UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Applied Ecology

2627-3-E1301Q059

Aims

The overall goal of the course is to provide knowledge regarding selected environmental problems, the criteria and methods for studying them, and the strategies and interventions for resolving them. The course aims to provide the tools to learn how applied ecology can be used to address various issues facing our society. The objectives are to (a) explore ecological topics in depth, (b) acquire practical knowledge in the field of Applied Ecology for solving environmental problems. By the end of the course, students will be able to apply their ecological knowledge to understand the distribution of individuals, populations, and the diverse distribution of species within ecosystems, understand the ecological mechanisms underlying the world's most significant environmental problems, and use the main ecological methods of investigation.

Knowledge and understanding: Acquisition of the fundamental knowledge required to understand the effects of anthropogenic pressures on the structure, functioning, and conservation of ecosystems.

Applying knowledge and understanding: Ability to apply the principles of applied ecology to assess ecosystem quality, identify the main environmental pressures, and evaluate appropriate management, mitigation, and restoration strategies.

Making judgements: Development of the ability to critically evaluate complex environmental issues and to identify scientifically sound strategies for ecosystem management and biodiversity conservation.

Communication skills: Development of effective communication skills through active participation in class discussions, group activities, and the presentation of case studies related to applied ecology.

Learning skills: Development of the ability to integrate theoretical knowledge with practical applications in order to interpret ecological processes, understand the effects of environmental change, and independently apply methods for ecosystem assessment and management.

Contents

The course addresses applied ecology in an integrated and multi-level manner, exploring issues related to the Anthropocene and its impacts, ecosystem services, land-use planning and management, environmental health, and the applications of population ecology to biodiversity conservation and environmental restoration. This approach provides an integrated vision of sustainable ecosystem management strategies.

Detailed program

The course offers an integrated introduction to the principles and applications of ecology to address current environmental challenges. Starting with the transition from theoretical to applied ecology, students will examine how ecological concepts can be used to understand, evaluate, and manage natural and human-induced ecosystems in the context of global environmental change.
The course introduces the concept of the Anthropocene, focusing on the main drivers of environmental change, including climate change, habitat loss, pollution, biological invasions, and the overexploitation of natural resources. Students will explore the ecological consequences of these pressures and their implications for biodiversity, ecosystem functioning, and human well-being.
A substantial portion of the course is dedicated to ecosystem services, including their classification, ecological foundations, methods of assessment and quantification, and their role in supporting sustainable development and environmental decision-making.
The course examines the ecological principles underlying land-use planning and management, with a focus on landscape ecology, habitat fragmentation, ecological connectivity, spatial planning, and the integration of ecological knowledge into environmental policies and land management.
Topics related to environmental health include the interactions between environmental quality and ecosystem integrity, the sources and effects of environmental contamination, ecotoxicology, and the ecological consequences of pollutants on populations and ecosystems.
Students will also explore the applications of population ecology, including population dynamics, species interactions, conservation biology, fisheries ecology, and the ecological basis of sustainable resource management. Special emphasis will be placed on the use of ecological principles for biodiversity conservation, habitat restoration, ecological restoration of degraded ecosystems, and evidence-based environmental management.
Throughout the course, ecological theory will be connected to practical environmental issues through discussion of case studies, environmental assessments, and examples of ecosystem management strategies, enabling students to develop an integrated understanding of ecological processes and their application to sustainable environmental planning and conservation.

Prerequisites

According to the course's teaching regulations, to take the applied ecology exam, students must have passed the ecology exam.

Teaching form

Lectures in classroom supported by multimedia presentations, scientific articles for recent case studies, didactic seminars by experts.

- 19 2-hour lessons held in person.

- 2 lessons of 2 hours held in interactive mode in person.

Textbook and teaching resource

The entire teaching material used in the lectures will be made available to students in pdf and via the e-learning platform (presentations and articles).

Textbooks (suggested)
Galassi, S., Ferrari, I., Viaroli, P. (2014). Introduzione all'ecologia applicata. Dalla teoria alla pratica della sostenibilità. Milano: CittàStudi. ISBN 978-88-251-7392-5

Semester

Spring semester

Assessment method

The exam is oral and consists of a discussion on the topics covered in the course syllabus. During the exam, students must demonstrate their ability to connect the various topics covered in the course. During the oral exam, students must demonstrate their ability to clearly present the knowledge acquired, demonstrating complete understanding and demonstrating fluency in their language.

Assessment criteria: assessment of scientific and technical knowledge related to the topics, ability to critically and individually rework experimental problems assigned by instructors, communication and reasoning skills, and correct use of technical language.

There are no in-itinere tests planned.

Office hours

On appointment. Please write to the lecturer directly by email: paolo.biella@unimib.it

Sustainable Development Goals

LIFE ON LAND