

# Bachelor in Forestry and Natural Environment Engineering

## Course information

Year 2019-20

GENERAL SPECIFICATIONS				
<b>English name</b>				
Forest ecology				
<b>Spanish name</b>				
Ecología Forestal				
<b>Code</b>		<b>Type</b>		
606510205		Compulsory		
<b>Time distribution</b>				
	<b>Total</b>	<b>In class</b>	<b>Out class</b>	
Working hours	150	60	90	
<b>ECTS: 6</b>				
<b>Standard group</b>		<b>Small groups</b>		
	<b>Classroom</b>	<b>Lab</b>	<b>Practices</b>	<b>Computer classroom</b>
<b>3.5</b>		2.0	0.5	0
<b>Departments</b>		<b>Knowledge areas</b>		
Agroforestry Sciences		Environmental technologies		
<b>Year</b>		<b>Semester</b>		
2º		1º		

TEACHING STAFF			
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SPECIFIC INFORMATION OF THE COURSE
<b>1. Contents description</b>
1.1. In English:
Ecology. Forest ecology: Edaphic, climatic, biotic and dynamic evaluation of forest station
1.2. In Spanish
Ecología. Ecología de las masas forestales. Evaluación edáfica, climática, biótica y dinámica de la estación forestal.
<b>2. Background</b>
2.1. Situation within the Degree:
The course requires knowledge of anatomy and plant physiology, soil science and climatology (Earth Sciences) and statistics. Their contributions are essential to the subjects of silviculture and reforestation, Mediterranean silviculture and forest geobotany.
2.2. Recommendations:
There are no specific prerequisites, but it is highly recommended that students have a background in technical or science subjects at pre-university level, as well as in subjects of anatomy and physiology and Earth Sciences

### 3. Objectives (as result of teaching):

The main objective is to provide students with the knowledge and skills to understand the functioning and structure of forest ecosystems. To be able to study, describe, assess their production capacity and the impact of interventions on them. The specific objectives are:

#### Part I: BASIC ECOLOGY

- To expose the most significant theory and models in Forest Ecology.
- To analyze and discuss the main biotic and abiotic elements in forest ecosystem.
- To describe the relationships between the different components of the ecosystem.
- To expose models of analysis of forest ecosystems for their diagnosis, conservation and exploitation. This will be done at three levels: populations, communities and ecosystems.

#### Part II: APPLIED ECOLOGY

- To offer different methods to assess the quality of the forest site.
- COMMON – To know the order of magnitude of the main variables used in forest ecology.
- To identify the main authors on forest ecology and on the environment and recognize their contributions.

#### OBJECTIVES OF AFFECTIVE ORIENTATION (VALUES AND ATTITUDES)

- To encourage maximum respect towards the forest environment, including rural populations.
- To promote the student's appreciation of the forestry profession in its scientific and technical aspects.

#### OBJECTIVES OF PRACTICE GUIDANCE (SKILLS, ABILITIES AND PROCEDURES):

- To properly handle the terminology of each discipline.
- To develop conceptual and technical skills that enable the acquisition and analysis of information from the forest environment (in the field, laboratory and nursery) and indirect sources (bibliography, Internet). To develop conceptual and technical skills that enable the student to face and solve possible problems of their profession.

### 4. Skills to be acquired

#### 4.1. Specific Skills:

C04: Forest ecology

#### 4.2. General Skills:

CB1. Demonstrate to understand and have acquired knowledge about an area of study that starts from basic Secondary Education, and is often at supported by advanced textbooks, but also includes some aspects that involve knowledge related to the forefront of their field of study.

CB2. Know how to apply their knowledge to their work or vocation in a professional way. They should also possess the skills that are usually demonstrated through the elaboration and defence of arguments and in problem solving within their area of study.

CB3. Gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues.

CB4. Be able to convey information, ideas, problems and solutions to both specialised and non-specialised audiences.

CB5. Develop the learning skills required to undertake further studies with a high degree of autonomy.

GC1. Capacity to analyze the structure and ecological function of forest systems and resources.

TC2. Develop a critical attitude, being able to analyse and synthesize.

TC3. Develop an attitude of inquiry that permanently enables to review and deepen in the knowledge.

TC4. Acquire Computer and Information Skills (CI2) and apply them working.

TC5. Master strategies for active job search and entrepreneurship.

TC6. To promote, respect and safeguard human rights, democratic values, social equality and environmental sustainability, without discrimination on the basis of birth, race, sex, religion, opinion or other personal or social circumstances.

## 5. Training Activities and Teaching Methods

### 5.1. Training Activities:

Theory classes on the contents of the Program.

Problem Solving sessions.

Practical sessions in specialized laboratories or computer rooms.

Field sessions to approach the industrial reality.

Activities Academically Directed by the Faculty: seminars, conferences, development of works, debates, collective tutorials, evaluation activities and self-evaluation

### 5.2. Teaching Methods:

Theory classes

Practical lessons in the laboratory

Work in groups

Practical work

Field training

### 5.3. Development and Justification:

#### 1. Theory classes

There will be 35 hours of lessons in which the theoretical base of the subject will be explained, with the aid of board work and computer presentations. Participation of the students is highly encouraged and will form part of the evaluation

#### 2. Practical lessons in the laboratory

There will be 10 two-hour sessions in the laboratory. These practical lessons will consist in solving practical tasks.

