UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Laboratory of Industrial Microbiology

2425-2-E0201Q052-E0201Q066M

Aims

The course provides some basic theoretical knowledges and practical skills for a correct handling of microorganisms. Also safety procedures will be covered.
Students attending the LTA-Microbiology practical course are expected to achieve the following aims:
Knowledge and understanding.
Consolidate and deepen basic knowledge (theoretical, technical and methodological) in the field of Microbiology and Industrial Microbiology.
Applying knowledge and understanding.
Correctly interpret the experimental protocols (isolation, identification and characterization of microbial strains) and recognize their relevant aspects; carry out the proposed experimental protocols in compliance with good laboratory practices and safety standards; collect and process experimental data.
Making judgements.
Recognize the experimental design, consider its critical points; critically evaluate the results obtained; recognize the contexts of application of the experimental methods carried out.
Communication skills.
Re-elaborate experimental data, effectively describe experimental procedures and results, using an appropriate technical vocabulary.
Learning skills.
Recognize and give a correct interpretation to experimental protocols similar to those practically performed, in a different context (i.e., a reserch laboratory).

Contents

This learning unit deals with issues and techniques useful to perform a basic morphological and physiological characterization of the most common members of a microbial community and to evaluate their interactions with the environment. Particular focus will be on sterility working, on pure culture preparation, on microbial biodiversity and

on selective pressure.

Detailed program

Introduction to a microbiology laboratory: operating and personal safety rules, sterilization and microbial cultivation techniques.
Analysis of the microbial community in a natural environment: sampling and plating, morphological examination of the microbial colonies, isolation of single colonies and preparation of pure cultures. Direct observation of microbial cells, Gram staining. Basic concept of identification and classification of microorganisms.
Growth and microbial physiology: nutritional requirements of microorganisms and effects of cultivation conditions and medium composition on microbial growth kinetic.
Production of molecules of industrial interest: The microorganism as source of useful biomolecules such as: antibiotics, enzymes and metabolites. Analysis of the production, in shake flask and in bioreactor, of an enzyme of biotechnological interest.

Prerequisites

Background: To a fruitful course attendance, basic notions of microbiology are suggested.
Specific prerequisites: none
General prerequisites: Students can take the exams of the second year after passing the examinations of Introductory Biology, General and Inorganic Chemistry, Mathematics, and Foreign Language.

Teaching form

Laboratory - 8 laboratory activities for a total of 30 hours, carried out in interactive presence mode.
Each experience includes one or more experimental protocols to be carried out independently, preceded by brief additional didactic interventions, student interventions and possible application exercises. The discussion of the experimental results will take place in the classroom at the end of each experimental experience.
Attendance is compulsory.
The course will be held in Italian.

Textbook and teaching resource

Teaching materials are available at the e-learning page dedicated to the LTA-Industrial Microbiology teaching unit and consist of:
Introductory theoretical handout
Experimental protocols
Slides related to the theoretical part
Videos

Semester

Second semester

Assessment method

Written exam. The exam includes 10 multiple-choice questions and one open-ended question, and covers all topics, both theoretical and practical, covered in the course. Acquired skills, self-reflection and critical thinking skills gained on course-related topics will be evaluated.

Office hours

Contact: on demand, upon request by mail to lecturers.

Sustainable Development Goals