (<http://www.sas.upenn.edu/lps/students/current/forms-handbooks>). Normally, permission is granted and a W (withdrawal) is recorded on the transcript. After the published withdrawal deadline, students are permitted to withdraw only under extraordinary circumstances, which must be documented. Students who withdraw from a course have full financial obligation, except in documented cases of illness, military service, or other extraordinary circumstances, when they may petition for a 50 percent refund.

Note: Dropping a course is not identical with withdrawing from a course. Withdrawing from a course takes place after the sixth week of class and carries with it full financial obligation. In addition, the student's transcript will read "W" (Withdrawal) next to the title of this course. However, if a student drops a course during the normal Add/Drop period, no record of that course will appear on the transcript and there is no financial obligation.

Master's Thesis Registration

MSAG students who have completed all course work toward the degree, but have not completed their Project Design capstone project, will be automatically enrolled in the non-credit Master's Thesis course (GEOL 990) for every subsequent semester until the capstone is complete. This includes summer semester, thus if a student does not complete their capstone in May, they will be automatically enrolled in Master's Thesis in Summer 11-Week. If the capstone is not completed by August, the student will be automatically enrolled in Master's Thesis for the Fall. The cost of thesis registration is less than the cost of a regular course and keeps the student status active. Students enrolled in Master's Thesis have access to the library and other Penn systems. Should a student wish to extend Master's Thesis registration beyond two semesters, they must receive permission from the MSAG Faculty Advisory Committee. Students not completing the program requirements after two semesters of Master's Thesis may be withdrawn from the program for lack of progress toward degree.

Student Status

Students with Visa restrictions and/or loan requirements should be aware of their student status. Students are considered full-time if they meet one of the following criteria:

- Student is enrolled in 3 or 4 courses in a single semester
- Student is enrolled in Master Thesis GEOL 990.

If a student is enrolled in 2 or fewer courses in a single semester (other than Master Thesis) they are considered part-time. Students who meet the requirements of a full time student are automatically enrolled in Penn's Student Health Insurance coverage unless the student shows proof of coverage through another source. It is the student's responsibility to ensure all paperwork has been submitted if they choose to opt out of the Penn insurance plan.

Time to Completion

Master of Science in Applied Geosciences students may enroll on either a part-time or full-time basis. Time to completion will vary depending on how many classes are taken each semester and whether summer classes are taken. Full-time students can complete the program in two years, taking three or four classes per semester. Part-time students typically complete the degree in three years, taking one or two classes per semester. Students are expected to complete their degree in four years or less. Students needing additional time to complete their degree must petition the Faculty Advisory Committee for permission to continue beyond the four-year rule. In addition, students may not be on Masters Thesis (GEOL 990) for more than two semesters. Students not completing the program requirements after two semesters of Master's Thesis may be withdrawn from the program for lack of progress toward degree.

VII. Project Design and Graduation Procedures

Faculty Readers

Two faculty readers are required for the Project Design capstone: one designated as the primary reader and the other as the secondary reader. The primary reader will work with the student to plan and carry out the proposed research. The Primary Reader works with the student on a weekly basis to complete the project and ultimately approve the final capstone project. The secondary reader will evaluate drafts of the capstone project, though they may also be involved in formulating the project. The primary reader must be an expert in the capstone topic the secondary need not be.

Capstone faculty readers need not be members of the Penn standing faculty, and one reader may be drawn from outside of Arts and Sciences. However, they must be academically engaged in the student's capstone topic. Professors from local universities have served as capstone readers, as have adjunct faculty members and lecturers. In general, students choose faculty readers from among the professors they have had within the MSAG program.

Students will identify a reader during the Project Design Seminar course under the guidance of the course instructor. **All readers must be approved by the MSAG Faculty committee before they are asked by the student to work on the project.**

Registering for Project Design

All students are required to take GEOL 699 Project Design in their first or second semester of their academic career. In that course students will write the proposal prior to the student beginning their research work.

Writing the Project Design

The Project Design may take one of two forms: an extended traditional academic research paper or a professional technical paper. Details of expectations for the Project Design proposal and project, including a timeline for completing the project, are available on the Canvas MES and MSAG Online Community capstone group once the student's proposal has been approved and in the GEOL 699 Project Design Seminar course.

Incomplete Projects and Master's Thesis Registration

Students who fail to complete their project by the end of the semester, must remain active students in all subsequent terms in order to complete their MSAG program and graduate. In brief, the final Project product is due to the Project Design Readers approximately two weeks prior to the evaluation deadline (students should check with their readers to see if they will need additional time for grading). Any students who have not had their final Project evaluated by both readers by that semester's deadlines will be registered automatically for GEOL 990 in the subsequent term and for each and every term thereafter until the completed and approved Project is submitted to the MSAG Program. Note: GEOL 990 may only be repeated twice (see *Master's Thesis* Registration section above about limitations for this course).

