UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Applied Plant Biology

2526-1-F0602Q128

Aims

knowledge and understanding: the course will allow the student to understand the technologies of applied botany and to learn the potential of plant biology and biotechnology to rethink production processes and products according to sustainable paradigms.
Applied knowledge and understanding: At the end of the course the student will have understood the potential of plant breeding systems and plant biotechnologies, methods of bioindication, phytostabilization and phytoremediation and technologies for the conservation and restoration of biodiversity. The student will also have learned how to exploit plant biomass to improve energy, food, cosmetics and pharmacological productions.

Autonomy of judgment: Acquiring and interpreting in a critical way the information related to the methodologies and technologies of applied botany. Understanding the advantages and disadvantages of the different approaches, contextualizing innovations in the operational environment and acquiring critical skills in evaluating new processes.
Communication skills: the course aims to provide the student with a good critical ability to communicate effectively, and with specific language, the fundaments of applied botany and plant biotechnology.
Learning skills: at the end of the course the student should be able to autonomously explore the topics covered during the course, also thanks to the comparison with institutions and industries in the sector and through the access to scientific and specialized literature. The student must also have acquired a good critical ability of the contexts of application of plant biotechnologies, integrating the scientific aspects with the social, economic, and legal ones.

Contents

The course aims to provide a broad and updated overview of the technologies and methodologies of applied botany also in relation to the ongoing ecological transition and the SDGs that require the rethinking of processes and products. The key topics will concern plant biotechnologies for well-being and the environment, strategies for restoring and conserving biodiversity and the potential for exploiting plant biomass to obtain new products with a low environmental impact and with advantages for the human health and well-being.

Detailed program

Knowledge and potential of spontaneous plants and plant biomass for the environment, human health, and well-being. The origin of the cultivated plants, the plant domestication and the ‘green revolution’. Plant biotechnologies: from selection strategies to first generation GMOs. Technological innovations of biotechnology. Genome editing and plant factory. Control systems and regulatory aspects of genetically modified plants. Genetic pollution and traceability.
Molecular markers for the identification of species and varieties. Traceability of plants in environmental contexts, food and along the supply chains.
Boindication, phytostabilization and phytoextraction. Basics of naturalistic engineering. Plant biomimetics. Plants, new materials, and energy. The value of primary and waste biomass. Plants for cosmetics and nutraceuticals. New plant species for food.
Technologies for the conservation and restoration of biodiversity in natural and anthropogenic contexts. Emblematic interventions, regulatory and management aspects
Plants and human well-being. Biological, psychological, and social aspects.

Prerequisites

General Botany

Teaching form

The course will consist of 42 hours of frontal lessons delivered in 32 and 10-hour lessons consisting of:
• a part (about 2/5 of the lessons) in delivery mode (delivery teaching, DE) focused on the presentation-illustration of contents, concepts, scientific principles, but within which there is never a lack of moments of interactive teaching determined by extemporaneous questions asked to the students or upon request for clarification.

• a part in interactive mode (interactive teaching, DI, approximately 2/5 of the lessons), which includes additional teaching interventions with examples of applications, exchanges with students, viewing of short videos and dedicated seminars
• 1-2 lessons will be carried out through visits/experiences in laboratories, parks, green areas.
• 2-3 lessons will be held remotely in asynchronous mode

Textbook and teaching resource

Slides showed at lessons will be available on the e-learning platform.
Suggested books:
• Pasqua G., Forni C. Biotecnologie Vegetali. Piccin ed.
• Pasqua G. Biologia cellulare & biotecnologie vegetali. Piccin ed.
• Raven P.H., Evert R.F., Eichorn. S.E. Biologia delle Piante. Zanichelli ed.
• Strasburger. Trattato di botanica per le università. Volume 2. Evoluzione Sistematica ed ecologia

Semester

First semester

Assessment method

The oral exam is aimed at assessing the student's knowledge of applied botany and its various applications. There are no ongoing or intermediate tests during the course but only a final exam.

The exam consists of some questions. The first questions are of a general nature on the topics of the course. These questions are aimed at understanding the student's method of study and deepening. The following questions are aimed at analyzing the student's ability to understand the main technologies and methodologies of applied botany and plant biotechnology. During the exam, the ability to contextualize the topics, the critical ability and the ability to propose appropriate solutions to different contexts and problems will also be assessed.
Evaluation criteria: scientific and technical knowledge of the topics covered, argumentation skills, critical analysis, and language properties.

Office hours

On appointment; mail to: massimo.labra@unimib.it

Sustainable Development Goals

ZERO HUNGER | AFFORDABLE AND CLEAN ENERGY | CLIMATE ACTION | LIFE ON LAND