



Study Plan

School: School of Sciences and Technology

Degree: Master

Course: Conservation Biology (cód. 473)

1st Year - 1st Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO10181	Assessment of Conservation Priorities	Biological Sciences	6	Semester	156
BIO10182	Biodiversity and Conservation	Biological Sciences	6	Semester	156
BIO10183	Conservation of Mediterranean Vegetation	Biological Sciences	6	Semester	156
BIO10184	Project and Seminar I	Biological Sciences	3	Semester	78

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
MAT7367	Sampling Biological Populations	Mathematics	6	Semester	156
BIO7368	Biology of Macro Fungi	Biological Sciences	3	Semester	78
BIO10696	Advanced Studies in Biodiversity and Nature Conservation	Biological Sciences	3	Semester	78
BIO7370	Conservation Genetics	Biology	3	Semester	78

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
PAO7371	System Analysis and Ecological Modeling	Environment and Ecology Sciences	6	Semester	156
PAO7372	Spatial Analysis	Geosciences	6	Semester	156
PAO7375	Landscape Characterisation and Interpretation	Environment and Ecology Sciences	6	Semester	156

1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO10185	Management and Conservation of Terrestrial Faunal Communities	Biological Sciences	6	Semester	156
PAO7756	Decision Aid Methodologies	Environment and Ecology Sciences	5	Semester	130
BIO10186	Project and Seminar II	Biological Sciences	3	Semester	78

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO7373	Biogeography and Ecology of Bird Communities	Biology	4	Semester	104
BIO7374	Biology and Conservation of Mammals	Biology	4	Semester	104
BIO7376	Conservation of the Iberian Herpetofauna	Biology	4	Semester	104
BIO7377	Conservation of Terrestrial Macroinvertebrates	Biology	4	Semester	104
BIO7378	Ecology of Linear Structures	Biology	4	Semester	104
BIO7379	Structure and Behaviour of Vegetal Communities	Biology	4	Semester	104
BIO7380	River Rehabilitation for Fish	Biology	4	Semester	104
BIO7381	Fauna Sampling Methods	Biology	4	Semester	104
BIO7382	Vegetation Sampling Methods	Biology	4	Semester	104



2nd Year - 3rd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Dissertation					

Conditions for obtaining the Degree:

*** TRANSLATE ME: Para aprovação na componente curricular deste Mestrado, é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares:

1.º Semestre

- 4 UC Obrigatórias num total de 21 ECTS

- 1 UC Optativa do Grupo I

- 1 UC Optativa do Grupo II

2.º Semestre

- 3 UC Obrigatórias 14 ECTS{\}newline

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- 4 UC Optativas do Grupo III

Para obtenção do grau, é necessário também a aprovação em Dissertação com o total de 40 ECTS, no 3.º Semestre. ***

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Assessment of Conservation Priorities (BIO10181)

1. Assessment criteria for species

National and international legislation

Conservation synoptic

Proxy and surrogate species

Ecological and biogeographical bases

Taxonomy and phylogenetic

Social/economic valuing

2. Assessment criteria for priority areas

Assessment of biotopes and habitats

Ecological systematic conservation

Ecologic valuation of urban and rural areas

Models of selection for protected areas



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Biodiversity and Conservation (BIO10182)

- 1. Introduction
 - 1.1. Environmental problems and human population growth
 - 1.2. Guiding principles of Conservation Biology
 - 1.3. Conservation values
 - 1.4. Ethics of Conservation
- 2 Biodiversity
 - 2.1. Losses and threats
 - 2.2. Patterns and processes
- 3 Conservation
 - 3.1. Statutes of Conservation
 - 3.2. Legislation
 - 3.3. Management towards conservation
 - 3.4. Protected areas
 - 3.5. Sustainable development
 - 3.6. Ecology, Sociology, Politics and Economics
 - 3.7. Conservation biologists: learning to be practical and efficient
- 4 Population Viability Analysis
 - 4.1. Extinction and minimum viable populations
 - 4.2. Spatially structured populations and metapopulations
 - 4.3. Questions to answer
- 5 Global changes
 - 5.1. Scenarios and impacts
 - 5.2. Main measures
- 6 Landscape Ecology and Conservation
 - 6.1. Factors that affect the spatial occurrence and movement
 - 6.2. Habitat fragmentation
 - 6.3. Ecology of linear infrastructure
- 7 Agriculture and Conservation

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Conservation of Mediterranean Vegetation (BIO10183)

- 1. Characterization of the Mediterranean region
Origin and history of flora and vegetation. Physical characterization, biological limits and current processes.
- 2. Determinants for the conservation
Conservation and development; economic contribution of plants. Maintenance of essential habitats and environmental stability.
- 3. The case of the Iberian Peninsula
Floristic richness. Habitat mosaics. Endemic, rare and endangered plant species. Invasive plants.
- 4. Scales of conservation
Conservation of habitats, communities and ecosystems. Ex situ conservation and its constraints. Genetic and germplasm banks.
- 5. Strategies for conservation
Recovery and restoration of habitats. Reintegration of fragmented habitats. Climate change and conservation.
Ecosystem Management and conservation of plant diversity - Case studies

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Project and Seminar I (BIO10184)

- Module 1 - Designing a master dissertation
- Module 2 - Scientific writing - how to write a scientific dissertation.
- Module 3 - Give scientific style to an oral presentation and seminar.
- Module 4 - Scheduling and time management: objectives and tasks; psychological aspects.