In addition to the requirements for enrollment in each term during which students continue to work on the project, graduation posting will also be affected. Students must reapply online for graduation in the term during which they plan to complete the project. Thus if a student does not complete the project design in the semester in which they originally applied, they must re-apply for graduation in the next semester. The student's graduation date will be posted for the term in which they complete their project and receive passing evaluations, not the term in which the student originally intended to graduate.

VIII. University Policies and Resources

The Pennbook is a collection of policies that relate to student life at the University of Pennsylvania. These policies govern academic activities such as grading and exams, provide guidance on the use of campus resources, and explain expectations for membership in the university community.

<https://catalog.upenn.edu/pennbook/>

Enrollment Status

MSAG students who are enrolled for three or four courses per term are considered full-time students and will be billed the full general fee. This fee covers access to many of the services described below. MSAG students enrolled in one or two courses per term are considered part-time students.

Student Identification

Once a student is enrolled at Penn, a student I.D. number (PennID) will be issued; this I.D. is used for registration and other transactions throughout the University. Never give out your social security number via email or fax. Once matriculated, students should never give out their entire social security number; the PennID number or the last four digits of your social security number are all that is necessary.

PennCard and PennCard Center

<http://cms.business-services.upenn.edu/penncard/home.html>

2nd Floor of the Penn Bookstore, 36th & Walnut Streets

The PennCard is the official University of Pennsylvania identification for students, faculty, and staff. The PennCard provides access to University facilities, services, cash convenience and more. To obtain a PennCard, students should bring a valid form of photo ID (driver's license, passport, etc.) to the PennCard Center. Only active students registered for courses in the current or upcoming term may receive a PennCard, which should be carried at all times on campus.

PennKey

<http://www.upenn.edu/computing/pennkey/>

A PennKey is required to authenticate, or verify, an individual's identity for many of Penn's networked computer systems and services. Authorized users need a PennKey and password to access such resources as Penn InTouch (course registration), Canvas (used in most classes/<https://canvas.upenn.edu>), certain library resources, and public campus computers. A PennKey is also required to obtain a Penn email address. New students should receive either a letter or an email with information on how to create a PennKey and password within a few days of their admission to the MSAG.

Penn InTouch

https://medley.isc-seo.upenn.edu/penn_portal/intouch/splash.html

Penn InTouch provides secure access via the Internet to online course registration, class schedules, academic records, future academic planning, billing, financial aid application status and awards, address corrections and updates, and student health information. A PennKey is required to access Penn InTouch.

Email

<http://www.sas.upenn.edu/computing/help/students/email>

All students enrolled at the University of Pennsylvania are eligible for a Penn email address free of charge. Even if the student plans to use a non-Penn email account, they should also establish a Penn address. The MSAG program will send out program information to this address and also contact students with important information through this system. Course instructors will be given this address as well and will expect to contact students in this way. Should students wish, they may forward email from their Penn address to another account through Penn's webmail site. Instructions on how to create and use a Penn email account are available through SAS Computing website above. Students can arrange to forward email from their Penn account to another account at this website.

Academic Support Services

Weingarten Learning Resources Center

<http://www.vpul.upenn.edu/lrc/>
3702 Spruce Street, Suite 300

215-573-9235

Provides professional consultation services in skills such as academic reading, writing, study strategies, and time management. This academic support is provided through a variety of services and programs including the very popular series of study skills workshops offered at the beginning of each fall and spring term for students. Consult their website for specific dates and times for these workshops or for more information.

Access & Achievement Programs

<http://www.upenn.edu/programs/acadsupport.php>
3820 Locust Walk

215-898-0809

Offers individual and group tutoring, and mid-term and finals review sessions for all Penn students. The support services help students enhance learning in core academic subjects, manage their time, find financial aid and feel more confident about their abilities. Assistance and counseling are available on an individual basis. For information, consult the Academic Support Program at:

Student Financial Services

<http://www.sfs.upenn.edu/paying/paying-grad.htm>
100 of the Franklin Building at 3451 Walnut Street

215-898-1988

Student financial aid, including applications and disbursement of money, are handled through Student Financial Services (SFS). Call or visit the website for deadlines and procedures.

Penn Bookstore**

<https://www.facilities.upenn.edu/maps/locations/bookstore-university-pennsylvania>

215-898-7595

36th St. and Walnut St

The Penn Bookstore carries textbooks and trade books as well as stationery, art supplies, school supplies, gifts, and other items. For supplies and electronics, please visit the following website: <https://upenn.bncollege.com/shop/upenn/products/supplies-electronics>

**Note that many faculty members use the Pennsylvania Book Center, on 34th Street between Walnut and Sansom Streets, to order their courses' texts. 215.222.7600.

