UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Integrative Identification of Functional Biodiversity

2627-1-F0602Q109-F0602Q10901

Aims

Knowledge and Understanding:
This laboratory course aims to provide students with multidisciplinary tools and knowledge for the characterization of biodiversity, with a particular focus on the functional aspects that drive key supporting and regulating ecosystem services in both natural and human-modified environments (e.g., pollination, seed dispersal, pest removal). The course promotes a multilevel understanding of the interactions between environmental variables and organisms, which is central to the concept of ecological transition. Learning will be supported through hands-on fieldwork and in-class activities, including critical discussion and reinterpretation of real-world case studies relevant to the course topics.

Applying Knowledge and Understanding:
The course will equip students with a multiscale and integrated view of biodiversity and environmental sustainability, going beyond classical concepts such as bioindication and biodiversity conservation. Fieldwork will provide students with a direct experience of ecosystems and their dynamics, using interdisciplinary tools and approaches. From an applied perspective, students will develop skills related to the design, support, and critical evaluation of ecological transition processes (e.g., Nature-Based Solutions, mitigation strategies for environmental and anthropogenic impacts), applicable at both micro- and macro-territorial scales.

Making Judgements:
Students will be able to identify and interpret, within the framework of ecological transition, the main risk factors for biodiversity and the potential mitigation strategies that can enhance ecosystem functionality and resilience. This will be assessed during the final exam, which will take the form of a scientific presentation in a peer-review-like and critical discussion setting.

Communication Skills:
The course aims to develop the student’s ability to evaluate and communicate, effectively and using appropriate technical language and modern formats, key concepts related to functional biodiversity and the ecosystem services it provides to nature and humans. This will be assessed through the original presentation of data collected during the practical laboratory sessions.

Learning Skills:
By the end of the course, students will be able to independently deepen their understanding of the topics covered, adopt a multidisciplinary perspective, and develop the ability to engage with field experts or consult specialized scientific literature.

Contents

The laboratory is made up of strictly connected theoretical and practical elements. The first part involves the practical activity of characterization and estimation of biodiversity in natural ecosystems and in environments subject to anthropogenic disturbance. Environmental parameters and disturbing factors that can influence biological complexity will be analyzed in detail. The second part focuses on the analysis of functional interactions and will allow the student to understand which are the main functional groups present and to quantify their interactions, from the perspective of ecosystem services of regulation and support. The last part of the laboratory will be dedicated to interpreting the results obtained from the previous phases in a multidisciplinary and critical way in order to identify which functional components of biodiversity require protection and/or strengthening actions through the planning of territorial requalification/management actions. An important element will also be predictive analysis that will allow to evaluate how any protection or disturbance actions act on the ecosystem and the services associated with them and the repercussions in the field of sustainability and well-being not only for the biodiversity of the ecosystem itself but also for humans.

Detailed program

The course program includes 6 CFU of practical activities in the field lasting several days, alternating with intermediate frontal teaching activities. These activities will be carried out in different ecosystems of natural areas of regional and national interest (parks, reserves) but also in anthropized areas close to these. One of the objectives is in fact to compare how functional biodiversity is influenced by key variables, such as land use, the abundance of water and the abundance of resources. We will study how these elements have an impact on both the qualitative and quantitative aspects of the ecosystem and more generally on the well-being of organisms including humans. To this end, activities will be carried out for the detection of environmental parameters, sampling of organisms, their identification and characterization of the main functional groups (e.g. pollinators, predators, seed dispersers, etc.). These activities will also be accompanied by statistical and computer analysis to provide the student with the necessary skills in interpreting the data collected in order to understand in detail the dynamics of interaction and their relevance in the ecosystem. A final critical phase will also be dedicated to the elaboration of possible solutions for the conservation and restoration of biodiversity and mitigation activities of stress factors.

Prerequisites

Basic knowledge of biology (zoology, ecology, botany) and statistics.

Teaching form

Lectures in the field and in the classroom, eventual seminar activities by experts and land management operators. All the activities (totalling 20 hours) will be carried out in the field and in the laboratory through interactive teaching.

Textbook and teaching resource

The teaching material (presentations and scientific articles) will be made available on the University e-learning platform.

Semester

Second semester.

Assessment method

The oral exam is aimed at assessing the student's knowledge of the topics of the laboratory. There are no midterm exams scheduled.

Office hours

By appointment by writing to the teachers.

Sustainable Development Goals

SUSTAINABLE CITIES AND COMMUNITIES | LIFE ON LAND