

# Master Degree Program in Environmental Sciences

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## General Information

The degree of Master of Science (MS) in Environmental Sciences is offered with four possible specializations:

- Ecosystem Management in the Faculty of Agricultural and Food Sciences (FAFS)
- Environmental Health in the Faculty of Health Sciences (FHS)
- Environmental Technology in the Maroun Semaan Faculty of Engineering and Architecture (SFEA)
- Environmental Policy Planning in the Faculty of Arts and Sciences (FAS)

The program draws on the resources of various departments of the faculties of Agricultural and Food Sciences (FAFS), Arts and Sciences (FAS), Engineering and Architecture (SFEA), Health Sciences (FHS), and Medicine (FM), and it provides opportunities for study and research in the general field of the environment.

The program provides graduates with the necessary tools for professional practice and/or the pursuit of higher education. It is administered by an interfaculty committee that coordinates with the graduate committees of the faculties concerned.

## Criteria for Admission

To be accepted into the program, an applicant must:

- meet general university requirements for admission to graduate study
- be recommended by the appropriate faculty graduate committee and accepted by the Interfaculty Coordinating Committee of the program
- Applicants to the program may be admitted under the following categories:
- graduate - if the average in the last 60 credits or the last two years is greater than 80
- graduate on probation - if the average in the last 60 credits or the last two years is less than 80 and greater than 75

Adequate preparation to take any graduate course is decided by the academic advisor and the Interfaculty Graduate Environmental Sciences Program Committee (IGESPC).

## Comprehensive Examination

The student must register and pass a 0-credit comprehensive examination course in accordance with University general requirements. Timing of the examination is set by the department/program. The Pass (P) or Fail (F) is entered online or is reported to the Registrar immediately on the date the comprehensive examination is passed any time during the semester.

In general, a comprehensive examination is a test that covers a broad base of material. The purpose of the examination is to assess the student's knowledge and capacities to earn a given graduate degree in the field of specialization. Depending on the degree program, it may test course knowledge, knowledge of the student's proposed research area, and/or general knowledge in the field. The student's thesis committee or the department administers the comprehensive exam.

## Degree Requirements

Requirements for the degree of Master of Science in Environmental Sciences (any specialization), both thesis and non-thesis options, are tabulated below. The master's degree with thesis option will normally require between 20 and 24 months to be completed. In both options, the student is required to complete 30 credits of which 9 credits are core courses.

Course	Group	Thesis Option Credits	Non-Thesis Option Credits
Core	A	9	9
Electives	B	15	18
Thesis		6	
Project			3
<b>Total number of credits required for graduation</b>			<b>30</b>

Core courses, as well as basic and broad electives, are listed below. These courses are structured to provide students with a diversified and multi-disciplinary background in environmental sciences. Students have to register the core course offered by their faculty of concentration. Students are also required to select two other supplementary courses from the list of core courses approved by the program. Students can take other elective courses from other faculties after securing the approval of the advisor. Specific Faculty/Department requirements are defined under each respective Faculty/Department.

Group A	Core Courses in Environmental Sciences	Credits
ENSC 630/LDEM 630	Natural Resources Management	3
ENSC 640/ENHL 310	Toxicology and Environmental Health Hazards	3
ENSC 650/PSPA 316	International Environmental Policy	3
One of the following offered courses		
ENSC 600/CIVE 655	Air Pollution and Control	3
CIVE 552	Waste Management and Treatment	3
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 553	Environmental Biotechnology	3
CIVE 654	Environmental Bioremediation	3