Career Counseling

<http://www.vpul.upenn.edu/careerservices/connectwithus.php>
3718 Locust Walk

215-898-7531

The University provides career counseling through the Career Services office. Career information specific to the MSAG program may be found at:

<http://www.vpul.upenn.edu/careerservices/careerfields/#environment> .

Computer Labs

http://www.sas.upenn.edu/computing/teaching_resources/computer_labs

For a current list of computer labs on campus, along with a list of software installed and eligibility for usage.

Computer Resource Center

<http://www.upenn.edu/computing/crc/general/location.html>

215-898-9085

Suite 202 Sansom West (Grad Tower B), 3650 Chestnut Street

The Computer Resource Center (CRC) offers advice, training, consulting services and computer support to Penn students. Students will need their PennCard for access to the building.

Family Center at Penn

<https://familycenter.upenn.edu/resources-support>

3615 Locust Walk

Libraries

<http://www.library.upenn.edu/>

3420 Walnut Street (entrance on College Green)

Van Pelt Library, the main University library has extensive holdings, computers, and the Weigle Information Commons.

Writing Center

<http://www.writing.upenn.edu/critical/>

215-573-2729

[Weigle Information Commons](#) at [Van Pelt Library](#)

The Writing Center provides free writing consultation by appointment at Weigle Information Commons. Appointments are made online.

Recreation Facilities

<http://www.upenn.edu/recreation/>

215-898-6100

MSAG students have access to all of the recreation facilities available to the University community. For information on fees, hours, programs, locker rentals, etc. see website above.

Office of the University Ombudsman

<http://www.upenn.edu/ombudsman>

215-898-8261

The Office of the Ombudsman assists individuals in finding solutions to problems that they may not be able to resolve through normal channels. The office is concerned with safeguarding individual rights and promoting better channels of communication throughout the University. It is independent of all administrative offices. The Ombudsman is not an advocate for any one individual or group. He or she is an advocate for fairness, adherence to University regulations, due process, and personal responsibility. The Office supplements, but does not replace, any existing grievance mechanisms or modes of redress. It can and does recommend changes in the existing rules and practices when necessary.

Student Health Information

<http://www.upenn.edu/shs>

215-662-2850

The university has a number of health-related requirements for students. These include completion and submission of health and immunization records, coverage for outpatient medical care through the Student Health Service (SHS) and maintenance of health insurance coverage for in-patient and catastrophic care. Students are advised to call SHS or consult their web site for the most accurate and up-to-date information on student health requirements.

Student Health Service

<http://www.vpul.upenn.edu/shs/>

3535 Market St, 1st floor

The University provides outpatient medical care to students through its Student Health Service. The SHS offers an array of clinical services, including initial and follow-up treatment of acute medical illness and injury, management of chronic health problems, health screening and preventive care. All full-time students must carry coverage for care at the Student Health Service, either through payment of the Clinical Fee or through enrollment in the Penn Student Insurance Plan (PSIP). Full-time students who have private or employer-sponsored insurance do not have to purchase the student plan, but they must still pay the clinical fee for coverage at the Student Health Service. Coverage for the Student Health Service (either through the clinical fee or through enrollment in PSIP) is optional for part-time students. Be sure to bring your PennCard and insurance information whenever you go for medical care. For hours and other information refer to the Student Health web site.

Student Health Insurance

The University requires all full-time students to maintain medical insurance with coverage for in-patient care and catastrophic illness and injury. Students may satisfy insurance requirements through private or employer-sponsored plans or through enrollment in PSIP. All full-time students must either enroll in PSIP or submit a waiver indicating alternative coverage. Students who fail to provide information about coverage will be enrolled and billed for PSIP. Part-time students may enroll voluntarily in PSIP, but they are not subject to the insurance requirement, and will not be enrolled by default in PSIP. Coverage for the Student Health Service (either through the Clinical Fee or through enrollment in PSIP) is optional for part-time students.

Immunization

Students enrolled in the MSAG are part of the University community and benefit from the University's efforts to provide a safe and healthy environment. All MSAG students are required to comply with immunization requirements upon first enrolling in credit courses.

To comply, students should complete a Pre-Matriculation Health Record obtained from the Student Health Service. Please note: Students born on or before January 1, 1957 are exempt from the above requirements. The Student Health Service can provide missing immunizations at a fee that covers costs. In the event of an outbreak of a communicable disease in any Penn class, all students in that class would be required to comply immediately with the University's immunization requirements. Contact the Immunization Coordinator at 215.349.5047 for more information.

