UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

# Cellular Biology

**2021-1-H4601D066-H4601D090M**

## Aims

Provide the tools for understanding the molecular mechanisms that control cell division and differentiation, with particular regard to the alterations of these same mechanisms that are involved in human diseases

## Contents

Structure and function of the cytoskeleton, adhesion mechanisms between cells and the extracellular matrix, the communication between cells in multicellular organisms(endocrine, paracrine, autocrine), signal transduction, cell cycle and its control mechanisms, apoptosis, mitosis and meiosis, crossing-over and genetic consequences, X chromosome inactivation, principles and consequences of genomic imprinting and mitochondrial inheritance, multifactorial inheritance, cancer genetics; the immunogenetics and the generation of antibody diversity.

## Detailed program

Structure and function of the cytoskeleton; adhesion mechanisms between cells and the extracellular matrix; endocytosis and exocytosis; the communication between cells in multicellular organisms (endocrine, paracrine and autocrine regulation); signal transduction and the central role played by protein kinases; cell cycle and its genetic control; apoptosis; mitosis and meiosis; crossing-over and genetic consequences; Cell differentiation: embrional and adult stem cells; Variability and inheritance; phenotype and genotype; Diploidy and sex: homologous chromosomes, alleles and loci, homozygosity and heterozygosity- Wild-type and mutated alleles, multiple alleles, dominance and recessivity; Mendel's laws exceptions: penetrance and expressivity; Sex determination; and implications for X chromosome inactivation in the manifestation of syndromes and genetic diseases; principles and consequences of genomic imprinting and mitochondrial inheritance; multifactorial inheritance; cancer genetics: genes that contribute to the onset of cancer (Rb1, p53, and WT1); the immunogenetics and the generation of antibody diversity; pedigree analysis.

## Prerequisites

Basic Sciences course

## Teaching form

Lectures

## Textbook and teaching resource

Main Textbook G. De Leo, E. Ginelli, S. Fasano. Biologia e Genetica EdiSES, 2013

More Resources - H. Lodish, A. Berk, S.L. Zipursky, P. Matsudaira, D. Baltimore, J. Darnell. Molecular cell biology, Ed. FREEMAN, 6° ed. 2007.

## Semester

Second semester

## Assessment method

The assessment of this module will take place togheter with the other modules of this course. Written test multiple choices and open shorts questions

## Office hours

By appointment