UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Cell and Molecular Biology I

**2122-1-H4102D002-H4102D006M**

### Aims

The course will provide the essential theoretical knowledge of biology, also focusing on the possible future application in the medical field. The subjects of the course will provide the necessary knowledge to understand the vital processes, both at the cellular and molecular level.

### Contents

Structure and function of the most important cellular macromolecules; DNA duplication and repair mechanisms; transcription and RNA processing; translation and protein sorting; transcriptional and post-transcriptional regulation; signal transduction pathways; molecular and cellular mechanisms which control the cell cycle, cellular growth and differentiation as well as cell-to-cell interactions.

### Detailed program

GENERAL BIOLOGY – Classification of living organisms – Structure od prokaryotic and eukaryotic cells – Viruses, classification, lytic and lisogen cycle. MOLECULAR BIOLOGY. Chemical composition and molecular organization of the cell – water, carbohydrates, lipids, proteins and nucleic acids. Identification of the chemical compound carrying the genetic information – Molecular basis of inheritance – DNA replication. Telomerases – Mechanisms of DNA repair. Correlation with human diseases, aging and cancer. - RNA, structure and function – Transcription and RNA maturation – The genetic code, and its biological implication (redundancy, frameshift) – Translation – Protein sorting

CELL BIOLOGY – Structure and function of the cytoskeleton – Cell adhesion mechanisms – Endocytosis and Exocytosis – Cell-to-cell communication in complex organisms – Signal transduction and the role of protein kinases

– Cell cycle and its regulatory mechanisms. _ Mytosis and Meiosis – Apoptosis – Oncogenes and oncosuppressors - Cell differentiation processes: embrional and adult stem cells.

## Prerequisites

Basic sciences (chemistry, physics)

## Teaching form

Lessons in attendance, subject to any ministerial changes following the COVID pandemic situation.

## Textbook and teaching resource

Alberts and Johnson. Molecular biology of the cell. Sixth edition. Garland Science, 2014; H. Lodish, A. Berk, S.L. Zipursky, P. Matsudaira, D. Baltimore, J. Darnell. Molecular cell biology, Freeman, 2016

## Semester

first semester

## Assessment method

These subjects will be evaluated within the exam of the integrated course, that will be an oral examination on the subjects taught during the lectures or on further subjects (part of the program) not exhaustively discussed in class. The exam will be in attendance.

## Office hours

by appointment