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Biology of Macro Fungi (BIO7368)

1. The Kingdom Fungi: eukaryotic and heterotrophic organisms.
2. Historical landmarks of Mycology.
3. Characterisation of the "true" fungi. Cellular organization: the fungi cell (structure and ultrastructure); the hyphae (ultrastructure and growth model).
4. The main taxonomic groups, classification, somatic and reproductive characterization (sexual and assexual): Divisions: Ascomycota and Basidiomycota. Life cycles and metabolism. Physiology and ecology: saprophytism, parasitism, mutualism.
5. Importance of the fungi: biodegradators and bio-indicators. Economic relevance and alternative uses of macrofungi.
6. Biodiversity and conservation of macrofungi.

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Advanced Studies in Biodiversity and Nature Conservation (BIO10696)

This postgraduate course has an exceptional feature, whether by its very specialized contents or because there is no fixed planning lectures on Biodiversity and Nature Conservation. Each advanced course depends on the favourable conditions each year (scientific meetings, scientific cooperation agreements, large projects research, free courses, visitors or invited researchers, etc.).

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System Analysis and Ecological Modeling (PAO7371)

I - Tools for ecological and environmental modeling:

Physical and mathematical models. Management tools, shapes and components of the models. Typical external variables and their cycles. The importance of the scales in modelling. Equations type to simulate various types of relationships between variables and their graphical representation equations. The behaviour of the models. Sources of uncertainty in ecological modelling.

II - Analysis ecological and environmental systems:

The representation of the behaviour of ecological systems. Models of population dynamics. The Lotka-Volterra equations. Models for parasitism and for symbiotic relationships. Types of stability. Behaviour around the equilibrium points. Models and ecological buffer capacity. Models for phytoplankton, periphyton and macrophyte growth. Models for regulation by biophysical factors. Models of individual growth.

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Spatial Analysis (PAO7372)

1. Geographic representation: evaluation of the different representation metaphors and an introduction to a systemic approach to representation metaphors.
2. Spatial data models: detailed analysis of vectorial model, raster model and other data models.
3. Single layer spatial operations: neighbourhood analysis, buffering, masks and filtering.
4. Multiple layer spatial operations: overlay analysis and geoprocessing operations.
5. Dimensionality of geographic data: 3-dimensional models and an introduction to time modelling.
6. Conceptual design of data models and geographic modelling: geographic modelling concepts and flowcharts design including map algebra operations.
7. Network analysis: shortest path analysis, service area, cost distance functions
8. Future perspectives: new spatial data models, new models for spatial relations and new spatial analysis processes.



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Landscape Characterisation and Interpretation (PAO7375)

The course has a conceptual component linked to the understanding of the rural landscape and the inner processes that both shape and occur in the landscape. But also reflects the new demands for the rural landscapes today as well as the multiple transition pathways that thus may characterise rural landscapes in Europe.

It has a larger practical component, based on landscape ecology and its developments, where several types of methodological approaches to the study of the landscape and analysis of the processes affecting and being affected by the landscape, are exploited. These concerns both the land use and land cover classifications, types of management options and types of land ownership, landscape pattern (composition and configuration) and changes, assessment of values, indicators, etc. A case study area will be studied, where the practical work by the students as to be applied to, assessing landscape characteristics, pattern and change.

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Management and Conservation of Terrestrial Faunal Communities (BIO10185)

Communities and ecosystems: interactions and disturbances.

Fauna of urban areas: damages and benefits.

Wildlife and linear infrastructures - an ecological perspective.

Management of agroecosystems for wildlife conservation.

Management of invasive species and exotic fauna.

Breeding in captivity and animal restoring .

Topics on conservation genetics

Plans for control and eradication of exotic species.

Plans for maintenance and recovery of priority native species

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Decision Aid Methodologies (PAO7756)

a. Decision Methods: importance to Nature Conservation and Environment. Relation with Landscape Planning and Management and Sustainable Development; Sustainable Development as an objective of Landscape Planning and Management

b. Portuguese policies. Environmental Law, Soil, Landscape Planning and Urban Law; Protected areas network.

c. Methodologies for Decision Support. Participation, Interactivity and Simplicity. Cognitive aspects of Decision processes. Multimethodology concept and practical application. Structuring: actors and actions. Evaluation. Recommendations.

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Project and Seminar II (BIO10186)

General presentation of potential topics for dissertations

General objectives of the work program.

Experimental design and methodologies.

First results and data processing proposed.

Final evaluation of the structure and content: objectives, methodology, state of the art, literature review.



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Biogeography and Ecology of Bird Communities (BIO7373)

Introduction: the paradigms of Biology (Darwin & Wallace); the natural history of the Earth (plate tectonics and climate change); Birds as a reference model; scales of perception and levels of biological organization.

