

**Earth & Environmental Science
Masters Programs**

Student Handbook

Master of Environmental Studies

University of Pennsylvania



College of Liberal and Professional Studies
Academic Year 2024-25

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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 (36 semester hours), 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. Students in the program may also take up to 4 graduate courses from any other 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 you are eligible for. Full-time students enroll in three or four CUs per semester while part-time students enroll in one or two CUs 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.

Note: *While international students must maintain their full-time status (be enrolled in 3-4 courses) during the Fall and Spring semesters, the Summer semester is different. If it is **not** their first or last semester, international students may enroll in 0, 1, 2, 3 or 4 courses during the Summer.*

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, MCP/MES, MLA/MES, or International Environmental Management) or sub-matriculantes should consult the *Dual Degree* handbook available on the Canvas EES Community for specific requirements for their program.

MES students are required to complete at least 12 CU's of graduate level course work, eight of which must be in the School of Arts & Sciences. A graduate level course is any Penn course numbered 5000 or above. There are three required courses for the MES

program: ENVS 5100 Proseminar: Contemporary Issues in Environmental Studies, ENVS 6998 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 5100 Proseminar: Contemporary Issues in Environmental Studies

Required Course

The Proseminar course is a required course for all students and must be taken in the first semester of a student's academic career in MES. Proseminar introduces MES students to critical issues in the environment and exposes 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 four parts:

- Readings and lectures on environmental science
- Readings and class discussions on critical environmental issues (e.g., 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 for a wide range of audiences
- Group projects working with local organizations on a range of environmental issues.

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 EESC 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
- Environmental Chemistry
- Environmental Geology
- Urban Environment
- Environmental Justice
- Environmental Sustainability
- Energy
- Environmental Policy
- Environmental Law
- Resource Management
- Environmental Business
- 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 [Path@Penn](#). If no name appears there, email the program’s administrative coordinator to confirm your advisor.

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 5000 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 EES 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, 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 and 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*** – This concentration is only for students completing a Dual Degree with the Master of Public Health Program. There are 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 typically work for government organizations such as the US EPA, 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 project. 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

Required Course

Each student must take a semester-long course in methods that will prepare them for the Capstone project. This may be done in one of several ways: a field methods course (i.e., ENVS 5404, ENVS 6434, ENVS 5744); a statistics course (i.e., EESC 6710, BIOL 5510, PUBH 5010); a GIS course (i.e., ENVS 5706, ENVS 5716); a disciplinary methods course (i.e., ethnography, epidemiology); or an independent study with emphasis on methods. The course selection should be made in consultation with the academic adviser. At the end of the course, each student should have a clear idea of the methods appropriate for their selected capstone project.

ENVS 6998 Capstone Seminar

Required Course

ENVS 6998 Capstone Seminar is a required course for all students and must be taken in the second semester of the student's academic career in MES. 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 6998 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 6998 where 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 their 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 against a defined rubric 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 5404 Wetlands
- ENVS 5744 Regional Field Ecology
- ENVS 6414 Creating Gateways to the Land Through Smarter Conservation
- ENVS 6424 Field Study of Puerto Rico's Ecology
- ENVS 6434 Birds as Bioindicators of Environmental Change
- ENVS 6464 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 master's degrees in five years. Undergraduate students in their *junior year or before the end of their 7th semester* at the University of Pennsylvania may apply for sub-matriculation into the 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 program and their undergraduate academic adviser and then apply for sub-matriculation at their undergraduate academic office.

Students sub-matriculated into the MES program may take up to **four** graduate level courses while they are undergraduates. The remaining eight courses must be taken after the undergraduate program is completed. All four graduate level courses may be double counted toward both the undergraduate and graduate degrees if these courses are pre-approved by the student's MES academic adviser and undergraduate major adviser.

Students should obtain a *MES Submatriculation Course Form* from the [Canvas EES Community](#) (found under "Forms") to apply for course approval for double counting **prior** to taking the course. If you do not have access to Canvas, email the administrative coordinator and request the form. 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 varies 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 an 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 EES 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 program 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 (EES FAC) 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 EES FAC and may be placed on academic probation or dismissed from the program. Students on Academic Probation must 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 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 semesters, 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 an Incomplete (I) 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 (including the summer term). 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 automatically placed on Academic Probation. These students are subject to registration hold and are required to meet with the MES Program 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 may take time away from their studies for a wide variety of reasons that include, but are not limited to:

- Managing a medical concern
- Fulfilling a family obligation
- Pursuing career-related opportunities
- Completing military service
- Working 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 to manage a medical condition should also 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, but individual circumstances may require more or less time. Students on leave should remain in contact with the MES program director and their academic adviser and update them about any 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 the MES program director to develop a plan that includes connection with appropriate resources.