Code of Conduct and Code of Academic Integrity

Provost's Code of Academic Integrity:

<https://catalog.upenn.edu/pennbook/code-of-academic-integrity/>

Provost's Code of student conduct:

<https://catalog.upenn.edu/pennbook/code-of-student-conduct/>

Student Guide to Academic Integrity:

<http://www.upenn.edu/academicintegrity/>

Inasmuch as the standing of an educational institution and the value of a degree from that institution are dependent upon the integrity of study and research carried on at that institution, the Code of Academic Integrity is drawn to make clear the policy of the University concerning academic honesty. Each student attending the University must abide by this code, the text of which appears in the Pennbook and is found at the website above.

Confidentiality of Student Records

<https://catalog.upenn.edu/pennbook/confidentiality-student-records/>

Pursuant to the Family Educational Rights and Privacy Act of 1974, as amended, in general, personally identifiable information can be disclosed to people outside the University only with the written consent of the student or alumnus involved. A statement setting forth specific University policy concerning (1) disclosure of information to people outside the University, (2) disclosure of information to people within the University, (3) permitting students to inspect and review records and (4) providing students with the opportunity to seek the correction of their records appears in the Pennbook and is found at the website above.

Nondiscrimination Policy

www.upenn.edu/affirm-action

215-898-6993

3600 Chestnut Street, Sansom Place East, Suite 228

The University of Pennsylvania values diversity and seeks talented students, faculty and staff from diverse backgrounds. The University does not discriminate on the basis of race, color, sex, sexual orientation, religion, national or ethnic origin, age, disability or status as a disabled or Vietnam Era veteran in the administration of its educational policies, programs, or activities, admissions policies and procedures, scholarship and loan programs, employment, recreational athletic or other University administered programs. Questions or concerns regarding the University's equal opportunity and affirmative action programs and activities or accommodations for people with disabilities should be directed to the Director of Affirmative Action.

Also see:

<https://catalog.upenn.edu/pennbook/student-grievance/>

Equal Opportunity and Affirmative Action Policy:

<https://catalog.upenn.edu/pennbook/equal-opportunity-affirmative-action-policy/>

Rules Governing Exams

Provost's Policy on Common Midterm Examinations:

<https://catalog.upenn.edu/pennbook/common-midterm-examinations/>

Rules Governing Final Examinations:

<https://catalog.upenn.edu/pennbook/final-examinations/>

Holidays

Provost's Policy on secular and religious holidays:

<https://catalog.upenn.edu/pennbook/secular-religious-holidays/>

The University observes the following holidays: Martin Luther King, Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and the day after, and New Year's Day.

The University also recognizes that there are several religious holidays that affect large numbers of University community members, including Christmas, Rosh Hashanah, Yom Kippur, the first two days of Passover and Good Friday. In consideration of their significance for many students, no examinations may be given and no assigned work may be required on these days. Students who observe these holidays will be given an opportunity to make up missed work in both laboratories and lecture courses. If an examination is given on the first class day after one of these holidays, it must not cover material introduced in class on that holiday.

Office of Student Conduct

<http://www.upenn.edu/osc/>

215-898-5651

3440 Market St., Suite 400, Philadelphia, PA 19104

The Office of Student Conduct (OSC) is responsible for acting on behalf of the University in matters of student discipline. OSC deals with alleged instances of academic dishonesty and other student misconduct, in order to determine how best to resolve these allegations consistent with the goals and mission of the University as an educational and intellectual community.

Mission

It is the purpose of the student disciplinary system to further the educational mission of the University by resolving alleged violations of the Code of Student Conduct, the Code of Academic Integrity and other applicable policies regarding student behavior. There are numerous ways complaints about alleged student misconduct can be resolved. These include the formal disciplinary process as outlined in the Charter of the Student Disciplinary System, referral to the University Mediation Program, and referral to other University resource offices.

The Office of Student Conduct at Penn has twin goals: to help create a safe environment where academic life can flourish; and to promote the development of students.

Our student disciplinary process is meant to set the standard for behavior on our campus and to determine a student's standing in the community. It is not meant to replace or substitute for the criminal justice system or other legal avenues. However, the student disciplinary process provides an important additional forum to respond to the interests of the Penn community. Our processes are designed to educate and, where appropriate, sanction those students who violate our rules. We seek both to promote a student's sense of responsibility by enforcing accountability, and to protect our community by, where necessary, removing or restricting those who may pose a threat to others.

Finally, our Mediation Program is available to everyone in the Penn community to facilitate the constructive resolution of disputes (excluding academic integrity complaints). Our intention is

to emphasize the peaceful and productive handling of conflict when possible and where appropriate.

Student Codes of Conduct Enforced

In addition to the Code of Academic Conduct, Penn students are expected to adhere to the provisions of all other codes as well. More information on these codes is available at the above link. They are:

- * Code of Student Conduct
- * Code of Academic Integrity
- * Policy on Acceptable Use of Electronic Resources
- * Guidelines on Open Expression
- * Acquaintance Rape and Sexual Violence Policy
- * Sexual Harassment Policy
- * Anti-hazing Policy
- * Alcohol and Drug Policy
- * Bicycle Policy

The Student Disciplinary System does not handle alleged violations of the University's parking regulations.

