



Study Plan

School: School of Sciences and Technology
Degree: Master
Course: Environmental Management and Policy (cód. 623)

1st Year - 1st Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS12139M	Climate and Atmospheric Environment	Environmental Sciences	3	Semester	78
BIO12140M	Biological Communities	Environmental Sciences	6	Semester	156
PAO12141M	Pollution and Environmental Risk	Environmental Sciences	6	Semester	156
FIS12142M	Energy and Natural Resources	Environmental Sciences	6	Semester	156
PAO12143M	Environmental Technologies	Environmental Sciences	3	Semester	78
SOC12144M	Law and Sociology of the Environment	Social Sciences	6	Semester	156

1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
ECN12145M	Environmental Economics	Social Sciences	6	Semester	156
ECN12146M	International relationship and Environment	Social Sciences	3	Semester	78
PAO12147M	Environmental Management	Environmental Sciences	6	Semester	156
PAO12148M	Environmental assessment	Environmental Sciences	6	Semester	156
PAO12149M	Environmental Planning and Policies	Environmental Sciences	6	Semester	156
BIO12150M	Case Studies	Environmental Sciences	3	Semester	78

2nd Year - 3rd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
	Dissertation				
	Project Work				

2nd Year - 4th Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
	Dissertation				
	Project Work				



Conditions for obtaining the Degree:

*** TRANSLATE ME: Para conclusão do curso é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares:

1^o Ano

1^o Semestre:

6 UC obrigatórias num total de 30 Ects

2^o Semestre:

6 UC obrigatórias num total de 30 Ects

Para obtenção do grau, é necessário também a aprovação na Dissertação ou Trabalho de Projecto, com um total de 60 ECTS, no 3.^o e 4.^o Semestre. ***

Program Contents

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Climate and Atmospheric Environment (FIS12139M)

●Climate and Climate System

●Radiation

1. Atmospheric circulation
2. Climate forcing due to greenhouse gases and aerosols
3. Climate changes
4. Observational and monitoring methods of climate system
5. Basic concepts about atmospheric composition and structure
6. Biogeochemical cycles
7. Sources, Sinks and fluxes
8. Main cycles
 - 8.1. Water cycle
 - 8.2. Carbon cycle
 - 8.3. NO₂ cycle
 - 8.4. SO₂ cycle
9. Anthropogenic activities with impact upon the cycles
10. Heavy metals and mercury biogeochemical cycle



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Biological Communities (BIO12140M)

1. Terrestrial communities
 - 1.1. Vegetation
 - 1.1.1. Bioclimatic regions of the world
 - 1.1.2. Principal biomes: climate, soil, vegetation fauna human pressures
 - 1.1.3. Mediterranean vegetation
 - 1.1.4. Principal climatic and edafic series and respective successional unities
 - 1.1.5. Natural and semi-natural vegetation as a bio indicator
 - 1.2. Animal communities
 - 1.2.1. Fauna of the main terrestrial ecosystems
 - 1.2.2. Threads to terrestrial fauna
 - 1.2.2.1. Fragmentation/ destruction of habitats
 - 1.2.2.2. Introduction of alien species
 - 1.2.2.3. Overexploitation
2. Freshwater communities
 - 2.1. Structure and function of lotic ecosystems
 - 2.2. Structure and function of lentic ecosystems
 - 2.3. Ictiofauna
 - 2.4. Ecological flow
3. Coastal and oceanic communities
 - 3.1. Environmental sea profiles
 - 3.2. Hard and soft coastal ecosystems
 - 3.3. Wetlands
 - 3.4. Pelagic ecosystems
 - 3.5. Deep benthic ecosystems

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Pollution and Environmental Risk (PAO12141M)