Group B	Examples of Concentration Electives	Credits
<b>1. Ecosystem Management</b>		
ENSC 600/CIVE 655	Air Pollution and Control I	3
CIVE 552	Waste Management and Treatment	3
ENSC 631/LDEM 631	Agricultural Pollution and Control	3
ENSC 633/LDEM 633	Ecological Landscape Design and Planning	3
ENSC 634/LDEM 634	Sustainable Landscape Planning and Management	3
ENSC 635/LDEM 635/ PSPA 3446A	Political Ecology of Water	3
ENSC 622/CIVE 653	Environmental Chemistry and Microbiology	3
ENSC 641/ENHL 312	Occupational Health	3
ENSC 642/ENHL 314	Environmental Management Systems	3
ENSC 652/CIVE 656	Environmental Impact Assessment	3
ENSC 654	Physical and Biological Resources in Terrestrial Ecosystems	3
ENSC 655/AGSC 301	Statistical Methods in Agriculture	3
ECON 333	Energy Economics and Policy	3
ENSC 662/ECON 338	Economics of Natural Resources and the Environment	3
LDEM 300	Directed Study in Ecosystem Management	3
LDEM 301	Urban Greening	3
LDEM 302	Green Infrastructure for Resilient Landscapes and Cities	3
BIOL 362	Advanced Ecology	3
BIOL 363	Population and Community Ecology	3
AGSC 376	Resource and Environmental Economics	3
AGSC 384	Rural Social Changes Development and Environment	3
CIVE 649	Climate Change and Water Resources	3
CIVE 552	Waste Management and Treatment	3
CIVE 633	Soil and Site Improvement	3
CIVE 654	Environmental Bioremediation	3
CIVE 655	Air Pollution and Control	3
CIVE 756	Environmental and Water Conflict Management	
URPL 664	Urban Land Use Planning	
URPL 665	Development and Planning Policies	

<b>2. Environmental Health</b>		
ENSC 600/CIVE 655	Air Pollution and Control I	3
ENSC 641/ENHL 312	Occupational Health	3
ENSC 642/ENHL 314	Environmental Management Systems	3
ENHL 300	Introduction to Environmental Health	2
ENHL 307	Food Safety	3
ENHL 308	Tutorial	1-3
ENHL 320	Special Topics in Environmental Risk Analysis	3
ENSC 652/CIVE 656	Environmental Impact Assessment	3
ENSC 658/PSPA 343	Environmental Conflict Resolution	3
ENSC 661/BIOL 363	Population and Community Ecology	3
ENSC 662/ECON 338	Economics of Natural Resources and the Environment	3
CIVE 756	Environmental and Water Conflict Management	3
<b>3. Environmental Technology</b>		
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 552	Waste Management and Treatment	3
CIVE 553	Environmental Biotechnology	3
CIVE 555	Air Quality Management	3
CIVE 602	Experimental Design and Statistical Methods	3
CIVE 650	Water and Sewage Works Design	3
CIVE 651	Processes in Water and Wastewater Treatment	3
CIVE 652	Landfill Engineering Design	3
CIVE 653	Environmental Chemistry and Microbiology	3
CIVE 654	Environmental Bioremediation	3
ENSC 600/CIVE 655	Air Pollution and Control I	3
CIVE 656	Environmental Impact Assessment	3
ENSC 651/CIVE 657	Methods of Environmental Sampling and Analysis	3
CIVE 751	Wastewater Reclamation and Reuse	3
CIVE 658	Industrial Waste Management	3
ENSC 602/CIVE 755	Air Pollution Modeling	3
ENSC 642/ENHL 314	Environmental Management Systems	3
ENSC 662/ECON 338	Economics of Natural Resources and the Environment	3
CIVE 601	GIS and Geospatial Data Modeling	3
CIVE 659	Environmental and Water Conflict Management	3

