UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Ecosystem Services (regulating)

**2526-1-F0602Q109-F0602Q10902**

### Aims

Knowledge and understanding: The student will acquire multidisciplinary tools and knowledge regarding biodiversity-mediated regulatory ecosystem services in natural and anthropogenic environments (e.g., pollination, seed dispersal, removal of harmful animals, air or water purification) mediated by both animals and microorganisms. The biodiversity-environment interface and interactions between organisms, which are intrinsic aspects of the concepts of ecological transition, will be explored. In addition, management and mitigation issues to increase ecosystem functionality and resilience will be addressed.

Applied knowledge and understanding: The student will gain a multilevel view of environmental sustainability and the role of biodiversity in regulating natural and non-natural ecosystems. Field and laboratory activities will allow a practical understanding of the subject, and the multidisciplinary techniques will also be of immediate application in other biological and environmental professional contexts. The module will allow for skills in the critical assessment of regulatory ecosystem services and also ecological transition processes applicable to micro- and macro-scale spatial contexts.

Making judgment: The student will acquire the ability to critically and independently evaluate and characterize the various biotic components that contribute to regulatory ecosystem services.

Communication skills: the teaching aims to provide the student with the skills to effectively evaluate and communicate concepts related to functional biodiversity and its benefits to ecosystems and humans in a modern, specific language. This will be done through hands-on activities and moments of shared work and discussion.

Learning skills: upon completion of the course, the student should be able to independently explore the topics covered, have a multidisciplinary outlook and mature the ability to interface with experts in the field or consult dedicated scientific literature. Lecturers will provide supporting teaching materials and references to scientific literature.

## Contents

The module involves the hands-on activity of characterizing and estimating biotic components that contribute to regulatory ecosystem services, in natural environments and those subject to anthropogenic disturbance. Teaching focuses on the analysis of biotic interactions to understand which major functional groups are present and quantify their interactions, from the perspective of regulatory ecosystem services. Data processing and preparation of an illustrative presentation are also expected.

## Detailed program

The module program includes 2 CFU of practical field activities, alternating with frontal teaching and laboratory activities. These activities will be conducted in different ecosystems of natural areas of regional and national interest (parks, reserves) but also in anthropized areas (urban green areas). This will allow comparison of how functional biodiversity is affected by landscape modification such as land use or alteration of basic resources. The following issues will be addressed: i) What are ecosystem services and what regulatory services mediated by interactions between species (pollination, microbiome), biotic components, and biotic processes that contribute to the pollination and microbiome service; ii) how sampling can be planned to assess regulatory ecosystem services; iii) what techniques can be applied for sampling and the difficulties and strategies on quantification of ecosystem services and geographic scales at which to characterize them; (iv) field and computer-based surveys of environmental parameters will be applied, and (v) characterization of interactions among major functional groups (pollinators, predators, seed dispersers, environmental microbial communities) and ecological significance of diversity indices and descriptors of interactions. These activities will also be supported by data analysis to provide the skills of interpretation and understanding of regulatory ecosystem service.

## Prerequisites

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

## Teaching form

Lectures in the field and in the classroom, seminars by ecosystem services experts.

- 1 4-hour laboratory lesson carried out in interactive mode in person;
- 1 4-hour laboratory lesson carried out in explanatory mode in person;
- 3 total practical exercises for a total of 12 hours carried out in interactive mode in person;

## Textbook and teaching resource

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

## Semester

Spring semester (May/June).

## Assessment method

The oral examination in the form of an interview on the topics covered in class, with preparation of a paper from the data collected, is directed at assessing the student's knowledge of the laboratory topics. There will be no in-progress testing.

Evaluation Criteria: evaluation of scientific and technical knowledge regarding the subjects, critical and individual reworking skills of experimental problems assigned by teachers, communication and reasoning skills, correct use of technical language.

## Office hours

By appointment by writing to the lecturer by e-mail: paolo.biella@unimib.it; antonia.bruno@unimib.it

## Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | SUSTAINABLE CITIES AND COMMUNITIES | LIFE ON LAND