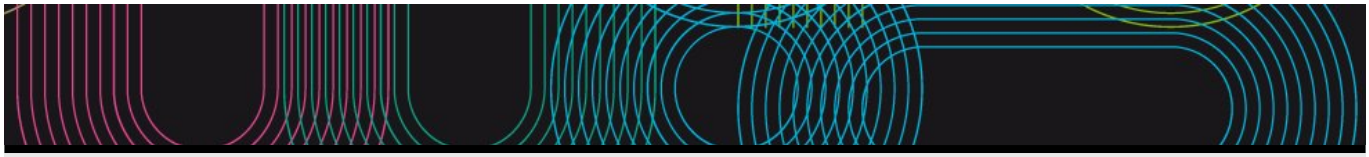
Universidade Vigo

Subject Guide 2020 / 2021



IDENTIFYING DATA				
Forestry Ecology				
Subject	Forestry Ecology			
Code	P03G370V01402			
Study programme	(*)Grao en Enxeñaría Forestal			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Sobrino Garcia, Maria Cristina			
Lecturers	Cordero Rivera, Adolfo Sobrino Garcia, Maria Cristina			
E-mail	sobrinoc@uvigo.es			
Web	http://ecoevo.uvigo.es			
General description	Ecology is the science that studies the response of organisms to environmental variations, from the individual level to the ecosystem. This course has as objectives to provide the basic knowledge of Ecology, with special reference to the forest environment.			

Competencies	
Code	
B1	Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area.
B2	Ability to analyze the ecological structure and function of forest systems and resources, including landscapes.
B3	Knowledge of degradation processes that affect forest systems and resources (pollution, pests and diseases, fires, etc.) and capacity for the use of forest environment protection techniques, forest hydrological restoration and biodiversity conservation .
C12	Ability to know, understand and use the principles of: Forest Ecology
D2	Ability to communicate orally and written in Spanish or in English
D3	Ability to communicate orally and in writing specifically in the Galician language
D4	Sustainability and environmental commitment
D5	Capacity for information management, analysis and synthesis
D7	Skill in the use of IT tools and ICTs.
D8	Ability to solve problems, critical reasoning and decision making

Learning outcomes			
Expected results from this subject	Training and Learning Results		
New	B1 B2 B3	C12	D2 D3 D4 D5 D7 D8
(*)Compromiso e defensa dos valores democráticos			

Contents	
Topic	
0. ORGANIZATION OF THE COURSE. FORESTS AND FOREST PLANTATIONS.	Development of the subject. Techniques of evaluation of the student: objectives and methods. Forests and plantations: differences and similitudes. The principles of Forest Ecology.

