

Course Unit: 15716 – Cellular and Molecular Biology

Year 2 Semester 3 ISCED Code: 511 ECTS: 5,0

Type of Course Unit: Compulsory Delivery Mode: Face-to-face Language of Instruction: Portuguese

COURSE COORDINATOR: Luís Manuel Mendonça Carvalho

HOURS OF WORK

TOTAL HOURS	Contact Hours								Hours in autonomous work
	Theory	Theory and practice	Practical and laboratory work	Field work	Seminar	Internship	Tutorial guidance	Other	
125	30		30						65

Prerequisites (if applicable): Not applicable

LEARNING OUTCOMES (knowledge, skills and competence)

The objective of this curricular unit is to provide a description of the functioning of cells and how their functions are related to their internal structure and organization, to communication with other cells and to the external environment.

At the end of this course, students should be able to:

Identify similarities and differences between different cell types.

Identify the different cellular organelles of eukaryotes and describe their functions.

Understand the fundamental concepts underlying division and cell cycle, cell signaling and cell adhesion. Describe how proteins are synthesized from DNA and how this process is regulated.

Perform experimental techniques of molecular genetics.

Analyze experimental results.

CONTENTS

Organization and function of living cells.

DNA replication.

Transcription of DNA.

Protein synthesis.

Chromosomes and genetic organization.

Chromatin.

Regulation of Transcription in Eukaryotes.

mRNA processing.

Splicing.

Stability and translation of mRNA.

Mitochondria and chloroplasts.

Peroxisomes.

Endoplasmic reticulum.

Golgi apparatus.
Lysosomes and endosomes.
Cytoskeleton.
Intracellular transport.
Cell cycle and cell division.
Cell death.
Regulation of gene expression and function in cells and organisms.
Polymerase chain reaction (PCR): applications-
DNA sequencing: laboratory methodology and applications.
Construction of DNA libraries: laboratory methodology and applications.
Southern and Northern Blotting methodology: applications.
Protein binding to DNA: laboratory methodology.
Restriction enzymes. Construction of restriction maps.
Genetic mutations and DNA repair.
Genetic Recombination.

DEMONSTRATION OF THE CONTENTS COHERENCE WITH THE COURSE UNIT'S LEARNING OUTCOMES

The integrated and progressive approach of the UC program will enable students to develop the knowledge and competencies provided for in the objectives, ensuring consistency between them and programmatic content.

Programmatic contents include the main subjects that need to be known and understood about cellular structure, molecular genetics and concomitant laboratory techniques, allowing a harmonious articulation between theory and practice.

TEACHING METHODOLOGIES

Theoretical classes and Laboratory classes.

DEMONSTRATION OF THE COHERENCE BETWEEN THE TEACHING METHODOLOGIES AND THE LEARNING OUTCOMES

The teaching and learning methodologies aim at the integrated development, in the students, of the knowledge referred to in the programmatic contents and the achievement of the established objectives and competences.

In the evaluation process, a 30% weight was given to the reports of the practical classes, such as the desire for students to acquire and develop knowledge related to organization, transmission and gene expression, and to interpret experimental results applying and consolidating acquired knowledge during the theoretical classes.

EVALUATION METHODS

The evaluation will be done by final exam (70%) + reports of practical classes (30%).

MAIN BIBLIOGRAPHY

- B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter (2015). Molecular Biology of the Cell. Garland Science, Taylor&Francis Group, New York.
- B. Alberts, D. Bray, K. Hopkin, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter (2014). Essential Cell Biology. Garland Science, Taylor&Francis Group, New York.
- C. Azevedo e C. E. Sunkel (2012). Biologia Celular e Molecular. Edições Lidel, Lisboa.
- J. E. Krebs, S. Kilpatrick, E. Goldstein. (2013) Lewin's Genes XI. Jones and Bartlett Publishers. Burlington, MA, USA.
- Ficheiros PowerPoint apresentados durante as aulas teóricas e práticas.