

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

**SEMESTER:** Spring

**CREDITS:** 7.5 ECTS (Theory 2 hrs. during 10 weeks and 5 hrs. per week during 5 weeks;  
Laboratory 3 hrs. per week during 10 weeks)

**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, 4<sup>th</sup> 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, 5<sup>th</sup> Edition. Authors: Alberts B., Johnson A., Lewis J., Raff M., Roberts K., Walter P.
- Histology and Cell Biology: An Introduction to Pathology, 4<sup>th</sup> Edition. Author: Kierszenbaum A.
- Molecular cell biology, 7<sup>th</sup> 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.