#### 3. Work in groups

There will be two tasks for students to carry out in small groups:

#### 4. Practical work

For the practical section of this course, the students will be required to characterize the climate, soil and vegetation of a specific area based on different information that they have gathered and managed. The teacher will provide a list of areas from which to choose at the beginning of the course.

#### 5. Field training

There will be a field trip (1 day) in the province of Huelva in which a soil sampling and vegetation monitoring procedure will be followed

## 6. Detailed Contents:

THEORY

Part I. BASIC FOREST ECOLOGY.

UNIT 1: GENERAL CONCEPTS OF ECOLOGY. Definition and division of Ecology. Populations, communities and ecosystems. Forest ecology Ecological factors: Definition and modes of action, Classification of ecological factors. Limiting factors, Law of tolerance and Law of the

minimum. Ecological factors and forest management.

UNIT 2: AUTOECOLOGY I: CLIMATIC FACTORS. Radiation Temperature. Light. Precipitation. Wind. Joint action of climatic factors in vegetation. Development of climate indexes.

UNIT 3: AUTOECOLOGY II: Edaphic AND PHYIOGRAPHIC FACTORS. Edaphic properties that most influence vegetation and its evaluation. Classification of plant species in relation to soil properties. Joint action of edaphic factors in vegetation. Influence of physiography on vegetation: orography, altitude, slope, orientation. Development of edaphic and physiographic indexes.

UNIT 4: AUTOECOLOGY III: BIOLOGICAL FACTORS. Intraspecific coactions. Interspecific coactions. Competition between plant populations. Symbiosis of vegetables with fungi and microorganisms. Parasitism on fungal plants and microorganisms. Interspecific coercions of animals on vegetables. Anthropic influences.

UNIT 5: POPULATIONS DYNAMICS. Patterns of spatial distribution. Density. Sampling techniques Temporal evolution of the populations. Modalities of growth. Fluctuations Dynamics of forest populations: regeneration, growth, mortality.

UNIT 6. POPULATIONS GENETICS. Life histories of the species, variability and its causes, frequencies of alleles and genotypes. Hardy-Weinberg Law. Endogamy vs. exogamy. Genetic drift. Species and Speciation. Quantification of the variation of gene frequencies.

UNIT 7: COMMUNITIES. Definitions and components of the communities. Spatial distribution of the species. Species richness and diversity. Index. Dynamics of forest communities. the plant succession, climax. concept and criticism, human interventions in plant succession. Physiognomy and classification. of forest communities

UNIT 8: FOREST ECOSYSTEMS. Concepts Structure and operation. Energy flow: the trophic chain. Matter flows. Water cycle. Carbon cycle. Nutrient cycle The biogeochemical cycle in forest ecosystems. Temporal variation Effect of silvicultural interventions on the functioning of forest ecosystems.

UNIT 9: DISTURBANCES. Disturbances in the dynamics of forest ecosystems. Effect of disturbances. Magnitude of the disturbing agent. Susceptibility of the ecosystem. Classification of disturbances. The disturbance regime. Abiotic disturbances. Biotic disturbances. Response of ecosystems to disturbances. Application to forest management.

## Part II: APPLIED FOREST ECOLOGY

UNIT 10: EVALUATION OF THE QUALITY OF THE FOREST SITE Forest Productivity, Concept and Indexes. Methodologies for assessing the quality of the forest site. Dendrometric methods for estimating the quality of the forest site. Methods based on the leaf area index. Methods based on the height of the trees. Methods based on diameter, basal area or percentage of sapwood. Methods based on vegetation. Types of Cajander site. Indicator species. Methods based on ecological factors. Climatic index based on topography and soil. Productivity maps. Multifactor methods. Territorial classifications.

## 7. Bibliography

### 7.1. Basic Bibliography

Barnes, B.V., Zak, D.R., Denton, S.R. y Spurr, S.H. 1998. Forest ecology. 4th ed. John Willey & Sons, Inc. USA. 774 pp. Se puede consultar una traducción de la primera edición:

Begon, M et al. 2003. Ecology: individuals, populations and communities: Blackwell Science Malden, Massachusetts,

Brower, J.E.; Zar, J.H.; Von Ende, C.N. 1998. Field and laboratory methods for general ecology. Mc Graw-Hill. USA.

Crawley, M.J. 1997. Plant ecology. Blachwell Science. 2nd Edition. Saunder College Publishing. USA.

Caujapé-Castells, J. 2006. Brújula para botánicos desorientados en la genética de poblaciones.

Exegen Ediciones. Las Palmas de Gran Canaria. 132 p.

Escolástico León C. et al. 2008. Ecología I: introducción, organismos y poblaciones: Universidad Nacional de Educación a Distancia, Madrid

Garmendia A., Samo Lumbreras AJ 2003. Prácticas de ecología: Universidad Politécnica de Valencia.