SECTION I. 1. INTRODUCTION TO ECOLOGY.	The concept of sustainability. The demographical problem (implications of human growth population on natural resources). Introduction to Ecology. Levels of biological organization and subdivisions of Ecology. The concept of ecosystem. Forest Ecology and the principle of determinism. The scientific method. Introduction to ecological economics (National accounting and the loss of natural resources. The ecospace and the ecological footprint). Ecology and environmentalism.
SECTION II. THE ENVIRONMENT. 2. THE MATCH BETWEEN ORGANISMS AND THE ENVIRONMENT.	Genotypic and phenotypic variation. Natural selection. Ecotypes. Concept of resource and ecological factor. Ecological effects of solar radiation (Photosynthesis, index of foliar surface, morphology, shadow tolerance, photoperiodism). The temperature and the organisms (Q10, diapause, physiological time, effects on plants, adaptations of plants to unfavourable temperatures). Atmospheric humidity and vegetal adaptations. Effects of the wind on vegetation (dissemination of reproductive propagules, physiological effects, morphological effects). Adaptations to fire.
3. FOREST IMPLICATIONS OF BIOLOGICAL ADAPTATION.	Implications of evolutionary concepts in the exploitation of forests. Importance of the factor light in forestry. Importance of the factor temperature in forestry. Importance of water in forestry. Importance of the wind in forestry.
SECTION III. ECOLOGY OF POPULATIONS. 4. DEMOGRAPHY.	Concept of population. Unitary and modular organisms. Construction and analysis of life tables. Survivorship courves. Age pyramids. Populational growth (geometrical growth, mathematical models, intrinsic rate of growth, innate capacity of increase). Populational growth and intraspecific competition: concept of carrying capacity. Analysis of key factors.
5. INTERACTIONS (I): COMPETITION AND PREDATION.	Theory of niche: concept, multidimensional approach. The relationship between niche and habitat. Type of interactions between organisms. Intraspecific competition (exploitation, interferencie, densodependency, population regulation, asymmetry). Allelopathy. Interspecific competition (logistical model, model of Tilman). Principle of competitive exclusion. Character displacement. Type of predators. Model of Lotka-Volterra. Examples in the laboratory and the field. Strategies in the search of food. Functional responses. Coevolution prey-predator. Mechanisms of defence of the prey (physical defences, chemical, crypsis, aposematism, mimicry). Interaction herbivores-plants.
6. INTERACTIONS (II): MUTUALISM AND DETRITIVORY.	Concept of mutualism. Types of mutualism (behaviour, care, polinización, intestinal, symbiosis, mycorhyzes). Lichens. Leguminous plants and Rhizobium. Decomposers: Bacteria and fungi. Soil detritivores (earthworms, insects). Aquatic detritivores. Relative role of microflora and detritivores. Interactions detritivore-resource (vegetal detritus, faeces, carrion).
SECTION IV. ESTRUCTURA AND ORGANIZATION OF ECOSYSTEMS. 7. THE BIOLOGICAL COMMUNITY.	Concept. Characteristics of the community. Physical structure (stratification, forms of growth, biomas). Seasonality (Temperate zones, tropical zones). Concept of ecotone (effect of border, ecotones between forests and grasslands). Concept of guild.
8. DIVERSITY IN FOREST ECOSYSTEMS.	Concept and type of diversity. Why preserve biodiversity? The measure of the biodiversity (index of Shannon, rank-abundance plots). Latitudinal gradient of biodiversity. Main forest activities and their effect on biodiversity. Techniques for maintaining biodiversity in forest plantations. Principles of eco-forestry.
9. PRIMARY PRODUCTIVITY.	Production and respiration (biomass, net and gross production). Type of photosynthesis (plants C3, C4 and CAM). Methods to measure primary productivity. Quimiosynthesis. Limiting factors of primary productivity (terrestrial and aquatic communities). Relation Productivity:Biomass in natural ecosystems. The productivity of forest ecosystems (factors that affect forest NPP; NPP of forests and monocultures).
10. FLOW OF ENERGY.	Thermodynamics. Trophic levels. Trophic chains and nets. Ecological pyramids. Diagramas of flow of energy. Storage and dynamic of the energy in ecosystems. Effects of the exploitation of forests in the flow of energy.
11. CYCLES DE MATHER.	Circulation of the mather. Biogeochemical cycles (P, N, S, C, the greenhouse effect). Cycles of elements in forest ecosystems (effect of the age of the trees, of the type of ecosystem, of the type of tree, effects over production, additions and losses of nutrients, effects of the extraction of wood on long-term productivity).

12. THE ECOLOGICAL SUCESSION.	The sucession (primary/secondary, alogenic/autogenic/biogenic, degradative). Hypotheses about sucession and the concept of climax. Mechanisms behind sucession (colonization, alteration of the environment, species displacement). Sucessional models (Horn, Tilman). Changes in the functioning of the ecosystems during the sucession. Examples of sucessions (abandoned fields, cyclic sucession). Importance of the sucession in the exploitation of the forests.
SECTION V. APPLIED ECOLOGY. 13. POLLUTION.	Definition. Types of pollutants. The acid rain (effects of the sulphur compounds on plants and animals: the decline of forest ecosystems). The hole in the layer of ozone. Noise. Watter pollution. Bioindicators of water quality. Eutrophication (Causes, recovery of eutrophic lakes).
14. EXPLOITATION AND CONTROL OF POPULATIONS.	Concept of maximum sustainable yield. Models of exploitation (fixed quota). Principles about the exploitation of populations (regulation of the effort of exploitation, instability, exploitation of a percentage, dynamic models). The exploitation of the forests. Techniques of pest control (aims, chemical control, biological control, genetic control, integrated control).
15. BASIC PRINCIPLES OF CONSERVATION BIOLOGY.	The number of species that inhabit the planet. The value of the species and ecosystems (intrinsic, instrumental, peculiarity). Processes and causes of extinction (historic extinctions, antropic effects). Management of ecosystems. Social, economic and political factors.
Practicals in the classroom. 1. METHODS IN FIELD ECOLOGY: mobile populations.	Methods and devices of sampling (devices for air, plants, soil, and water sampling). Methods of mark-recapture (index of Lincoln, method of Jolly). Relative estimates (selective predation, progressive predation, captures by unity of effort).
Practicals in the classroom. 2. METHODS OF WORK IN FIELD ECOLOGY: sesile populations.	Quadrats. Transects. Linear interception. Punctual interception. Method of the quadrats centered in a point. Spatial distribution (patterns of distribution). Experiment: sampling of a simulated community of plants.
Practicals in the computer room. 3. ECOLOGICAL IMPORTANCE OF BODY SIZE: ALLOMETRY.	Variability of body size in different types of organisms. Concept of allometry. Types of allometry. Examples. Study of problems to determine of the existence of allometry.
Practicals in the laboratory. 4. METHODS DE DETERMINATION OF AGE.	Methods of determination of the age in different type of organisms. Growth of the organisms. Experiment: studio of the growth in different tree species.
Field practicals. 1. Forest pests.	Density of Gonipterus scutellatus on Eucalyptus, and biological control by means of its parasitoid Anaphes nitens.
Field practices. 2. Estimation of water quality in the river Almofrei by means of biological methods.	The use of bioindicators to study river water quality.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	30	45	75
Studies excursion	9.8	14.7	24.5
Laboratory practical	9	13.5	22.5
Mentored work	7	10.5	17.5
Practices through ICT	3	4.5	7.5
Problem and/or exercise solving	2	0	2
Problem and/or exercise solving	1	0	1

