UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Ecosystems and Technosystems: Aspects of Sustainable Societies

2526-1-E3304M005

Learning objectives

The course 'Ecosystems and Technological Systems: Aspects of Sustainable Societies' explores the interconnections between natural ecosystems and technological systems. It examines how technologies have influenced ecological sustainability and how ecosystems can be used to promote sustainable technological development.
Students will gain a multidisciplinary understanding of the dynamics between environment, economy and technology. The focus is on EU policy, natural resource management and the promotion of ecological innovation.
Upon successful completion of this course, students will have cultivated a more profound appreciation for the complexity of ecosystems and the pivotal role that technology has played in generating a healthier environment.
The primary objective of this course is not to persuade students of the existence of any facile solutions to environmental issues, nor to reach a consensus on the identification of these issues. Instead, the course is designed to equip students with the necessary skills to evaluate the scientific principles of ecology, in addition to providing them with fundamental information to inform future decision-making.

Contents

The multidisciplinary nature of ecology and the study of the relationship between humanity and the environment. In particular:
• - Comprehension of the concepts of ecosystems and technosystems, and their interactions.
• - Analysis of the impact of technologies on the environment and the capacity of ecosystems to support sustainable innovations.
• - Development of skills to evaluate the role of ecology in the transition to more sustainable economies.
• - Exploration of strategies for natural resource management, waste management and the circular economy in a technological context.

Detailed program

The following topics will be covered in this module:
Introduction to Ecosystems and Technosystems
• The definition of ecosystem and technosystem
• The history and evolution of the relationship between nature and technology
• The concept of sustainability and key principles
• Natural systems and technical systems: similarities and differences
The Basics of Ecosystems
The functioning of natural ecosystems: biodiversity, biogeochemical cycles, and energy flows
• - Ecosystems and climate change
• - Ecosystems and ecosystem services: definition and classification
• - Measuring and monitoring ecosystem health
• - The multidisciplinary nature of ecology and the study of relationships between organisms and the environment.
• - The physical environment: climate, aquatic and terrestrial environment
• - Organisms and the environment: genetic ecology, adaptation and natural selection.
• - Populations: properties and growth of populations.
• - Populations: life cycle patterns.
• - Intraspecific regulation of populations.

Interactions between ecosystems and technosystems
• - Technological impacts on ecosystems: pollution, resource exploitation, and environmental degradation- The use of technologies for ecosystem monitoring and management
• - The role of innovation in environmental protection
• - Case studies of technologies with positive impacts on ecosystems

Examples of technological innovations for environmental sustainability:

Case Studies and Analysis of Sustainable Projects

- Presentation of case studies on ecosystems and technosystems in various sectors: agriculture, energy, industry, urbanisation

Prerequisites

None

Teaching methods

The course has been designed to encompass a comprehensive array of learning modalities, including theoretical lectures, case study discussions, readings, and practical activities. Students will engage in a series of seminars, undertake group research projects with final presentations.
The course structure is as follows:
• 12 lectures of 2 hours delivered in face-to-face mode,
• 4 2-hour lectures delivered in face-to-face interactive mode, and
• 8 2-hour lectures delivered in interactive eLearning mode.
It is noteworthy that all teaching delivery methods are meticulously supervised by the lecturer to ensure the efficacy

of the learning process.

Assessment methods

The oral examination, which is scheduled to take place at the conclusion of the course, will serve to evaluate the students' learning outcomes. The examination board will employ a set of assessment criteria to evaluate the students' acquisition of the topics covered in “Ecosystems and Technological Systems: Aspects of Sustainable Societies”, as well as their experiences made during the e-learning activities. The questions will be designed to ascertain the students' acquisition of basic skills and to assess their understanding of concepts and their ability to link the various topics covered.
The examination will encompass the following aspects:
Knowledge and understanding. By the end of the course the student should know: the basic principles of ecosystems and the relationship between humans and the environment.
Ability to apply knowledge and understanding. The student should be able to apply the acquired knowledge by demonstrating the ability to assess the impact of human activities on the environment.
Autonomy of judgement. The student should be able to evaluate.
Communicative skills. By the end of the course, the student will be able to appropriately describe the topics studied using the correct specific vocabulary.
Learning skills. By the end of the course, the student will be able to consult the literature on the topics covered and the reference legislation.

Grade expressed in thirtieths: range 18-30

Textbooks and Reading Materials

Smith and Smith - Elements of Ecology - Pearson Editore
Ricklefs R. E., 1999, The Economics of Nature, Zanichelli, Bologna;
Odum E. P., Barrett 2006, Fundamentals of Ecology, Piccin, Padova
Pusceddu A., Sarà G., Viaroli P., 2020- Ecologia - UTET
Slides projected during lectures

Semester

second semester

Teaching language

English

Sustainable Development Goals