Leave of Absence: Policies and Processes

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 a 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. The student is responsible for completing the steps outlined below.

(i) 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](#)
- [Center for Community Standards and Accountability](#)

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.

(ii) 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 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

The College of Liberal and Professional Studies does not offer an admission deferral option. All offers of admission are valid only for the specific term to which you have been admitted. If you are unable to enroll for the term offered, you will need to re-apply for admission to a future term.

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 through the [X-CAT online form](#) for approval during the first semester of matriculation in the MES program. Only courses appropriate to the student's degree program, not used for a completed degree, and with a grade of B or better 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 federal subsidized student loans through Penn's Office of Student Financial Services, <https://srfs.upenn.edu/sfs>. Full-time students (taking three CUs or more in a semester) and part-time students (taking two CUs in a semester) may be eligible for these subsidized student loans and should fill out a FAFSA form to determine eligibility. International students are not eligible for these US government subsidized loans. 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, lab, and travel costs 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 Canvas EES 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.

Computational Systems and Generative AI

In light of the growing use of computational systems (such as AI, Chatbots, and LLMs) to generate text for student assignments, the College of Liberal and Professional Studies released the following statement:

Computational systems which may be classed as Chatbots, Large Language Models (LLMs), Artificial Intelligence (AI), or generative AI (gAI) may or may not be approved for use by individual instructors. Some instructors may permit use of these systems in a given class; If they do so, they will specify when, where, and how it is to be used and any restrictions about the specific tools permitted. In the absence of these specifications, students should assume that use of such tools will be considered a violation of Penn's [Code of Academic Integrity](#) and suspected use will be reported to the Center for Community Standards & Accountability.

Computational systems which fall under this statement include, but are not limited to, ChatGPT, GPT-4, BingChat, Claude, goblin.tools, and Grammarly.

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. Students 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 the *Canvas EES Community* 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 EES Community*. Departmental web pages often include course descriptions as well. The Course Timetable appears in March and October and may be viewed online at <https://srfp.upenn.edu/registration-catalog-calendar/timetables/main>. Additionally, Path@Penn 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 EES Community*, they must seek approval from their adviser before registering as it may not be acceptable for the program. Courses numbered below 5000 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 in. 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 (<https://www.lps.upenn.edu/about/academic-calendar>) and/or the Registrar's website for the exact dates for Advance Registration.

Regular Registration

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

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.*

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 to count toward the MES degree. "Pass/Fail" or "Audit" are not acceptable options.
- Only courses numbered 5000 and above may count toward the degree (the first set of three digits after the course subject is the course number -- e.g., ENVS 6011 001 but **not** ENVS 1106 601).
- As a masters student, permission may be needed from the department to register for some graduate courses in other departments or schools (permit procedures can be found on the [Canvas EES Community](#)).
- Full-time students should enroll in three or four CUs. Students are not permitted to enroll in more than four CUs per semester.
- Part-time students should enroll in one or two CUs per semester.

Permits

Courses that require special permission from the instructor or department are indicated in Path@Penn as "Permit Required." Instructions for how to obtain a Permit from various

departments can be found on the *Canvas EES Community* under “Forms”. **Please check this list before emailing the instructor or random offices at Penn.**

Once a permit is obtained/approved, students must “claim” the permit by actually enrolling in the course through Path@Penn. 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 EES 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, who will then set up the Independent Study course once approved.

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 with the permission of the course instructor. 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 CUs 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 up to four CUs of graduate courses (numbered 5000 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 EES 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 add/drop deadlines which may be different than deadlines for other schools and departments. Students should consult the current LPS Course Guide or the LPS website for deadlines for making registration changes and corresponding financial obligations (<https://www.lps.upenn.edu/about/academic-calendar>). Students can make these changes in [Path@Penn](#). Adherence to LPS deadlines is strictly observed. Should students need to drop or withdraw from a course beyond the deadline, they should petition LPS (<https://sfs.upenn.edu/registrar/forms>). 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.

Note that if a student is taking a course in another school (Law School, Business School, etc.) they should be aware that the add/drop deadlines may be earlier than LPS.

