UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Microbial Biotechnologies

2425-1-F0901D025

Aims

Knowledge on microbial pathogens causing disease to man (bacteria, viruses, fungi and protozoa); microbial virulence factors, mechanisms of pathogenicity and methods used to elucidate them; traditional microbiology diagnostic methods and the applications of biotechnologies in the development of new molecular microbiological methods for the diagnosis of infectious diseases, molecular typing of microorganisms and monitoring of antimicrobial therapy; mechanisms of action of antimicrobial agents and strategies for the development of new antimicrobial agents; antimicrobial resistance mechanisms and modalities for the acquisition and diffusion of antimicrobial-resistance genes; molecular epidemiology studies of microbial infections, outbreak investigations for community or nosocomial infections, molecular surveillance of health-care associated infections (HCAI) and of antibiotic-resistant pathogens; knowledge on preventative measures and on strategies for the development of new vaccines against infectious diseases; applications of new technologies for the monitoring and prevention of human infections acquired from the environment, food and water.

Contents

By the end of this course students will have acquired knowledge regarding major issues of clinical microbiology which will be particularly focused on microbial mechanisms of pathogenesis, diagnostic methods in microbiology, new strategies for the treatment and prevention of microbial diseases as well as biotechnologies applied to epidemiological and surveillance studies of community and health-care associated infections (HCAI).

Detailed program

• Ultrastructure and classification of human pathogenic microorganisms

• Replication and genetics of microbial agents

• Human-microorganism interactions

• Mechanisms of microbial pathogenesis

• Regulation of bacterial virulence genes

• Methods for the study of bacterial virulence

• Role of viruses in oncogenesis

• Microbial biofilms

• Mechanism of action of the main antimicrobial drugs

• Antibiotic resistance: Mechanisms and methods of acquisition and strategies for overcoming it

• Main mechanisms of antibiotic resistance in Gram-positive bacteria, Gram-negative bacteria and mycobacteria

• Strategies for the development of new antimicrobial agents

• Surveillance and Prevention of infectious diseases, vaccines in bacteriology and virology and new vaccination strategies

• Principles of traditional and molecular microbiological diagnostics

• Microbiological techniques applied to the analysis of water and food

• Microbial typing methods phenotypic and genotypic

• Molecular epidemiology and surveillance of microbial infections

• Viral vectors in medical biotechnology

Prerequisites

Basic knowledge in the field of biology and genetics.

Teaching form

- 20 2-hours lessons carried out in delivery mode
- 3 4-hour laboratory activities carried out in interactive mode in person

Textbook and teaching resource

- Bacterial Pathogenesis: a Molecular Approach. ASM Press Wilson et al.
- Microbiologia Medica. EMSI Sherris
- Microbiologia Medica. UTET. Poli et al
- Principi di Microbiologia Medica. Esculapio. La Placa
- Microbiologia Medica. EMSI. Murray et al
- Principi di Microbiologia Medica. Casa Editrice Ambrosiana. Antonelli et al
- Manuale di Virologia Medica. McGraw Hill. Dianzani, et al

Review and scientific articles indicated during lectures.

Semester

Second semester of the first year.

Assessment method

Written and oral test: Open questions to check the preparation on the exam program, on the ability of independent reflection, on the problem solving skills. From a choice of 4 proposed topics, 2 open questions will be elaborated by the candidates. The following oral interview will focus mainly on the completed written works. Time for the written test: 2 hours. Score assigned: up to a maximum of 15 points for each topic. There are no ongoing tests.

Office hours

To be fixed by appointment

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | PARTNERSHIPS FOR THE GOALS