COURSE DATA

DATA SUBJECT

Code: 43276
Name: Field Ecology: methods and techniques
Cycle: Master's Degree
ECTS Credits: 9
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2148 - Master's degree in Biodiversity: Conservation and Evolution	Facultat de Ciències Biològiques	1	Annual

SUBJECT-MATTER

Degree	Subject-matter	Character
2148 - Master's degree in Biodiversity: Conservation and Evolution	Techniques and tools for the study of ecosystems	ELECTIVES

COORDINATION

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SUMMARY

The module on **Methods for the study of ecosystems** is an optative one included in the speciality of **Ecosystem biodiversity and conservation** of the master in Biodiversity: conservation and evolution. The module includes theoretical lessons, but mainly practical ones where we will work on how to gather datasets needed for the management and sustainability of ecosystems, and particularly on the embedded organisms. The student should finish with the ability to work on different functional aspects of organisms in ecosystems which are basic for the management of hunting and fishing activities. The main part of the module is carried out in the field, where students will practice on the observation of living organisms and develop their capability for selection and obtaining data to be stored and analysed.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

The students must have a basic knowledge of ecology, botany, zoology, microbiology, geography, geology and statistics. Furthermore, they must be able of recognizing different groups of living organisms. Capability of landscape analysis.

COMPETENCES / LEARNING OUTCOMES

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Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.

Favour intellectual curiosity and encourage responsibility for one's own learning.

Stimulate the capacity for critical reasoning and for argumentation based on rational criteria.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.

Students should demonstrate self-directed learning skills for continued academic growth.

To acquire basic skills to develop laboratory work in biomedical research.

DESCRIPTION OF CONTENTS

1. Introduction. Study of ecosystems and communities

Introduction to the study of protected organisms and their environment, biological communities and ecosystems in the natural setting. Study units. Aims of fieldwork studies. Phases, needs, working plan.

2. Types of data

Data types in relation to objectives, capacities and subject of study. Categorical, numerical, continuous and discontinuous data. Incidence, abundance, cover, density, production and biomass. Environmental and individual (morphometric, physiological, state) data.

Sampling types: quadrats, transects, point-quadrant and others

3. Sampling types and design

Sampling types: quadrats, transects, point-quadrant and othersSampling design: random, systematic, stratified and combined.

4. Sampling techniques and sample processing

Data on the physic environment. Geology, geography, edaphology, limnology and physical oceanography.
Sampling terrestrial communities. Vegetation, invertebrates, vertebrates. Capture, mark and recapture.
Sampling aquatic communities. Phytoplankton, macrophytes, zooplankton, benthos, fish.
Acquiring data on interactions. Herbivory, predation, parasitism, competition, facilitation, mutualism (including pollination, dispersal).
Ecosystem functions. Biomass and productivity.
Sampling in palaeoecology.

5. Methods for data analysis on biodiversity, populations and communities

Individuals and populations. Morphometry, density, spatial dispersion, dynamics, survival.
Diversity indices.
Diversity scales: alpha, beta, gamma.
Effects of effort. Rarefaction.
Statistical methods for the ordination and classification of communities.
Methods to compare communities.

6. Practical application of data analysis

Analysis and interpretation of geological structures and identification of fossil remains. Acquiring field data on individuals, populations, communities and ecosystems, including terrestrial plants and animals and aquatic organisms. Observation and capture of organisms, sampling. Measuring and identifying organisms and their remains (pellets, sediment, stomach content) with the use of microscopy in the lab.

7. Practical application of data analysis

Statistical analysis of field and laboratory data using freely available software. Capture and recapture data analysis, hypothesis testing with univariate data, description and testing multivariate data. Focus on how to analyze data gathered by the student during the practical work.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours

Computer classroom practice	10,00
Classroom practices	80,00
Total hours	**90,00**

NON PRESENCIAL ACTIVITIES

Activity	**Hours**
Attendance at other activities	10,00
Individual or group project	45,00
Independent study and work	30,00
Preparation of lessons	15,00
Preparation for assessment activities	15,00
Resolution of case studies	20,00
Total hours	**135,00**

TEACHING METHODOLOGY

Practical lessons in the class and computer class will be carried out with a combination of magistral lessons, analysis of methodological issues and use of software for data analysis in computers. Practicals for the acquisition of data in natural ecosystems will be carried out through field excursions with the professorship and participation of external experts on biodiversity. Laboratory practicals will also be used for identifying organisms and obtaining further data from field samples.

EVALUATION

The evaluation of this module will consist partly of an exam on the theoretical contents and practical fundaments, which will be eliminatory, this is, the module could be passed only if the mark of this exam is equal or higher than 4 (over 10 maximum points). This exam may include both test type (multiple choice) questions, so as open questions. Its mark, if higher than 4, will account for 10% of the final mark of the module. If lower than 4, this will be the final mark of the corresponding evaluation period. Another part of the evaluation will consist on an oral presentation of some works carried out in the field, and it will account for 80% of the final mark. The student must reply orally to questions raised by the professors, and the presentation will be in front of a committee composed of 2-4 professors, each giving a mark, from which an average will be generated. The interest shown by the students while in the field will also be taken into account (10%) for the final mark.

REFERENCES

- Brower, J. E., Zar, J. H. y von Ende, C. N. (1997). Field and laboratory methods for general ecology. McGraw-Hill, Boston.

- Brewer, R. y M.T. MacCann, (1982). Laboratory and field manual of ecology. Saunders College Publishing, Philadelphia

- Krebs C. J. (1999). Ecological methodology (2ª edición), Wesley Longman, Inc. Menlo Park, CA. 620 pp.

- Southwood, T.R.E. & Henderson, P.A. (2000). Ecological Methods 3ª Edition. Blackwell & Science. London

- Sutherland, W.J. (1996). Ecological Census techniques a handbook. Cambridge University Press. Cambridge