Counseling and Psychological Services

<http://www.vpul.upenn.edu/caps/>

215-898-7021

3624 Market Street, First Floor, West

CAPS provides professional psychological and psychiatric services to all Penn students who need help in dealing with academic stress, social difficulties, situational crises, managing personal problems, developing greater self-awareness and skills for life-long learning. Students presenting with more serious concerns like depression, anxiety, and eating disorders, among others, are seen as well. Licensed psychologists, psychiatrists, and social workers provide confidential short-term psychotherapy for individuals, group counseling, emergency crisis services, medication evaluations, workshops, career assessments/development counseling, and referrals free of charge.

Office of Alcohol and Other Drug Initiatives

www.vpul.upenn.edu/alcohol/

215-573-3525

3611 Locust Walk

This office seeks to identify methods to reduce substance abuse and violence, control and mitigate campus environments where potential abusive behavior exists, and foster a campus culture in which healthy living efforts are plentiful and successful.

Student Disability Services (SDS)

<https://www.vpul.upenn.edu/lrc/sds/>

215-573-9235 or TDD 215.746.6320

Stouffer Commons, 3702 Spruce Street, Suite 300

The Weingarten Learning Resources Center houses the Office of Student Disabilities Services (SDS), which provides comprehensive professional services and programs for students with disabilities to ensure equal academic opportunities and participation in University-sponsored programs. Reasonable accommodation to a qualified student's known disability may be provided to assure equal access. Penn invites students with disabilities to self-identify at any time during their course of study as enrolled students. Although the self-identification process is confidential and completely voluntary, it is required for those requesting accommodation.

Office of Student Affairs

<https://www.vpul.upenn.edu/osa/>

215-898-6533

The Office of Student Affairs, a department within the Division of University Life, serves as a primary source of information and advice about co-curricular opportunities and resources. Staff members assist students in becoming involved in campus life, conduct leadership development programs, provide continuity for organizations from year to year, manage organizational finances, educate students about University policies, mediate disputes, advise event planners, and help students put classroom learning into practice through the techniques of experiential education. A full list of services provided by the Office is available.

The Office of Student Affairs seeks to provide a range of co-curricular experiences designed to supplement students' classroom experience and contribute significantly to their personal development. Staff members encourage students to create and participate in intellectual, artistic, social, recreational and multicultural activities; to assume campus leadership and governance responsibilities; to develop positive interpersonal relationships and skills within groups; to explore different cultures, ideas and experiences; and to put their learning into practice in the laboratory of co-curricular programs. Staff members support students through various forms of advocacy, through the encouragement of proactive approaches to campus problems and concerns, and through a commitment to the creation of a Penn community.

OSA provides information on student organizations categorized as follows. Students can learn more by visiting their website.

- Academic and Educational
- Cultural and Support
- Environmental Organizations
- Governmental and Umbrella
- Hobbies and Recreation
- Honor Societies
- Performing Arts
- Political Issues
- Publications and Media
- Religious
- Service
- Social
- Graduate and Professional Organizations
- Registered Organizations

Penn Violence Prevention (PVP)

<https://secure.www.upenn.edu/vpul/pvp/>

The University of Pennsylvania is committed to the safety of all students, and is at the forefront of handling cases involving sexual violence, relationship violence, and stalking. The Penn Violence Prevention (PVP) is a collaborative program that grew out of the Penn Women's Center. PVP aims to engage the Penn community in the prevention of sexual violence, relationship violence, and stalking on campus. The goal is to not only ensure students have access to safe and effective resources, but to provide preventative education focused on building healthy relationships, understanding consent, reaching out to friends in need, and being an active bystander.

Also see: Sexual Misconduct Policy, Resource Offices and Complaint Procedures

<https://catalog.upenn.edu/pennbook/sexual-misconduct-resource-offices-complaint-procedures/>

Appendix

MSAG COURSE LIST

NOTE: This is a comprehensive list of courses offered in Earth & Environmental Science as of 8/26/2020 that may be taken to fulfill requirements in the MSAG curriculum. Be aware that new courses are being offered all the time and some courses are being discontinued due to faculty availability. Please consult the latest course lists each semester for the most up to date lists.

The parentheses indicate which requirement the course fulfills and the brackets indicate the semester when the course is typically offered. Not all courses are offered every year. Check current course listings for which courses are offered each semester. Some courses may fulfill more than one requirement.

GEOL 411 Soils (Elective Engineering Geology/ Env Geology) {Fall}

Soil is considered the "skin of the Earth", with interfaces between the lithosphere, hydrosphere, atmosphere, and biosphere. It is a mixture of minerals, organic matter, gases, liquids and a myriad of organisms that can support plant life. As such, soil is a natural body that exists as part of the environment. This course will examine the nature, properties, formation and environmental functions of soil.

