Study Plan

School: School of Sciences and Technology
Degree: Master
Course: Forestry Engineering: Mediterranean Systems (cód. 359)

1st Year - 1st Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
MAT10014M	Experimental Design Methodologies	Mathematics	6	Semester	156
MAT10015M	Fundamentals of Operations Research	Mathematics	6	Semester	156
GEO10016M	Soil, Climate and Forestry Systems	Geosciences	6	Semester	156
FIT10017M	Fundamentals of Forestry	Forest Sciences	6	Semester	156
FIT10019M	Dendrometry and Biometry	Forest Sciences	6	Semester	156

1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
PAO10020M	Sustainability of Forestry Systems	Biology Environment and Ecology Sciences	6	Semester	156
GEO10021M	Soil, Climate and Management of Forestry Resources	Forest Sciences	6	Semester	156
FIT10022M	Applied Forestry	Forest Sciences	6	Semester	156
FIT10023M	Forest Inventory and Modelling	Forest Sciences	6	Semester	156
ECN10024M	Economics of Foresty Production	Economy	6	Semester	156

2nd Year - 3rd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
ECN10025M	Economics and Management of Foresty Systems	Economy	6	Semester	156

2nd Year - 3rd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Group of Options					

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIT10026M	Mediterranean Systems Forestry	Forest Sciences	6	Semester	156
FIT10027M	Forestry-based Livestock Production	Agronomy Forest Sciences	6	Semester	156
FIT10028M	Forestry Planning	Forest Sciences	6	Semester	156
FIT10029M	Forest Use Planning	Forest Sciences	6	Semester	156
PAO10030M	Forest Biology and Game	Biology Environment and Ecology Sciences	4	Semester	104
PAO10031M	Inland Waters Planning	Biology Environment and Ecology Sciences	4	Semester	104
BIO10032M	Forest Ecophysiology	Biology	4	Semester	104
Group of Free Options					

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: {\}newline

1.º Semestre{\}newline

- 5 UC Obrigatórias num total de 30 ECTS{\}newline

2.º Semestre{\}newline

- 5 UC Obrigatórias num total de 30 ECTS{\}newline

3.º Semestre{\}newline

- 1 UC Obrigatória num total de 6 ECTS{\}newline

Os alunos têm de completar no 3º semestre, 12 ECTS em optativas pertencentes ao Grupo I ou como optativas livres.{\}newline

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Para obtenção do grau é necessário também a aprovação na Dissertação de Mestrado, com o total de 42ECTS, no 3.º e 4.º Semestre. ***

Program Contents

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Experimental Design Methodologies (MAT10014M)

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Fundamentals of Operations Research (MAT10015M)

1-Introduction to the methodology of operations research
2-ProblemFormulation
3-Linear programming
4-Optimization in networks and graphs
5-Project management
6-Decision theory

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Soil, Climate and Forestry Systems (GEO10016M)

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Fundamentals of Forestry (FIT10017M)

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Dendrometry and Biometry (FIT10019M)

1 The mathematical and statistical concepts of mensuration
2 Individual tree mensuration
3 Stand mensuration
4 Tree growth mensuration
5 Stand growth mensuration
6 Herbaceous and shrub strata mensuration
7 Soil organic layer mensuration.

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Sustainability of Forestry Systems (PAO10020M)

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Soil, Climate and Management of Forestry Resources (GEO10021M)

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Applied Forestry (FIT10022M)

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Forest Inventory and Modelling (FIT10023M)

Forest inventory. Sampling theory and statistical inference: 1 Sampling units; 2 Simple and stratified random sampling; 3 Regression estimators and propostions; 4 Duble sampling; 5 Double Sampling; 5 Sampling
proportionally with the dimension; 6 Multistage sampling; 7 Systematic sampling; 8 Rare populations sampling.

Modeling : 1 Importance of growth models and its classification; 3 Growth function from empirical to mechanistic theory; 4 Growth corves and its application; 5 Stand growth models with and without diameter
distribution simulation; 6 Spatial and non spatial tree growth models; 7 Simulation studies using Portuguese available growth models.

