DIM-SAP-239 Principles of Molecular Cell Biology and Biotechnology

SEMESTER: Spring

CREDITS: 7.5 ECTS (Theory 4.5 ECTS ; Laboratory 3 ECTS)

LANGUAGE: English

DEGREES: SAPIENS program

Course overview

This course deals with the biology of cells of higher organisms, their structure and function; and processes operating in cells, such as transcription, protein biogenesis, cell adhesion, cell proliferation, cell communication and differentiation. Experimentation with eukaryotic cells, as well as biology data analysis and introduction to scientific communication are also introduced.

Prerequisites

Previous knowledge on biology is advisable but not mandatory.

Course contents

Theory:

Lectures are divided into four main parts:

1. Introduction: eukaryote cells: organization, components, genetic information and research tools.
2. Cell membrane structure, transport mechanisms, protein transport pathways, metabolism and cell signaling.
3. Cytoskeleton, extracellular matrix and cell proliferation and adhesion. Cellular communication mechanisms.
4. Cancer. Research approaches.

Laboratory:

Practical sessions include the following topics:

Lab1. Methods of imaging

Lab2. Genetic information and its transmission: DNA and mitosis

Lab3. Biochemistry of protein folding

Lab4. Part I: The effect of sugar structure on fermentation rate in yeast.
Part II: Photosynthesis.

Lab5. Introduction to tissue culture

Lab6 – 9 Introduction to mammal's cell culture and experimentation. Proliferation and apoptosis. Wound healing assay. Differentiation assay. Protein extraction from cell culture.

Textbook

- Essential Cell Biology, 4th Edition. Authors: Alberts B., Bray D., Hopkin K., Johnson A., Lewis J., Raff M., Roberts K. and Walter P.

Other sources:

- Molecular biology of the cell, 5th Edition. Authors: Alberts B., Johnson A., Lewis J., Raff M., Roberts K., Walter P.
- Histology and Cell Biology: An Introduction to Pathology, 4th Edition. Author: Kierszenbaum A.
- Molecular cell biology, 7th Edition. Authors: Lodish H., Kaiser C.A, Bretscher A., Amon A., Berk A., Krieger M., Ploegh H., and Scott M.P.

Grading

To pass the course is necessary to achieve an overall grade of at least 5 over 10.

The overall grade is obtained as follows:

- Mid-term 1: 15%
- Mid-term 2: 15%
- Laboratory: 30%.
- Team research work: 15%
- Final exam: 25%

If the student fails the course, he or she can take a second examination to pass the subject and must achieve at least 6 over 10 to gain a pass overall.