GEOL 418 Geochemistry (Required course: Geochemistry) {Fall}

This course provides a comprehensive introduction to theory and applications of chemistry in the earth and environmental sciences. Theory covered will include nucleosynthesis, atomic structure, acid-base equilibrium, thermodynamics, oxidation-reduction reactions. Applications will emphasize oceanography, atmospheric sciences and environmental chemistry, as well as other topics depending on the interests of the class. Although we will review the basics, this course is intended to supplement, rather than to replace, courses offered in the department of Chemistry. It is appropriate for advanced undergraduate as well as graduate students in Geology, Environmental Science, Chemistry and other sciences, who wish to have a better understanding of these important chemical processes

GEOL 421 Elemental Cycling in Global Systems (Required Course: Geochemistry/ Elective Env Geology) {Spring}

Humans have an enormous impact on the global movement of chemical materials. Biogeochemistry has grown to be the principal scientific discipline to examine the flow of elements through global earth systems and to examine human impacts on the global environment. This course will introduce and investigate processes and factors controlling the biogeochemical cycles of elements within and between the hydrosphere, lithosphere, atmosphere and biosphere. Students will apply principles learned in lectures by building simple computer-based biogeochemical models.

GEOL 528 Aqueous Geochemistry (Required Course: Geochemistry/Elective Hydrogeology/ Env Geology) {Fall}

This course is designed to provide the graduate student with an understanding of the fundamentals of aqueous geochemistry. The chemistry of water, air and soil will be studied from an environmental perspective. The nature, composition, structure, and properties of pollutants coupled with the major chemical mechanisms controlling the occurrence and mobility of chemicals in the environment will also be studied. Upon completion of this course, students should expect to have attained a broad understanding of and familiarity with aqueous geochemistry concepts applicable to the environmental field. Environmental issues that will be covered include acid deposition, toxic metal contamination, deforestation, and anthropogenic perturbed aspects of the earth's hydrosphere.

GEOL 531 Advanced Mineralogy (Elective) {Fall}

This course will examine advanced crystallography, representative minerals, their chemical and physical properties. Use of petrographic microscope in identifying common rock-forming minerals in thin section will be investigated.

GEOL 542 Numerical Techniques and Applications (Elective Engineering Geology/Hydrology) {Fall}

This course will introduce numerical techniques for analyzing data and formulating models in Earth Science. Students will first be introduced to Octave, a high level computer programming language (equivalent to Matlab, but free of cost) that allows data analysis and manipulation, sophisticated plotting and numerical modeling from the same interface. Data analysis will focus on time series, pattern recognition, image/topography analysis, and correlation statistics; modeling will include groundwater and surface water flow, random processes, diffusion, and erosion and deposition. This will be a seminar-style course where discussion will be encouraged, and additional topics may be covered depending on student interest. Through project-based learning exercises students will gain proficiency in Octave which will be useful for all aspects of Earth science.

GEOL 596 Geologic Field Methods (Elective) {Summer}

Saturday field trips are required. This course will provide an introduction to geologic mapping tools that include the Sight Level, Brunton Transit, Theodolite, and GPS. We will review theory and concepts related to these methodologies. Instruction will emphasize traditional observation methods, hands on learning of instrumentation during site visits, interpretation of field measurements and preparation of geologic maps.

GEOL 620 Applied and Environmental Geophysics (Required: Geophysics) {Fall}

The application of geophysical investigation techniques to problems of the local and shallow subsurface structure of the earth. The application of geophysical measurements and interpretation for environmental site characterizations, locating buried structures, groundwater investigations, and identifying geotechnical hazards with emphasis on gravity methods, seismic refraction and reflection, electrical resistivity, electromagnetic methods, ground penetrating radar, and borehole nuclear logging.

GEOL 643 Sustainable Development of Water Resource Systems (Elective) {Spring}

The evaluation of technical, social and economic constraints on the design of water supply and sanitation projects. The focus on sustainable design emphasizes how technical solutions fit within the appropriate social context. Case studies are used to demonstrate these principles across a range of examples from developed and developing countries including detailed studies from rural communities with limited resources.

GEOL 650 Environmental Due Diligence (Resource Management) [Fall]

Evaluation of environmental contamination and liability is an important tool during acquisition of real estate property, and a standard work product in the environmental consulting field. This course will cover the purpose and history of the Superfund law, the various classifications of Superfund liable parties, and protections against Superfund liability, specifically with regard to bona fide prospective purchasers (BFPP). In the context of the BFPP liability defense the course will focus on the performance of “All Appropriate Inquiry” for the presence of environmental contamination (e.g. Phase I environmental site assessment). Our study of “All Appropriate Inquiry” will include evaluation of historical maps and other resources, aerial photography, chain-of-title documentation, and governmental database information pertaining to known contaminated sites in the area of select properties on or near campus. Site visits will be performed to gain experience and knowledge for the identification of recognized environmental conditions. Students will prepare environmental reports for select properties and will have an opportunity to hone technical writing skills.

