



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Microbiologia Molecolare

2425-1-F0601Q117

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#### Aims

The Molecular Microbiology course provides competences and skills on the basis of molecular microbiological applied to molecular mechanism in bacteria. It Concerns a trasversal course regarding aspects of General Microbiology, Environmental Microbiology and molecular mechanisms involved in the bacteria-host interactions, including also pathogenic aspects. 1. Knowledge and understanding. Knowledge of the basis of Molecular Microbiology 2. Applying knowledge and understanding. At the end of the course the student will be able to apply the knowledge acquired in the molecular mechanisms of bacteria. 3. Making judgment. The student will be able to elaborate the knowledge in molecular microbiology. 4. Communication skills. At the end of the course the student will be able to write experimental reports with microbiological vocabulary 5. Learning skills. The student will be able to apply the acquired knowledge in the field of molecular microbiology.

#### Contents

The content of the course will be focused on: molecular mechanisms involved in cellular division in prokariotics; examples of microbial differentiation as in *Caulobacter crescentus*; molecular mechanisms involved in sporulation and germination; biofilms; secretion system in bacteria; interaction bacteria-host; interaction bacteria-environment

#### Detailed program

1.BACTERIAL CELL DIVISION Building of cytokinesis apparatus Formation of FtsZ ring Proteins of the divisome Regulation of divisome proteins Regulation of control of cell cycle and DNA replication 2.EXAMPLE OF CELLULAR DIFFERENTIATION Cell cycle of *Caulobacter crescentus* Phases of cell cycle Regulation of cell cycle Control of the regulation of cell cycle and DNA replication Regulation of divisome proteins 3.EXAMPLE OF CELLULAR DIFFERENTIATION Cell cycle of *Bacillus subtilis* Phases of cell cycle Sporulation Germination 4.MICROBIAL

BIOFILM Biofilms in nature and biofilm formation Role of biofilm Biofilm as differentiated community Quorum sensing phenomenon Formation of the quorum sensing phenomenon Regulation of the quorum sensing phenomenon Autoinductors in different bacteria 5. MICROORGANISM-HUMAN INTERACTIONS Mechanisms of pathogenesis Main steps of infective process Contact Adhesion/Colonization Replication Secretion systems type I, II, III, IV, V, VI Virulence factors and bacterial toxins 6. MICROORGANISM-ENVIRONMENT INTERACTIONS Physiological adaptation Variation of gene expression in response to environmental stress Genetic adaptation Response to environment variations and genome alterations in response to mutation events or acquisition of exogenous DNA

## **Prerequisites**

The course requires a background in General Microbiology and Molecular Biology

## **Teaching form**

The course will be provided through frontal lessons in presence in the lesson room.

## **Textbook and teaching resource**

All the last editions of books of Microbiology as background, but the course needs the availability of the Reviews and papers indicated during the lessons from the Professor

## **Semester**

first semester

## **Assessment method**

written and oral examination. The student has to respond to 4 open questions on the topics treated during the course. On the basis of the answer the student can deeper explain this topics during the oral examination. In itinere no examinations are planned.

## **Office hours**

By direct contact with the Professor through an appointment by email to:  
patrizia.digennaro@unimib.it

## **Sustainable Development Goals**

GOOD HEALTH AND WELL-BEING

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