



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	Spanish Galician			
Department	Ecology and Animal Biology			
Coordinator	Cordero Rivera, Adolfo			
Lecturers	Cordero Rivera, Adolfo Sobrino Garcia, Maria Cristina			
E-mail	adolfo.cordero@uvigo.es			
Web	http://ecoevo.uvigo.es			
General description	(*)A Ecoloxía é a ciencia que estudia a resposta dos organismos ás variacións ambientais, dende o nivel individual ao ecosistema. Esta materia ten como obxectivos proporcionar os coñecementos básicos da Ecoloxía, con especial referencia ao ambiente forestal.			

Competencies

Code

Learning outcomes

Expected results from this subject	Training and Learning Results
New	

Contents

Topic	
0. ORGANIZATION DO 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 curves. 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, interference, 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, mycorrhizas). 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, biomass). 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 MATTER.	Circulation of the matter. 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 SUCCESSION.	The succession (primary/secondary, alogenic/autogenic/biogenic, degradative). Hypothesis on succession and the concept of climax. Mechanisms behind succession (colonization, alteration of the environment, species displacement). Successional models (Horn, Tilman). Changes in the functioning of the ecosystems during the succession. Examples of successions (abandoned fields, cyclic succession). Importance of the succession 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. Water 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.
16. INTRODUCCIÓN TO THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA). Practicals in the classroom.	Fundamentals, terminology and definitions. Objectives of the EIA. Phases of the EIA. Methods and models to define the relation cause-effect.
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 DE WORK EN ECOLOGY DE FIELD: sessile 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.
(*)Práctica de laboratorio. 5. METABOLISMO MICROBIANO	(*)Utilización do método Winkler para a determinación da actividade fotosintética e respiratoria
Field practicals. 1. Forest pests.	Density of <i>Gonipterus scutellatus</i> on <i>Eucalyptus</i> , and biological control by means of its parasitoid <i>Anaphes nitens</i> .
Field practices. 2. Estimation of water quality in the river Alfofrei 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 practices	9	13.5	22.5
Classroom jobs	7	10.5	17.5
Computer practices	3	4.5	7.5
Short answer tests	2	0	2
Problem 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 practices	Laboratory practical lectures
Classroom jobs	Class room work
Computer practices	Simulations of ecological systems in the computer room

Personalized attention

Methodologies	Description
Lecturing	

Assessment

	Description	Qualification	Training and Learning Results
Lecturing	A final written examination will be used to evaluate the work done over the course.	70	
Studies excursion	(*)Avaliarase no exame escrito da materia	8	
Laboratory practices	(*)Avaliarase no exame escrito da materia	6	
Classroom jobs	(*)Avaliarase no exame escrito da materia	10	
Computer practices	(*)Avaliarase no exame escrito da materia	6	

Other comments on the Evaluation

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
