

# **Earth & Environmental Science Masters Programs**

# **Student Handbook**

## **Master of Environmental Studies**

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 Department's Master of Environmental Studies (MES) Program with information vital to the successful completion of their 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 assigned academic adviser at least once per semester 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 academic adviser or the MES 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 also be submitted to the Director.

### ***I. Program Overview***

The Master of Environmental Studies (MES) at the University of Pennsylvania is a 12-CU, non-thesis graduate program designed to prepare students to enter various environmental professions.

The MES encourages a broadly interdisciplinary approach to the study of the environment and requires exposure to sciences, humanities, and social sciences as well as in-depth study of a selected concentration. As a culminating exercise, students must complete an individual project that demonstrates their ability to define a problem, develop appropriate methods, complete research, and present the results in a clear and concise manner. Many MES students select a format for this project that represents the profession they hope to enter.

Students may study in the MES program part-time or full-time and may take either day or evening courses in any school at the University of Pennsylvania, provided the courses are pre-approved by the student's academic adviser and/or the program director. All required courses and the most popular electives are offered in the evening, and 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). 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. Students in the program may also take graduate courses from any department or school within the University with the approval of a program adviser and permission of the department offering the course.

Your enrollment status (part-time or full-time) will determine which Penn services for which you are eligible. Full-time students enroll in **three** or **four** courses per semester while part-time students enroll in **one** or **two** courses per semester. Students may 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 and domestic students must be enrolled in a minimum of two courses per semester to maintain their eligibility for federal loans.

## **II. Curriculum**

The following is the standard curriculum for MES students. Students in a dual degree program (MBA/MES, MPA/MES, JD/MES, MPH/MES, NPL/MES, ML/MES, VMD/MES, CPLN/MES, MLA/MES, or International Environmental Management) or sub-matriculantes should consult the *Dual Degree* handbook available on the *Canvas MES and MSAG Online Community* for specific requirements for their program.

Students are required to complete at least 12 CU's of graduate level course work for the MES program. A graduate level course is any Penn course numbered 400 or above. There are three required courses for the MES program: ENVS 601-Proseminar, ENVS 699 Capstone Seminar, and a research methods course (see below for specific courses that fulfill this requirement). Students take four foundation courses and five concentration courses to round out their coursework. A Capstone project submitted as a paper and poster and approved by two readers and the program is the final requirement for the degree.

### ***ENVS 601-Proseminar: Contemporary Issues in Environmental Studies***

The Proseminar introduces MES students to critical issues in the environment and expose them to current environmental research, analysis, and management practices. Students are challenged to understand the complexity that confounds many environmental issues and to discuss possible solutions to these problems. The course is comprised of three parts:

- Readings and lectures on environmental science

- Readings and class discussions on critical environmental issues (e.g., metabolic, social and political uses of energy; geopolitics of water; climate change; and cause and effect in complex systems).
- Writing in various formats about complex environmental issues to a wide range of audiences.

***Foundation (Core) Requirements***

Based on the premise that environmental issues and solutions have both scientific and social dimensions, the MES requires students to take coursework in both scientific and social aspects of environmental problems outside of their chosen concentrations. To assure the interdisciplinary breadth necessary to address complex environmental issues, each student selects four courses from the list of topics presented in Table 1. These courses complement the career goals of the student. Only one course from each field can be used for the foundation (i.e. you may not take four Environmental Geology courses) and the foundation courses may not be the same as a student’s concentration. Thus, if a student is concentrating in Environmental Policy they may not fulfill any of the foundation courses with an Environmental Policy course. In consultation with an adviser, students select foundation courses from Earth & Environmental Science offerings. Foundation courses cannot be taken in other schools in the University and are restricted to ENVS and GEOL courses.

**Table 1.** Students take four courses selected from four different disciplines selected from this list. See **Appendix** for list of courses and what foundation they fulfill.

- |                                |                           |
|--------------------------------|---------------------------|
| • Environmental Biology        | • Energy                  |
| • Environmental Chemistry      | • Environmental Policy    |
| • Environmental Geology        | • Environmental Law       |
| • Urban Environment            | • Resource Management     |
| • Environmental Health         | • Environmental Business  |
| • Environmental Sustainability | • Resilience & Adaptation |

***Concentrations***

In addition to the foundation requirements, each student must develop a five-course concentration that will provide sufficient expertise for them to assume a lead role in analysis and management in that area. The development of a concentration is done in consultation with a program academic adviser (assigned when the student enters the program). You can find your academic adviser by going to PennInTouch (Fig. 1). If no name appears there, your academic adviser is Dr. Bordeaux ([bordeaux@sas.upenn.edu](mailto:bordeaux@sas.upenn.edu)).

