

**COURSE DATA****Data Subject**

Code	36828
Name	Biología celular
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. Period year
1106 - Degree in Biology	Faculty of Biological Sciences	1 Second term

Subject-matter

Degree	Subject-matter	Character
1106 - Degree in Biology	5 - Biología	Basic Training

Coordination

Name	Department
CRESPO RUPEREZ, CARLOS	357 - Cellular Biology, Functional Biology and Physical Anthropol.
VAREA LOPEZ, EMILIO	357 - Cellular Biology, Functional Biology and Physical Anthropol.

SUMMARY

"Cell Biology" is taught as a basic training course in the second semester of the first degree course in Biology. With it, it is intended that students acquire in the first grade year all the basics needed to understand how the cell is organized. Given that the cell is the structural and functional basis of living matter, the subject should be considered a cornerstone of the training the student in this grade. The study of cell structure is interrelated at all times to study its function, thus intends to convey a dynamic view of cell biology. From a comparative analysis of different levels of organization of living matter, from viruses to prokaryotes and finally to the eukaryotes. Emphasis will be placed along the course in the structural organization of eukaryotic cells, both animal and plant, studying their maximum levels of complexity.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

1106 - Degree in Biology

- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- Use scientific language, both oral and written, and be able to adapt the register to the target audience and/or readers. Use the most common foreign languages in each discipline as a vehicle for communication in a globalised system.
- Be able to integrate knowledge of the structure and function of cells, tissues and animal and plant organs.
- Know how to obtain, process and analyse material of biological origin by applying histological techniques for light and electron microscopy.
- Be able to integrate the biological processes of energy production and cell signalling mechanisms.

Identify the cell types of animals and plants

identify cellular components in optical and electron microscopy images

Properly relate biomolecules with cellular structures

Adequately interpret classical staining, histochemical and immunocytochemical techniques

DESCRIPTION OF CONTENTS



1. Introduction

Methods of Study in Cell Biology. Prokaryotic and eukaryotic cell. Viruses, structure and life cycle. Organization of the prokaryotic cell. Organization of the eukaryotic cell. Animal and plant cell.

2. Plasma membrane

Fluid mosaic model. Components of the membranes. Membrane receptors, ion channels, transporters and ion pumps. The chemical potential and the electrical potential of membrane.

3. Cell nucleus

Embolcall nuclear. Els porus nuclears. Organització de la cromatina. Estructures de ribonucleoproteïna. El nuclèol. Estructura i biogènesi dels ribosomes.

4. Endomembrane system

Smooth endoplasmic reticulum. Rough endoplasmic reticulum. Distribution and transport and protein degradation. The ubiquitin-proteasome system. Golgi apparatus. Lysosomes. Vacuoles. Peroxisomes. Glyoxysomes. Endocytosis. Exocytosis. Vesicular traffic.

5. Cytoskeleton

Intermediate filaments. Microtubules, microtubule organizing center, cilia and flagella. Microfilaments. Cell mobility.

6. Cell surface

Intercellular contacts. Cell polarity. Glycocalyx. Tight junctions. Adherens junctions. "Gap" junctions. Plasmodesmata. Cell adhesion proteins. Membrane receptors. Cell signaling.

7. Extracellular matrix

Cell wall. Collagen. Elastic fibers. Adhesive glycoproteins. Basal lamina. Amorphous matrix. Biogenesis of matrix components.

8. Mitochondria and chloroplasts

Mitochondrion structure. Electron transport chain and ATP synthesis in mitochondria. Transport of proteins into mitochondria. Mitochondrial biogenesis. Structure of chloroplasts. Components of thylakoid membranes. Types of plastids. Biogenesis of plastids. Endosymbiont theory.

**9. Cell cycle**

Cell cycle phases. Mitosis: stages of mitosis. Metaphase chromosomes. Cytokinesis. Notions of cell cycle regulation. Stem cells. Cellular senescence and apoptosis.

10. Meiosis

Phases of meiosis. Sexual and asexual reproduction. Gametogenesis in animals. Spermatogenesis and spermiogenesis. Oogenesis.

11. Fertilization and embryonic development

Fertilization, cleavage and gastrulation. Cell differentiation. Germ layers.

12. Practical classes

PRACTICE 1.-The optical microscope: types. Sample preparation.

PRACTICE 2.- Inclusion and microtomy.

PRACTICE 3.- Dyes and Stains.

