



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Bioprospecting

2627-2-F7603Q008-F7603Q00802

Aims

The overarching objective of the course is to address contemporary challenges associated with waste reclamation (reuse of waste) issues, from a sustainability and process circularity perspective aimed at valorising biological matrices incorporated into existing productive processes. Specifically, the course comprises two complementary modules (Bioprospecting and Bio-based processes), each comprising four CFUs for a total of eight CFUs. The primary objective of this first teaching module is to provide students the abilities to communicate in an effective and proper manner the concepts regarding the methods adopted to valorize from an applicative and economic point of view natural matrixes, by considering the impact in terms of sustainability (i.e., green extraction processes) as well as the role of biodiversity as a provider of pivotal ecosystem services for human lives. By the conclusion of this teaching, students will be able to independently delve into these modern issues, leveraging the interaction with industry experts and consulting recommended websites and/or relevant literature.

Contents

The development of a knowledge in the field of bioprospecting and biomanufacturing will make students able to look at biodiversity with a practical approach, aimed at the identification of different compounds, genes, proteins, metabolic pathways and natural extracts useful for industrial applications.

The overall meaning of the present teaching is to consider from a scientific and technological perspective the economic issues deriving from the recovery and valorization of natural sources from two main point of view: i) extraction and recover of bioactive compounds (bioprospecting) produced in nature as signals between organisms, however endowed with several added value properties, useful for many different industrial sectors, such as the cosmetic, nutraceutical and agrifood industry; ii) understand the main analytical frameworks associated with the study of natural products endowed of bioactive properties. The aim of these targets is to make students aware of the importance of ecosystems services provided by biodiversity and to understand how to valorize waste matrixes to promote a circular economy models designed to offer a valuable alternative to the take-make-dispose framework.

Detailed program

Key concepts and principles of the Module:

- The role of bioactive compounds in natural ecosystems: classification and diversification, coupled with study approaches both of analytical and economic concern;
- Analysis of relevant natural products which made the history in the field of chemistry, pharmacy and food industries;
- Green extraction methods and quantification of bioactive compounds in complex biological matrices;
- Case study: application of plant-derived compounds into commercial products: functional foods, cosmetics, herbicides, drugs and pharmaceutical products;
- Case study: valorization of coffee by-products to recover valuable compounds useful for applicative purposes with insight on the social benefits of this supply chain;
- Analysis of compounds in pharmaceutical products: the case of Aspirin.

Prerequisites

Basic knowledge of plant biology and chemistry will be useful to better understand the topic of this teaching, nonetheless the focus will be always on the overall process and needed information will be always given during lessons. Teacher will provide students with material to fill the gaps based on the student feedback and requirements.

Teaching form

The teaching form will be provided both in a frontal manner by presence (70%) and interactively by presence (30%). The course will also provide the organization of visits to laboratories and/or companies involved in activities dealing with resources revalorization and re-waste from different supply chains, as well as synchronized lessons between the teachers of the tow modules, with the possibility to involve also professionals of the different sectors. During the lessons space will be given to shared activities, such as case studies evaluation, flipped class and open discussion, in order to verify that the concepts are clearly understood by all the students and also to let the students to understand the prerequired skills, which will be propaedeutic to reach the learning objectives.

Textbook and teaching resource

The slides used during the different lessons will be made available online on the e-learning platform, together with scientific literature and bibliography to better understand the topic explained throughout the course, by also exploiting the interactive activities that will be provided interactively during the course.

Semester

Semester: I semester

Assessment method

The final exam consists of a single oral exam at the end of the course, with a score between 18-30 / 30 cum laude, which comprises the discussion of various topics covered in the course, with an emphasis also on the connections between concepts and processes, such as to arrive at a critical evaluation.

The final score will be between 18/30 and 30/30 cum laude, based on the overall assessment considering the following criteria:

- (1) knowledge and understanding;
- (2) ability to connect different concepts;
- (3) autonomy of analysis and judgment;
- (4) ability to correctly use scientific language

Office hours

Always after scheduling an appointment via e-mail.

Sustainable Development Goals

ZERO HUNGER | GOOD HEALTH AND WELL-BEING | DECENT WORK AND ECONOMIC GROWTH |
INDUSTRY, INNOVATION AND INFRASTRUCTURE | RESPONSIBLE CONSUMPTION AND PRODUCTION |
LIFE ON LAND