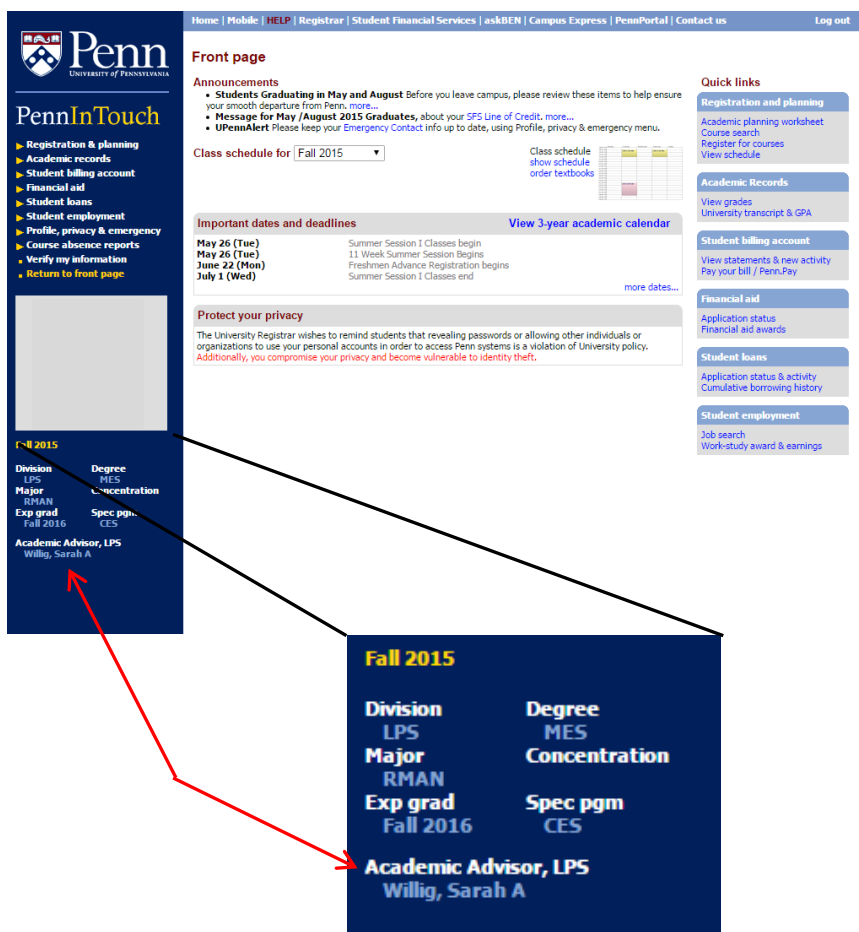


Figure 1. Finding your academic adviser on the PennInTouch screen. Arrow points to your academic adviser's name. Click on the name to email your adviser to set up a meeting or ask a question.

Ideally, each student builds on previous academic and professional experience when developing a concentration. However, occasionally, a student may seek to move in a different direction. In such cases, additional coursework may be required beyond the 12 CU minimum.

Concentration courses are selected from among courses developed specifically for the MES, from other graduate courses in the College of Liberal and Professional Studies, from graduate groups in Arts and Sciences and from graduate courses in other schools in the University. **Up to four graduate courses** in the concentration can be taken outside of the School of Arts and Sciences. Graduate courses are those courses **numbered 400 or above**. Students are expected to work closely with their academic adviser in selecting courses that will provide cohesive understanding in a specific area. A list of courses, approved for each concentration within the MES and across the University, is provided to students each semester. Check the [Canvas MES and MSAG Online Community](#) for the most up-to-date course lists. **Courses not on these lists must be approved by the academic adviser or the program director before the student enrolls in the course.**

A description of the primary concentrations in the MES program follows and specific courses that fulfill each concentration are in the Appendix.

- ***Environmental Biology*** - This concentration aims to prepare students in the environmental biological sciences. Students in this concentration must have the equivalent of an undergraduate major in biology and should expect to take several of their concentration courses in the Biology Department. Graduates may continue environmental research at the Ph.D. level, or work in environmental consulting or in horticulture or wildlife fields as biologists.
- ***Environmental Sustainability*** – Many graduates with this concentration work in positions labeled “Sustainability Coordinator.” Positions are common in the corporate, non-profit, academic, and government sectors. These positions typically require that all aspects of a business or group be examined to determine if they are being managed optimally with an eye to the triple bottom line. This differs from traditional environmental control, which usually is end of pipe treatment, which creates a cost to the bottom line. A sustainable approach reduces waste, reduces and substitutes renewable input materials, eliminates risk in the supply chain, generates consumer loyalty and reduces the overall cost. Areas such as greenhouse gas emissions, energy use, waste reduction and recycling, storm water runoff, and use of sustainable products all fall under the umbrella of a Sustainability Coordinator.
- ***Environmental Health*** – Many students concentrating in Environmental Health are also completing a Dual Degree with the Master of Public Health Program. Whether a student chooses to take the Dual degree program or the MES alone, they will find many opportunities to work at the intersection of Health and the environment. Land, water and air toxicity are a growing concern around the world and students preparing to work in this field are highly encouraged to do a field-based project for their capstone. Graduates work for government organizations such as the US EPA, and non-government organizations such as the NRDC, or private companies such as Coca Cola.
- ***Environmental Policy*** – Students concentrating in Environmental Policy study many facets of the topic. Some policy students develop programs around land and water-use planning and regulation. These students combine courses developed for the MES with courses in city and regional planning and are preparing for private consulting or public sector work. Environmental regulation at the federal, state and local level is another focus area for policy students. These students take courses developed for the MES program or in the Fels Program (Government Administration). Graduates with this concentration primarily work in the public sector after graduation. Other policy students focus on energy and take courses in Engineering and the *Kleinman Center for Energy Policy*. These students find positions in government and business. The final group of policy students study business and environment. They take many courses such as risk management and cost benefit analysis in the Wharton School. These students are preparing for careers in business.

- ***Resource Management*** – This concentration prepares students to work in habitat restoration, land conservation, and land management. Students develop a curriculum that combines science (e.g., ecology, geology, chemistry) with policy (e.g., law and planning) and field techniques. Students are required to have at least one field course and to do a field-based Capstone exercise. Graduates work in land conservation and management positions.
- ***Urban Environment*** – Students in this concentration, whether studying policy, humanities, or sciences, focus on urban areas. They may study urban brownfield remediation, urban education, community redevelopment or government administration. These students select their courses from MES courses, the Urban Studies Program, and City and Regional Planning. Graduates may work in municipal government or in urban institutions.
- ***Environmental Resilience and Adaptation*** - The realities of changing climate are acutely felt by cities where dense populations and aging infrastructure can lead to natural disasters such as heat waves, flooding, and disease outbreaks. Thus, there is a need for professionals that can understand and work across a multitude of disciplines for planning and preparedness. Graduates can expect to find positions in private industry, environmental consulting companies, city government (water departments and sustainability offices), and Non-Profit organizations working in environmental justice and planning capacities.
- ***Individualized*** – Occasionally a student’s interests do not fit within one of the above concentrations. Those students develop an individualized concentration under the supervision of a faculty adviser. A curriculum plan must be approved by the Program Director and the Faculty Curriculum Committee.