Adding a Course

Students may add a new course through the second week of the semester. After that it is not possible to add a course. Students may add a course during the first two weeks of the semester via [Path@Penn](#).

Dropping a Course

Students may drop a course with no financial obligation until the published add/drop deadline posted on the LPS Website (<https://www.lps.upenn.edu/about/academic-calendar>), typically two weeks into the semester. Students may also drop a course between the second and fourth weeks of the semester, but in so doing they will incur a 50 % 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 Path@Penn through the second week of the semester. After the

second week of the semester, students must submit a Withdrawal Form online. When making registration changes via Path@Penn, 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 (<https://www.lps.upenn.edu/students/forms>). 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 % 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 need to enroll in the non-credit Masters Thesis

course ENVS 9900 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 must enroll in Masters Thesis in Summer 11-Week. If the capstone is not completed by August, the student must enroll 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 for lack of progress towards degree.

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 CUs in a single semester
- Student is enrolled in Masters Thesis: ENVS 9900.

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

MES 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 CUs per semester. Part-time students typically complete the degree in three years, taking one or two CUs 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 9900 for more than two semesters. Students not completing the program requirements after two semesters of Masters Thesis may be withdrawn from the program for lack of progress toward the 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 regular 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.

Students will meet with their committee (both the primary and secondary reader) once per semester, including the Summer semester, from when their proposal is approved until the capstone is completed. Students are responsible for setting up these committee meetings, including providing agendas. Committee meeting forms must be completed by all members (the student, primary reader, and secondary reader) following each meeting. The link to these forms is available on the EES Community page on Canvas.

Registering for the Capstone Course

All students are required to take ENVS 6998 Capstone Seminar in the first Spring semester of their academic career (or the first Fall semester, for Spring admits). 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.

Academic Integrity and Generative AI for your Capstone

Students are expected to be familiar with and comply with Penn's Code of Academic Integrity, which is available in the [Pennbook](#). This program has a zero-tolerance policy for cheating or plagiarism, and all violations will result in substantial penalties. If you have any doubts or questions about what constitutes academic misconduct, please do not hesitate to contact your advisor.

Generative AI creates text, images, computer code, and more in response to user prompts. These programs are used for a variety of purposes and in academic settings are often used to generate ideas, create content, and edit work to improve writing clarity. However, these programs are tools and should only be used as such; they should not replace your own creativity and independent thinking.

These tools can be helpful for brainstorming when you are developing ideas for your capstone research. However, the final products of the capstone (thesis & poster) should reflect your own independently attained understanding, analysis, and synthesis of the project work. You may not submit any work generated by an AI program within your capstone thesis or poster. If you use AI as part of your prep work, you are required to disclose its use and appropriately cite all sources. You should also be mindful that AI programs will not necessarily give the best explanation or answer to your questions, and often the material(s) generated may be inaccurate, based on outdated information, or completely fabricated.

Using AI should supplement your learning experience, not replace your intellectual work. Your capstone research, and the effort taken to synthesize this work into a thesis and poster, are an essential part of your intellectual and professional development in environmental studies.

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 must register for Masters Thesis ENVS 9900 in the subsequent semester and for each and every semester thereafter (including summer) until the completed and approved Capstone is submitted to the MES Program. **Note: ENVS 9900 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 semester during which students continue to work on the Capstone, graduation posting will also be affected. Students must re-apply online for graduation in the semester 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 semester in which they complete their capstone and receive a grade, not the semester in which the student originally intended to graduate.

VIII. University Policies and Resources

The Pennbook (<https://catalog.upenn.edu/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.

Enrollment Status

MES students who are enrolled for three or four CUs 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 CUs per term are considered part-time students and will be billed accordingly. Please see the LPS website for more details: <https://www.lps.upenn.edu/degree-programs/mes/tuition>. Note that students enrolled in the Masters Thesis ENVS 9900 are considered full-time.

Student Identification

Once a student is enrolled at Penn, a student ID number (PennID) will be issued; this ID 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

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, located on the 2nd Floor of the Penn Bookstore, 3601 Walnut Street. Appointments for obtaining a PennCard can be scheduled at: <https://penncard.business-services.upenn.edu/>. 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

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 [Path@Penn](#) (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. For further information, see: <https://pennkeysupport.upenn.edu/>

Path@Penn

<https://path.at.upenn.edu/>

[Path@Penn](#) 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 Path@Penn.

Email

<https://computing.sas.upenn.edu/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 the 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

<https://weingartencenter.universitylife.upenn.edu/>

215-573-9235

220 South 40th Street, Suite 260

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.

Student Disability Services (SDS)

<https://weingartencenter.universitylife.upenn.edu/disability-services/>

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.

Student Financial Services

<https://srfs.upenn.edu/contact>

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>

36th St. and Walnut St

215-898-7595

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:

<https://upenn.bncollege.com/shop/upenn/products/supplies-electronics>

Career Counseling

<https://careerservices.upenn.edu/>

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:

<https://careerservices.upenn.edu/channels/sustainability-energy-conservation/>.

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.

Tech Center

<https://www.isc.upenn.edu/student-services>

215-898-9720

Ground Floor of Van Pelt Library (3420 Walnut Street), Room G-102

The Tech Center offers advice, training, consulting services and computer support to Penn students.

Family Center at Penn

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

215-746-2701

3615 Locust Walk

Libraries

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

215-898-7555

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

<https://recreation.upenn.edu/>

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

<https://ombuds.upenn.edu/>

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

<https://wellness.upenn.edu/>

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 and Counseling

<https://wellness.upenn.edu/student-health-and-counseling>

Medical Care Office: 3535 Market St, Suite 100

215-746-3535

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.

Counseling Office: 3624 Market Street, First Floor, West

215-898-7021

Student Health and Counseling (formerly SHS and 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.

SUPER Program (Substance Use, Prevention, Education, and Recovery)

<https://wellness.upenn.edu/wellbeing-initiatives/super-program-substance-use-prevention-education-and-recovery>

3624 Market St, 1st Floor West

215-898-7021

The mission of the SUPER Program is to reduce harm related to substance use at the University of Pennsylvania. Key efforts spearheaded by this office focus on education, prevention, and brief interventions for both individual Penn students and student groups. Our programs meet students where they are at in their harm reduction journey from a place of empathy and without judgement. We also oversee alcohol policy initiatives, violence prevention, data collection, strategic project management, and (in a collaboration with Student Intervention Services) proactive crisis management.

Office of Student Affairs

<https://osa.universitylife.upenn.edu/>

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://pvp.universitylife.upenn.edu/>

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/>

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: <https://wellness.upenn.edu/public-health-and-wellbeing/immunization-and-insurance-requirements>

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 215-746-4200 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.

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.

Leadership and Committee Position Eligibility

To serve in any student association leadership or committee position at the University of Pennsylvania, LPS students must: 1) be actively enrolled on a part- or full-time basis, and 2) maintain good academic standing as defined by their program. Students who are placed on academic probation or take a leave of absence must relinquish their position so that a replacement can be appointed to fill the vacancy.

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

<https://oaaeop.upenn.edu/>

215-898-6993

3451 Walnut Street, Franklin Building 4th Floor, Room 421

The University of Pennsylvania values diversity and seeks talented students, faculty and staff from diverse backgrounds. The University does not discriminate based on 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, Juneteenth, Independence Day, Labor Day, Thanksgiving and the day after, and the week between Christmas Day and New Year's Day, inclusive. The University also recognizes that there are several religious holidays that affect large numbers of University community members, including 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.

Center for Community Standards and Accountability

<https://csa.upenn.edu>

215-898-5651

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

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

The mission of the Center for Community Standards and Accountability (CSA) is to promote accountability, integrity, healing, and community building within the Penn community. CSA works to resolve violations of the Code of Academic Integrity and the Code of Student Conduct, as well as to coordinate university response to address incidents of bias and harm within our community.

Appendix

MES COURSE LIST

NOTE: This is a comprehensive list of courses offered in Earth & Environmental Science as of 07/05/2024 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 concentration or foundation 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 and may also fulfill the Research Methods requirement in some cases. Check with your academic adviser for these alternatives.

ENVS 5100 Proseminar: Contemporary Issues in Environmental Studies (Required Course) [Fall & Spring]

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

ENVS 5220 Sustainable Agriculture & Product Stewardship (Env Sustainability) [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 5310 History & Science of Climate Change (FDN: 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 5404 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 5600 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 5706 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 5716 Modeling Geographic Space (Resource Management) [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 5744 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 5810 Environmental Law for Environmental Professionals (FDN: Env Law) [Spring]

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 6300 The Future of Water (FDN: 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 introduce appropriately managing, valuing and investing in water assets to create sustainable and compelling business opportunities.

ENVS 6302 Climate Technology: Finance and Policy (Env Policy) [Fall]

The growing field of climate technology requires a multifaceted skill set anchored in a sound understanding of finance and policy. This course is designed for students interested in the climate economy seeking to gain functional proficiency in climate finance and policy. The course will cover four key areas of the climate economy from a finance and policy angle: electrification, carbon management, critical minerals & materials, and breakthrough technologies. The finance portion of the course will deliver a basic understanding of the financial reporting of companies within the given

subsector, functionality of the relevant technologies, capital structure of relevant companies, and general business model of relevant companies. The policy portion of the course will deliver a basic understanding of the salient policies and issues facing companies in the aforementioned subsectors as well as sector wide headwinds and tailwinds catalyzed by policy. Throughout the course, students will build a financial model, business plan, and present their end deliverable in a shark tank format at the end of the course with observers drawn from the field to provide networking opportunities.

ENVS 6414 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 6424 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 6434 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 6450 Environmental Activism: Actors, Approaches, and Outcomes (Env Sustainability) [Summer]

From Rachel Carlson to Greta Thunberg – and whether via public blockades or behind-the-scenes boardroom votes – activism has been a driving force of change on environmental issues. This course will offer an overview of environmental activism, including players, strategies and tactics, and impacts. Students will explore various types of activists (e.g., grassroots, NGO, employee, investor) and the relationships between activism aimed at businesses vs. governments. The course will help students understand the historical roots of environmental activism, and what influence current demographics, public opinion, and technology have had, including on recent climate activism. Through case studies, news stories, academic readings, and class discussion, students will learn the various roles activists play, how activism impacts business practices and laws, and many of the ways companies relate to activists. Quizzes, case analyses, and other methods will be used to demonstrate mastery of the material.

ENVS 6464 Ecology, Management, and Advocacy of Urban Forests (Urban Env/Resource Mgmt) [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 6500 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 6510 Leading Change for Sustainability (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 6530 Corporate Sustainability Strategies (Env Sustainability) [Spring]

Before the year 2000, "environmental management" for a business was typically driven by the need to respond to restrictions imposed by environmental regulation. But, at the dawn of the new millennium, leading businesses began to change their concept of environmental management to look beyond simply meeting governmental dictates. These organizations began to evolve and utilize "environmental strategy" to create new ways of growing their businesses by bringing sustainability to the core of their business strategies. This seismic shift in view was accompanied by a bottom line emphasis that, in some cases, turned sustainability efforts into profit centers. Sustainability increasingly is not hidden within the silo of environmental, health, and safety departments but has become much more seamlessly integrated into the operations of corporate functional disciplines. Today, to effectively work in senior management, an executive needs to be knowledgeable not only about his or her specific business function but also how his or her business will be impacted by governmental regulations, policies, corporate sustainability initiatives, green marketing regulations, industry guidelines or 'best practices', new sustainable technologies, energy planning, environmental performance metrics, and required reporting on the environmental impact of their business unit.

ENVS 6551 Principles of Mapping for Environmental Justice (FDN: Env Justice) [Fall]

Environmental Justice (EJ) mapping examines the intersection of environmental burdens and the vulnerable communities disproportionately impacted by their harm. From redlining to the static maps that first showed the correlation between race and waste, and moving through to today's truly dynamic EJ mapping tools, The Principles of Mapping for Environmental Justice explores how mapping quite literally put EJ on the environmental movement landscape. This is not a GIS course, nor a course on EJ generally, but an examination into the core components that are inherent to EJ mapping principles. Come explore the indicators and methodologies used by federal, state and local governments and the policy they influence, such as President Biden's Justice40 Initiative.

ENVS 6555 Gender and the Climate Crisis (FDN: Env Justice) [Summer] Online

The devastating impacts of climate change such as water scarcity, floods, migration, and sea level rise, are not gender neutral. Men and women, boys and girls are affected differently by these crises even though they live in the same household. Women and girls are more likely to face inequality in access to education and jobs, health, and safety with the current approaches to combating climate change. Climate action therefore must be investigated from a gender lens. Long-standing social norms around women providing food and water for their families have increasingly put them at risk of poor physical and mental health, sexual abuse, and lack of formal education. Further, the abuse of younger boys in water-scarce areas often goes undiscussed because of the cultural restrictions and taboos around homosexuality. In recent years, a small number of extraordinary women have emerged as global leaders in tackling the climate crisis. However, generally, women and the LGBTQIA+ community are greatly under-represented in high-level climate negotiations; tend to be disproportionately vulnerable to climate impacts, and climate solutions tend to ignore gender-specific issues perpetuating in a general bias of infrastructure and services not being gender-inclusive. This course will discuss such gender impacts of climate change, gender inclusion in climate-related workplaces, examples of gender empowerment, and ways by which gender-inclusive climate action can be designed.

