



Study Plan

School: School of Sciences and Technology
Degree: Master
Course: Environmental Management and Policy (cód. 332)

1st Year - 1st Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS09652	Climate and Atmospheric Environment	Environmental Sciences	5	Semester	130
BIO09715	Biological Communities	Biology	5	Semester	130
PAO09716	Environmental Pollution and Risk Assessment	Environmental Sciences	5	Semester	130
FIS09717	Energy and Natural Resources	Environmental Sciences	5	Semester	130
PAO09718	Environmental Technologies	Environmental Sciences	4	Semester	104
SOC09719	Law and Sociology of the Environment	Social Sciences	6	Semester	156

1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
ECN09720	Environmental Economics	Social Sciences	5	Semester	130
ECN09721	International Relations and Environment	Social Sciences	5	Semester	130
PAO09722	Environmental Management	Environmental Sciences	5	Semester	130
PAO09723	Environmental Assessment	Environmental Sciences	5	Semester	130
PAO09724	Environmental Planning and Policies	Environmental Sciences	6	Semester	156
BIO09725	Case-Studies	Environmental Sciences	4	Semester	104

2nd Year - 3rd Semester

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



Conditions for obtaining the Degree:

*** TRANSLATE ME: Para aprovação na componente curricular é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares: { \ }newline

{ \ }newline

1º Semestre: { \ }newline

6 UC obrigatórias num total de 30 Ects { \ }newline

{ \ }newline

2º Semestre: { \ }newline

6 UC obrigatórias num total de 30 Ects { \ }newline

{ \ }newline

Para obtenção do grau, é necessário também a aprovação na Dissertação ou Relatório de Estágio, com um total de 60 ECTS, no 3.º e 4.º Semestre. { \ }newline

Program Contents

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Climate and Atmospheric Environment (FIS09652)

- Climate system and Climate
- Climate variability
- Energy cycle and Atmospheric circulation
- Atmospheric composition and structure. Natural Greenhouse effect
- Enhancement of Greenhouse effect and aerosol impact.
- Climate forcing due to greenhouse gases and aerosols
- Climate changes
- Observational and monitoring methods of atmospheric constituents
- Climate change detection. Climate models; climate scenarios
- Biogeochemical cycles
- Sources, Sinks and fluxes
- Main cycles
- Water cycle
- Carbon cycle
- NO₂ cycle
- SO₂ cycle
- Anthropogenic activities with impact upon the cycles
- Heavy metals and mercury biogeochemical cycle



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Biological Communities (BIO09715)

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. Threats 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
 - 3.3. hard and soft coastal ecosystems
 - 3.3. Wetlands
 - 3.4. Pelagic ecosystems
 - 3.5. Deep benthic ecosystems

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Environmental Pollution and Risk Assessment (PAO09716)

1. Pollution concept
2. Pollution types and classification
3. Environmental Risk
 - 3.1. What is it
 - 3.3. 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 (FIS09717)

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
Nuclear fuels
Thermal efficiency of thermal machines
Fuel cells
Energy carriers: electricity, natural gas, liquid fuels, hydrogen
The transport
Centralized and decentralized energy
Efficiency of energy conversion
Thermal Impact
Mineral resources: what they are; classification.
Metallic resources;
Fuels;
Industrial minerals and rocks;
Mineral resources, environment and sustainable development.

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Environmental Technologies (PAO09718)

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, salinisation, 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 (SOC09719)

1. Fundamentals of law
 - 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 olitical responses
 - 4.3. From the natural environment to the socialized environment

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Environmental Economics (ECN09720)

1. Economics and the Environment.
2. Introduction to microeconomics: demand, supply curve and markets; perfect competition; fundamentals of general equilibrium: efficiency and social welfare.
3. Market failures and the environment (e.g. externalities; open access, public good).
4. Economic approach to pollution control: efficient level of pollution control; cost-effectiveness analysis; need of market intervention; property rights approach - Coase Theorem;
5. Environmental Policy Instruments: command and control, economic or market-based, information, voluntary and decentralized policies - approaches and evaluation/selection criteria.
6. Economics of natural resources: non-renewable and renewable resources – dynamic allocation models, user cost, efficient (and sustainable) resource use; open access.
7. Cost-benefit analysis: concept of total economic value; valuation techniques; case studies; limitations of CBA.



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International Relations and Environment (ECN09721)

1. United Nations Convention on Environment and International Cooperation
 - 1.1. Global Environmental Problems and International Politics
 - 1.2. Setting objectives, Implementation, Institutions and Conflicts of Interest
 - 1.3. Main conventions
 - 1.4. The role of the United Nations
 - 1.5. The Espoo Convention
2. International Management of Resources and Transboundary Pollution
 - 2.1. Scope of issues: global, continental and bilateral
 - 2.2. Energy sources
 - 2.2.1. Fossil fuels
 - 2.2.2. Renewable energy
 - 2.2.3. Energy Accounting
 - 2.2.4. Energy Geo-Strategy
 - 2.2.5. Petroleum Market
 - 2.2.6. Nuclear power
 - 2.2.7. The electricity market
 - 2.2.8. Strategies for energy planning
 - 2.2.9. Energy Use
 - 2.3. Management of Air Pollution
 - 2.4. EEZ Management
 - 2.5. The “Alqueva” case study
3. International Conflict and Crisis - Spaces oceanic and coastal zones
 - 3.1. Open ocean and coastal zones
 - 3.2. International waters and rivers
 - 3.3. Forest and biodiversity
 - 3.4. Climate change and desertification

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Environmental Management (PAO09722)

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 (PAO09723)

concept of environmental assessment

Environmental assessment as a tool to implement the sustainable development

environmental assessment as an integrated process

why to do environmental assessment?

environmental assessment tools; AIA, AAE

quality assesment and planning

environmental impact assessment process

sectorial assessments

outrage and risk



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Environmental Planning and Policies (PAO09724)

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 (BIO09725)

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