### ***Research Methods Course***

Each student must take a semester-long course in methods that will prepare them for the Capstone exercise. This may be done in one of several ways: a field methods course (i.e. ENVS 507, ENVS 606, ENVS 610, etc.); a statistics course (i.e. GEOL 658, BIOL 446, PUBH 501, etc.); a GIS course (i.e. ENVS 541, ENVS 681); a disciplinary methods course (e.g., ethnography, epidemiology, etc.); or an independent study with emphasis on methods. At the end of the course, each student should have a clear idea of the methods appropriate for their selected capstone project.

### ***Capstone Course***

ENVS 699 Capstone 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 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.



## ***Capstone Requirement***

The Capstone research is the culmination of the MES 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 by the end of the Capstone course (ENVS 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 Capstone Seminar (ENVS 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 an approved proposal will not be eligible for fulfillment of 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 an academic warning 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, there are two common approaches to completing the project. Each approach has some general guidelines.

In the first approach, the Capstone is an extended research paper, based on primary and/or secondary sources, that demonstrates the student's ability to understand and synthesize complex environmental problems. In this approach, the Capstone should reflect the student's MES coursework, but may also build upon the student's previous academic or professional experience.

In the second approach, the Capstone is a professional report that serves as a portfolio of professional skills. For example, a student may prepare an environmental inventory of a specific site using GIS technology; another may develop a land management plan for a specific habitat; yet another may develop a Life Cycle assessment of a particular product.

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 Courses***

Although not specifically required, students in the MES program are encouraged to take at least one field-based course while at the University of Pennsylvania. The MES has developed several field courses to meet the needs of our students. These courses are designed not only to provide the content that our students need, but to fit with the schedules of working adults. Sample field courses include (descriptions are in the Appendix):

- *ENVS 507 Wetlands*
- *ENVS 606 Birds as Bioindicators of Environmental Change*
- *ENVS 607 Field Study of Puerto Rico's Ecology*
- *ENVS 609 Creating Gateways to the Land Through Smarter Conservation*
- *ENVS 610 Regional Field Ecology*
- *ENVS 684 Ecology, Management, and Advocacy of Urban Forests*

## ***III. Special Programs and Certificates***

### ***Sub-matriculation***

Sub-matriculation allows Penn undergraduate students to take graduate-level courses while still undergraduates; allowing most to complete their bachelor's and masters degrees in five years. Undergraduate students in their *junior year or before the end of their 7<sup>th</sup> semester* at the University of Pennsylvania may apply for sub-matriculation into the MES. 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 MES and then apply for sub-matriculation at their undergraduate academic office.

Students sub-matriculated into the MES 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 MES academic adviser and undergraduate major adviser. The remaining eight courses must be taken after the student has graduated from their undergraduate program.

Students should obtain a "Request for Sub-matriculation Course Double Counting" form from the *Canvas MES and MSAG Online Community* (found under "Forms") to apply for course approval for double counting **prior** to taking the course. All sub-matriculate requests for double counted courses must be made no later than eight weeks into the student's eighth semester at Penn. LPS students should contact the MES 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:

<https://www.college.upenn.edu/submatriculation>

## *Certificates*

Students have the opportunity to pursue a number of certificates offered throughout the university while completing their MES degree. Most of these certificates require separate applications and students should meet with the certificate contact person early in their MES 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 MES degree if those two courses are appropriate for the MES curriculum. Consult with your MES academic adviser early to determine which courses can be used for the MES degree.

## *Dual Degrees*

There are many Dual Degree options with the MES degree. 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 *MES Dual Degree Handbook* available on the *Canvas MES and MSAG Online Community* for additional information about specific dual degrees. If you are interested in applying to a dual degree program contact the MES program Director as soon as possible.

## *IV Program Policies*

### *Academic Standards*

Students in the MES are expected to maintain the highest possible academic standards. To assure that students are making satisfactory progress toward their degree, the academic advisers review student performance every semester. The Earth & Environmental Science Faculty Advisory Committee has adopted the following requirements for MES students as they progress toward their degrees:

- Students must take all courses that will count towards the MES 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 GPA in order to be in good standing and graduate.
- Students cannot receive more than one grade below a B-.
- No grade below a “C” will be accepted toward fulfillment of the 12 CU’s required to complete the program.

Students who receive more than one grade below a B- or who receive a grade below a C will be reviewed by the Earth & Environmental Science Faculty Advisory Committee (EES FAC) and placed on academic probation.

Students on Academic Probation 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 probation without an approved plan in place. With the permission of the EES 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”. When 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 first course’s CU contributes to the total number of CU’s and only the grade for the first course is included in the cumulative GPA.

### ***Program Dismissal***

Students who do not meet the terms of academic probation are subject to dismissal from the program. At the end of each term, the EES FAC will review the academic progress made by candidates on academic probation and decide whether to remove the student from academic probation, continue academic probation, or dismiss the student from the Program. If the EES FAC 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) or an Extended Incomplete (II) or may not submit a grade (NR or GR). An Incomplete (I, NR or GR) must be made up within the first four weeks of the start of the next term, and an Extended Incomplete (II) 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. If an Incomplete grade is converted to an F, the instructor may change the grade after the student has completed all required work, but they are not required to do so. Students with two or more Incomplete grades will be placed on Academic Probation. These students are subject to registration hold and are required to meet with the MES 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.

## *Academic Grievances*

Evaluation of a student's performance in a course is the responsibility of the course instructor. Should a final grade in an EES 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 FAC. 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 EES FAC. 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 for other departments and schools.

### **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 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.

Students considering a leave should take time to think carefully about their goals for their time away and for when they return. Speaking with the MES program director is an important first step. Depending on the circumstances, students should obtain 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. The MES program director will help students connect with other campus resources as they 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 MES 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 MES 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 MES 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 and will not receive credit for classes taken elsewhere during the leave unless special approval by the Program is given. 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 the student has been dropped, that action will be posted to the student's transcript. The student's PennCard will be deactivated as soon as the leave, drop, or withdrawal has been processed.