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Class room lectures.
Studies excursion	Field work in forest ecosystems
Laboratory practical	Laboratory practical lectures
Mentored work	Class room work
Practices through ICT	Simulations of ecological systems in the computer room

Personalized assistance

Methodologies	Description
Lecturing	It is recommended that the student that wish to be attended in a one-to-one tutorial contact the corresponding professor previously by email.

Assessment

	Description	Qualification	Training and Learning Results	
Lecturing	A final written examination will be used to evaluate the work done over the course.	70	B1	C12
Studies excursion	Evaluation included in the written test	8	B1	C12
Laboratory practical	Evaluation included in the written test	6	B1	C12
Mentored work	Evaluation included in the written test	10	B1	C12
Practices through ICT	Evaluation included in the written test	6	B1	C12

Other comments on the Evaluation

Participation in the practical lectures and field lessons is compulsory for a positive final evaluation.

Dates of exams:

1ª period: 25 May 2021, 10:00 h

2ª period: 5 July 2021, 16:00 h

The official dates and any subsequent modification are published on the School and in the web http://forestales.uvigo.es/gl/

Sources of information

Basic Bibliography

Complementary Bibliography

Kimmins, J. P., **Forest Ecology**, 2,

Sevilla Martínez, F., **Una teoría ecológica para los montes Ibéricos**,

Cordero Rivera, A. (editor), **Proxecto Galicia: Ecoloxía, vol. 44**,

Terradas,J., **Ecología de la Vegetación**,

Molles, M.C., **Ecology: concepts and applications**, 6 (only until 4th edition available on the Library),

Barnes, B. V., Zak, D. R., Denton, S. R. & Spurr, S. H., **Forest Ecology**, 4,

Begon, M., Harper, J. L. & Townsend, C. R., **Ecología**,

Rico Boquete, E., **Política Forestal e Repoboacións En Galicia. 1941-1971**,

Recommendations

Subjects that continue the syllabus

Management of protected areas and biodiversity/P03G370V01801

Subjects that it is recommended to have taken before

Botany/P03G370V01303
Edaphology/P03G370V01302
Mathematics: Statistics/P03G370V01301
Forest entomology and Zoology/P03G370V01305

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===
Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===
* educational Methodologies that keep :
All the educational methodologies.

* Educational methodologies that modify
In case of a no face-to-face teaching, all the methodologies will be adapted virtually using as main tools the Remote Campus and Faitic platforms. The modifications will not be significant for most of the methodologies excepting thelaboratory practical lessons which will be explained using specific tutorials specific for each subject.

* Mechanism no face-to-face of attention to the students (*tutorías)
One-to-one tutorials with the professors will be performed by using the virtual offices in Remote Campus platform.

* Modifications (if they proceed) of the contents to give
Contents will not be modified.

* Additional bibliography to facilitate the car-learning
Additional bibliography will not be neccesary

=== ADAPTATION OF THE EVALUATION ===
The final test will be replaced by a written individual report that will include the answers to specific questions provided by the professors about the main contents from both, master classes and practical lessons, of the subject.
* Proofs that modify
[Test] = [Written individual report]