**4. Environmental Policy**

PSPA 300	Methodology and Research Design	3
ENSC 655/ PSPA 306	Research Methods and Techniques	3
PSPA 310	International Politics	3
PSPA 311	International Politics in the ME	3
PSPA 312	Public International Law	3
PSPA 314	The UN and International Politics	3
PSPA 317	International Political Economy	3
PSPA 324	Government and Politics of Lebanon	3
ENSC 657/PSPA 341	Environmental Regulation and Legislation	3
PSPA 345	Special Topics in Environmental Policy and Politics	3
PSPA 346	Special Topics in Natural Resource Policy and Politics	3
PSPA 351	Foundation of Public Administration	3
PSPA 352	Foundations of Public Policy	3
PSPA 360	Public Policy Research and Analysis	3
ENSC 659/PSPA 362	Public Policy and Administration	3
PSPA 373	The Ethics of Public Administration	3
AGSC 376	Resource and Environmental Economics	3
AGSC 384	Rural Social Change, Development the Environment	3
ECON 333	Energy Economics and Policy	3
ECON 338	Economics of Natural Resources and the Environment	3
URPL 664	Urban Land Use Planning	3
URPL 665	Development and Planning Policies	2

A student can take other elective courses from the other faculties after securing the approval of her/his advisor.

## Graduation Requirements

To be eligible for graduation with the master's degree in environmental sciences, a graduate student must:

- have attained a cumulative course average of 80 or above
- not be placed on probation by the time the course work is completed
- have completed the minimum credit hours of course work designated by the program
- have passed the comprehensive exam
- have completed thesis requirements for the thesis option degree
- have completed project requirements for the non-thesis option degree
- have met the residence requirements specified for the master's degree

## Master of Science in Environmental Sciences-Suggested Curriculum

Thesis Option		
Term I	Fall	Credits
ENSC 640	Toxicology and Environmental Health Hazards	3
Any one of the following offered courses		
ENSC 600/CIVE 655	Air Pollution and Control	3
CIVE 552	Waste Management and Treatment	3
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 553	Environmental Biotechnology	3
CIVE 654	Environmental Bioremediation	3
ENSC 69_	Elective	3
Term II	Spring	Credits
ENSC 630	Natural Resources Management	3
ENSC 650	International Environmental Policy	3
Any one of the following offered courses		
ENSC 600/CIVE 655	Air Pollution and Control I	3
CIVE 552	Waste Management and Treatment	3
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 553	Environmental Biotechnology	3
CIVE 654	Environmental Bioremediation	3
ENSC 69_	Elective	3
Term III	Summer	Credits
ENSC 699	Thesis	3
Term IV	Fall	Credits
ENSC 699	Thesis	3
ENSC 69_	Elective	3
Term V	Spring	Credits
ENSC 699	Thesis	3
ENSC 69_	Elective	3
Term VI	Summer	Credits
ENSC 699	Thesis (continued)	

Non-Thesis Option		
Term I	Fall	Credits
ENSC 640	Toxicology and Environmental Health Hazards	3
ENSC 69_	Elective	3
Any one of the following offered courses		
ENSC 600/CIVE 655 Air	Pollution and Control I	3
CIVE 552	Waste Management and Treatment	3
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 553	Environmental Biotechnology	3
CIVE 654	Environmental Bioremediation	3
Term II	Spring	Credits
ENSC 630	Natural Resources Management	3
ENSC 650	International Environmental Policy	3
Any one of the following offered courses		
ENSC 600/CIVE 655	Air Pollution and Control I	3
CIVE 552	Waste Management and Treatment	3
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 553	Environmental Biotechnology	3
CIVE 654	Environmental Bioremediation	3
ENSC 69_	Elective 3	3
Term III	Summer	Credits
ENSC 697	Project	3
ENSC 69_	Elective	3
Term IV	Fall	Credits
ENSC 69_	Elective	3
Term V	Spring Credits	
ENSC 697	Project	3
<b>Total</b>		<b>30</b>

## Course Descriptions

### CIVE 550 Water Treatment and Laboratory 3 cr.

A course that examines the quality and principles of municipal and industrial water treatment processes and methods of testing for physical, chemical and biological parameters. *Prerequisite: CIVE 251 or equivalent, or consent of instructor.*

### CIVE 551 Wastewater Treatment and Laboratory 3 cr.

A course that examines the quality and principles of municipal wastewater treatment processes and methods of testing for physical, chemical, and biological parameters. *Prerequisite: CIVE 252 or equivalent, or consent of instructor.*

### CIVE 552 Waste Management and Treatment 3 cr.

A course on engineering principles, practices, and techniques for the management of solid wastes: sources, composition, properties, impacts, generation, storage, collection and transport, processing, resource recovery, and disposal.