#### ***Notifications***

Students must notify all relevant offices of the 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 leave or drop, the student may contact the MES program office if they have any questions. Students need to be aware of the conditions for return outlined in their leave of absence letter, since they will be required to fulfill them before they 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 MES program. To begin this process, contact the MES 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 MES may defer their matriculation for up to one year. Students who wish to defer should notify the MES office in writing of their intentions as early as possible. It is not necessary for deferred students to reapply. However, students must inform the MES 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 first semester in the MES.

### ***Transfer Credit***

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

Students who enter the MES from another graduate program at the University of Pennsylvania for which they did not complete the program may count up to four graduate-level courses toward their MES degree. These courses must be submitted to the Director for approval during the first semester of matriculation in the MES 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 MES from an incomplete graduate program at another university may *count up to two graduate-level* courses towards their MES degree. These courses must be submitted to the director for approval during the first semester of matriculation in the MES 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 MES unless the student is a Penn sub-matriculate.
- Transferred courses must have been taken in the last five years.
- Courses taken outside of the University of Pennsylvania during a student's matriculation in the MES program are not eligible for transfer credit.

**Financial Aid**

***Tuition Support***

MES students are not eligible for University-based fellowships, teaching or research assistantships, 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 three or more courses in a semester) are eligible for full loan support. Part-time students (students taking one or two courses in a semester) are eligible for partial loan support. International students are not eligible for loans through the University. Students may seek outside scholarship support or tuition benefits from their employers.

***Research Support***

The MES 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, MES students may apply for funds to present their research at a conference or scientific meeting.

To be eligible for research funds through the MES program, students must identify an adviser who will work with them on the research project. Students with Incomplete (I) 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 four weeks prior to travel to allow for processing of such requests.*

## ***V. Designing Your Program***

### ***Student Advising***

Each student entering the MES 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 MES. Student's will meet with their adviser and define a plan for the remainder of their MES career.

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](https://portal.apps.upenn.edu/penn_portal/intouch/splash.html)) as well as the plan developed at the beginning of their program 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 MES program and from other departments and schools at Penn 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, PennInTouch 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 *Canvas MES and MSAG Online Community*, they must seek approval from their adviser before registering as it may not be acceptable for the program. Courses numbered below 400 are not graduate courses and do not count toward the degree.

## 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 online to see which courses 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.

### *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 may register for courses through Penn InTouch (on-line 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](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 MES 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., ENVS 601 001 but **not** ENVS 001 601) may count toward the degree.
- As a masters student, permission may be needed from the instructor 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 three or four courses. Students are not permitted to enroll in more than four courses per semester.

- Part-time students should enroll in one or two courses per semester.

### ***Permits***

Courses that require special permission from the instructor or department 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 “Forms”. **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 trying to get into the class.

### ***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* (under “Forms”). 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 the faculty member and the Director of the MES 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. MES students may register for up to two Independent Study courses during their career. **NOTE: Internships cannot be counted for Independent Study credit.**

### ***Auditing Courses***

MES students may audit courses. However, they will be charged tuition and fees at the MES 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-MES Courses (also see “Permits”)***

MES 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. MES students may need permission to register for courses outside the Department of Earth & Environmental Science. In such cases, students should consult the *Permit*

*Procedures* document on the Canvas Online Community. 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***

MES 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 web site for deadline dates 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 petition LPS (<http://www.sas.upenn.edu/lps/students/current/forms-handbooks>). 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 MES department 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 MES courses 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

MES 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 on the LPS website (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.

### ***Masters Thesis Registration***

MES students who have completed all course work toward the degree, but have not completed their Capstone project, will be automatically enrolled in the non-credit Masters Thesis course (ENVS 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 Masters Thesis in Summer 11-Week. If the capstone is not completed by August, the student will be automatically enrolled in Masters 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 Masters Thesis have access to the library and other systems. Should a student wish to extend Masters Thesis registration beyond two semesters, they must receive permission from the MES Faculty Advisory Committee. Students not completing the program requirements after two semesters of Masters Thesis may be withdrawn from the program.

### ***Student Status***

Students with Visa/Immigration restrictions and/or federal 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 Three or four courses in a single semester
- Student is enrolled in Masters Thesis: ENVS 990.

If a student is enrolled in two or fewer courses in a single semester (other than Masters 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.

### ***Time to Completion***

Master of Environmental Studies students may enroll on either a part-time or a 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 (ENVS 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. Capstone and Graduation Procedures***

### ***Faculty Readers***

Two faculty readers are required for the Capstone Project: 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 Capstone. 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.

At least one capstone reader must be a Penn standing faculty or lecturer, while the other reader may be drawn from outside of Penn. Readers from outside of Penn 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 MES program.

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

### ***Registering for the Capstone Course***

All students are required to take ENV5 699 Capstone Seminar in the first spring semester of their academic career. In that course students will identify their topic, develop a methodology for their research and write the proposal. Proposals must be approved prior to the student beginning their research work.

### ***Writing the Capstone***

The Capstone may take one of two forms: an extended traditional academic research paper or a creative piece. For example, students may produce handbooks or create a film for their Capstone. If a student chooses to do a creative Capstone, they must write a brief analytical paper that places the creative piece in an academic context.

Details about what is expected for the Capstone proposal and project, including a timeline for completing the Capstone, are covered in the Capstone Seminar course.

### ***Incomplete Capstone Projects and Masters Thesis Registration***

Students, who fail to complete their Capstone project by the final deadline, must remain active students in all subsequent terms in order to complete their MES program and graduate. In brief, the final Capstone product (paper and poster) is due to the Capstone Readers approximately two weeks prior to the capstone evaluation deadline (students should check with their readers to see if they will need additional time for grading). Any students who have not received two evaluations of their work by the deadline set for the semester for which they intend to graduate will be registered automatically for Masters Thesis (ENV5 990) in the subsequent term and for each and every term thereafter (including summer) until the completed and approved Capstone is submitted to the MES Program. **Note: ENV5 990 may only be repeated twice** (see *Master's Thesis Registration* section above about limitations for this course). Deadlines are provided to students when their capstone proposal is approved and must be followed to maintain good standing in the program.

