

Course Unit	Molecular Biology	Field of study	Biology and biochemistry
Bachelor in	Biology and Biotechnology	School	School of Agriculture
Academic Year	2022/2023	Year of study	2
Type	Semestral	Semester	1
Workload (hours)	162	Contact hours	T - TP - PL - TC - S - E - OT - O -
Level	1-2	ECTS credits	6.0
Code	9029-782-2101-00-22		

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) Altino Branco Choupina

### Learning outcomes and competences

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

1. Gain solid knowledge about the structure and properties of nucleic acids.
2. Know the function of DNA and the essential genetic mechanisms.
3. Identify the central dogma of molecular biology.
4. Understand the structure of the genome.
5. Interpret the different mechanisms of gene expression.
6. Understand the processes that allow the establishment of mutations and genetic recombinants.
7. Establish an overview of the techniques of recombinant DNA. Make work plans for the laboratory context involving concepts and molecular biology techniques.
8. Participate in laboratory experiments. Analyze and interpret the data obtained in the laboratory works.

### Prerequisites

Before the course unit the learner is expected to be able to:

1. Generally knowledge, of Biology, Biochemistry, Genetics and Microbiology.
2. It is also recommended to have knowledge of English.

### Course contents

Structure and function of nucleic acids. Fundamental genetic mechanisms (replication, transcription and translation). Analysis of gene expression in prokaryotes and eukaryotes. Mutations and genetic recombination. Cell cycle control. Molecular biology of the neoplastic cell. Tools and Techniques of recombinant DNA technology.

### Course contents (extended version)

1. Molecular basis of heredity.
2. DNA Replication.
3. RNA and proteins.
4. Chromatin structure Human Genome Organization
5. The gene expression control in prokaryotes and eukaryotes. Epigenetic control.
6. Spontaneous and induced mutation. Mutagens. Repair mechanisms of DNA damage
7. Chromosomal mutation.
8. Cell cycle control.
9. Molecular biology of the neoplastic cell.
10. Recombinant DNA: Overview
11. Program of practical classes / Theoretical-practical
  - Electrophoresis in agarose gels.
  - Restriction endonuclease analysis.
  - Extraction, purification and quantification of nucleic acids.
  - Polymerase chain reaction (PCR).
  - Preparation of competent cells and transformation with autonomous plasmids.
  - Evaluation of mutation and analysis of genomic sequences.
  - Discussion of scientific articles.

### Recommended reading

1. Weaver R. F. (2011) Molecular Biology, 5rd ed. , McGraw Hill.
2. J. Sambrook, David W. Russell, (2001). Molecular cloning : a laboratory manual 3ª ed. , New York Cold Spring
3. Keith Wilson & John Walker, (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Edition. Cambrige University
4. Karp G. (2010) Cell Biology, 6th Edition, John Wiley & Sons (Ltd)
5. Lewin B. (2008) Genes IX, 9th ed. , Jones and Barlett Publishers.

### Teaching and learning methods

Magistral classes using the classrooms equipped with datashow; laboratory manipulation of nucleic acids and genetic transformation in order to complement and consolidate the knowledge acquired in theoretical content, using laboratory rooms. Literature search, using their existing wireless network and libraries on the campus of Santa Apolonia.

### Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
  - Laboratory Work - 25%
  - Final Written Exam - 75%

### Language of instruction

Portuguese

## Electronic validation

Altino Branco Choupina	Paula Cristina Santos Baptista	Altino Branco Choupina	Paula Cristina Azevedo Rodrigues
16-01-2023	16-01-2023	16-01-2023	23-02-2023