### CIVE 553 Environmental Biotechnology 3 cr.

A course that examines current and emerging environmental biotechnologies used for environmental quality evaluation, monitoring, and remediation of contaminated environments, and provides students with a working knowledge of the science that underpins them. *Prerequisite: CIVE 252, or equivalent or consent of instructor.*

### CIVE 555 Air Quality Management 3 cr.

A course on the principles, practices, and techniques for the management of air pollution: Types, sources, properties, impacts, standards, control technologies, atmospheric dispersion, emissions, and indoor air quality.

### CIVE 601 GIS and Geospatial Data Modeling 3 cr.

A course that examines the concepts and principles of Geographic Information Systems (GIS). It provides coverage of state-of-the-art GIS methods and tools: spatial and terrain analysis, geostatistical analysis, time series analysis, and development of GIS integrated models.

### CIVE 602 Experimental Design and Statistical Methods 3 cr.

A course that covers the main steps required to efficiently plan, conduct, analyze, and interpret the results from experiment and observational studies. The course focuses on statistical inference and modeling. Topics covered include ANOVA, t-tests, regression models, and nonparametric tests. The course involves working within a statistical modeling environment.

### CIVE 633 Soil and Site Improvement 3 cr.

A course that covers compaction, admixture stabilization, foundation soil treatment, reinforced soil and composite materials, and material sites reclamation.

### CIVE 648 Climate Change and Water Resources 3 cr.

An introductory course on global climate change and its potential impacts on water resources and related sectors. It explores drivers of climate change, greenhouse gases emissions and mitigation efforts, and adaptation options with emphasis on Integrated Water Resources Management.

**CIVE 650 Water and Sewage Works Design 3 cr.**  
A course that examines the design of water and wastewater schemes, including design reports and a literature search on the development of conventional treatment processes. *Prerequisites: CIVE 550 and CIVE 551, or consent of instructor.*

**CIVE 651 Processes in Water and Wastewater Treatment 3 cr.**  
A course on sedimentation, filterability, permeability and fluidization, ion exchange, aeration, flotation, membrane filtration, and aerobic digestion. Experimental applications of processes. *Prerequisite: CIVE 251, CIVE 252, or equivalent or consent of instructor.*

**CIVE 652 Landfill Engineering Design 3 cr.**  
A course on solid waste disposal with emphasis on design development of landfill elements: site selection and characterization, gas extraction and management, leachate collection and management, liners, covers, closure and post-closure monitoring. *Prerequisite: Consent of instructor.*

**CIVE 653 Environmental Chemistry and Microbiology 3 cr.**  
A course that deals with organic, inorganic, and physical chemistry; chemical equilibrium; reaction kinetics; acidity, alkalinity; composition, morphology, and classification of microorganisms; energy, metabolism, and synthesis; growth, decay, and kinetics; and biological water quality indicators. *Prerequisite: CIVE 251, CIVE 252, or equivalent; or consent of instructor.*

**CIVE 654 Environmental Bioremediation 3 cr.**  
A course that discusses the application of biological treatment for the remediation of contaminated environments, and highlights current engineering methods/design used to enhance biodegradation.

**ENSC 600/ CIVE 655 Air Pollution and Control 3 cr.**  
A course that examines processes and design equipment for the control of particulates and gaseous emissions. *Prerequisite: Consent of instructor.*

**CIVE 656 Environmental Impact Assessment 3 cr.**  
A course on procedures of assessing/preparing/reviewing/presenting environmental impacts of developmental projects/facilities: industrial facilities, waste management/disposal, wastewater treatment, transportation, dams and reservoirs, irrigation/drainage schemes, coastal zone developments, natural resource management, and so on. *Prerequisite: E4 status or consent of instructor.*

