



## Study Plan

**School:** School of Sciences and Technology

**Degree:** Master

**Course:** Conservation Biology (cód. 640)

### 1st Year - 1st Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO10181M	Assessment of Conservation Priorities	Biological Sciences	6	Semester	156
BIO10182M	Biodiversity and Conservation	Biological Sciences	6	Semester	156
BIO10183M	Conservation of Mediterranean Vegetation	Biological Sciences	6	Semester	156
BIO10184M	Project and Seminar I	Biological Sciences	3	Semester	78

### Options 1

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO7368M	Biology of Macro Fungi	Biological Sciences	3	Semester	78
BIO10696M	Advanced Studies in Biodiversity and Nature Conservation	Biological Sciences	3	Semester	78

### Options 2

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
PAO12331M	Spatial Analysis	Landscape and Planning Sciences	6	Semester	156
PAO10613M	Landscape Ecology	Landscape and Planning Sciences	6	Semester	156

### 1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO10185M	Management and Conservation of Terrestrial Faunal Communities	Biological Sciences	6	Semester	156
PAO12329M	Methodologies for Decision Support	Landscape and Planning Sciences	3	Semester	78
BIO10186M	Project and Seminar II	Biological Sciences	3	Semester	78



### 1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
<b>Options 3</b>					
Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO12339M	Training in Mobility Context	Biological Sciences	9	Semester	234
BIO12332M	Biogeography and Ecology of Bird Communities	Biological Sciences	3	Semester	78
BIO12333M	Biology and Conservation of Mammals	Biological Sciences	6	Semester	156
BIO12334M	Herptofauna & Conservation	Biological Sciences	6	Semester	156
BIO12335M	Conservation of Terrestrial Macroinvertebrates	Biological Sciences	3	Semester	78
BIO12336M	Structure and Functioning of Plant Communities	Biological Sciences	3	Semester	78
BIO12337M	Sampling Techniques of Fauna	Biological Sciences	3	Semester	78
BIO12338M	Vegetation Sampling Techniques	Biological Sciences	3	Semester	78

### 2nd Year - 3rd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
	Dissertation				

### 2nd Year - 4th 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 1

- 1 UC Optativa do Grupo 2

2.º Semestre

- 3 UC Obrigatórias 12 ECTS{\ }newline

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- UC Optativas do Grupo 3 num total de 18 ECTS

Para obtenção do grau, é necessário também a aprovação em Dissertação com o total de 60 ECTS, no 3.º e 4.º Semestre. \*\*\*

## Program Contents



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### **Assessment of Conservation Priorities (BIO10181M)**

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 (BIO10182M)**

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 (BIO10183M)**

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 (BIO10184M)**

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 (BIO7368M)**

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 asexual): 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 (BIO10696M)**

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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### **Spatial Analysis (PAO12331M)**

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 Ecology (PAO10613M)**

The roots of a new science, between Ecology and Geography. Integration of disciplines for progresses in a problem solving, applied scientific approach. The concept of landscape and its evolution within Landscape Ecology (LE) and associated disciplines. The novelty of spatial landscape analysis. Progresses in LE since the middle of the 20th century. The role of the International Association for LE. Particularities of the European approach and the enlargement of the LE community. The emergence of the European Association for LE and its background. The fundamentals of the LE analysis. The classical literature and authors. Developments. The spatial approach and the local landscape as the specific context of work. Integration of natural and human sciences, and integration of quantitative and qualitative methods. Examples. Research and analysis, planning and design, decision support, the integration of the human and social perspectives. Novel developments in research and design.

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### **Management and Conservation of Terrestrial Faunal Communities (BIO10185M)**

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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### **Methodologies for Decision Support (PAO12329M)**

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 (BIO10186M)**

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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### **Training in Mobility Context (BIO12339M)**

The traineeship programme should be prepared in accordance with the training and/or vocational components for the student as well as the characteristics / activities of the host institution.



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### **Biogeography and Ecology of Bird Communities (BIO12332M)**

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 (BIO12333M)**

1 Introduction

- Peculiarities of mammals
- Diversity of mammals
- Zoogeography

2 Mammals of Portugal

- Species and distribution
- Diagnose and ecology
- Conservation

3 Mammals as a resource

- Domestication and domestic mammals
- Hunting and game species
- Eco-tourism and nature tourism

4 Conservation

- Extinctions
- Rarities and endangered species
- Major threats
- Competition with Man

5 Analysis of particular cases

Management plans for particular species of mammals



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### **Herpetofauna & Conservation (BIO12334M)**

Batrachology [Biology and ecology of amphibians]

Module 1 - (Caudata) tailed amphibians (salamanders and newts) and Gymnophiona (caecilians)

Module 2 - Anuran amphibians (frogs and toads)

Module 3 - Conservation of Iberian amphibians

Applied ecology to linear infrastructures (roadways and irrigation canals)

Conservation plans (examples) of Iberian amphibians.

Creation of artificial ponds for amphibians.

Reptilology [Biology and ecology of reptiles]

Module 4 - Turtles

Module 5 - Saurians (lizards) and amphisbaenians (worm lizards)

Module 6 - Snakes

Module 7 - Crocodiles and tuataras

Module 8 - Conservation of Iberian reptiles:

Conservation of sea turtles.

Habitat manipulation for the conservation of the herpetofauna.

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### **Conservation of Terrestrial Macroinvertebrates (BIO12335M)**

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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### **Structure and Functioning of Plant Communities (BIO12336M)**

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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### **Sampling Techniques of Fauna (BIO12337M)**

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 Techniques (BIO12338M)**

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