In addition to the requirements for enrollment in each term during which students continue to work on the Capstone, graduation posting will also be affected. Students must re-apply online for graduation in the term during which they plan to complete the Capstone. Thus, if a student does not complete the capstone 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 capstone and receive a grade, 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***

MES 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. MES students enrolled in one or two courses per term are considered part-time students. However, students enrolled in the Masters Thesis (ENVS 990) are considered full-time.

### ***Student Identification***

Once a student is enrolled at Penn, a student I.D. number (Penn I.D.) 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>

2<sup>nd</sup> Floor of the Penn Bookstore, 36<sup>th</sup> & 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 MES.

### ***Penn InTouch***

[https://medley.isc-seo.upenn.edu/penn\\_portal/intouch/splash.html](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 MES 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/>

215-573-9235

3702 Spruce Street, Suite 300

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>

215-898-0809

3820 Locust Walk

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> 215-898-1988  
100 of the Franklin Building at 3451 Walnut Street

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 34<sup>th</sup> Street between Walnut and Sansom Streets, to order their courses' texts. 215.222.7600.

***Career Counseling***

<http://www.vpul.upenn.edu/careerservices/connectwithus.php> 215-898-7531  
3718 Locust Walk

The University provides career counseling through the Career Services office. Career information specific to the MES 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](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

MES 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>

215-746-3535

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, 1<sup>st</sup> 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 MES are part of the University community and benefit from the University's efforts to provide a safe and healthy environment. All MES 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](http://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.

The 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/>

3624 Market Street, First Floor, West

215-898-7021

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/](http://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

## MES 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 Foundation and Concentration requirements in the MES 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 sector 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 Foundation or Concentration sector and may also fulfill the Research Methods requirement in some cases. Check with your academic adviser for these alternatives.

### **ENVS 404 Urban Environments: Speaking About Lead in West Philadelphia (Env. Health) [Fall]**

Lead poisoning can cause learning disabilities, impaired hearing, behavioral problems, and at very high levels, seizures, coma and even death. Children up to the age of six are especially at risk because of their developing systems; they often ingest lead chips and dust while playing in their home and yards.

In ENVS 404, students learn about the epidemiology of lead poisoning, the pathways of exposure, and methods for community outreach and education. Penn students collaborate with middle school and high school teachers in West Philadelphia to engage middle school children in exercises that apply environmental research relating to lead poisoning to their homes and neighborhoods.

### **ENVS 406 Community Based Environmental Health (Env. Health) [Spring]**

From the fall of the Roman Empire to Love Canal to the epidemics of asthma, childhood obesity and lead poisoning in West Philadelphia, the impact of the environment on health has been a continuous challenge to society. The environment can affect people's health more strongly than biological factors, medical care and lifestyle. The water we drink, the food we eat, the air we breathe, and the neighborhood we live in are all components of the environment that impact our health. Some estimates, based on morbidity and mortality statistics, indicate that the impact of the environment on health is as high as 80%. These impacts are particularly significant in urban areas like West Philadelphia. Over the last 20 years, the field of environmental health has matured and expanded to become one of the most comprehensive and humanly relevant disciplines in science.

This course will examine not only the toxicity of physical agents, but also the effects on human health of lifestyle, social and economic factors, and the built environment. Topics include cancer clusters, water borne diseases, radon and lung cancer, lead poisoning, environmental tobacco smoke, respiratory diseases and obesity. Students will research the health impacts of classic industrial pollution case studies in the US. Class discussions will also include risk communication, community outreach and education, access to health care and impact on vulnerable populations. Each student will have the opportunity to focus on Public Health, Environmental Protection, Public Policy, and Environmental Education issues as they discuss approaches to mitigating environmental health risks.

This seminar will consist of lectures, guest speakers, readings, student presentations, discussions, research, and community service. The students will have two small research assignments including an Environmental and Health Policy Analysis and an Industrial Pollution Case Study Analysis. Both assignments will include class presentations. The major research assignment for the course will be a problem-oriented research paper and presentation on a topic related to community-based environmental health selected by the student. In this paper, the student must also devise practical recommendations for the problem based on their research.

#### **ENVS 407 Urban Environments: Prevention of Tobacco Smoking in Adolescents (Env Health) [Spring]**

This course will examine the short and long term physiological effects of smoking, social influences, the effectiveness of cessation programs, tobacco advocacy and the impact of the tobacco settlement. Penn Students will work with middle school students on a campaign to prevent addiction to tobacco.

#### **ENVS 408 Urban Environments: The Urban Asthma Epidemic (Env. Health) [Fall]**

This course will examine the epidemiology of asthma, the potential causes of asthma, the public health issues and environmental triggers. Penn students will collaborate with the Children's Hospital's clinical research study - Community Asthma Prevention Program. Students will conduct environmental triggers classes in the community.

#### **ENVS 410 The Role of Water in Urban Sustainability and Resiliency (Urban Env or Resource Mgmt) [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 (Env Health) [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 416 Freshwater Ecology (Env Biology) [Spring]**

Survey of the physical, chemical and biological properties of freshwater ecosystems, both riverine and lentic, natural and polluted

### **ENVS 507 Wetlands (Env. Biology) [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 526 History & Science of Climate Change (Env Geology) [Summer]**

This course will provide an understanding of the Earth's climate system and how and why this has changed through time. The emphasis will be placed on spatial and temporal scales in the modern system while exploring the evidence for past change, possible mechanisms to explain these changes, and the implications of these changes to past, present, and future global climate. Students will learn to reconstruct the

history and scales of climate change through the use of proxies; understand the mechanisms that act to drive climate change; show an understanding of the long-term natural climate variability on a global and regional scale; understand the importance of natural environmental change, against which to assess human impacts, recent climate change and issues of future environmental change.

### **ENVS 541 Modeling Geographic Objects (Resource Management) [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 601 Proseminar (Required Course) [Fall]**

A detailed, comprehensive investigation of selected environmental problems. This is the first course taken by students entering the Masters of Environmental Studies Program.

