UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Microbial Biotechnologies

**2324-1-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 microbial human pathogens

• Replication and genetics of microbial pathogens

• Microbe-host cell interactions

• Mechanisms of microbial pathogenicity

• Regulation of virulence genes

• Methods for the study of bacterial virulence

• Role of viral agents in oncogenesis

• Microbial Biofilm

• Mechanisms of action of antimicrobial agents

• Antimicrobial-resistance: mechanisms and modes of acquisition

• Principal mechanisms of resistance in Gram-positive, Gram-negative and Mycobacteria

• Strategies for the development of new antimicrobial agents

• Prevention of infectious diseases and new strategies in vaccine development

• Traditional and molecular diagnostic microbiological methods

• Technologies applied to the microbiological analysis of food and water

• Microbial DNA typing methods

• Molecular epidemiology and surveillance of microbial infections

## Prerequisites

Basic knowledge in the field of biology and genetics.

## Teaching form

Lectures and laboratory practice.

## 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 exam and oral: based on a choice among 4 tracks, 2 open questions will be processed by the candidates and subsequent oral that will primarily focus on the work done.

## Office hours

To be fixed by appointment

## Sustainable Development Goals

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