1. Pollution concept
2. Pollution types and classification
3. Environmental Risk
 - 3.1. What is it
 - 3.2. Types of environmental risks
 - 3.3. Methods to evaluate environmental risk
4. Atmospheric Pollution
 - 4.1. Historical overview
 - 4.2. Air pollutants and its sources
 - 4.3. Air pollutants transport and dispersion
 - 4.4. Impacts of air pollution on health and ecosystems
 - 4.5. Air quality management
5. Water Pollution
 - 5.1. Water pollutants, their origins and contamination processes
 - 5.2. Degradation (morphological, physical, chemical and biological) of aquatic ecosystems
 - 5.3. Biological indicators of water resources quality
 - 5.4. Water Framework Directive
 - 5.5. Water resources management
6. Soil contamination
 - 6.1. Soil hazards and soil degradation
 - 6.2. Sources of soil hazards
 - 6.3. Soil contamination impacts



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Energy and Natural Resources (FIS12142M)

The energy sector

The energy cycle

Environmental reservoirs of energy

Hydrologic Cycle

Carbon cycle

Sources and sinks

Secular evolution of the ratio H / C in primary energy consumption

Growth in production / consumption

Fuels

CO2 emissions and sequestration opportunities

Replacement of competitive products and processes

1. Forms of energy, energy resources, conversion between different forms of energy. Environmental impact of energy conversion systems.

2. Renewable energy resources (biomass and bioenergy, solar energy, wind energy, Hydropower). Energy in buildings and transport.

Energy Policy.

3. Concept of georesource. Social and economic importance of geo-resources. Geo-resources availability.

4. Integrated management of natural resources.

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Environmental Technologies (PAO12143M)

General notions about systems of water supply. Quality water supply and design of treatment systems.

Examples of treatment systems.

Systems for wastewater treatment and their characterization.

Production and composition of waste. Collection and transportation of waste. Processes and Technologies of Solid

Waste Management. Social and economic aspects of waste management.

Definition of soil pollution. Main causes and processes of degradation. Integrated strategies for soil protection:

DPSIR approach and MF-MI. Soil Pollution by different economic activities. Erosion and desertification, salinization, environmental liabilities.

The natural and polluted atmosphere. The sources of air pollution. Characterization of the Portuguese situation in terms of emissions and air quality. Control of mobile sources and stationary sources. Integration of measures in plans and programs.



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Law and Sociology of the Environment (SOC12144M)

- 1.1. Social order and law.
- 1.2. Concept of law
- 1.3. Sources of law
- 1.4. Interpretation and integration of the legal law
- 1.5. Custody law
- 1.6. Temporal application of the law
2. Environmental Law
 - 2.1 Introduction
 - 2.2. National and international environmental law
 - 2.3. Principles of environmental law
 - 2.4. Management tools of environmental policy
 - 2.5. Ecological conflicts
3. European Institutions and Policies
 - 3.1. European model of integration
 - 3.2. European Institutions
 - 3.3. European environmental policies
4. Environmental Sociology
 - 4.1. Social Sciences and Environment
 - 4.1.1. Historical perspective
 - 4.1.2. Actual approach
 - 4.2. The environment as a social and political issue
 - 4.2.1. Borning of the environmental awareness
 - 4.2.2. Society and environment
 - 4.2.3. Political response to social concerns related to the environment
 - 4.2.4. Environmental awareness and political responses
 - 4.3. From the natural environment to the socialized environment

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Environmental Economics (ECN12145M)

Economics and the environment; economic approach to environmental problems identification and solving/mitigation.

Introduction to microeconomics: consumer behaviour, producer behaviour, markets; perfect competition; fundamentals of general equilibrium: efficiency and social welfare.

Market failures and the environment (e.g. positive and negative externalities; common-pool resources and open access, public goods) - causes and environmental consequences.

Economic approach to pollution control: efficient level of control; cost-effectiveness analysis; Coase (property rights) vs Pigou (taxes) approaches.

Environmental policy instruments: evaluation/selection criteria; type of instruments - command and control, economic and market-based, information, voluntary, decentralized action; case studies.