Valencia Henderson, P. A. 2003. Practical methods in ecology.: Blackwell. Oxford. Jørgensen SE (Ed) Ecosystem ecology. 2009. Elsevier. Amsterdam

Lambers H, Chapin III FS., Pons TL. 2008 Plant physiological ecology.: Springer. New York

Larcher, W. 2003. Physiological plant ecology : ecophysiology and stress physiology of functional groups.: Springer-Verlag, Berlin Molles, M. 2006. Ecología : conceptos y aplicaciones . McGraw-Hill Interamericana de España,

Oliver, C.D. y Larson, B.C. 1996. Forest stand dynamics. Update edition. John Wiley & Sons, Inc. USA.

Piñol J y Martínez J.2006 . Ecología con números : una introducción a la ecología con problemas y ejercicios de simulación: Lynx.

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Samo Lumbreras, A. . Garmendia A, Delgado JA. 2008. Introducción práctica a la ecología.: Pearson Educación, Madrid

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Smith, T. y Smith R. 2007. Ecología, Pearson Education. Madrid. Spurr, S.H. y Barnes, B.V. 1980. Ecología forestal. AGT editor, S.A. Méjico.

Suzuki D, Vanderlinden.K.. Ecología divertida: juegos y experimentos por un planeta más verde. Oniro. Barcelona ;,

Terradas, J 2001. Ecología de la vegetación : de la ecofisiología de las plantas a la dinámica de comunidades y paisajes. Omega. Barcelona.

UNED, 2009 Ecología II : Comunidades y ecosistemas. UNED, Madrid

van der Maarel E. (ed) 2005. Vegetation ecology.: Blackwell. Malden, MA

#### 7.2. Additional Bibliography:

Baskin, C C Baskin JM (eds) 2001. Ecology, biogeography, and evolution of dormancy and germination: Academic Press, San Diego

Desharnais. RA (ed) 2005. Population dynamics and laboratory ecology: Elsevier. Amsterdam

Eugène A. 2002 Ecología de las aguas corrientes. Acribia. Zaragoza Farina. A. 2005. Principles and methods in landscape ecology : toward a science of landscape: Springer. Dordrecht

Frelich, Lee E. 2002. Forest dynamics and disturbance regimes : studies from temperate evergreen-deciduous forests.: Cambridge University Press, Cambridge.

Hanski I., Gaggiotti. OE. (Ed) 2004. Ecology, genetics and evolution of metapopulations. Elsevier Academic Press. Amsterdam

Johnson, P S.. Shifley SR. Rogers ,R.2002. The Ecology and silviculture of oaks: CABI Publishing.

Wallingford Jong TJ. Klinkhamer PGL 2005. Evolutionary ecology of plant reproductive strategies.: Cambridge University Press, Cambridge

Maestre F, Escudero A, Bonet A. (editores). 2008. Introducción al análisis espacial de datos en ecología y ciencias ambientales : métodos y aplicaciones Madrid : Universidad Rey Juan Carlos

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Paracuellos M (editor). 2003. Ecología, manejo y conservación de los humedales.: Instituto de Estudios Almerienses,

Almería Valladares F. (editor). 2004 Ecología del bosque mediterráneo en un mundo cambiante: Organismo Autónomo Parques Nacionales, Madrid

Whalen JK, Sampedro. L. 2009. Soil ecology and management: CABI. Cambridge, MA

## 8. Systems and Assessment Criteria

### 8.1. System for Assessment:

Theory and practical written assessment

Bibliographic and field trial work

Practical work

Participation and interest

Theory and practical written assessment

This exam represents 70% of the final mark. To pass the subject it is necessary to obtain at least 5 out of 10 in this exam.

Bibliographic work

It consists in correctly manage information and write a memorandum that have been studied in practical lessons 7. The grade in this exam is: pass/fail.

Field trial Work

The mark is from 0 to 10 and to pass the subject it is necessary to obtain at least 4 points. The evaluation of this task takes into account the quality of the written work.

Practical work

The mark for this work represents 15% of the final mark. The mark is from 0 to 10 and to pass the subject it is necessary to obtain at least 4 points

### Participation and interest

The active participation and interest in the subject demonstrated by students will be evaluated, adding up to 2 point to the final mark. The maximum score will be reached with the regular attendance at the classes and the correct delivery of all volunteer work proposed during the course.

### Final mark

The final mark for the subject will be obtained thus:  $0.7 \times A + 0.15 \times B + 0.15 \times C + D$ ,

where A is the mark for the theory-practical written exam. B is the mark for the Bibliographic + Field trial task. C: is the mark for the practical work and D is the teacher's evaluation of the interest and active participation of the student.

To pass the subject, students have to obtain at least 5 points in the final mark, with at least 4 points in the grades for B and C and a "pass" in the practical activities.

Final results will be given in terms of a numerical scale between 0 and 10 (including tenths), with the corresponding qualitative ratings below:

≤4.9: Fail (D)

5.0 -6.9: Pass (C)

•7.0 -8.9: Pass with Merit (B)

•9.0 -10: Distinction (A)