UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Cellular Biology

2627-3-E1301Q070

Aims

The aim of the course is to give an overview of the main cell-to-cell signaling pathways and to analyze how these pathways are integrated within complex organisms to control fundamental cell functions.

1. Knowledge and understanding:
   Students will be able to understand pluricellular organisms coordinate the activities of different cell types in order to cope with the variety of external or endogenous stimuli in the most appropriate manner.
2. Applied knowledge and understanding:
   Students will be able to plan experiments in order to investigate novel cell-to-cell signals and their intracellular pathways.
3. Making judgments
   Students will be able to critically review the scientific bibliography inherent researches investigating intracellular signaling pathways.
4. Communication skills:
   Students will be able to use an appropriate scientific language to describe cell-to-cell signaling mechanisms, proliferation, migration and cell degeneration mechanisms.
5. Learning skills:
   This course will give to the students the molecular knowledge to comprehend the physiological aspect of organs and systems that will be analyzed in the specific exams.

Contents

The course will analyze the molecular mechanisms and signals involved in cell-to-cell communications. The signals involved the control of proliferation and apoptosis will be analyzed with more details.

Detailed program

1. MECHANISMS OF CELL-TO-CELL SIGNALING.

2. SIGNAL TRANSDUCTION: LIGANDS, RECEPTORS, EFFECTORS AND SECOND MESSENGERS:
   Cell signaling pathways mediated by:

- G protein receptors.
- ligand operated channels.
- receptors with enzymatic activity.
- receptors modulating intracellular proteolysis
- intracellular receptors.
  We will analyze the main endogenous ligands and cellular functions correlated to each signaling pathway.

3. CELL ADHESION MOLECULES AS MEDIATORS OF INTRACELLULAR SIGNALING:

- Cell junctions.
- Cell-extracellular matrix junctions.
- Mechanisms of cell migration

4. MECHANISMS FOR CELL DIVISION AND APOPTOSIS CONTROL:

- Mitosis: mechanisms and regulation of cell cycle progression.
- Apoptosis: mechanisms and activation signals.

Prerequisites

The knowledge of the basic mechanisms of cell biology, human physiology and histology is required.

Teaching form

The course is composed by 21 lessons (2 hours) that will be structured as lectures ("modalità didattica erogativa", DE) supported by slides and videos.
15 lessons will be delivered as face-to-face lectures, while 6 lessons will be delivered through distance-learning.

Textbook and teaching resource

BIOLOGIA MOLECOLARE DELLA CELLULA - BRUCE ALBERTS ET AL.- ZANICHELLI EDITORE
Or: L’ESSENZIALE DI BIOLOGIA MOLECOLARE DELLA CELLULA - BRUCE ALBERTS ET AL.- ZANICHELLI EDITORE

Semester

First semester

Assessment method

Students will be evaluated by three written "open" questions at the end of the course. The questions will be aimed at evaluating both the knowledge of the topics discussed throughout classes and the ability to synthetize the most important elements of each topic. First question will be focused on the intracellular pathways described. The second and third questions will be focused on one of the functional activities of cells. If required by the student or the teacher a critical discussion of the written assessment will complete the evaluation.

There will be no mid-course evaluations.

Office hours

Email to biocell1@libero.it to schedule a meeting

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION