UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biological Complexity

2627-1-F0602Q110-F0602Q11001

Aims

Knowledge and Understanding:By the end of the course, students will have acquired knowledge of the structural and functional characteristics of ecosystems, the main factors governing ecosystem balance, and the processes leading to ecosystem alteration and stress. They will also be able to understand the relationships between ecosystems and human activities across different environmental contexts, ranging from protected natural areas to peri-urban and urban environments.

Applying Knowledge and Understanding:Students will be able to identify and interpret the main characteristics of ecosystems in relation to human presence and activities, assessing their levels of complexity, stability, and resilience. They will be able to apply the knowledge acquired to the analysis of case studies and a variety of environmental contexts.

Making Judgements:The course will provide students with the tools to collect, analyse, and interpret data related to the structure, functioning, and dynamics of complex ecosystems. Students will also develop critical thinking skills to evaluate the role of biodiversity and ecosystem services in supporting human well-being and environmental sustainability.

Communication Skills:By the end of the course, students will be able to communicate clearly and effectively, using appropriate scientific terminology, the concepts, methodologies, and findings related to the topics covered during the course.

Learning Skills:Students will acquire the skills necessary to independently deepen their understanding of the topics covered by critically consulting scientific literature, specialised textbooks, databases, reliable online resources, and tools for biodiversity identification and analysis, including dichotomous keys and field guides.

Contents

Analysis of ecosystems in relation to human activities. Relationships between the environment, biodiversity, and human well-being.

Detailed program

The course includes 20 hours of field activities, preceded by a brief introductory session (1–2 hours), which may take place either in the classroom or directly in the field. Whenever possible, the field activities will be organised as a single multi-day field trip.
The course will focus on the analysis of the structural and functional characteristics of different ecosystems, ranging from highly complex Mediterranean ecosystems to moderately disturbed environments and urban areas characterised by high levels of human pressure.
Particular attention will be given to the relationships between ecosystems and human activities, examining the effects of anthropogenic pressures on biodiversity, ecosystem functioning, and ecosystem services, with particular reference to their role in supporting human well-being.

Prerequisites

General Botany

Teaching form

The course includes 20 hours of laboratory activities conducted entirely in the field. At least three different habitat types will be selected, including mature Mediterranean maquis ecosystems, moderately disturbed wetlands, and urban environments characterised by high levels of human pressure.
During the field activities, students will apply vegetation survey methods, including transects and other sampling techniques, to analyse floristic composition and identify the main plant taxa. These activities will enable students to understand the ecological role of different species, identify ecosystem alterations, and recognise the presence of invasive species.
The laboratory component will be organised into two or three intensive full-day field sessions, each lasting approximately 6–7 hours. Theoretical concepts will be integrated directly with field observations and practical exercises.

Textbook and teaching resource

Lecture notes provided by the instructor.

Recommended Textbooks:
Judd, W.S., Campbell, C.S., Kellogg, E.A., & Stevens, P.F. Plant Systematics: A Phylogenetic Approach. Piccin (Italian edition).
Raven, P.H., Evert, R.F., & Eichhorn, S.E. Biology of Plants. Zanichelli (Italian edition).
Strasburger. Strasburger's Textbook of Botany for Universities, Volume 2: Evolution, Systematics and Ecology (Italian edition).

Semester

Second semester

Assessment method

The examination is designed to assess students' ability to understand and interpret the structural and functional characteristics of the different ecosystems studied during the course, as well as their knowledge of the main disturbance factors and the processes that promote ecosystem stability and resilience. As part of the integrated assessment with the other course modules, the examination will also evaluate students' ability to understand and discuss the role of ecosystems, biodiversity, and ecosystem services in supporting human well-being.

Office hours

On appointment; mail to: massimo.labra@unimib.it

Sustainable Development Goals

SUSTAINABLE CITIES AND COMMUNITIES | CLIMATE ACTION | LIFE ON LAND