UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Laboratory of Sustainability and Biodiversity

2627-1-F7603Q024

Aims

The laboratory course aims to provide an understanding of biodiversity and the key elements of natural heritage conservation as a part of the transition to a more sustainable development. The complex diversity of species and ecosystems will be introduced to students. The fundamental role of ecosystem services in our lives and economies will be a key topic. The direct or indirect effects of human activities on animals, plants and ecosystems will be explained. In this context, the processes leading to species extinction and habitat loss will be analysed in the light of the main threats associated with global change. All issues will be analyzed against the framework of international and EU regulation, in order to set clear global objectives and strategies for tackling the biodiversity crisis. In particular, the course will explore how globalization, trade restrictions, and environmental exceptions impact conservation policies. Available data sources, indicators and tools for the monitoring of biodiversity status and change will be taught. Discussing real-world case studies will help to provide interdisciplinary knowledge and highlight practical implications for sustainable biodiversity and ecosystem management.

Knowledge and understanding
At the end of the course the student will have a fundamental understanding of:
• animal and plant biodiversity
• ecosystem functioning
• the importance of conserving biodiversity and ecosystems
• main threats to natural heritage deriving from global change
• the International and EU legal framework governing biodiversity and ecosystems
• legal and policy challenges arising from globalization, including how international trade and climate regulation impact biodiversity protection
• methods and indicators to know and monitor biodiversity and ecosystem status
• sustainable management of natural heritage for its conservation.

Applying knowledge and understanding
At the end of the course the student will be able to:
• understand basics of animal and plant biology as well as ecosystem functioning
• recognize the intrinsic value of natural heritage besides its role in economics and productive supply chain

• understand the effects of economic and productive schemes on biodiversity and ecosystems
• describe impacts on biodiversity and ecosystem status using the main metrics
• identify the main legal and policy tools addressing the loss of biodiversity and regulating the concept of sustainability
• identify the main legal and policy challenges impacting the conservation of biological diversity, including international trade measures
• identify sustainable measures to prevent or mitigate impacts on biodiversity and ecosystems in economic and productive schemes.

Making judgements
At the end of the course the student will be able to:
• critically assess the impact of activities on biodiversity
• direct efforts and resources in the most appropriate measures to reduce or eliminate threats to the natural heritage
• identify and interpret international legal standards set by international conventions and other relevant legal instruments.

Communication skills
At the end of the course the student should be able to:
• effectively assess and communicate to management bodies, supply chain and other stakeholders in the area, the value and risks for biodiversity, its mediated ecosystem services and the assessment of the impacts of anthropogenic or management activities on the communities studied.

Learning skills
At the end of the course, students should be able to independently:
• investigate the topics covered
• develop a multidisciplinary vision and acquire the ability to support and collaborate with experts in conservation biology and ecology, policy makers, and land managers, also making use of evaluation tools and scientific documentation adhering to the main international regulatory standard in the field of biodiversity and ecosystem conservation
• translate biological data into quantifiable supports to economic, social and environmental value.

Contents

• Basic concepts on animal and plant biodiversity.
• Ecosystem functioning and services.
• Global risk factors for biodiversity and conservation efforts.
• Process leading to species extinction and habitat loss.
• Tools and methodologies used to measure and compare animal and plant biodiversity.
• International and EU legal framework for biodiversity and ecosystem conservation.
• Conflict and tension between economic globalization and biodiversity conservation.
• Biological invasions and negative impacts derived from the spread of invasive alien species.
• Tools and innovative approaches and technologies for the monitoring of biodiversity.
• Key data sources for research and biodiversity conservation.
• Analysis of interdisciplinary real-world case studies.
• Sustainable practices and protocols to conserve plants and ecosystems and prevent biological invasion.

Detailed program

• Introduction to animal biodiversity and related concepts.
• Global risk factors for animal biodiversity and conservation efforts.
• Metrics for quantifying and comparing animal biodiversity.
• Analysis of key legal instruments regulating biodiversity, including the CBD Convention, the CITIES Convention, and other relevant treaties.
• Modern tools and technologies used in biodiversity monitoring.
• Reference data sources in research and conservation of biodiversity and ecosystems.
• Ecosystem services provided by animal biodiversity.
• Economic and social value of animal biodiversity.
• Basic understanding of plant life and plant interactions with the environment and other organisms.
• From individuals to plant communities: species, habitats and biomes.
• Plants and habitats as key components in providing ecosystem services fundamental to life on the earth.
• Basics on ecological indicators and techniques to monitor plant and habitat diversity and richness.
• Conservation efforts to tackle with plant species loss: in situ and ex situ conservation strategies.
• Red list of threatened species and ecosystems: a shared international protocol to assess the risk of extinction of species and ecosystems.
• The newly adopted Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction.
• Biological invasions: how species take advantage of global change to spread all over the world.
• The importance of managing biological invasions: environmental, social and economic impacts of invasive alien plants.
• Human-mediated pathways of introduction and spread of invasive alien plants.
• Strategies to manage biological invasions: international regulation and practical approaches.
• Resources, metrics and techniques to monitor biological invasions and their impacts.
• The relationship between trade, environmental regulation, and biodiversity conservation.
• Tensions between economic development and conservation: case studies on WTO, endangered species trade and deforestation.
• Real-world case studies interdisciplinary case studies.

Prerequisites

• Basic knowledge of animal and plant biology.
• Basic notions of environmental sustainability.

Teaching form

6 CFUs of mixed theoretical and interactive lessons (60 hours):
• 21 two-hour lectures, in person, mostly frontal teaching and discussion in class, Delivered Didactics;
• 9 two-hour lectures, mixed didactics in the classroom, to collect information and critically analyse real-world case studies in common to other modules, Interactive Didactics.

Attendance to lectures and interactive exercises is highly recommended.

Textbook and teaching resource

• Slides.

• Notes shown during lectures and additional material on selected topics, *i.e.*, scientific articles, made available on the e-learning website of the course.

Semester

II semester (March- June)

Assessment method

The final exam consists of a critical dicsussion of a case study common to the three modules of the laboratory course, with the discussion covering various topics covered in the course, with an emphasis on the connections between concepts and processes, such as to arrive at a critical evaluation of the analyzed case study from the point of view of sustainability in biodiversity conservation. A single oral exam at the end of the course is facultative: it may be a supplementary test requested by lecturers or students.

The final score will be between 18/30 and 30/30 *cum laude*, based on the overall assessment considering the following criteria:
(1) knowledge and understanding;
(2) ability to connect different concepts;
(3) autonomy of analysis and judgment;
(4) ability to correctly use scientific language.

Office hours

Always, after scheduling an appointment *via* phone or e-mail.

Sustainable Development Goals

QUALITY EDUCATION | SUSTAINABLE CITIES AND COMMUNITIES | RESPONSIBLE CONSUMPTION AND PRODUCTION | CLIMATE ACTION | LIFE BELOW WATER | LIFE ON LAND