Appraisal of investment projects: definition and typology of investments; selection and evaluation criteria - NPV, IRR; examples.



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International relationship and Environment (ECN12146M)

1. Introduction to the concept and practice of international relations. Global environmental Problems and International Politics. Setting objectives, Implementation, Institutions and Conflicts of Interest.
2. United Nations Convention on Environment and International Cooperation. Main conventions. The role of the United Nations. Prospects for Global governance.
3. International Management of Resources and Transboundary Pollution. Scope of issues: global, continental and bilateral. Energy sources. Fossil fuels. Renewable energy. Energy Accounting. Energy Geo-Strategy. Petroleum Market. Nuclear power. The electricity market. Strategies for energy planning. Energy Use. Management of Air Pollution. Case studies.
4. International Conflict and Crisis - Spaces oceanic and coastal zones. Open ocean and coastal zones. International waters and rivers. Forest and biodiversity. Climate change and desertification.

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Environmental Management (PAO12147M)

Environmental management principles: precautionary, polluter/user pays, responsibility, non-degradation and adaptive management principles. Sustainability: natural, manufactured and human capital: strong versus weak sustainability; implications for management of the natural capital. Sustainability assessment: biophysical indicators. Sustainability objectives: absolute and relative decoupling, factor 4 and factor 10. Integrated environmental assessment: types of indicators used; DPSIR model. Reporting environmental management information: State of the Environment Reports. Environmental scenarios. Establishment of environmental management priorities and targets. Environmental management systems – ISO 14001 standard and the Eco-management and Auditing Scheme (EMAS). Environmental audits – audit types; general methodology. Life cycle analysis: scope and objectives, life cycle inventory- allocation procedures, life cycle impact assessment; interpretation of results. Environmental labelling.

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Environmental assessment (PAO12148M)

1. Concept of Environment
2. Concept of Evaluation
3. Concept of Environmental Evaluation
 - a. Environmental evaluation as sustainability evaluation
 - b. Environmental evaluation in the frame of the decision cycle
4. Practical approaches to the evaluation process
5. The formal and administrative environmental evaluation instruments:
 - a. Environmental Impact Assessment
 - b. Strategical environmental assessment
 - c. Environmental audits
 - d. Environmental certification (ISO 9001 and 14001 norms)
 - e. Environmental management systems (EMAS regulation)
 - f. Others such as Product Life Cycle Assessment
6. The evaluation universes – biophysical systems
 - a. Geology
 - b. Climate
 - c. Soils
 - d. Hydrology
7. The specific universe of the ecological systems – illustration of the development of the evaluation procedure in a specific domain
8. Risk and Outrage evaluation – communication and public participation



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Environmental Planning and Policies (PAO12149M)

Environmental Plans and Policies, concepts, objectives, typologies and policies. Governance and public participation: democratic structures, formal and informal. Legal framework for participation. The role of public administration. Theory and practice of interactive methodologies and collaborative participation (3rd generation): a) identification and assessment of key actors, their interests and perceptions; b) Stakeholder mapping, relationship and conflict networks; c) Perception and risk assessment; d) Facilitation techniques, negotiation and environmental mediation – principles and practical applications. Information, communication and involvement of citizens, NGOs and the private sector. Integration of interactive methods in Territorial Management and in processes of EIA (Environmental Impact Studies) and AAE (Strategic Environmental Evaluation). New forms of citizenship and social responsibility.

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Case Studies (BIO12150M)

The contents will depend from the University where the edition will occur. In each edition study cases more related with the respective University. This CU will be jointly planned at the beginning of the classes by teachers representing the three universities as well as different scientific areas. For this reason, the responsible staff is composed by a set of teachers from the three universities.

The case studies will be explored by:

1. Seminars to introduce the case studies
2. Lectures to introduce technical visits to the case studies
3. Technical visits to the case studies
4. elearning