UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Microbiology

2223-2-E1301Q082

Aims

The course aims at providing basic knowledge about microorganisms and related processes, their diversity and evolution and their ecological aspects. 1. Knowledge and understanding: at the end of the course the student must know the general information on the structure and functions of microbial cells, the energy and nutrient acquisition strategies of microorganisms, the main classical and molecular methods for the analysis of isolates and microbial communities, genomics and genetics of microorganisms and virology ; contribution of microorganisms to biogeochemical cycles .2 Ability to apply knowledge and understanding: At the end of the course the student must have acquired the basic knowledge to deepen microbiological skills and to apply the correct methods of analysis in the microbiological field. 3. Making judgments: The student must be able to read critically a basic microbiology text. 4. Communication skills. At the end of the course the student will be able to describe appropriately the topics studied using the correct specific vocabulary.5. Learning skills: at the end of the course the student will be able to consult the literature on the topics covered and autonomously integrate the knowledge acquired with others related to other biological disciplines.

Contents

Students of the course will be provided with basic knowledge to understand the structure and function of microbial cells, to describe microbial biodiversity, with insights into traditional and innovative methods and specific microbial habitats. In addition, topics related to the analysis of microbial communities, including systematics, and the description of specific microbial genetic elements will be discussed.

Detailed program

1. The microbiology in the historical context: historical excursus on the main discoveries and leading personalities

that have allowed the development of microbiology.
2. Microbial evolution. Origins of life on Earth.
3. Microbial physiology. Principles of microbial growth. Structures and functions (Bacteria, Archea, Eukarya unicellular)
4. Microbial metabolism
5. Microbial systematics
6. Microbial habitats
7. Genetics of microorganisms. Horizontal gene transfer, two-component systems, examples of transcriptional and post-translational regulation
8. Symbiosis. Principles and examples of different forms of symbiosis involving different categories of microorganisms
9. Antibiotics and quorum sensing
10. Biogeochemical cycles. General principles and specific description of the cycles of C, N, P and S
11. Virology. Virology bases: morphological and functional description of the various categories of viruses, and of the different forms of classification, including interactions with host

Prerequisites

Prerequisites: The student can take the exam only after passing the exams of General and Organic Chemistry and Biological Chemistry.

Teaching form

The methodological approach includes lectures supported by slides and selected videos.

Textbook and teaching resource

The course will be carried out with the help of slides, videos and scientific articles. All the teaching material projected and the in-depth material is made available to students on the e-learning platform. Suggested textbooks: Biologia dei Microrganismi (Dehò-Galli – Casa Editrice Ambrosiana); Brock – Biologia dei Microrganismi (Madigan, Martinko, Stahl, Clark – Casa Editrice PEARSON)

Semester

Second semester

Assessment method

Exams will be carried out by means of a written test at the end of the course. During the test, the student will have to carry out 2 questions that provide a broad and articulated answer. The first of the two questions will always focus

on metabolism. Three more specific questions that require concise but comprehensive answers will be provided. The time available to carry out the written test is 2 hours . An oral test follows, during which the elements of weakness identified during the written test are studied in depth.

Office hours

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Sustainable Development Goals

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