VNIVERSITAT DE VALÈNCIA

Course Guide
43276 Field Ecology: methods and techniques

COURSE DATA

Data Subject	
Code	43276
Name	Field Ecology: methods and techniques
Cycle	Master's degree
ECTS Credits	9.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2148 - M.D. in Biodiversity: Conservation and Evolution	Faculty of Biological Sciences	1	Annual

Subject-matter

Degree	Subject-matter	Character
2148 - M.D. in Biodiversity: Conservation and Evolution	12 - Techniques and tools for the study of ecosystems	Optional

Coordination

Name	Department
ARMENGOL DIAZ, JAVIER	275 - Microbiology and Ecology
MESQUITA JOANES, FRANCESC	275 - Microbiology and Ecology
MONROS GONZALEZ, JUAN SALVADOR	275 - Microbiology and Ecology

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.

OUTCOMES

2148 - M.D. in Biodiversity: Conservation and Evolution

- 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.
- Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.
- Stimulate the capacity for critical reasoning and for argumentation based on rational criteria.
- Favour intellectual curiosity and encourage responsibility for one's own learning.

LEARNING OUTCOMES

The student should be able to:

- Recognize distribution trends of organisms in ecosystems, their demographic patterns, age and sex, survival, and the interactions between them and the environment or other organisms.
- Order and evaluate the previous parameters in spatial and temporal gradients to recognize similarities and differences between ecosystems. This aspect includes its application to the present landscape which is strongly influenced by human activities.
- Acknowledge the variety of ecological and historical factors affecting the distribution of organisms, recognizing which are the most important and acquiring a dynamic view of spatio-temporal patterns of variation.
- Understand the role of human activities on organisms.
- Understand and know how to work with organisms and their interactions with the environment and other organisms, including the application of mathematical models in ecology.
- Get familiar with information sources on animal and plant ecology.
- Learn the main methods and techniques used in ecological analysis.
- Know how to apply theoretical knowledge on Ecology to practical conservation issues.

- Select organisms in order to solve conservation-related problems.

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.

2. Approach to aims and planning

Aims of fieldwork studies. Phases, needs, working plan.

3. 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.

4. Sampling types and design

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

5. 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.

6. 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. Rarification.
Statistical methods for the ordination and classification of communities.
Methods to compare communities.

7. Practical application of data analysis

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.

8. 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

ACTIVITY	Hours	% To be attended
Classroom practices	80,00	100
Computer classroom practice	10,00	100
Attendance at events and external activities	10,00	0
Development of group work	30,00	0
Development of individual work	15,00	0
Study and independent work	15,00	0
Readings supplementary material	15,00	0
Preparation of evaluation activities	5,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	20,00	0
Resolution of online questionnaires	10,00	0
TOTAL	**225,00**	

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

Basic

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

Additional

- 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