UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Cell Biology

2021-1-E3201Q088-E3201Q002M

Aims

The course is divided into two modules: Cell Biology (first module) e Biologia Animale (second module).

The Cell Biology module will provide the student with the student with the basic morphological and functional knowledge of the animal eukaryotic cell and its subcellular components and knowledge related to tissue/organ organization. The lectures will be supported by the laboratory activity in which the technical-theoretical informations for the preparation of histological samples will be provided. Moreover, the theoretical description, together with the observation of histological samples, will allow students to understand the organization of the tissues / organs that represent the interface between the organism and the environment. This knowledge will allow students to understand some of the interactions that occur between the organism and environmental pollutants and will be preparatory with some courses that the student will follow during his training.

1. Knowledge and understanding

At the end of the course the student will acquire knowledge about the animal eukaryotic cell and the organelles that characterize it in morpho-functional terms and the organization of the epithelial tissues.

2. Applying knowledge and understanding

At the end of the course the student will be able to apply the knowledge acquired in point 1 to the subsequent subjects he will study in the following years.

3. Making judgements

The student must be able to critically process the acquired knowledge and choose the most appropriate approach to link the morpho-functional characteristics of the animal eukaryotic cell to more complex organization levels such as tissues.

4. Comunication skills

At the end of the course the student will be able to describe, with an appropriate scientific language, the organization of the animal eukaryotic cell.

5. Learning skills

At the end of the course, the student will have the skills to face the subsequent studies that require basic knowledge of Cell biology.

Furthermore the student will be able to associate the knowledge learned with the concepts that he will assimilate in the subsequent studies that require cytological and tissue knowledge as prerequisites.

Contents

The Cell Biology deals with the study of the animal eukaryote cell and the organelles that characterize it from a morphological and functional point of view, followed by the study of tissues and organs.

Detailed program

Module I: Cell Biology

The world of the cell. Morphology of the prokaryotic and eukaryotic cells. Hierarchy and complexity of biological organization.

- Structure and function of macromolecules. Carbohydrates, proteins, lipids and nucleic acids

- Structure and function of biological membranes. Selective permeability, passive transport, active transport.

- Intracellular membrane systems. Structure and function of the endoplasmic reticulum and the Golgi apparatus. Lysosomes, peroxisomes and control of the fate of synthesized proteins.

- Mitochondria. Morphology and function.

- The cytoskeleton. Microtubules, microfilaments and intermediate filaments. Relationship between cytoskeleton and other cellular structures. The junctions.

- Nucleus: Morphology. Nuclear envelope and nucleus-cytoplasm traffic. From DNA to the chromosome: organization. Notes on DNA duplication. Nucleolus: structure and function.

- Transcription and translation of gene information. Overview of the RNA structure. Genetic code: definition. Overview of the mechanisms that regulate translation.

- Cellular reproduction. The phases of the cell cycle: overview. Phase M: stages of mitosis and cytokinesis. Meiosis: the process that regulate it and its biological role.

- Laboratory: tissues and organs that interface with the environment.

- The optical microscope. Histological samples preparation.

- Definition of tissue, organ, organism.

- Organization of tissues / organs that represent the environment organism interface.

The following topics will be investigated with the observation of histological preparations under an optical microscope

Prerequisites

None prerequisite.

Teaching form

module of Cell Biology: Lectures in the classroom (44 h) and obligatory practical laboratories (5 h).

The course is supported by tutoring activities (20 h distributed throughout the academic year).

During the **Covid-19 emergency**, lectures will be given to relatively small and separate groups of students. These groups will attend for an entire week and the groups will be flipped between weeks. All lessons will be recorded and made available through the e-learning platform.

The laboratory experiences during the emergency will be reduced in number and replaced with remote activities.

Textbook and teaching resource

Recommended textbooks:

The student can choose one of the following texts:

- Biologia cellulare e molecolare. Concetti ed esperimenti. G. Karp edito EdiSes

- L’essenziale di biologia molecolare della cellula. Alberts B., et al. edito da Zanichelli (versione cartacea-versione elettronica

- Il mondo della Cellula. Becker. Edito da Pearson

- Cellule. G. Lewin, edito Zanichelli

Scientific articles and teaching material suggested by the teacher.

Laboratory activity:

- Histology and elements of microscopic anatomy - Dalle Donne et al., EdiSES. II edition

All slides can be found at the Moodle webpage related to the teaching module.

Semester

Cell Biology and related laboratories are provided in the first year of the course, first semester

Assessment method

Written admission test (whose score does not average with the final one) and oral exam.

The written test consists of 30 short questions in the form of a computerized test. The oral exam is accessed by answering 50% of the questions. Subject to evaluation and criteria: students' knowledge of the topics covered in the classroom are assessed.

Oral exam (subject of evaluation and criteria): the aim is to verify the student's knowledge about the contents of the topics related to cell biology and the organization of epithelial tissues. The final score depends exclusively on the oral test.

Office hours

By appointment upon request to the e-mail address: anita.colombo@unimib.it