

Course Unit	Cell Biology and Human Genetics	Field of study	Biology and Biochemistry
Bachelor in	Dietetics and Nutrition	School	School of Health
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	1
Workload (hours)	135	Contact hours	T - - TP 30 PL 30 TC - S - E - OT 7,5 O -
		Level	1-1
		ECTS credits	5.0
		Code	8149-807-1102-00-23

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) **Sílvia Filipa Alves Beato Salvador Salvador**

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Understanding the fundamental principles of the structure and function of human cells.
2. Identifying and describing the main cellular organelles and their functions related to nutrition.
3. Understanding the principles of human heredity and the mechanisms of gene transmission.
4. Analyzing how genetic variations can influence nutritional needs and individuals' health.
5. Studying and understanding the structure of DNA and its role in genetic coding.
6. Understanding the processes of DNA replication and expression and their relationship to nutrition and hereditary diseases.
7. Exploring the relationship between genetics and nutrition, including how genetics influences individual dietary responses.
8. Identifying personalized nutritional strategies based on individuals' genetics.

### Prerequisites

Before the course unit the learner is expected to be able to:  
No pre requisites need

### Course contents

Cell organization.  
Nucleus: chromatin organization.  
Biological membranes.  
Cytoskeleton.  
Mitochondria.  
Cell signaling.  
Cell division.  
Genes, Genetic transmission, and the laws of genetic inheritance.  
Population genetics, variation, polymorphism, and mutation.  
Molecular and biochemical basis of genetic diseases.  
Nutrigenomics, Pharmacogenomics.  
Target genes in Nutrigenomics.  
Molecular mechanisms of longevity regulation and caloric restriction.

### Course contents (extended version)

1. PRACTICAL CLASSES  
Introduction to Microscopy  
Observation of Bacteria
2. Observation of Blood Smears with Wright's Stain
3. Behavior of Red Blood Cells in Different Osmolarity Media
4. Observation of Cells in Mitosis  
Observation of Meiosis Figures in Definitive Preparations
5. Techniques in Cell Biology and Genetics  
Population Genetics  
Analysis of familiar genetics
6. Clinical Cases: Genetic Diseases and Their Expression. Nutrigenetics and Nutrigenomics
7. THEORETICAL CLASSES
8. Cellular Structure and Function: Comparison between Eukaryotic and Prokaryotic, Animal, Plant Cells.
9. Genetic Processes: Transcription, Translation Mechanisms, and Chromatin Organization.
10. Membrane Biology: Lipid Bilayer and Membrane Transport.
11. Cytoskeleton and Cellular Functions.  
Energy Production and Genetics in Mitochondria.
12. Cell Signaling Mechanisms.  
Cell Division: Mitosis and Meiosis.
13. Historical Perspective of human Genetics.  
Genetic Structure, Expression Regulation, and Epigenetics.
14. Genetic Inheritance, Variation, and Mechanisms of Diseases.

### Recommended reading

1. Azevedo, C. & Sunkel, C. E. (2012). *Biologia Celular e Molecular* (2ª ed. ). Lisboa: Lidel
2. Alberts, B., et al., (2002). *Fundamentos da biologia celular* (2ªed.) Porto Alegre: Artmed.
3. Lodish, H., Berk, A., Zipursky, S. L., Matsudaira, P. (2002). *Biologia celular e molecular* (4ª ed. ). Porto Alegre: Artmed.
4. Strachan, T., Read, A. (2004). *Human Molecular Genetics*. Bios Scientific Publishers Ltd
5. Passarge, E., BorgesOsorio, M., R., Robinson, W. R. (2004). *Genetica texto e atlas*. Porto Alegre: Artmed.

### Teaching and learning methods

The TP classes cover explanation of theoretical concepts using multimedia equipment. In PL classes, students engage in laboratory activities involving protocols related to cellular biology and diagnostics. In tutorial sessions, they analyze articles on various topics and respond to questions. Assessment is carried out through interim exams or a final exam, evaluating both the TP and PL components.

**Assessment methods**

1. Theoretical and Practices - (Regular) (Final)
  - Intermediate Written Test - 20% (Practices - Students perform one test during the semester (Minimum grade 8.5))
  - Reports and Guides - 20% (Practices - Pratical activity report)
  - 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 - 60% (Theoretical - Students perform a test (Minimum grade 8.5))
  - Final Written Exam - 40% (Practices - Students perform a test (Minimum grade 8,5))
3. Theoretical and Practices - (Regular) (Supplementary, Special)
  - Final Written Exam - 60% (Theoretical - Students perform a test (Minimum grade 8.5))
  - Final Written Exam - 40% (Practices - Students perform a test (Minimum grade 8,5))

**Language of instruction**

Portuguese

**Electronic validation**

Silvia Filipa Alves Beato Salvador Salvador	Maria José Miranda Arabolaza	Ana Maria Nunes Português Galvão	Adília Maria Pires da Silva Fernandes
20-01-2024	22-01-2024	22-01-2024	22-01-2024