UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Agricultural, Urban and Industrial Sustainability

2627-1-F7503Q034

Aims

The course focuses on the environmental sustainability of agricultural, urban, and industrial techno-ecosystems. For each techno-ecosystem, the following topics will be addressed:

- Main environmental externalities;
- Best practices for improving environmental sustainability;
- Sustainability measurement through the use of indicators.

Particularly, the following educational objectives are planned:

Knowledge and understanding

- Knowledge about the differences in the functioning of natural (ecosystems) and anthropogenic (agricultural, urban and industrial) systems.
- Knowledge of environmental externalities generated by anthropogenic systems.

-**Knowledge and applied understanding**

- Knowledge, understanding and application of the main methodologies to be used for evaluating the sustainability of techno-ecosystems.

Autonomy of judgment

- Through the acquisition of the concepts of sustainability of anthropogenic systems, the student will increase his skills in evaluating the level of sustainability of techno-ecosystems.
-

Communication skills
During the lessons, the student will be invited to be active part in the lesson by discussing the topics covered in

class. This will improve its communication skills in public.

Ability to learn
The course will improve the student's learning skills in the interpretation of distortions in the relationship between man and environment

Contents

Environmental problems, their causes, and sustainability. Ecosystems and techno-ecosystems. Concept of environmental externality. Environmental externalities of the main human activities. Sustainable agriculture in the context of European policies. Smart city. Industrial sustainability. Industrial symbiosis. Sustainability indicators

Detailed program

Introduction

- Environmental problems, their causes, and sustainability
- Planetary boundaries: beyond borders?
- Techno-ecosystems: differences from natural ecosystems
- The concept of environmental externality

Agro-ecosystems

- Main environmental externalities of agricultural systems
- European policies for sustainable agriculture
- Plant protection, fertilization and use of water resources in the context of the sustainability of agricultural systems
- Measuring sustainability in agriculture: indicators of sustainability at different scales of application (farm and territorial scale)

Urban systems

- The city as a heterotrophic ecosystem.
- From the village to the BoWash: human population and urbanization.
- Main environmental externalities of urban systems.
- Towards the smart city: how to make urban systems sustainable: (sustainable mobility, territorial planning and control).
- Measuring sustainability: sustainability indicators for urban systems.

Industrial systems

- Industry: environmental externalities in linear transformation processes.
- Towards the closed-loop for industrial sustainability.
- Industrial symbiosis and sustainability of supply chains.
- Measuring sustainability: sustainability indicators for industrial systems.
- The corporate sustainability report (CSR)

Prerequisites

Basic knowledge of ecology, applied ecology, chemistry and physics

Teaching form

32 lectures (two hours each), in person, Delivered Didactics, 8 CFU

Textbook and teaching resource

- Caporali F.. Ecologia per l’agricoltura. Teoria e pratica. UTET
- Tyler Miller G. (Jr) e Spoolman S.. Environmental Science. Problems, Concepts, and Solutions. 12ma edizione. Thomson Learning, Inc.
- Xiaohong L.. Industrial ecology and industry symbiosis for environmental sustainability: Definitions, Frameworks and Applications ISBN 978-3-319-67501-5 (eBook). https://doi.org/10.1007/978-3-319-67501-5
- Slide proiettate a lezione

Semester

first semester

Assessment method

Oral examination at the end of the course. No partial tests during the course period are planned. The evaluation criteria during the exam will consist in the verification of the acquisition of competences by the student of the topics treated by the teacher during the lectures . The questions will aim to ascertain the acquisition of basic notions and to evaluate the understanding of the concepts, the ability to link the different topics covered.
Vote expressed: 18-30 / 30

Office hours

by arrangement writing an email to antonio.finizio@unimib.it

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | SUSTAINABLE CITIES AND COMMUNITIES | RESPONSIBLE CONSUMPTION AND PRODUCTION | CLIMATE ACTION