Evolution and diversity of Birds: distinction of species; phylogenies; geographical variations; speciation and current numbers.

Distribution patterns: continental species (biogeographic regions); island species (the insular syndrome); pelagic species; movements (dispersal and migration).

Historical biogeography: vicariance and dispersal; perispecific taxa (population structure of species); cycles of expansion and shrinkage of glaciers (differentiation, speciation and extinction); history of the avifaunas in the Mediterranean Region.

Ecological biogeography: niche theory; communities, assemblages, guilds and populations; composition and community structure; gradients diversity; relation richness-surface; inter-specific interactions. Synthesis essay.

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Biology and Conservation of Mammals (BIO7374)

1. Biology of Mammals

- Special features and Classification
- Diversity. Characteristics of the main orders and adaptations to special conditions
- General characteristics and particular aspects of the biology of the species occurring in Portugal
- Zoogeography and constraints of the current distribution

2. Mammals as a resource

- Domestication and domestic mammals
- Hunting and wild game
- Ecotourism and nature tourism

3. Conservation

- Extinctions
- Rarities and endangered species
- Main threats
- Competition with Man
- Analysis of particular cases with emphasis on examples in Portugal

4. Management of Mammals

- Inventory and evaluation of the mammal component of Environmental Impact Studies and Territory Management Plans
- Management plans for particular species of mammals

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Conservation of the Iberian Herpetofauna (BIO7376)

Iberian Amphibians:

- Biogeography, systematics and nomenclature.
- Suitable aquatic habitats and ecotypes.
- Conservation perspectives.

Conservation plans (examples) of Iberian amphibians.

Creation of artificial ponds for amphibians.

Iberian Reptiles:

- Biogeography, systematics and nomenclature.
- Suitable terrestrial (and aquatic) habitats and ecotypes.
- Conservation perspectives.

Conservation of sea turtles.

Manipulation of habitat for the conservation of the herpetofauna.



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Conservation of Terrestrial Macroinvertebrates (BIO7377)

The evolutionary success of terrestrial macroinvertebrates and its overall biodiversity, past and present conservation of terrestrial macroinvertebrates; the emergence of conservation biology of macroinvertebrates; levels of analysis: scale, fragmentation and destruction of habitats, species and their conservation, biological pest control and conservation, the ethical value of macroinvertebrates; action plans: habitats and their evaluation.

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Ecology of Linear Structures (BIO7378)

1. Wildlife and linear infrastructures - an ecological perspective.
- 2 Linear Infrastructures
Roadways; railways ; irrigation canals; lines of transport and power; dams; wind farms.
- 3 Landscape Ecology and Conservation
 - 3.1. Factors that affect the spatial occurrence and movement of individuals
 - 3.2. Connectivity and genetic diversity
 - 3.3. Habitat fragmentation
 - 3.4. Corridors and dispersal of individuals
- 4 Effects of linear infrastructures
 - 4.1. Flora and vegetation
 - 4.2. Wildlife
 - 4.3. Landscape
 - 4.4. Monitoring
- 5 Mitigation of impacts of linear infrastructures
- 6 Legislation
- 7 Planning for environmentally sustainable infrastructures
- 8 Natural linear structures
 - 8.1. Waterways and hedgerows
 - 8.2. Ecological corridors

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Structure and Behaviour of Vegetal Communities (BIO7379)

Agroforestry ecosystems and environment: energy flows, water and nutrients.
Vegetation structure, productivity and dynamics of forest biomass: carbon acquisition and respiration.
Responses to environmental stresses of Mediterranean vegetation.
Responses to external disturbances: fire, pruning, drought, herbivory, pests and diseases
Regeneration of Mediterranean vegetation.
Methods and equipment in ecophysiology (forests).

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Fauna Sampling Methods (BIO7381)

- Sampling techniques:
- Drag-netting of aquatic macroinvertebrates.
 - Techniques for catching Ropalocera butterflies.
 - Trapping ground beetles.
 - Electric fishing and marking freshwater fishes.
 - Bioacoustics for detection of frogs and toads and intensive prospection of amphibians.
 - Transects and routing barriers for reptiles.
 - Absolute and relative methods for censusing birds.
 - Bird ringing.
 - Trapping, scent stations and attendance rates in mammals.



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Vegetation Sampling Methods (BIO7382)

1. Vegetation (herbaceous, shrub and tree) attributes - specific composition and abundance: frequency, coverage, density
2. Vegetable diversity
 - 2.1 Indices of species diversity
 - 2.2 Functional diversity
3. Actual vegetation
 - 3.1 Methods of floristic surveying for herbaceous, shrub and trees
 - 3.2 Analysis of plant communities (inventorying, mapping, classification and ordination; cartography)
4. Structural diversity of vegetation - horizontal and vertical structure
 - 4.1. Physiognomy and architecture
 - 4.2 Phenology, growth and productivity
5. Phytosociological surveying
6. Woody species surveying
7. Potential vegetation - seed harvesting and soil seed bank analysis