GEOL 651 Geocomputations (Required: Geocomputations) {Fall}

Review and applications of selected methods from differential equations, advanced engineering mathematics and geostatistics to problems encountered in geology, engineering geology, geophysics and hydrology.

GEOL 653 Introduction to Hydrology (Required: Intro to Hydrology) {Fall}

Introduction to the basic principles of the hydrologic cycle and water budgets, precipitation and infiltration, evaporation and transpiration, stream flow, hydrograph analysis (floods), subsurface and groundwater flow, well hydraulics, water quality, and frequency analysis.

GEOL 654 Geomechanics: Solids (Required: Geomechanics) {Fall}

Mechanical properties of solid and fluid earth materials, stress and strain, earth pressures in soil and rock, tunnels, piles, and piers; flow through gates, weirs, spillways and culverts, hydraulics, seepage and Darcy's law as applied to the hydrologic sciences.

GEOL 656 Fate and Transport of Pollutants (Elective Hydrogeology) {Summer or Spring}

This course covers basic groundwater flow and solute transport modeling in one-, two- and three-dimensions. After first reviewing the principles of modeling, the student will gain hands-on experience by conducting simulations on the computer. The modeling programs used in the course

are MODFLOW (USGS), MT3D, and the US Army Corps of Engineers GMS (Groundwater Modeling System).

GEOL 658 Geostatistics (Required: Geocomputations/Elective) {Summer or Spring}

Statistical analysis of data from geological, geotechnical, and geohydrologic sources.

GEOL 661 Environmental Groundwater Hydrology (Required: Groundwater Hydrology/ Elective Hydrogeology) {Spring}

This course is designed to introduce the major definitions and concepts regarding groundwater flow and contaminant transport. The theory underlying concepts, including mathematical derivations of governing equations used to model groundwater flow and contaminant transport, will be discussed and applications to environmental problems addressed.

Upon completion of this course, students should expect to have attained a broad understanding of and familiarity with groundwater flow and contaminant transport concepts, and to have acquired the skills necessary to pursue work in flow and transport modeling.

GEOL 668 Geomechanics: Fluids (Required: Geomechanics/Elective Hydrogeology/Engineering Geology) {Spring}

Static and Dynamic mechanical properties of fluid in earth materials, as applied to the Hydrologic Sciences; Principles of Fluid Mechanics and Hydraulics applied to open channel flow in earth materials; flow through gates, weirs, spillways, and culverts; Applications of Darcy's Law to subsurface flow and seepage.

GEOL 670 Engineering Geology: Rock Mechanics (Required: Engineering Geology/Elective Eng Geology) {Fall}

This course focuses on the rock mechanics aspects of Engineering Geology. The theme is characterization of the geologic environment for engineering and environmental investigations. Covered are the various exploration tools and methods, including: Collection and analysis of existing engineering data; Interpretation of remotely sensed imagery; Field and laboratory measurements of material properties; Measurement and characterization of rock discontinuities; Rock slope stability analysis; Stress, strain and failure of rocks and the importance of scale; Rock core logging; Rock mass rating; Rock support and reinforcement; Rock excavation, blasting and blast monitoring and control.

GEOL 671 Engineering Geology: Surficial Materials and Processes (Required: Engineering Geology/Elective Eng Geology) {Spring Odd Years}

As the human population continues to grow, the environment and earth's resources become more important. This course will concentrate on the occurrence and distribution of earth's surficial materials and their engineering and environmental properties. The engineering classification, testing, and use of the earth materials will be emphasized. The geohazards of surficial processes will

also be studied in the context of geologic history and the planning and use of the geologic environment.

GEOL 680 Interpretation of Near-surface Geologic Structure for Engineering and Environmental Geology (Required: Engineering Geology/Elective Eng Geology) {Spring Even Years}

The course introduces the basic principles of structural geology and their applications to engineering and environmental site characterization. Includes the mechanisms for the deformation and failure of the earth's crust, folded and faulted structures, and the orthogonal and stereographic solutions to characterize near-surface geologic structure. It also includes the construction and interpretation of geologic maps, geologic cross sections and block diagrams. Emphasis is placed on the graphical representation of subsurface data, including the use of selected computer programs, and the integration of the data to solve problems encountered in engineering and environmental projects.

GEOL 699 Project Design (Required){Spring}

This course is designed to prepare Master of Science in Applied Geosciences students to undertake their capstone exercise. In this course, we discuss how to identify an appropriate research project, how to design a research plan, and how to prepare a detailed proposal. By the end of the course, each student is expected to have completed a capstone proposal.

