UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Biologia Vegetale Applicata

2627-1-F0602Q128

Aims

Knowledge and understanding: the course will provide students with an understanding of the main technologies and approaches in applied botany and will explore the potential of plant biology and plant biotechnology to redesign processes and products from a sustainability perspective.

Applying knowledge and understanding: by the end of the course, students will have gained an understanding of the potential of plant breeding systems, plant biotechnologies, bioindication methods, phytostabilization and phytoremediation techniques, as well as technologies for biodiversity conservation and restoration. They will also have learned how the valorization of plant biomass can contribute to improving energy, food, cosmetic, and pharmaceutical production.

Making judgements: students will develop the ability to critically acquire and interpret information related to the methodologies and technologies of applied botany. They will understand the strengths and limitations of different approaches, contextualize innovation across a range of application fields, and develop critical skills for evaluating processes.

Communication skills: the course aims to provide students with the skills necessary to communicate the fundamental concepts of applied botany and plant biotechnology effectively, appropriately, and using discipline-specific terminology.

Learning skills: by the end of the course, students will be able to independently deepen their knowledge of the topics covered, through interaction with research institutions and industries in the sector and by consulting specialized scientific literature. They will also have developed strong critical skills for evaluating the contexts in which plant biotechnologies are applied, integrating scientific aspects with social, economic, and legal considerations.

Contents

Biological diversity, plant technologies, plant biotechnology, biomimetics, biorobotics.

Detailed program

The knowledge and potential of wild plants and plant biomass for the environment, human health, and well-being. The origin of cultivated plants, domestication, and the Green Revolution. Plant biotechnology: from conventional breeding strategies to first-generation genetically modified organisms (GMOs). Technological innovations in plant biotechnology: genome editing and plant factories. Control systems and regulatory frameworks governing genetically modified plants. Genetic contamination and traceability.
Molecular markers for the identification of plant species and varieties. Plant traceability in environmental and food systems, and throughout production supply chains.
Bioindication, phytostabilization, and phytoextraction. Fundamentals of ecological engineering. Plant biomimetics. Plants, novel materials, and energy. The value of primary and residual plant biomass. Plants for cosmetics, nutraceuticals, and pharmaceuticals. Novel plant species for food production.
Technologies for biodiversity conservation and ecological restoration in natural and human-modified environments. Case studies, regulatory frameworks, and management approaches.
Plants and human well-being: biological, psychological, and social aspects.

Prerequisites

General Botany

Teaching form

The course consists of 28 hours of lectures and 20 hours of classroom and field practical activities, organized as follows.
Lectures -Lectures (Teaching Delivery – TD) (approximately 4/5 of the lecture hours) are devoted to the presentation and explanation of course content, concepts, and scientific principles. Lectures will include opportunities for student interaction through questions, requests for clarification, and brief discussions on the topics covered.
Interactive teaching (IT) (approximately 1/5 of the lecture hours) is dedicated to in-depth discussion of current topics in applied botany and plant biotechnology. Topics will be selected based on the latest scientific literature and may be agreed upon with students according to their interests and emerging scientific developments.
Practical Activities
Classroom practical activities (approximately 3/5 of the practical hours) include application examples, analysis and discussion of case studies, group work, guided discussions, viewing and critical discussion of educational videos, and thematic seminars.
Seminars and field activities (approximately 2/5 of the practical hours) include seminars delivered by professionals working in the field, experts from industry, and researchers from national and international research institutions, as well as educational visits to companies, parks, botanical gardens, and other organizations involved in applied plant biology.

Textbook and teaching resource

Biotecnologie vegetali
Gabriella Pasqua, Cinzia Forni (a cura di)
Editore: Piccin Nuova Libraria, 2022
ISBN: 9788829932849

Semester

Second semester

Assessment method

TThe assessment consists of an oral examination designed to evaluate the student's level of knowledge and understanding of the topics covered during the course. No mid-term tests or continuous assessment activities are planned.

The oral examination generally consists of 3–4 questions. The first question is of a general nature and is intended to assess the student's study approach, overall mastery of the subject, and ability to place the course topics within a broader conceptual framework.

The second question focuses on specific topics included in the syllabus and aims to assess the student's ability to understand the course content, establish connections among different topics, and enrich the discussion by referring to examples presented during the course or to independent study based on the scientific literature.

Any subsequent questions are intended to evaluate the student's critical thinking skills, with particular emphasis on the advantages, limitations, and potential applications of the technologies and methodologies discussed during the course. Students will also be assessed on their ability to contextualize these approaches in different application areas and to discuss their technical, legal, ethical, economic, and social implications.

Assessment criteria: the final evaluation will take into account the student's scientific and technical knowledge, the accuracy and appropriateness of scientific terminology, the ability to develop clear and well-structured arguments, the capacity to establish connections among the different course topics, and the ability to critically and independently analyze and synthesize the course content.

Office hours

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

Sustainable Development Goals

SUSTAINABLE CITIES AND COMMUNITIES | CLIMATE ACTION | LIFE ON LAND