**ENSC 651/ CIVE 657 Methods of Environmental Sampling and Analysis 3 cr.**  
A course on sampling techniques and instrumental methods in environmental sciences; determination of pollutants in water, air, and soil; analytical techniques; adaptation of procedures to specific matrices; case studies. *Prerequisite: CIVE 251, CIVE 252, or equivalent or consent of instructor.*

**CIVE 751 Wastewater Reclamation and Reuse 3 cr.**  
A course that examines environmental issues in water reuse, risk assessment, water reclamation technologies, storage of reclaimed water, usage of reclaimed water, and planning of wastewater reclamation and reuse. *Prerequisite: CIVE 551.*

**CIVE 685 Industrial Waste Management 3 cr.**  
A course on engineering principles, practices, and techniques for the management of industrial hazardous wastes: sources, generation, properties. Impacts and auditing of industrial facilities. Basic treatment processes and disposal methods. Site remediation. *Prerequisite: Consent of instructor.*

**ENSC 602/ CIVE 755 Air Pollution Modeling 3 cr.**  
A course that deals with mathematical models, air pollution meteorology, plume rise, dispersion and atmospheric chemistry, meteorological models, as well as Gaussian, statistical, and other special application models. *Prerequisite: CIVE 555 or consent of instructor.*

**CIVE 659 Environmental and Water Conflict Management 3 cr.**  
A course on the development of case studies in environmental and water conflict management taught under a framework of role play of opponents perspective and decision making thereof.

**LDEM 300 Directed Study in Ecosystem Management 1-3 cr.**

**LDEM 301 Urban Greening 3 cr.**  
This course focuses on the literal green aspect of urban greening that is plants and how they contribute to improve urban living. Topics covered in the course include urban agriculture, green roofs, walls, facades and corridors, parks and open spaces, urban forestry, and horticulture therapy.

**LDEM 302 Green Infrastructure for Resilient Landscapes and Cities 3cr.**  
The course will introduce students to the concepts, theories, and applications of design, planning, and policy of green infrastructure with a focus on the delivery of ecosystem benefits. A particular focus is the relationship between green infrastructure and climate change adaptation of landscapes and cities. A case study approach is utilized to study green infrastructure across multiple scales, disciplines and applications in the Middle East and North Africa (MENA) Region.

**ENSC 630/ LDEM 630 Natural Resources Management 3 cr.**  
This course is an ecosystem approach to NRM. Data sources and interpretation for NRM. Physical, socio-economic, cultural, political, and geographic specificity of NRM. Principles and processes of NRM. Case studies and practical examples in contrasting situations.

**ENSC 631/ LDEM 631 Agricultural Pollution and Control 3 cr.**  
This course covers fate of agrochemicals in the environment. Effect on terrestrial and aquatic systems. Contamination, monitoring residues, methodologies, and risk assessment models and research.



**ENSC 633/ LDEM 633 Ecological Landscape Design and Planning 3 cr.**

This course is an introduction to the theory and methodology of ecological landscape design and planning, aims to introduce the holistic approach of landscape ecology and its application in sustainable management of natural and cultural landscape systems. *Alternate years.*

**ENSC 634/ LDEM 634 Sustainable Landscape Planning and Management 3 cr.**

This course is an introduction to the theory and methodology of sustainable landscape planning, which aims at introducing a holistic approach of sustainable planning on the national level of management, including the legal framework, relevant sector policies and prevailing practices.

**ENSC 635/ LDEM 635/ PSPA346A Political Ecology of Water 3 cr.**

This course provides an approach to understand water issues bringing together political economy and hydro-geography. The course objective is to introduce students to the modes of use and management of water resources, analyzing the causes of water injustice, revealing power relations and environmental hidden costs. The course is planned to emphasize on the situation of water politics in the Arab region.