### **ENVS 604 Conservation & Land Management (Resource Mgmt.) [Fall]**

Understanding a region's natural resources and its threats are a key component in land preservation. This course will explore the different drivers and the techniques used to achieve success in small- and large-scale land protection. This field-based course will explore various strategies for open space conservation and protection, along with cultural perspectives on land preservation. Evaluation of management techniques used on preserved lands will also be investigated. Emphasis will be placed on developing skills in reading the landscape, the landowner, and the political motivators to determine conservation and restoration priorities.

### **ENVS 606 Birds as Environmental Bioindicators (Resource Mgmt. or Env Biology) [Spring-Even Years]**

This class will explore the foundations of avifaunal biology and ecology using a combination of hands-on classroom and in-the-field experiences. Classroom content includes physiology, anatomy, and morphology of birds. The fall migration of birds in North America is an epic and often tragic event. Sampling birds in migration has resulted in foundational understandings about stopover habitats, species-specific energy budgets and has helped realize the complete life cycle of hundreds of species. We will enter the field and participate in actual ornithological research, explore avifaunal ecology through birdwatching, and meet with regional leaders in the ornithological field.

### **ENVS 607 Field Study of Puerto Rico's Ecology (Env. Biology or Resource Mgmt) [Spring]**

Puerto Rico has a varied climate, geology, and topography that combine with periodic disturbance from earthquakes, landslides, hurricanes, floods, and the occasional tsunami (such as 1918 Puerto Rico Tsunami) to produce a rich diversity of ecological systems (see Miller and Lugo, 2009). Human use of the island's mineral and biological resources together with agricultural production, military operations, industrial, commercial, and residential development and tourism have greatly reduced the area of intact systems and put pressure on surviving remnants. Fortunately, there are protected natural areas (see map by Gould et al., 2011) that provide the opportunity to observe and come to understand important ecological patterns and processes of tropical areas.

The course will include regular classes leading up to the trip over spring break during which we will review the literature and learn from Penn researchers about the ecological systems of the island, especially in the Luquillo Experimental Forest (see Harris et al., 2012). Students will work collaboratively on a specific system or location that we will visit and present to the class before we leave. Upon our return, students will work individually on a research topic of interest related to the field trip and present findings and analysis in class and in a paper.

### **ENVS 609 Creating Gateways to the Land with Smarter Conservation (Env. Biology or Resource Mgmt) [Fall]**

Conservationists were long accused of ignoring the needs of human communities. Indeed land preservation has often been thought of as protecting land from people. Now, the conservation movement is embracing a different view—protecting land with and for people. As a result innovative programs have been developed that connect people to nature, thereby helping to facilitate land conservation. This interdisciplinary course will integrate concepts in scientific method, study design, ecology, and conservation with a focus on birds in order to foster an understanding of how research can inform management of wildlife populations and communities. Topics will include wildlife management, habitat restoration, geographical information systems (GIS), sustainable agriculture, integrated land-use management, and vegetation analysis. This course will also provide opportunities for field research and application of techniques learned in the classroom.

### **ENVS 610 Regional Field Ecology (Env. Biology) [Summer]**

Over the course of six Saturday field trips, we will travel from the barrier islands along the Atlantic Ocean in southern New Jersey to the Pocono Mountains in northeastern Pennsylvania and visit representative sites of the diverse landscapes in the region along the way. At each site we will study and consider interactions between geology, topography, hydrology, soils, vegetation, wildlife, and disturbance. Students will summarize field trip data in a weekly site report. Evening class meetings will provide the opportunity to review field trips and reports and preview upcoming trips. Six all-day Saturday field trips are required.

## **ENVS 611 Environmental Law for Environmental Professionals (Fdn Law) [Fall]**

This course is designed to introduce non-attorney, environmental professionals to the field of environmental law, policy and regulation. This is a survey course with a focus on the federal environmental regulatory system. General regulatory, enforcement and compliance assistance concepts will be presented and discussed in depth. Lectures will provide students with an introduction to and understanding of the primary components of a number of federal environmental statutes, including: Clean Air Act; Clean Water Act; CERCLA; NEPA; EPCRA; RCRA; and the Safe Drinking Water Act. The interplay between federal and state environmental laws and requirements will also be discussed. A recurring theme will be the role that the environmental professional plays as part of the interaction between governmental regulators and members of the regulated community. Case studies will be presented to address the practical implications that environmental legal requirements have on the regulated community. The class will explore current topics, such as climate change regulation; federalism issues; regulation of e-waste; safe drinking water issues, and the jurisdiction of federal clean water protection efforts. Students also will develop important career tools including: learning how to testify effectively as an expert witness in administrative and judicial proceedings; and preparing persuasive expert reports.

## **ENVS 616 Risk Assessment: Science & Policy Challenges (Env Policy) [Spring]**

How do government policy-makers make decisions about potential threats to human health and the environment in the face of scientific uncertainty? The course develops the concept of Risk Assessment from the publication of 1983 National Research Council (NRC) report commonly known as the “Red Book” which was used to rank the initial hazardous waste sites under the Superfund program. Using a variety of teaching tools, including lectures, panel discussions, and case studies, the course examines how public policy decisions regarding environmental risk are made and how effective those decisions are at reducing risks to affected populations. The course focuses on the complex interaction of science, economics, politics, laws, and regulations in dealing with environmental and public health risks. The course will begin with a review of the policy process and methods used in evaluating human health and environmental risks, including the traditional steps in the risk assessment process, including quantitative and qualitative aspects of hazard identification, dose-response assessment, exposure assessment, and risk characterization. The course will then focus on how scientific uncertainty, risk perceptions, socio-economic disparities, risk communication, and politics influence environmental risk-based decision-making. Issues such as special populations (e.g., children, elderly, immune-compromised, woman of pregnancy age, etc.) must be considered when developing risk reduction strategies. The use of the “precautionary principle” will be discussed in the context of different types of environmental stressors (e.g., pesticides, chemicals, climate change, air pollution, water quality, and land use) and how this important controversial principle is applied differently in contrasting national and European risk management policies.

