

Experimental Methods in Terrestrial Ecology

Code: 42919
ECTS Credits: 6

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

Contact

Name: Bernat Claramunt Lopez

Email: bernat.claramunt@uab.cat

Other comments on languages

Part del mòdul pot estar impartit en anglès

Use of Languages

Principal working language: spanish (spa)

Teachers

Francisco Lloret Maya

Prerequisites

There are no additional prerequisites

Objectives and Contextualisation

This module brings students to places and circumstances where studies in terrestrial ecology are carried out. The module is based on the student's contact with several research groups and / or several experimental designs, and with the interaction with them. The module consists of theoretical classes mixed with related practices, so that 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). Thus, students get to know the scientists in charge of experimental stations and active experimental fields, and know and manipulate cutting-edge scientific equipment in the context of studies in ecology. During the sessions, activities are carried out with students to assess the various aspects, practical and theoretical, of each of the cases, with special emphasis on the balance found between quality of experimental design and logistical or operational limitations.

Competences

- 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) On-site assessment of experimental designs in different fields, including the objectives, the hypotheses, the methodology that is intended to be used, and the expected results
- 3) Presentation of various works related to the visits made

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

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

Assessment

The students must prepare several works, some individuals and some in groups, related to the visits made.

In the event of a student committing any irregularity that may lead to a significant variation in the grade awarded to an assessment activity, the student will be given a zero for this activity, regardless of any disciplinary process that may take place. In the event of several irregularities in assessment activities of the same subject, the student will be given a zero as the final grade for this subject.

Assessment 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

Chapin FS, Matson PA, Mooney, HA (2002) *Principles of Terrestrial Ecosystem Ecology*. Springer, New York, NY, USA.

Farina A (2007) *Principles and Methods in Landscape Ecology: Towards a Science of the Landscape*. Springer, New York, NY, USA.

Gotelli NJ & Ellison AM (2004) *A primer of Ecological Statistics*. Sinauer, Sunderland, MA, USA.

Karban R & Huntzinger M (2006) *How to Do Ecology. A concise Handbook*. Princeton University Press, Princeton, NJ, USA.

Krebs CJ (1999) *Ecological Methodology* (2nd Edition). Benjamin Cummings, Menlo Park, CA, USA.

Lambers H, Chapin III FS, Pons JL (1998) *Plant Physiological Ecology*. Springer, New York, NY, USA.

Lovejoy TE & Hannah L (2005) *Climate Change and Biodiversity*. Yale University Press, New Haven, USA.

Pearcy RW, Ehleringer J, Mooney HA, Rundel P (eds.) (1989) *Plant physiological ecology: field methods and instrumentation*. Chapman and Hall, London, UK.

Quinn GP & Keough MJ (2002) *Experimental Design and Analysis for Biologists*. Cambridge University Press, Cambridge, UK.

Sala OE, Jackson RB, Mooney HA, Howarth RW (eds.) (2000) *Methods in Ecosystem Science*. Springer, New York, NY, USA.

Schlesinger WH (1997) *Biogeochemistry. An analysis of global change* (2nd edition). Academic Press, San Diego, California, USA.

Schulze E-D, Beck E, Müller-Hohenstein K (2005) *Plant Ecology*. Springer, Berlin, Germany.

Sutherland WJ (2006) *Ecological Census Techniques* (2nd edition). Cambridge University Press, Cambridge, UK.

West PW (2004) *Tree and Forest Measurement*. Springer, Berlin, Germany.

Software

No specific software required