**ENHL 300 Introduction to Environmental Health 2 cr.**

A course that introduces students to the physical life support system and interactions with the socio-economic context. Emphasis is placed on assessing, preventing, and controlling environmental hazards affecting human health and ecological wellbeing. The role of local and global regulatory systems in impacting change and sustaining a healthy environment is highlighted. Enabling communities through this process of sustainable development is critically assessed.

**ENHL 307 Food Safety and Health 3 cr.**

The course will focus on the safety and management of processed food products. It will address the advantages and limitations of food processing techniques and in specific the application of food additives. Areas covered will relate mainly to food safety and quality control, health impacts, types and limitations of food processing methods, use of food additives, exposure estimation, toxicological implications, risks and benefits governing use and quality control measures and applications both at the national and international levels.

**ENHL 308 Tutorial 3 cr.**

This course is a tutorial on Special Environmental Health projects of interest to the students. A written report is required.

**ENSC 640/ ENHL 310 Toxicology and Environmental Health Hazards 3 cr.**

A course that reviews the essentials of toxicology: dose response, toxicokinetics (absorption, distribution, metabolic conversion, elimination), and the molecular basis for toxic action, target organ toxicity, mutagenesis, teratogenesis, and carcinogenesis. Selected chemical and biological agents that adversely affect man and environmental quality are introduced as case studies.

**ENSC 641/ ENHL 312 Occupational Health 3 cr.**

This course is an introduction to the general principles relating to occupational health. Issues related to work, work environment and organization, and their impact on the physical and mental wellbeing of employees. Principles of recognizing, evaluating, and controlling work hazards with an emphasis on the multidisciplinary nature of the field of occupational health. Various disciplines involved in occupational health and used by occupational health professionals to safeguard the health of employees, including toxicology, safety, hygiene, epidemiology, ergonomics, occupational medicine, psychology, and sociology. This course is designed for students of multiple educational and training backgrounds and does not require prerequisite knowledge.

**ENSC 642/ ENHL 314 Environmental Management Systems 3 cr.**

This course provides an overview of the most common international standards for environmental management systems, primarily the International Standards Organization (ISO) harmonized management systems, and its implications for different firms. It provides students with the skills to design, implement and assess such management systems. Though the first part of the course is mainly lecture based, student participation in the form of questions and discussion is always welcomed and encouraged. Critical thinking will be promoted throughout the course. Students will be expected to prepare a technical report on a firm or industry of their choice and to communicate project findings to their colleagues through verbal presentation. Emphasis is placed on solving environmental problems using an integrated approach in order to achieve an optimized management performance. *Alternate years.*

**ENHL 320 Special Topics in Environmental Health 3 cr.**

This course includes a “service learning” component through which students will engage with a predetermined organization to identify and address a public health problem. This opportunity will allow students to “share” and “receive” knowledge and expertise leading to enhanced learning among students and benefit to the chosen organization

**PSPA 300 Methodology and Research Design 3 cr.**

This course is an introduction to the philosophy of science and how it influences the choice of research design. The emphasis is on developing skills that are useful for any method (survey, research, comparative historical analysis, game theory). The objective is to provide students with the practical tools they need to successfully complete original research. *Core course. Annually.*

**ENSC 653/ PSPA 306 Research Methods and Techniques 3 cr.**

A course that deals with various methods of data collection and analysis. Specific research methods include both quantitative and qualitative techniques such as experimental, survey, field observation, content analysis, historical/comparative, and evaluation. *Occasionally.*

**PSPA 310 International Politics 3 cr.**

This seminar provides a survey of the discipline of international politics and contemporary research in the field. In addition to covering central theoretical perspectives in international relations theory, the course will introduce students to contemporary debates in international politics and policy with an emphasis on topics and themes relating to the Middle East. Students will develop critical thinking and analytical writing skills through close reading of key texts and writing exercises. *Core course. Annually.*