### **ENVS 620 Developing Environmental Policy (Env Policy) [Fall]**

When we think of environmental policies in the USA, we may think of one or more laws geared to improve our nation's air, water, ecosystems, and biodiversity. However, environmental policies and policy-making comprise more than just specific laws and regulations. Making and implementing environmental policy is a process influenced by multiple political, cultural, and economic factors in addition to scientific factors, all of which impact the ability of policies to be effective, that is, to improve the environment. In this course, we develop a framework to analyze the effectiveness of the social actors, process and outcomes of environmental policy-making. We ask questions such as: How do policy makers define environmental problems and solutions? Who are the social actors involved in the process? How are policies created and negotiated? What underlying assumptions and realities about the roles of government and society shape policy instruments and design? Are science and risk accurate or distorted? How are social and environmental justice intertwined? To answer these complex questions, we contextualize and critically analyze policies to determine how both government and society impact on regulatory approaches. We study the institutions involved and examine social and ecological outcomes of environmental policies. We also discuss contemporary issues and policy situations that arise throughout the course of the semester, and comment on them in a class blog. Finally, students will select an environmental issue and formulate a policy proposal to recommend to decisionmakers.

### **ENVS 629 The US Water Industry in the 21<sup>st</sup> Century (Env Policy) [Spring]**

This course is taught by the former Philadelphia Water Commissioner, the CEO of a \$1 billion water, wastewater and stormwater utility. The objective of the course is to expose the student to the inner workings and management of the US water industry and the transformation of this industry to a 21st-century sustainable utility model. Influences from new technologies and aging infrastructure, acceptable levels of risk, public and private sector competition, climate change, the bottled water industry, resource recovery, rates and affordability and other issues will be investigated.

The context of the class discussions will center on how politics, vision and leadership are used to create and implement change in a traditional utility structure. The role of environmentalism, infrastructure financing, water/wastewater treatment facility operations, public affairs and media, and designing a capital improvement program are examples of other topic areas.

### **ENVS 642 Global Water Conference in Stockholm, Sweden (Env Policy) [Summer Odd Years]**

The global water and sanitation crisis kills over 4,000 children each day and represents one of the biggest health problems in the world. At the University of Pennsylvania school year 2010-2011 was declared the "Year of Water" in recognition of the many challenges that lie ahead as global increases in population and affluence and the influences of climate change will stress limited water resources. Each year the Stockholm International Water Institute convenes a Conference with experts from



around the globe to exchange the latest water research findings and develop new networks. Students will attend the Conference, present research by presentations/posters, document a key issue, interview experts, and meet colleagues with common interests. They will also help other organizations at the Conference.

### **ENVS 644 Energy, Waste, and the Environment (Foundation: Env Energy) [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 648 Issues in Food and Agriculture Policy (Env Policy or Urban Env) [Spring]**

Food is central to our daily lives, yet we seldom think about the political or social implications of what we eat. In this course, students will study how societies produce, distribute, market and consume food, with an emphasis on American politics and food systems to develop an understanding of how policies are shaped by power relations, institutions, and ideas. Topics include food systems, food and agriculture industries, farming practices, sustainable agriculture, food security, genetically modified foods, hunger, obesity, nutrition policy, food labeling and marketing, fast food, junk food, and more.

### **ENVS 667 Introduction to Sustainability (Env Sustainability) [Fall]**

The study of sustainability—the long-term viability of humans in harmony with the environment—has been identified as a critical issue for society and industry and is evolving to examine how society should conduct itself to survive. There are a number of aspects to how society organizes its activities that will be reviewed. Issues such as sustainable products, sustainable agriculture, sustainable forestry, sustainable fisheries, and sustainable communities, to name just a few, are areas that are the focus of the need for change. This course will review the various aspects of sustainability in society and ask each student to conduct a qualitative comparison of the life cycle impacts of two products that provide the same function to determine which is more sustainable and if and how they could both be made sustainable for the long term.

### **ENVS 673 The Future of Water (Env Business) [Fall]**

From Wall Street to rural Sub-Saharan Africa, technology innovation to aging infrastructure—this course will explore the; impact of water and consider what future leaders need to know about the dynamics of the industry, investment and business opportunities, and water-related risk; Opportunities for water are booming around the

world, in large part because of existing or looming shortages and decades of underinvestment, population growth, rapid industrialization and urbanization, pollution, and climate change. Water is the only irreplaceable natural resource on the planet. Its critical role in every aspect of the global economy, could, in fact, lead it to be the next gold or the next oil; This course will address the fundamentals of the water sector from an international perspective. The future of water will be critical to our global economic, social and political development and will likely become one of the most influential factors in business decisions for the future. Furthermore, it is essential for leaders across all sectors—from pharmaceuticals to financials, energy to agriculture—to understand how to sustainably manage and account for water resources, capitalize on new technologies, mitigate water-related risks and navigate through complex and dynamic policy and regulation. The course will engage students in high-level discussion and strategy formation, challenging them to develop creative and sustainable solutions to some of the greatest challenges facing environmental, business and water industry leaders today. Interactive sessions and projects will provide an introduction to appropriately managing, valuing and investing in water assets to create sustainable and compelling business opportunities.

### **ENVS 674 Life Cycle Analysis (Env Sustainability) [Spring]**

In order to make sensible decisions on products or projects, people need to understand the environmental impacts of these actions. Life cycle assessment (LCA) is a process to assess environmental impacts throughout the different stages of a product or project's life. This seminar is intended to be comprehensive and covers material extraction, processing, manufacture, distribution, use and end of life reuse, recovery or disposal. The objective of conducting an LCA is to compare the full range of environmental impacts that emanate from the provision of these products or services and then use that information to improve the situation to minimize or eliminate harm. The focus of this class will be to understand the phases of an LCA as well as conduct LCAs that compare the impacts of two related options. This course will enable the student to conduct LCAs and examine the use of software that could be used in this regard.

