

Course Unit	Cellular Biology		Field of study	Science Base	
Bachelor in	Biomedical Laboratory Sciences		School	School of Health	
Academic Year	2023/2024	Year of study	1	Level	1-1
Type	Semestral	Semester	1	ECTS credits	5.0
Code	9995-804-1104-00-23				
Workload (hours)	135	Contact hours	T	-	TP
			22,5	PL	30
			TC	-	S
			E	-	OT
			7,5	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) Filipa Sofia Dinis Reis, Maria José Miranda Arabolaza

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. Extracellular matrix. Cytoskeleton. Specialities of membrane. Nucleus. Cell cycle. Meiose. Endoplasmic reticulum. Golgi apparatus. Lysosomes. Mitochondria. Peroxisomes. Cell communication. Gametogenesis. PRACTICE - Microscopy. Micrometria. Bacteria. Cellular composition of blood. Permeability of biomembrane. Globular resistance. Caryotype. Polytene chromosome. Mitosis. Catalase activity. 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*
 - Observation of cell divides by mitosis.
 - Catalase activity
 - 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. Extracellular matrix of animals. Components of the extracellular matrix. Functions
6. Cytoskeleton. Membership, organization and functional significance.
7. Specialities cell membrane. Cell junctions: tight junctions, adherens junctions and gap junctions
 - Microvilli cilium, flagellum, stereocilia
8. Nucleus Constitution Molecular structure, function of the genetic material Chromatin and chromosomes
9. Cell Cycle. Overview of the cell cycle. Mitosis. Control of the cell cycle events. Apoptosis
10. Endoplasmic Reticulum Structure and types Relationship with cellular organelles/structures Functions
 - Structure and function of the ribosomes
11. Golgi apparatus. Framework . Compartmentation. Functions
12. Lysosomes. Ultra-structure. The lysosomes and the intracellular digestion. Lysosomal diseases.
13. Mitochondrion Ultra-structure, composition and functions. Mitochondrial DNA.
14. Peroxisomes. Structure. Functions. Peroxisomical diseases.
15. Cell communication. Types of signals. Recetors
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 Minimum grade 8, 5)
 - Final Written Exam - 60% (Theoretical - Students perform a test Minimum grade 8, 5)

Language of instruction

Portuguese

Electronic validation

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14-11-2023	21-11-2023	21-11-2023	21-11-2023

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