

Environmental Metrology Policy (EMAP)

EMAP 4401 EMAP Chemistry Bootcamp

Level: Graduate, Undergraduate

Grading: No Grade

EMAP 5500 Weekly Seminars

This is program's bi-weekly seminars or/and discussion forum

Level: Graduate, Undergraduate

Grading: Pass/Fail Default

EMAP 5501 Chem of Environ Exposures 3 Credits

The course concerns the study of the earth (geosphere), air (atmosphere), water (hydrosphere), and living environments (biosphere), the effects of technology thereon (anthrosphere), and the interactions among them. On the one hand, it guides students through the chemistry related to the sources, reactions, transport, fates, and effects of chemical species in water, soil, air, and living environments, and the effects of technology thereon. On the other hand, it also exposes students to the chemistry underlining effects of environmental chemical species on life, including the chemistry of toxic substances with emphasis upon their interactions with biologic tissue and living organisms. Overall, students will learn the chemical principles and interactions that govern the environmental processes around us, particularly the chemistry/biochemistry that help identify and quantify the effects of environmental exposures. Students will also develop an appreciation of the intertwined nature and fragile equilibrium among the five environmental spheres.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

EMAP 5502 Statistical Methods Metrology 3 Credits

The course teaches concepts and methodologies of statistical methods and interplay between statistics and measurements in metrology through in-depth discussion of the best statistical methods for the assessment and expression of measurement uncertainty. This is a topic that is essential to metrology but not commonly known to even experienced statisticians. Topics to be covered, but are not limited to, include (1) probability modeling of measurement error, (2) elementary one-/two-sample statistical methods and measurement and inter-lab comparison, (3) intermediate-level statistical methods to quantify the importance of sources of variability in measurements, (4) statistical analysis of repeatability and reproducibility (R&R), (5) linear regression and calibration, (6) quantization/digitalization effects, (7) quantifying how measurement precision affects one's ability to detect differences between measurands, (8) models and methods of spatial statistics applied to environmental problems. The course also introduces R language and its application for environmental statistics and discusses statistical modeling methods used by EPA. Overall, the course is designed to help students understand the quality and reliability of the measurements, acquire the ability to parse a measurement problem, identify the critical sources of variability and bias, and develop approaches to address these using the core concepts of uncertainty, traceability, validation, and quality systems.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

EMAP 5503 Environmental Economics 2 Credits

Introduction to Environmental Economics will introduce fundamental economic concepts as they relate to the environment. These fundamental concepts will then be used to explore and assess current and potential policy responses to some of the major environmental issues of our time. Examples are drawn from all over the world and include such vital issues as climate change, natural resource use, waste management, water pollution, and loss of biodiversity.

Level: Graduate, Undergraduate

Course attribute:

Grading: Main Campus (UGrad, Grad)

EMAP 5504 US Int'l Enviro Laws Pol 2 Credits

This course introduces the variety of important environmental challenges addressed by environmental laws and the legal complexities of environmental regulatory schemes. The course teaches first the US legal system in the context of environmental protection with emphasis on the legal framework for environmental protection as it has evolved in the United States, including an overview of administrative law processes and an examination of the science methodologies that are used to support regulatory decisions. Students is exposed to key constitutional principles, common law, statutes, and regulations that govern the administration of environmental law. The course then examines the history, development, sources and principles of international environmental law and review the role of relevant international organizations in the context of environmental protection. Other key international issues including atmospheric protection, climate change and trans-boundary water are examined in the context of US and international environmental law. This course provides the foundation by covering the "fundamentals" of environmental laws.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

EMAP 5505 EnviroToxicologyEpidemiology 2 Credits

Environmental Toxicology and Epidemiology - Principles and Applications - Toxicology is a multidisciplinary science that investigates the harmful effects of environmental stressors (chemical, physical and biological agents) on humans, animals, and the ecosystem. Toxicology has progressed from a science concerned with poisons and the harmful effects of chemical exposure to a science concerned with safety. It incorporates knowledge and methods from fundamental sciences such as exposure, metrology, chemistry biology, biochemistry, medicine, epidemiology, pharmacology, and even engineering disciplines. Toxicological and epidemiological assessments employ a multidisciplinary approach to predict what and how environmental agents will potentially cause harm to fauna and flora and how this information could help to protect public health and ecological habitats including regulatory policy-making. These assessments could be extremely complicated due to several challenges.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-EMAP program.

EMAP 5511 Environmental Metrology 2 Credits

Level: Graduate, Undergraduate

Prerequisites: (EMAP 501 or EMAP 5501) and (EMAP 502 or EMAP 5502)

Grading: Main Campus (UGrad, Grad)

EMAP 5512 Princ of Instrumental Analysis 3 Credits

Level: Graduate, Undergraduate

Prerequisites: (EMAP 501 or EMAP 5501) and (EMAP 502 or EMAP 5502) and (EMAP 511 (may be taken concurrently) or EMAP 5511 (may be taken concurrently))

Grading: Main Campus (UGrad, Grad)