PRACTICE 4.- Cell proliferation and division processes.

PRACTICE 5.- Cell cultures (I).

PRACTICE 6.- Cell cultures (II). Organelles labelling.

PRACTICE 7.- Electron microscopy: types. Sample Preparation.

PRACTICE 8.- Observation and study of organelles in electron microscopy micrographs (I).

PRACTICE 9.- Observation and study of organelles in electron microscopy micrographs (II).

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	39,00	100
Laboratory practices	18,00	100
Tutorials	3,00	100
Development of group work	10,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	40,00	0
Preparation of practical classes and problem	20,00	0
TOTAL	150,00	



TEACHING METHODOLOGY

The acquisition of knowledge by the student, will be based on four cornerstones:

1. Theory classes.

Theory classes consist of one hour classroom sessions where the teacher orally transmitted knowledge of the subject the student. This transmission is supported at all times of the materials the teacher deems appropriate for each topic. In the lectures, the teacher will encourage student participation by asking questions or approach issues and questions arising out of debate. Virtual Classroom will be used as a tool where the teacher can provide students with all learning materials it deems appropriate to supplement the lectures.

2. Practical classes.

Practical classes will consist of laboratory sessions of two hours where the student works on different topics of the course. In general, it is intended that the methodology used in these sessions for learning is very variable. In some sessions, the student becomes familiar with the use of the microscope as a basic tool for the analysis of cells and with the most basic techniques of sample preparation. In other sessions, the student will prepare their own samples, performs some simple stains and interpret them with the optical microscope. There are also sessions where the student looks at photographs of different preparations and optical microscopy and transmission electron. This is intended to recognize and identify all components of cells.

3. Interdisciplinary Activity: Poster.

Conducting a scientific poster on this subject type arises from an interdisciplinary perspective in conjunction with other subjects of the same course, mainly with "Basic Tools in Biology." Students will prepare in small groups interdisciplinary poster on a topic proposed by the teachers of these subjects, to do so on the advice and help from teachers. You have to make an oral presentation of the poster, as part of a congress of Biology to be held at the end of the course. The poster and presentation will be evaluated jointly by the subject teachers concerned. Alternatively to this activity, it can make other interdisciplinary activity of a project of educational innovation supported by the CAT.

4. Student's class work.

Should be considered as all the work that the student engaged in the preparation of the course regardless of attendance at lectures, practices, seminars, tutorials and exams. Includes various activities. On one side are the hours of study each week to be spent to expand and consolidate the knowledge acquired in the classroom and in practical classes. It also includes additional work that the teacher can plan for the student to perform throughout the semester to supplement the lectures and practices (answering questionnaires, editing pictures or diagrams that provide the teacher on some issues, present written work, conduct literature searches ...). All this extra work may arise in some cases as individual work and in



others as a collective work to be done in small groups.

To complement the above, the methodology also includes tutorials, raised as one-hour sessions that will assist the teacher can track the degree of student learning. Sessions were presented as open to dialogue and participation of all students, which will formulate and solve questions and discuss concerns or issues which interest related to the knowledge of the subject.

EVALUATION

Learning in this subject will be evaluated considering, on the one hand, the knowledge acquired in theory classes and practices; and on the other hand, the evaluation obtained in carrying out interdisciplinary activities. For this reason, the subject will be divided into “two independent evaluation blocks”.

1. Evaluation of the theoretical-practical block:

To assess the knowledge acquired in this block, the student will take a written exam that will consist of two parts: a theory test and a practical test. The grade obtained in this block will compute 90% of the final grade.

To pass the subject, it will be necessary to have passed the exam of the theoretical-practical block. To pass the exam, the student must obtain a minimum of 5 points out of 10 in the theory test and a minimum of 5 points out of 10 in the practical test. The mark obtained in the theory test will suppose 80% of the final mark in this block. The mark obtained in the practical test will suppose the remaining 20%.

If a student does not pass the exam of the theoretical-practical block in the first call, they will have to re-examine the entire block in the second call.

2. Evaluation of the interdisciplinary activity:

The grade obtained in the interdisciplinary activity will compute the remaining 10% of the final grade. This grade will be the result of the joint and centralized assessment that is made at the end of the course for all groups.

If by adding the two blocks, having passed the theoretical-practical block, a final grade of less than 5 is obtained, the subject will be suspended.

REFERENCES

Basic

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