

32108 - Cell Biology

Syllabus Information

Academic year: 2024/25

Subject: 32108 - Cell Biology

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 653 -

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Basic Education

Module:

1. General information

The objective of the subject is for the student to acquire essential knowledge about the functioning of living beings at the cellular level, focusing on the structure and function of the main biomolecules, central metabolism, the structure and function of cellular organelles, the replication of DNA and gene expression, and cell proliferation and death.

2. Learning results

General learning outcomes

CO_01. Recognize the fundamentals of cell biology.

CO_03. Demonstrate basic knowledge in health sciences about cellular biology, highlighting ethical principles and their applications in different situations and stages of life.

CP_08: Emotional intelligence. Understand and regulate one's own emotions and those of others to interact and participate in an effective and constructive way in social and professional life.

HA_05. Identify the metabolic and structural processes that occur in cells, tissues and organs of the human body, and apply them to explain their physiological functions, and how they can be used in biomedical applications.

Specific learning outcomes

1. Identification and understanding of the main biological molecules, such as carbohydrates, lipids, proteins and nucleic acids, as well as their structures and functions.
2. Detailed knowledge of cellular organelles, including their structure, function, and how they interact with each other to maintain cellular homeostasis.
3. Understanding of central metabolic processes, such as glycolysis, cellular respiration and photosynthesis.
4. Knowledge of DNA replication mechanisms and their importance in genetic inheritance and cell division.
5. Understanding gene expression and protein synthesis, including the processes of transcription, translation and gene regulation.
6. Familiarity with the cell cycle and the different control points that regulate its progression.
7. Knowledge of the mechanisms of programmed cell death, such as apoptosis, and its role in the development and maintenance of tissues.
8. Become familiar with the basic experimental techniques used in cell biology, including microscopy techniques, cell culture, and molecular analysis.
9. Analyze and synthesize complex information related to cell biology.
10. Relate the structure and function of biological molecules to cellular processes.
11. Analyze and interpret basic experimental data related to cell biology.
12. Effectively communicate concepts and results related to cell biology, both in writing and orally.
13. Work as a team on laboratory projects and discuss the results obtained.
14. Apply the knowledge acquired in practical and experimental contexts.
15. Solve problems related to cell biology using scientific reasoning.
16. Use basic laboratory techniques for the study of cell biology, such as microscopy, differential centrifugation or spectrophotometry and interpret the results.
17. Communicate clearly and effectively the results of experiments and analyses in the context of cell biology.
18. Solve problems related to cell biology using critical thinking and scientific reasoning.
19. Apply the principles of cell biology in broader contexts, such as medicine, biotechnology and environmental conservation.

20. Adapt to new technologies and methodologies in constant evolution in the field of cell biology.

3. Syllabus

Theory classes

Origin, organization and classification of living beings. Chemical composition of cells. Proteins. Enzymes. Carbohydrates. Lipids. Nucleic acids. Basic techniques in Cell Biology. Prokaryotic and eukaryotic cells. The cell membranes. Transport across membranes. The endoplasmic reticulum. The Golgi apparatus and vesicular trafficking. The nucleus. Cytoskeleton. Introduction to metabolism and cellular bioenergetics. General aspects of the main metabolic routes. Mitochondria, chloroplasts and peroxisomes. Introduction to molecular genetics. From DNA to proteins. The cell cycle and cell death.

Practical classes

Practice 1: Introduction to the use of the optical microscope. Observation and comparison of animal and plant cells.

Practice 2: Cell count and viability.

Practice 3: Observation of subcellular organelles: plastids. Study of osmotic phenomena.

Practice 4: Observation of yogurt bacteria.

Practice 5: Observation of unicellular eukaryotes and microinvertebrates.

4. Academic activities

1. Master classes (1A): 40 hours (4 ECTS).
2. Problem and case resolution (2A): 5 hours (0.5 ECTS).
2. Laboratory practices (3A): 10 hours (1 ECTS).
3. Teaching and other works (6B): 5 hours (0.5 ECTS)
4. Evaluation tests (8): 4 hours.

5. Assessment system

The evaluation of the subject will be carried out based on **seminars** given by the student during the course, **periodic controls**, **laboratory practices** and a **final theoretical exam**. The student can opt for a single theoretical-practical final exam in which he or she can obtain the maximum grade, and must pass both the theoretical and practical parts to pass the subject. A minimum grade is not necessary in the remaining evaluation activities. The evaluation of the second call will be carried out through a theoretical exam with the same characteristics as in the first call and it will not be necessary to repeat the rest of the tests, maintaining their grade.

Seminars

The seminars taught by students will account for up to 6% of the maximum final grade for the subject.

Periodic controls

Three periodic controls will be carried out, which will account for up to 9% of the final grade for the subject.

Practices

Carrying out the practices and preparing the corresponding practice notebook will account for up to 10% of the final grade for the subject.

Theoretical exam

It will consist of multiple choice questions and development questions. Each part must be approved to pass the subject. This exam represents 75% of the final grade.

In case of failing any of the two parts of the final theoretical exam (test or short answer questions), and the final grade is equal to or greater than 5, a 4.9 will appear in the minutes.

6. Sustainable Development Goals

- 4 - Quality Education
- 14 - Life Below Water
- 15 - Life on Land