ENVS 6611 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 6820 The US Water Industry in the 21st 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 6840 Energy, Waste, and the Environment (FDN: 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 6880 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 6885 Fundamentals of Climate Action Planning for Cities (Resilience & Adaptation) [Fall]

Many cities around the world, both large and small, have created climate action plans over the past few years. This course will outline aspects of the planning process including: decision factors for creating a plan, resourcing, outreach, communications, data and tracking, and execution. 3Students will leave the course with a clear understanding of how city level climate plans come together and are executed.

ENVS 6998 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 EARTH & ENVIRONMENTAL SCIENCE COURSES

EESC 5200 Aqueous Geochemistry (FDN: Env Chem) [Fall] Online

This course is designed to provide the graduate student with an understanding of the fundamentals of aqueous geochemistry. The chemistry of water, air and soil will be studied from an environmental perspective. The nature, composition, structure, and properties of pollutants coupled with the major chemical mechanisms controlling the occurrence and mobility of chemicals in the environment will also be studied. Upon completion of this course, students should expect to have attained a broad

understanding of and familiarity with aqueous geochemistry concepts applicable to the environmental field. Environmental issues that will be covered include acid deposition, toxic metal contamination, deforestation, and anthropogenic perturbed aspects of the earth's hydrosphere.

EESC 5630 Hydrology (FDN: Env Geology) [Fall] Online

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.

EESC 6664 Field Study of Soils (FDN: Env Geology) [Summer]

Processes of soil development in a variety of temperate environments. Effects of lithology and climate on soil properties. This course includes 5 full field days on campus combined with zoom based sessions. On campus days are: June 5-9, 2023. Students are expected to be in the field all day, every day from June 5th to the 9th. Transportation and equipment will be provided.

EESC 5710 Role of the Environmental Professional in Managing Contaminated Site Liability (Resilience & Adaptation) [Spring]

Evaluation of environmental contamination and liability is an important tool during acquisition of real 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 landowner liability protections, including innocent landowners, contiguous property owners, and bona fide prospective purchasers (BFPP). In the context of establishing landowner liability protection, the course will evaluate 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, aerial photography, and various forms of environmental documentation. Students will prepare environmental reports for select properties and will have an opportunity to hone technical writing skills.

EESC 5720 Environmental Due Diligence (Resource Management) [Fall] Online

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.

EESC 6610 Sustainable Development of Water Resource Systems (Resilience & Adaptation) [Spring]

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

EESC 6620 Environmental Groundwater Hydrology (FDN: Env Geology) [Spring] online

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.

EESC 6715 Water Resources for Geologists and Environmental Scientists (Resilience & Adaptation/Urban Env) [Summer] Online

This class will provide an overview of water topics and issues and is intended to provide geologists and environmental scientists with a working understanding of current water resource issues and challenges ranging from stormwater and flooding to stream restoration, water re-use and ecological restoration. Starting with an understanding of hydrology, streams, and related ecosystems, the class will look at the various ways we use and depend on water, the ways in which water resources are degraded, and practices to restore and protect the resource. Topics to be covered include green infrastructure, water and wastewater sources and water reuse, stream

health, stream channel restoration, riparian buffers, floodplains, best practices, and the concept of “one water”. We will also cover current regulations, changing water policies, sustainability, and the implications of climate change.

EESC 6720 Landslides (Resilience & Adaptation) [Spring] Online

Landslides are important geomorphic agents in mountainous terrain, mobilizing sediment and playing a key role in controlling relief and elevation. The work of landslides is often characterized by their magnitude-frequency, which also has direct implications for people, property, and infrastructure in mountainous terrain, and for the approaches taken to minimize the risk from landslides. This course will introduce students to a conceptual understanding of landslides at a range of spatial scales, including the mechanics of the processes governing landslides from trigger to deposition. Methods of slope monitoring and the varied approaches to landslide risk mitigation and management will be explored, with a range of geotechnical and environmental applications. This course includes lab-based sessions to demonstrate simple techniques to understand fundamental landslide processes, and applications of GIS technology to explore slope monitoring and failure prediction.