### **ENVS 676 Corporate Sustainability Management & Communication (Env Sustainability) [Fall]**

Sustainability (i.e. the long-term viability of humans in harmony with the environment) has been identified as a critical issue for society and industry. The question is what actions individual companies can take to promote sustainability. This course will focus on the approach to both managing and communicating the corporate sustainability function. The opportunity that exists is to demonstrate that sustainability can reduce costs and enhance the corporation's reputation. A sustainable approach looks to change core business activities that consume resources and generate waste (now to be seen as by-products) so that the new business model will not only have a beneficial impact on the environment but also generate better products, reduce costs and improve trust between society and the company. The implementation of sustainability management systems, which assists in aligning business operations with sustainable principles, has the potential for significant benefit for industry as well as for the long term viability of the human population and

the natural ecosystem. The key will be to communicate the approach and the benefit so that investors, employees and the public understand what is at stake.

### **ENVS 677 Sustainable Agriculture & Product Stewardship (Env Sustain) [Fall]**

This course will focus on how food is produced around the globe and inputs required to ensure food security. Topics explored include: Integrated Pest Management, Precision Agriculture, Product Stewardship, Biodiversity, Biologicals, Organics and Synthetic Products, GMOs, Sustainable Development Goals, Regulations, Stakeholders (Growers, NGOs, consumers, etc.), and Food waste.

### **ENVS 681 Modeling Geographic Space (Resource Mgmt.) [Spring]**

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.

### **ENVS 682 Leading Change for Sustainability (Education or Env Sustainability) [Spring]**

Sustainability presents both a challenge and an opportunity for society. Issues like global warming, pollution, resource depletion, and population imbalance are stressing the planet's capacity in ways that threaten our ability to sustain thriving and just societies. At the same time, these systemic problems are unfolding too slowly to prompt most of us to take serious and significant action, or to trigger meaningful responses from our political leaders. Ask the average person what they think of when they hear the word sustainability and you will get responses like recycling, renewable energy, hybrid cars, and energy and water conservation. People equate sustainability with efficiency, waste minimization, and pollution prevention – all worthy goals – but at the current rate of consumption and growth these approaches alone will not create the future of abundance and equity that we desire and need. To quote MIT professor Dr. John Ehrenfeld, "Reducing unsustainability – although critical – will not create sustainability." What will it take to extricate us from the current predicament and forge a new path? This class will take a realistic look at human nature and how we might (or might not!) rise to meet today's ecological and societal challenges. We will examine the underlying psychological and cultural barriers to sustainability and discuss strategies for surmounting them. Readings and discussions will explore the application of positive psychology to leverage the "human technologies" of creativity, innovation, and collaboration in the pursuit of a more balanced and sustainable relationship with others and our ecosystems, and to shift the sustainability dialogue from the current problem-oriented approach to one where we create a vision of human wellbeing and planetary flourishing.

**ENVS 684 Ecology, Management, and Advocacy of Urban Forests (Education/  
Urban Env/Resource Mgmt/Env Resilience & Adaptation) [Spring  
Odd years]**

Urban forests provide ecological and socio-economic benefits ranging from improving air, water, and soil quality to creating wildlife habitat to enhancing thermal comfort and the health of individuals and whole communities to increasing property values and more. We will explore research on the nature, function, and value of urban forests. We will investigate reforestation efforts in Philadelphia, Baltimore, New York, and Pittsburgh with projects typically involving deer control, invasive plant removal, planting of native trees and shrubs increasingly propagated from local seed sources, maintenance, and monitoring. We will learn about the myriad advocacy and education programs supporting urban forests. Speakers from the US Forest Service, Philadelphia Parks and Recreation, and TreePittsburgh will expand our understanding of these important ecosystems. Five weekend field trips to Fairmount Park in Philadelphia, Baltimore, and NYC will illustrate the character of urban forests and reforestation projects. Students will research and present on an urban forest system (from Philadelphia or elsewhere) and research a topic of interest related to course content.

**ENVS 688 Floodplain Management in a Changing Climate (Resilience &  
Adaptation) [Fall]**

According to a 2019 paper by Scott A. Kulp and Benjamin H. Strauss in the journal Nature Communications, 230 million people worldwide occupy land that is less than 1 meter above current high tide. These lands will be inundated by sea level rise by the end of this century, or earlier. Add to this the inherent flood risks in riverine and urban settings. How do we prepare and adapt? The class will explore the challenge of floodplain management in a changing climate through lectures, talks by guest experts, readings and multimedia, and exploration in the field. We will take a field trip to the New Jersey coast to witness home elevations, beach nourishment, and locales that are already experiencing chronic tidal flooding; we will meet with municipal officials challenged by increasingly persistent sea level rise. Our class will look at the National Flood Insurance Program, examine its goals, critique its 50-year history and debate reforms to the program at the same time the US Congress is considering reauthorization of the program. We will look at resiliency efforts that states and local governments are pursuing and the new city- and state-level position of Chief Resiliency Officer. In class we will cover hazard mitigation planning, land use, hard and natural infrastructure, regulations, the Community Rating System and other issues pertaining to flooding and climate change, including social justice and public health issues. Throughout the course, material will be introduced to prepare the student to take the Certified Floodplain Manager exam administered by the Association of State Floodplain Managers. This optional test, should the student pass, will provide credentialing that is well recognized in the United States.

### **ENVS 699 MES Capstone Seminar (Required) [Spring]**

This course is designed to prepare Master of Environmental Studies 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 GEOLOGY COURSES FOR MES**

### **GEOL 411 Soil Science (Foundation: 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 528 Aqueous Geochemistry (Env Chem) [Fall]**

Chemical composition and interactions of soils and soil water with applications to current problems.

### **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 653 Introduction to Hydrology (Env Geology) [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 658 Geostatistics (Research Methods) [Spring Odd Years]**

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

### **GEOL 661 Environmental Groundwater Hydrology (Env Geology) [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.