SELECTED ENVIRONMENTAL STUDIES COURSES FOR MSAG

ENVS 410 The Role of Water in Urban Sustainability and Resiliency (Elective Hydrogeology) [Fall]

This course will provide an overview of the cross-disciplinary fields of civil engineering, environmental sciences, urban hydrology, landscape architecture, green building, public outreach and politics. Students will be expected to conduct field investigations, review scientific data and create indicator reports, working with stakeholders and presenting the results at an annual symposium. There is no metaphor like water itself to describe the cumulative effects of our practices, with every upstream action having an impact downstream. In our urban environment, too often we find degraded streams filled with trash, silt, weeds and dilapidated structures. The water may look clean, but is it? We blame others, but the condition of the creeks is directly related to how we manage our water resources and our land. In cities, these resources are often our homes, our streets and our communities. This course will define the current issues of the urban ecosystem and how we move toward managing this system in a sustainable manner. We will gain an understanding of the dynamic, reciprocal relationship between practices in a watershed and its waterfront. Topics discussed include: drinking water quality and protection, green infrastructure, urban impacts of climate change, watershed monitoring, public education, creating strategies and more.

ENVS 411 Air Pollution: Sources & Effects in the Urban Environment (Elective: Env Geology) [Fall]

This course is designed to provide the student with an understanding of air pollution at the local, regional, and global levels. The course will focus on Philadelphia's air quality and how air

pollutants have an adverse effect on the health of residents. Through a partnership with Philadelphia Air Management Services (AMS), the science of air monitoring and trends will be explored. The city's current non-attainment status for PM 2.5 and ozone will be studied, as well as current initiatives to improve air quality. Students will learn to measure PM 2.5 in indoor and outdoor settings and develop community-based outreach tools to effectively inform the community about air pollution.

ENVS 507 Wetlands (Elective Env Geology/Hydrogeology) [Fall]

The course will focus on the natural history of different wetland types including the factors of climate, geology, and hydrology which influence wetland development and associated soil, vegetation, and wildlife characteristics and key ecological processes. Lectures will be supplemented with weekend trips to different wetland types ranging from tidal salt marshes to non-tidal marshes, swamps, and glacial bogs in order to provide field experience in wetland identification, characterization, and functional assessment. Outside speakers will discuss issues in wetland seed bank ecology, federal regulation, and mitigation. Students will present a short paper on the ecology of a wetland animal and a longer term paper on a selected wetland topic. Readings from the text, assorted journal papers, government technical documents, and book excerpts will provide a broad overview of the multifaceted field of wetland study.

ENVS 541 Modeling Geographic Objects (Required: Geocomputations/Elective) [Fall]

This course offers a broad and practical introduction to the acquisition, storage, retrieval, maintenance, use, and presentation of digital cartographic data with both image and drawing based geographic information systems (GIS) for a variety of environmental science, planning, and management applications. Its major objectives are to provide the training necessary to make productive use of at least two well-known software packages, and to establish the conceptual foundation on which to build further skills and knowledge in late practice.

ENVS 644 Energy, Waste, and the Environment (Elective) [Spring]

The aim of this course is to provide an incentive to use geochemical and mineralogical principles to address and solve major environmental problems. The students identify the problems that are associated with different types of waste. This course covers a wide range of problems associated with the waste arising from the generation of electricity. The main topics will be the uranium cycle, characterization of nuclear waste, and the containment and disposal of nuclear waste. Based on insights from the nuclear fuel cycle, solutions are presented that diminish the environmental impacts of coal and biomass combustion products, incineration of municipal solid waste, toxic waste due to refuse incineration, and landfills and landfill gases.

ENVS 681 Modeling Geographic Space (Required: Geocomputations/Elective) {Spring, Except Spring 2018}

This course explores the nature and use of digital geographic information systems (GIS) for the analysis and synthesis of spatial patterns and processes through 'cartographic modeling'.

Cartographic modeling is a general but well defined methodology that can be used to address a wide variety of analytical mapping applications in a clear and consistent manner. It does so by decomposing both data and data-processing tasks into elemental components that can then be recomposed with relative ease and with great flexibility.

DYNM 619 Organizational Project Management (Required Course) {Fall/Spring}

The course provides an overview of the concepts, procedures and fundamental processes of project management for working professionals. Participants are introduced to the principles, tools and techniques of project management within an integrative framework. The course emphasizes that, for most organizations, projects are the primary means for implementing strategic initiatives. Course Objectives: 1) Understand and critically evaluate expectations, procedures and processes of project management as currently practiced in large for-profit enterprises. 2) Understand the content and processes and standards of practice as defined by the Project Management Institute (PMI). 3) Understand how to build and manage effective project teams. 4) become familiar with the critical components of effective project plans