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Economics of Foresty Production (ECN10024M)

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Economics and Management of Foresty Systems (ECN10025M)

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Mediterranean Systems Forestry (FIT10026M)

(1) The forest systems in a ecological and economical perspective; (2) The concept of multifuntionality and multiple use of forest systems; (3) Multifunctional silviculture; (4) Forest system functionality concepts; (5) The forests systems and its biodiversity; (6) Aforestation and silviculture methods; (7) Special conditions of application of silviculture methods, the Mediterranean forests and oak woodland forests ("montado").

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Forestry-based Livestock Production (FIT10027M)

History of land use.
Sivopasture systems
Caracterization and role of this systems
The Alentejo and Mediterranean forestry (Montado) in the past:
Ager, The Saltus and sustained Silva;
The degradation of the systems (ex:Montado).
Biodiverse permanent pasture rich on legumes in the forestry systems
(Species, installation and management).
The agricultural and environmental multifunctionality of the forestry systems.

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Forestry Planning (FIT10028M)

1 Forest and natural resources management; 2 Valuation and characterization of forest sites; 3 Estimation and projection for forest stands according with site conditions; 4 Optimization of objectives at tree and stand levels; 5 Linear problems and graphical solution techniques; 6 Linear programming applied to forest management problems; 7 Advance forest planning techniques; 8 Mathematical concepts of sustainability for forest and natural resources; 9 Modeling forest stand structures; 10 Control technique for amenities production and biodiversity enhancement objectives; 11 Spatial restrictions and considerations for forest planning; 12 Hierarchical systems for planning and scheduling management activities; 13 Forest supply chain management; 14 Carbon sequestration; 15 Forest certification.

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Forest Use Planning (FIT10029M)

1. Frame, 2. Concepts and definitions, 3. Planning at National Level, Territorial Planning Plan, National Forest Strategy, National Forest Inventory, Forest Defence Against Forest Fires, 4. Planning at Regional Level, Municipality Plan, Municipality Plan of Forest Defence Against Forest Fires, National Ecological Reserve, Protected Areas, 5. Methodologies for the elaboration of planning plan, characterisation and general and specific objectives, frame, scale, territorial frame, legal frame, space characterisation, land and forest use, geomorphological and biophysical characterisation, protection areas, trees and forest stands of special value, forest infra-structures, accessibility and recreation, hazards identification and characterisation, aptitude areas for the forest species, homogeneous zones and functionalities, plan characterisation, objectives, territorial organisation models, proposals of intervention, 6. Forest certification.

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Forest Biology and Game (PAO10030M)

Bio-ecology of the main sedentary game species in Portugal. Game management basis: spatial ecology (habitat use) and population dynamics of small and big game most important species. Management design: carrying capacity, population estimation and harvesting plan. Game management special problems: releasing; management of migratory species; predator control. Designing Management Plans.

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Inland Waters Planning (PAO10031M)

- Planning and Management basis for sustainable exploitation of aquatic resources
- Structure and functioning of inland aquatic ecosystems and riparian areas. Production factors
- Fisheries resources: fish fauna and decapods. Bio-ecology on main species, stock assessment and recruitment.
- Threatened species and conservation values. Impact and control of invasive species. Mitigation of impacts and beneficiation of target species
- Policy of Fisheries and Aquaculture and legislation
- Water Quality and Ecological status
- Conservation and rehabilitation of habitats
- Bio-manipulation and restocking. Potentialities and constrains.
- Planning and managements programs: study cases

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Forest Ecophysiology (BIO10032M)

Forest Systems and Environment. Microclimate and Energy Exchange. Water Relations and Hydraulic Architecture. Forest Productivity (Carbon Acquisition and Respiration). Stable Isotopes. Nutrient Acquisition, Allocation and Recycling. Plant Functional Responses to Disturbances (Fire, Clear-Cutting, Thinning, Drought, Herbivory, etc.) Modelling: Scaling from Plant to Forest. Techniques and Equipment in Forest Ecophysiology. Field Experiments.