**PSPA 311 International Politics and the Middle East 3 cr.**

This seminar deals with issues and themes relevant to contemporary Middle East politics within the context of international relations. It explores how the politics of the Middle East, US policy in the Middle East, and the Middle East as a regional system have been understood and represented through the lens of international relations theory and scholarship. Topics include: the evolution of the Middle East state system, Arab Nationalism and the Cold War, the Arab-Israeli conflict and US policy towards Israel and the Palestinians, the geopolitics of oil and the Gulf, the Iraq War and its regional consequences, Iran's role in the Arab world, the question of empire and the future of US grand strategy, and Lebanon's position in regional politics. *Annually.*

**PSPA 312 Public International Law 3 cr.**

A course that aims to provide an understanding of the principles underlying public international law that facilitates relations among states, resolves disputes, protects human rights, allocates resources, and restricts conduct during wartime. Emphasis is placed on subfields of international law most closely connected to international politics such as the legal consequences of very serious violations of international law, the role played by the United Nations or the legal regulation of the use of force. Reflecting upon the kind of role international law plays in the conduct of international relations, this course includes many recent case studies and tackles some of the major debates in the field. *Annually.*

**PSPA 314 The UN and International Politics 3 cr.**

This seminar examines the role of the United Nations (UN) within the context of international politics, security, and development. It focuses on the UN role in the Global South, particularly the Arab region. The course explores theoretical perspectives on the role of the UN in world politics and traces the evolution of UN institutions, and in particular UN peacekeeping, from the Cold War to post-Cold War period including the war on terror. It then considers a series of case studies in depth. The course will include, when possible, guest presentations from UN officials and a field trip to better appreciate the conditions within which UN operations work. *Occasionally.*

**ENSC 650/ PSPA 316 International Environmental Policy 3 cr.**

A course that seeks to provide a broad overview of the key concepts, actors, and issues related to global environmental policy. This course outlines the evolution of environmental policy in facing global environmental challenges and how such policies have become inherently intertwined with government policy, business practice, and international trade. *Annually.*

**PSPA 317 International Political Economy 3 cr.**

This course provides a critical examination of the politics of international economic relations, global economic development, and transnational economic activity with a special emphasis on the position and experiences of the Middle East states in the global political economy. The course offers a survey of theoretical approaches to international political economy and addresses themes critical to the experience of the Middle East such as state-led industrialization, trade and regionalism, finance, oil, labor migration, MNCs, transnational movements, globalization, neo liberalism, and the politics of development and global governance. *Occasionally.*

**PSPA 324 Government and Politics in Lebanon 3 cr.**

A course that examines the evolution of the political system and the different approaches to the study of government institutions in Lebanon. This course focuses on patterns of change involving state and society from the founding of the state in the early 1920s to the present. *Occasionally.*

**ENSC 657/ PSPA 341 Environmental Regulation and Legislation 3 cr.**

An introduction to contemporary legislative approaches to environmental protection, the rationales for their embodiment in policies, and their effectiveness in achieving prescribed goals and alleviating environmental degradation. This course also examines the emergence of environmental initiatives in developing countries with a focus on the latest developments in Lebanon. *Occasionally.*

**PSPA 345 Special Topics in Environmental Policy and Politics 3 cr.**

May be repeated for credit. *Occasionally.*

**PSPA 346 Special Topics in Natural Resource Policy and Politics 3 cr.**

May be repeated for credit. *Occasionally.*

**PSPA 351 Foundations of Public Administration 3 cr.**

This seminar is an advanced study and analysis of the field of public administration, from its foundations and origins up to the present. It covers topics such as: historical public administration, the traditional model of public administration, new public management, and collaborative public administration. The course will also review contemporary research activities and findings related to public administration. *Annually.*

**PSPA 352 Foundations of Public Policy 3 cr.**

This seminar covers topics related to the substance, methods and frameworks of public policy in a variety of disciplines including: welfare economics, political science, political economy, and organization theory. Emphasizing the role of theory in empirical policy research, the course illuminates the various policies and policy challenges in the following substantive areas: economics; education; the environment; national security; and immigration. *Annually.*

