UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Biologia Cellulare

2425-1-E3201Q088-E3201Q002M

Aims

The course of **Animal and Cell Biology** is divided into two modules: **Cell Biology (first module)** e **Zoology (second module)**.

The **Cell Biology module** will provide 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 laboratory activity in which the technical-theoretical information for the preparation of histological samples will be provided. Futrhemore, the theoretical description, combined with the observation of histological samples, will allow students to understand the organization of the tissues / organs which constitute the the organism-environment interface. This knowledge will allow students to understand some of the interactions that occur between the organism and environmental pollutants and will be preparatory to 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 should be able to describe the animal eukaryotic cell in general with all its organelles clearly and with linguistic properties, bearing in mind that the morphology of a cell is related to its

function..

5. Learning skills
At the end of the course the student will have the necessary skills to independently deal with subsequent studies that require basic knowledge of Cell Biology.
Furthermore, the student must be able to associate the knowledge learned with the concepts that he will assimilate in subsequent teachings that require prerequisites related to cell biology.

Contents

The Cell Biology module deals with the study of the animal eukaryotic cell and the organelles that characterize it in morpho-functional terms and provides notions relating to the ability of cells to organize themselves into tissues/organs.

Detailed program

Module of 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

****Teaching language: Italian

Cell Biology Module
22 x 2-hour lessons composed by:

- a section of **delivered didactics** (Didattica erogativa, DE) focused on the presentation, illustration of contents, concepts and basic principles of Cell Biology;
  -a section of **interactive teaching** (Didattica Interattiva, DI) which includes supplementary teaching interventions, additional demonstrations relating to the notions presented and discussion with the students
  The teaching activities are delivered through **frontal lessons**

Laboratory: 5 hours of divided into 2 activities (first activity lasting 2 hours and second activity lasting 3 hours) carried out in interactive mode (interactive teaching, DI) which involves the use of the optical microscope for the observation of biological samples, wooclap.

- **20 hours of tutoring activities**, distributed throughout the academic year, to support students throughout their studies in preparation for the exam provided by **interactive teaching** (Interactive Teaching, DI) through in-person tutorials

Textbook and teaching resource

In general, any University textbook on Cell Biology is suitable.

Here are some texts that the student can choose:
-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
The material relating to the laboratory activity will be provided by the teacher.

On the **e-learning page** of the course, it will be possible to find:
-Copy of the slides used in classroom and in the laboratory;
-Didactic material (films, cards) made available by Pearson publishing house for in-depth analysis of the Cell Biology topics covered in class
-Self-assessment quizzes made available by Zanichelli publishing house for the Cell Biology topics covered in classroom

Semester

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

Assessment method

There are no tests in progress

Only the oral test is foreseen (subject and evaluation criteria): the objective is to verify the basic knowledge of an animal eukaryotic cell in morphological and functional terms. The student will have to demonstrate that he has understood the topics presented and that he has acquired not only an adequate scientific language but also the ability to reason on all the contents of the module (topics covered in classroom and during laboratory activities).

Office hours

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

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION