UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Biological System of Resources

2526-1-E3304M004-E3304M004-1

Learning objectives

The course covers the main technologies currently available related to biological resources, especially those that are sourced from plants. The aim of the course is to identify new processes, products, and materials with a high degree of sustainability and reduced environmental impact. The course consists of a total of 24 hours of teaching (3 ECTS), focused on the technologies related to the production of plant-based resources, including 16 hours of in-person lectures and 8 hours of online/e-tivity sessions. Classes are held weekly and will utilize PowerPoint slides.

1. Knowledge and understanding: Upon successful completion of the course students will have a solid understanding of plant-related technologies (i.e., phytotechnologies).
2. Knowledge and applied comprehension skills: In addition to mastering the main technologies presented, students will develop critical skills to apply the concepts learned in various fields of interest.
3. Autonomy of judgment: By the end of the course, students will understand the currently available plant-based solutions available, their strengths and challenges, and will be able to choose between different solutions based on the problem at hand.
4. Communication skills: By the end of the course, students will have acquired appropriate scientific terminology and will be able to present e course topics using accurate terminology.
5. Learning ability: By the end of the course, students will be able to read scientific literature and explore covered topics.

Contents

We will examine the main phytotechnologies which are based on processes, products, and materials that have a high degree of sustainability and low environmental impact

Detailed program

Nature-based solutions: description of the main available technologies. Water management and treatment: sustainable urban drainage systems, bioswales and water retention ponds, rain gardens, natural wastewater treatment. Interventions on soil and impermeable surfaces: green pavements, soil demineralization. Vertical green interventions: green fences, noise barriers, and façades. Interventions on the horizontal elements of buildings: green covering, shelters, green roof (intensive/extensive). Indoor air purification: botanical filtration. Food production: climate-smart greenhouses, urban orchards, rooftop gardens, food forests, floating farms. Energy biomass: oilseed biomass and biodiesel, sugar biomass and bioethanol. Biogas. Energy crops for biomass energy production. Phytoremediation: principles and applications of the main types of phytoremediation (phytoextraction, phytostabilization, phytodegradation, and phytovolatilization). Brief notes on biomaterials and bioinspiration. Assessment of environmental impacts of phytotechnologies through LCA.

Prerequisites

None

Teaching methods

Sixteen hours of lessons will be conducted exclusively in person (no streaming) and recorded, with recordings made available along with PowerPoint lecture files. Additionally, eight hours will be delivered online in e-tivity mode and will focus on applying concepts learned in class accompanied by self-assessment activities.

Assessment methods

The written exam will consist of 6 questions: 3 concentrating on the first part of the course (Principles of Biology) and 3 on the second part of the course (Biological System of Resources). Students will be evaluated based on the level of knowledge demonstrated in their responses and their capacity to apply their knowledge on simple problem-solving exercises. No midterm exams are scheduled.

Textbooks and Reading Materials

Educational materials (ppt presentations) prepared by the teacher

Semester

First semester

Teaching language

English

Sustainable Development Goals

SUSTAINABLE CITIES AND COMMUNITIES