**PSPA 360 Public Policy Research and Analysis 3 cr.**

This seminar provides an introduction to policy analysis typologies, policy tools, and the factors that shape the utilization of policy analysis. It is designed to give students the theoretical and practical exposure to the process of the analysis of public policy as well as to its relevant qualitative, survey, and mixed method approaches and techniques. *Annually.*

**ENSC 659/ PSPA 362 Public Policy and Administration 3 cr.**

This seminar covers topics and frameworks related to the substance and approaches of public policy as they relate to public administration. Students will engage in a serious analysis of the economic, social, and cultural assumptions that underpin government and its relationship to the polity. The course is also designed to give students an organized opportunity to investigate their own interests within a specific key policy area. *Annually.*

**BIOL 362 Advanced Ecology 3 cr.**

A discussion and analysis of topics of current interest in ecology with emphasis on population and community dynamics; methods of ecological investigation and analysis; includes fieldwork.

**ENSC 661/ BIOL 363 Population and Community Ecology 3 cr.**

A course that introduces the various models and theories of population dynamics and community structure, and their applications in assessing the complex interactions that occur in natural plant-animal systems as a result of long co-evolution, with emphasis on chemical ecology.

**ECON 333 Energy Economics and Policy 3 cr.**

A study of the theories related to energy economics, such as economics of natural and energy resources, and the interrelationship between energy, economics and the environment, as well as some important issues in energy policy. *Students cannot receive credits for both ECON 333 and MECH 674. Occasionally.*

**ENSC 662/ ECON 338 Economics of Natural Resources and the Environment 3 cr.**

An analysis of economic issues regarding the efficient use of natural resources and the management of environmental quality. *Occasionally.*

**ENSC 654 Physical and Biological Resources in Terrestrial Ecosystems 3 cr.**

Physical and biological resources in ecosystems. Soils in the ecosystem. Soil conservation. Principles of soil chemistry and microbiology. Plant and animal biodiversity. Collection and conservation of wild types. Preservation of endangered species. Plant response to environmental stress. *Alternate years.*

**ENSC 655/ AGSC 301 Statistical Methods in Agriculture 3 cr.**

An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

**AGSC 376 Resource and Environmental Economics 3 cr.**

This course addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

**AGSC 384 Rural Social Change, Development and the Environment 3 cr.**

This course provides an understanding of economic development and underdevelopment as it relates to environmental degradation and demographic, social and cultural change; with special application to the economies of the Middle East.

**URPL 664 Urban Land Use Planning 3 cr.**

This course examines the theory and practice of land use planning as it has developed within the wider practice and theorization of planning. The course explores the ways in which land use controls have been developed and managed in different institutional and regional contexts, unraveling the different conceptualizations of planning that support each of them. Special emphasis is placed on the case of Lebanon where the practice of land use planning is explored through a detailed introduction to planning institutions, agencies, and regulations.

**URPL 665/ ARCH 062 Development and Planning Policies 3 cr.**

The course examines local and regional development and spatial planning projects and policies. It investigates the policy governance and institutional setup, the role of professional expertise, the spatial impacts on the built and un-built environments, as well as the social and environmental impacts. Using case-study analysis of selected cities and regions, students learn how the built environment's growth and development is being managed, across different contexts, by a constellation of stakeholders negotiating conflicting interests, often yielding benefits and costs unequally distributed across various constituent groups.

**ENSC 690<sup>1</sup>/ CIVE 601 Seminar in Environmental Engineering and Sciences 0 cr.**

Current research or applied projects are presented by faculty members, students, or invited speakers. *Annually.*

**ENSC 695 Comprehensive Exam 0 cr.**

**ENSC 697 Project 3 cr.**

The project must be undertaken, in partial fulfillment of the requirements for the degree, upon the completion of at least 27 credits of core and elective courses. A student who is unable to finish the project in one semester can register for one additional time.

**ENSC 699 Thesis 6 cr.**

<sup>1</sup> ENSC 690 course should be registered twice by the program's students during their residency at AUB. Otherwise, they are equally encouraged to attend the seminar when offered.