

# Bachelor in forestry and Environment Engineering

## Course information

Year 2020-21

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>3.5</b>		2.0	0.5
<b>Departments</b>		<b>Knowledge areas</b>	
Agroforestry Sciences		Environmental technologies	
<b>Year</b>		<b>Semester</b>	
2º		1º	

TEACHING STAFF			
Name	E-Mail	Telephone	Office
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SPECIFIC INFORMATION OF THE COURSE
<b>1. Contents description</b>
1.1. In English:
<b>Ecology. Forest ecology: Edaphic, climatic, biotic and dynamic evaluation of forest station</b>
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
<b>3. Objectives (as result of teaching):</b>

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: That the students have demonstrated to possess and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects which imply knowledge coming from the forefront of their field of study

CB3: That students have the ability to gather and interpret relevant data (normally within their area of study) to make judgments that include a reflection on relevant issues of social, scientific or ethical nature

CB4: That students can transmit information, ideas, problems and solutions to a specialized and non-specialized public

CB5: That the students have developed the necessary learning skills to undertake subsequent studies with a high degree of autonomy

G16: Sensitivity for environmental issues

T01: Use and mastery of a second language.

T02: Knowledge and improvement in the field of ICT

## 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:

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:  
- 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.

4. 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. Blackwell Science. 2nd Edition. Saunders 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.

Bellaterra Pugnaire F Valladares. F. (ed) 2007. Functional plant ecology: CRC Press. Boca Raton

Rodríguez J. 2010, Ecología ,: Pirámide Madrid,

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

Schneider, David C. 2009 Quantitative ecology [Recurso electrónico] : measurement, models and scaling. Amsterdam ; Boston : Academic Press/Elsevier,

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

Dykinson,. Newton, A C. 2007 Forest ecology and conservation : a handbook of techniques: Oxford University Press,. Oxford

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

### 8.2. Assessment Criteria and Marks:

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.

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)