

Course Unit	Cellular Biology		Field of study	Biology and Biochemistry	
Bachelor in	Dietetics and Nutrition		School	School of Health	
Academic Year	2021/2022	Year of study	1	Level	1-1
Type	Semestral	Semester	1	ECTS credits	5.0
Code	8149-501-1102-00-21				
Workload (hours)	135	Contact hours	T	-	TP
			30	PL	30
			TC	-	S
			-	E	-
			OT	6	O
			-		

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Maria José Miranda Arabolaza, Filipa Sofia Dinis Reis

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:  
Know the complexity of the cell as structural and functional unit of all living beings.

### Prerequisites

Before the course unit the learner is expected to be able to:  
NONE

### Course contents

THEORETICAL- Biomembranes. Macrotransport. Microtransport. Specialities of membrane. Extracellular matrix. Nucleus. Endoplasmic reticulum. Golgi apparatus. Lysosomes. Mitochondria. Peroxisomes. Cytoskeleton. Cell communication. Cell cycle. Meiose. Gametogenesis. PRACTICE - Microscopy. Micrometria. Bacteria. Cellular composition of blood. Permeability of biomembrane. Globular resistance. Caryotype. Polytene chromosome. Catalase activity. Mitosis. Extraction of DNA. Cells in meiosis.

### Course contents (extended version)

1. PRACTICAL CLASSES Microscopy: Optical microscope Types. The electron microscope. Types. Micrometria
  - Observation of bacteria. Comparison cellular composition blood analyzed with Wright's stain method
  - Effects of heat, freezing and solvents in the biomembranes permeability.
  - Behavior of animals cells in different osmolarities
  - Preparation of karyotypes
  - Observation polytene chromosomes of salivary glands of *Drosophila melanogaster*
  - Catalase activity
  - Observation of cell divides by mitosis.
  - DNA extraction, quantification and purity determination from living tissue.
  - Observation of cell divides by meiosis.
2. THEORETICAL CELL ORGANIZATION -- Biological Membranes. The lipid bilayer . Membrane proteins
3. Membrane transport of small molecules. Diffusion. Active ion transport .
4. Transport into the cell of large molecules and particles. Endocytosis and exocytosis. Transcytosis
5. Specialities cell membrane. Cell junctions: tight junctions, adherens junctions and gap junctions
  - Microvilli cilium, flagellum, stereocilia
6. Extracellular matrix of animals. Components of the extracellular matrix. Functions
7. Nucleus Constitution Molecular structure, function of the genetic material Chromatin and chromosomes
8. Endoplasmic Reticulum Structure and types Relationship with cellular organelles/structures Functions
  - Structure and function of the ribosomes
9. Golgi apparatus. Framework . Compartmentation. Functions
10. Lysosomes. Ultra-structure. The lysosomes and the intracellular digestion. Lysosomal diseases.
11. Mitochondrion Ultra-structure, composition and functions. Mitochondrial DNA.
12. Peroxisomes. Structure. Functions. Peroxisomal diseases.
13. Cytoskeleton. Membership, organization and functional significance.
14. Cell communication. Types of signals. Recetors
15. Cell Cycle. Overview of the cell cycle. Mitosis. Control of the cell cycle events. Apoptosis
16. Meiosis and fertilization . Meiosis. Eggs. Sperm. Fertilization.

### Recommended reading

1. ALBERTS, B. et al. (2018) – *Biologia Molecular de la Célula*, 6ª ed. Ed. Omega, Barcelona.
2. AMABIS & MARTHO (2004) - *Biologia dos organismos*, 2ª ed. Ed. Moderna, São Paulo.
3. AZEVEDO, C. & C. E. SUNKEL (2012) – *Biologia Celular e Molecular*, 5ª ed. Edições Lidel, Lisboa.
4. LODISH et al. (2005) - *Biologia Celular y Molecular*, 5ª ed. Médica Panamericana
5. BERG, J. M. ; J. L. TYMOCZKO & L. STRYER (2004) - *Bioquímica*, 5ª ed. Guanabara Koogan

### Teaching and learning methods

Theoretical-practices - Methodology actively using the multimedia, texts and question-answer sessions. Practical classes - carrying out practical laboratory with preparation of their reports.

### Assessment methods

1. Theoretical and Practices - (Regular) (Final)
  - Intermediate Written Test - 20% (Practices - Students perform one test during the semester Minimum grade 8.5)
  - Portfolio - 20% (Practices - At the end of the practical classes they deliver their portfolio to be evaluated)
  - Final Written Exam - 60% (Theoretical - Students perform a test Minimum grade 8.5)
2. Theoretical and Practices - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 40% (Practices - Students perform a test Minimum grade 8, 5)
  - Final Written Exam - 60% (Theoretical - Students perform a test Minimum grade 8.5)
3. Theoretical and Practices - (Regular) (Supplementary, Special)
  - Final Written Exam - 40% (Practices - Students perform a test

**Assessment methods**

Minimum grade 8.5)  
- Final Written Exam - 60% (Theoretical - Students perform a test  
Minimum grade 8.5)

**Language of instruction**

Portuguese

**Electronic validation**

Maria José Miranda Arabolaza	Juliana Almeida de Souza	Ana Maria Nunes Português Galvão	Adília Maria Pires da Silva Fernandes
10-11-2021	14-11-2021	15-11-2021	15-11-2021