EMAP 5513 MetrologyLab IIA-Guided IndRes 2 Credits

Full Title: Environmental Metrology Lab IIA: Guided Independent Research This is a transitional course from EMAP 512 Environmental Metrology Lab I: Instrumental Principles and Measurements to EMAP 518 Capstone Projects. It provides authentic experiential learning processes through which students learn to carry out guided independent laboratory research on topics formulated either during EMAP-512 or the 10-week summer internships (EMAP 800) in the preceding summer. Under the guidance of instructors/advisors, students will first formulate a draft research proposal that addresses (1) why the chosen topic is important in environmental protection (big picture), (2) what are the specific questions of current interest that the proposed research aims to answer (research objectives), and (3) how the proposed research will be carried out. Students will then carry out trial laboratory experiments to refine/finalize the proposal and obtain preliminary results accordingly. The finalized proposal, together with the obtained preliminary results, will serve the blue print for the ensuing EMAP 518 Capstone Projects. At the end of the course, students are required to produce (1) a 5-min video that summarizes, (2) 10- to 15-min oral presentation of, and (3) a poster of (for the Q&A session), and (4) a comprehensive written report (in the format for peer-reviewed publications) of their independent research. (2) and (3) will take place at the Independent Research Symposium organized at the end of the course.

Level: Graduate, Undergraduate

Prerequisites: (EMAP 512 or EMAP 5512)

Grading: Main Campus (UGrad, Grad)

EMAP 5514 Environ Risk Assessment Mgt 2 or 3 Credits

Level: Graduate, Undergraduate

Prerequisites: (EMAP 503 or EMAP 5503)

Grading: Main Campus (UGrad, Grad)

EMAP 5515 Adv Env Pol Making Science I 2 Credits

Level: Graduate, Undergraduate

Prerequisites: (EMAP 501 or EMAP 5501) and (EMAP 502 or EMAP 5502) and (EMAP 503 or EMAP 5503) and (EMAP 504 or EMAP 5504) and (EMAP 511 (may be taken concurrently) or EMAP 5511 (may be taken concurrently)) and (EMAP 512 (may be taken concurrently) or EMAP 5512 (may be taken concurrently)) and (EMAP 514 (may be taken concurrently) or EMAP 5514 (may be taken concurrently))

Grading: Main Campus (UGrad, Grad)

EMAP 5516 Adv Env Policy Making Sci. II 2 Credits

Continuation of Advanced Environmental Policy Making Science I: A Study of Practical Cases

Level: Graduate, Undergraduate

Prerequisites: (EMAP 515 or EMAP 5515)

Grading: Main Campus (UGrad, Grad)

EMAP 5517 Data Sci Mach Learn Env Met 2 Credits

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

EMAP 5520 Toxicity Testing for 21st Cent 2 Credits

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

EMAP 5521 MetrologyLabIIB:IndepResearch 1 Credit

This is a transitional course from EMAP 512 Environmental Metrology Lab I: Instrumental Principles and Measurements to EMAP 518 Capstone Projects. It provides authentic experiential learning processes through which students learn to carry out guided independent laboratory research on topics formulated either during EMAP-512 or the 10-week summer internships (EMAP 800) in the preceding summer. Under the guidance of instructors/advisors, students will first formulate a draft research proposal that addresses (1) why the chosen topic is important in environmental protection (big picture), (2) what are the specific questions of current interest that the proposed research aims to answer (research objectives), and (3) how the proposed research will be carried out. Students will then carry out trial laboratory experiments to refine/finalize the proposal and obtain preliminary results accordingly. The finalized proposal, together with the obtained preliminary results, will serve the blue print for the ensuing EMAP 518 Capstone Projects. At the end of the course, students are required to produce (1) a 5-min video that summarizes, (2) 10- to 15-min oral presentation of, and (3) a poster of (for the Q&A session). Students are not required to submit a comprehensive written report.

Level: Graduate, Undergraduate

Prerequisites: (EMAP 512 or EMAP 5512)

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: EMAP 513

Course registration restrictions:

Enrollment limited to students in the Env. Metrology and Policy department.

EMAP 7949 Tutorial 0.025-6 Credits

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

EMAP 7952 Program Internship

10-week research internship at NIST, EPA, or other qualified government agencies and NGOs.

Level: Graduate

Grading: Pass/Fail Default

Course registration restrictions:

Enrollment is limited to Graduate level students.

EMAP 7998 Capstone Project A 1 Credit

This is a summative independent research course that follows EMAP 518 Metrology Lab IIA/EMAP xxx Metrology Lab IIB. If needed, students may continue to finalize their research proposal at the very beginning of the course that started previously in Metrology Lab IIA/B. They will carry out the research proposed in the finalized the proposal. At the end of the course, students are required to produce (1) a 5-min video that summarizes, (2) 10- to 15-min oral presentation of, and (3) a poster of (for the Q&A session), and (4) a comprehensive and summative written report (in the format for peer-reviewed publications) of their capstone project research. (2) and (3) will take place at the Capstone Projects Symposium organized at the end of the course. In the written report, students are specifically required to address and discuss the research's relevance to policymaking related to the chosen contemporary environmental issue(s) that is the focus of students' capstone project.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

EMAP 7999 Capstone Projects B

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Students in the MS-EMAP program may **not** enroll.

Enrollment is limited to Graduate level students.