

Experimental Methods in Terrestrial Ecology

Code: 42919
ECTS Credits: 6

Degree	Type	Year	Semester
4313774 Land Ecology and Biodiversity Management	OT	0	1

Contact

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Other comments on languages

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Use of languages

Principal working language: spanish (spa)

Prerequisites

There are no additional prerequisites

Objectives and Contextualisation

This module takes students to places and circumstances where studies in terrestrial ecology are developed. The module is based on an experimental design developed by the students under the tutelage (tutoring) of the teaching staff. This process requires the recognition and interpretation of the natural environment, the application of the general principles of ecology and the use of sampling, measurement and analysis techniques according to this experimental design.

The module consists of theoretical classes mixed with related practices so that the students know the bases of the different techniques used and the main equipment used in each one of the areas (ecophysiology, plant ecology, animal ecology). In addition, practical visits are made to experimental stations and active experimental fields in which the students know the scientists in charge of these works, and they know and manipulate cutting edge scientific equipment in the context of studies in ecology.

Once the theoretical classes are done, the students are invited to design a study in an area that allows the realization of different experiments in terrestrial ecology. To this end, meetings are held with the students (in small groups) to guide them, according to the characteristics of the proposed area and to a first proposal of the thematic scope of the study, in the realization of a scientifically coherent and robust experimental design. To do this, students should apply the knowledge acquired in other modules ("Modeling and environmental statistics" and "Advanced content in terrestrial ecology"). This stage of the module ends with the writing of the study proposal, evaluated by the teachers.

Skills

- Apply research methodology, techniques and specific resources to solve problems and produce innovative results in a particular area of specialisation.
- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.

- Evaluate and analyse the diversity of animal, plant and fungal organisms from an evolutionary and functional perspective, and their interactions with the medium.
- Organise, plan and manage projects related to the area of study.
- Sample, handle, identify and characterise animal, plant and fungal samples, by tissues, individuals, communities, populations and landscapes.

Learning outcomes

1. Apply the main techniques for sampling and measuring used in (animal and plant) ecology.
2. Apply the main tools used in functional ecology to measure exchanges of matter and energy between organisms and their environment.
3. Autonomously organise and carry out a scientific study, from the initial hypotheses to the detailed planning.
4. Design a scientific study on the basis of an initial hypothesis.
5. Identify and correctly use the most appropriate measuring technique for a particular objective, keeping in mind its limitations.
6. Identify the main approaches used to set up experimental studies, both in field conditions and in greenhouses or experimental fields, and the limitations of these approaches.
7. Interpret and apply protocols for data collecting, sampling and instruments.
8. Make significant field observations for ecological studies.
9. Present the results of a study on the state of conservation of one (or several) threatened species.
10. Work in a group to conduct and present a scientific study.

Content

Description of the contents of this module:

- Main methods and techniques of sampling in ecophysiology, including the characterization of the medium (eg, soil moisture measurement by TDR probes), morphology and architecture of plant cover and root systems (optical and spectroradiometric methods, rhizotrons) , The study of the water use by plants (eg, gravimetric techniques, measurement of water potential and sap flow) and their hydraulic properties (hydraulic conductivity, vulnerability to embolism), the measurement of gas exchange at leaf level (Porometers, IRGA-porometers, fluorescence).
- Main methods and techniques of sampling in plant ecology, including inventory and census techniques (transects, point quadrat, plots), measurement of the main structural parameters of a forest (basal area, biomass, leaf area index), dendrochronology, net primary production at the ecosystem level (successive crops, eddy covariance), soil decomposition and respiration fluxes, isotopic methods and examples of complex experimental designs under field conditions.
- Main methods and techniques of sampling in animal ecology, including methods of identification and tagging of individuals, census and population monitoring techniques, methods for studying occupation areas and the use and characteristics of territories, as well as habitat selection, methods to studying the foraging of terrestrial vertebrates (eg, cafeteria experiments), ethological methods.

Methodology

The methodology used in this module follows the scientific process, with some activities directed and the rest supervised. All work is done in working groups. Thus, the methodology that follows is the following:

- 1) presentation of the main field techniques in eco-physiology, plant ecology and animal ecology
- 2) experimental design at a sampling site, including objectives, assumptions, methodology to be used, and expected results
- 3) presentation of the results

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Field sessions on ecological field techniques	49	1.96	5, 6
Therory sessions	5	0.2	4, 6
Type: Supervised			
Design of an experimental work	35	1.4	2, 1, 4, 5, 7, 3
Proposal of a scientific work	23	0.92	9
Type: Autonomous			
Groups to organize work	30	1.2	3, 10

Evaluation

Student groups should present the work in oral presentation. The evaluation is made from different evaluation rubrics (clarity of objectives, hypotheses and results, presentation and defense of the work, design etc)

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Design of an experimental work, use of the scientific method	30	0	0	2, 1, 4, 8, 5, 6, 7
Presence and active participation	20	4	0.16	3, 10
Presentation of the results	50	4	0.16	9, 10

Bibliography

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