

Cell and Molecular Biology

Calendar: 4th semester

Contact Hours: T: 30,0; TP:30,0; PL:7,5

Intended learning outcomes of the curricular unit:

The objective of this curricular unit is to increase the knowledge about the basic functional unit of all living beings – the cell, in terms of its composition, dynamic and functioning. The students should know and comprehend molecular and cellular events intrinsic to the functioning, regulation and cellular differentiation, and they should acquire the capacity to have a global perspective of the working of cells and consequently of living organism. It is intended that the students acquire knowledge and be able to apply basic experimental methodologies of molecular biology.

Syllabus:

1.Biomembranes: transport systems, signal transduction and membrane receptors. 2.Overview of the structure and function of proteins 3.Physico-chemical structure of nucleic acids. Expression of the genetic information, RNA synthesis (transcription) and processing. Protein synthesis (translation). Maintenance of the genetic information. DNA replication and repair. Recombination. Mitosis and meiosis. Molecular mechanisms of homologous recombination. Detection, types and effects of mutations. 4.Mobile genetic elements (virus, transposons and plasmids). Recombinant DNA technology. Regulation of gene expression. 5.Genomic organization, gene and non-coding sequences, chromosomal structure and morphology 6.Molecular control of the cell cycle. Cell division. stem cell lines and formation of gametes. Regulatory process of programmed cell death, necroses and apoptosis.

Demonstration of the syllabus coherence with the curricular unit's intended learning outcomes.

The syllabus contents of this curricular unit broaches the main areas that describe the molecular composition and the dynamic functioning of a cell, namely, biomembranes and their role in the regulation of the responses to external stimuli, proteins, and structure and function of nucleic acids in the context of the maintenance and flux of the genetic information. The syllabus includes also a brief introduction to basic techniques of molecular biology, an area that will be further explored in the curricular unit of genetic engineering. The syllabus contains also the themes of replication, cell cycle regulation, differentiation and cell death, essential aspects for the understanding of the workings of a living cell.

Teaching methodologies (including evaluation):

This curricular unit is organized in two parts, a theoretical component and a practical one. Presentation of the theoretical content will be done with the help of powerpoint support. In the practical component, series of practical exercises will be resolved, that contextualize with relevant aspects of laboratory and real life situations. Evaluation will be done with a final exam (70 %) and the evaluation of the practical component (30 %).

Demonstration of the teaching methodologies coherence with the curricular unit's intended learning outcomes.

This curricular unit is organized in two components, a theoretical and a practical one. The syllabus contents will be presented to the students, to help him attain a profound knowledge of functioning of a cell. The practical component will allow the students to acquire basic competencies to do and analyze the results of laboratory procedures in the context of molecular biology. In terms of evaluation, a higher weight is given to the understanding of the syllabus contents, being the practical application account as 30 % of the grade.