COURSE DATA

DATA SUBJECT

Code: 33173
Name: Cellular biology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1111 - Grado en Biotecnología	Facultat de Ciències Biològiques	2	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1111 - Grado en Biotecnología	Cellular biology	COMPULSORY

COORDINATION

BLASCO IBAÑEZ JOSE MIGUEL

SUMMARY

The objective of this course is that the students acquire an integrated vision of the various processes involved in the cellular function from the perspective of the static cell as well of the cell division and of the interactions among cells in a multicellular organism. This knowledge is necessary for a deep understanding of the possible interactions with the cellular metabolism. The contents correspond to: The cell as a structural and functional unit of living matter. Organization of the prokaryotic and eukaryotic cells. Plasma membrane and endomembrane systems, vesicular trafficking and protein trafficking. Mitochondria and chloroplasts. The nucleus, the nuclear matrix and chromatin organization. The cytoskeleton and cell motility. Cell interactions and extracellular matrix. The plant cell. Structures and compartments of the plant cell. Cell cycle: phases. Cell signaling. Mechanisms of action and signal transduction. Introduction to the basic molecular mechanisms of cell fate control: growth and cell division, differentiation, senescence, and apoptosis. Mitosis. Meiosis. Gametogenesis in animals. Fertilization. Notions of embryogenesis. Introduction to animal and plant tissues.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1102 -

Be able to identify the molecules that make up a living being.

Know how to carry out a study of the different phases of the cell cycle and quantify them correctly.

Understand cell signalling processes.

Understand the process of synthesis of proteins, their processing and their location in different sub-cellular compartments.

1111 - Grado en Biotecnología

Actuar con autonomía en el aprendizaje, tomando decisiones fundamentadas en diferentes contextos, emitiendo juicios en base a la experimentación y el análisis y transfiriendo el conocimiento a nuevas situaciones

Apply analytical, synthetic and critical thinking skills in the application of the scientific method.

Colaborar eficazmente en equipos de trabajo, asumiendo responsabilidades y funciones de liderazgo y contribuyendo a la mejora y desarrollo colectivo

Conocer la composición, formación y función de cada compartimento celular y de los diferentes tejidos

Demostrar razonamiento crítico y autocrítico en el ámbito de la titulación, considerando aspectos tales como la ética profesional, los valores morales y las implicaciones sociales de las diferentes actividades realizadas

Entender los procesos de división celular, fecundación y formación de organismos multicelulares

Identify the molecules that make up a living organism.

Participate in multidisciplinary teams, engaging in teamwork and collaboration.

Propose creative and innovative solutions to complex situations or problems, typical of the area of ¿¿¿¿connection, to donate responses to the various professional and social needs

Saber comunicarse de manera efectiva, tanto de forma oral como escrita, adaptándose a las características de la situación y de la audiencia

Saber realizar un estudio de las diferentes fases del ciclo celular y su cuantificación de forma correcta

Understand cellular signalling processes.

Understand the process of protein synthesis, its processing and its localisation in different subcellular

compartments.

Use English to write reports and to interpret information from protocols, manuals and databases.

Work in laboratories, including safety procedures, waste management and accurate activity logging.

DESCRIPTION OF CONTENTS

Theory
1 Levels of organization, cell theory and study techniques in cell biology.
2 lipid membranes: composition, structure and function. Transport through membrane.
3 Nucleus. The interphase chromatin. The metaphase chromosome. The nuclear lamina. The nuclear membrane. The nuclear pore: transport through the pore.
4 nucleolus. Other intranuclear organelles.
5 The rough endoplasmic reticulum. Translation and processing of membrane proteins and secreted proteins. The smooth endoplasmic reticulum.
6 Golgi. Maturation and transport of membrane proteins and extracitoplasmáticas. Protein transport to lysosomes.
7 Exocytosis. Endocytosis. Receptor-mediated endocytosis. Vesicle transport and routing.
8 Components of the cytoskeleton. Microtubules, intermediate filaments and microfilaments: assembly, function and location. Cell migration.
9 extracellular matrix. Components and structure. Degradation of extracellular matrix components. Cell adhesion to extracellular matrix.
10 The cell junctions. Unions anchor cell-cell: adherent junctions and desmosomes. Occluding junctions. Junctions.
11 Cell signaling. Signaling systems. Receptor types. Surface receptors bound to G-proteins bound to surface receptors enzymes. Cellular adaptation.
12 The mitochondria and chloroplasts. Protein transport to mitochondria and chloroplasts. Peroxisomes. Origin and biogenesis
13 cell cycle. Cell growth and proliferation. Growth factors. Cancer. Senescence and cell death. Necrosis and apoptosis. Cell division
14. Mitosis.
15 Sexual reproduction. Meiosis. Meiotic stages. Gametogenesis in animals. Spermatogenesis and spermiogenesis. Oogenesis.
16 Fertilization. Segmentation. Gastrulation. Cell differentiation. Germ layers.
17 types of tissue: origin and organization. Epithelial tissues.

Practice

1. The optical microscope: types. Sample preparation: making a blood smear.

2 Electronic Microscopy. Organelles.

3 Problems of electron microscopy. The electron microscope.

4 Fluorescence microscopy. Cell markers. Counts in a hemocytometer.

5 Mitosis. Markers of cell division and cell activity.

6 Plant tissues. Spermatogenesis and oogenesis.

7 Epithelial tissues. Skin, lung, kidney, digestive tract. Exocrine and endocrine glands.

8 Fabrics nonepithelial. Connective. Bone. Cartilage. Muscle.

9 Blood and hematopoietic tissues.

10 Nervous tissue. Neurons and glia. Gray matter and white matter.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	38,00
Laboratory	20,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	2,00
Individual or group project	0,00
Independent study and work	0,00
Preparation of lessons	70,00
Preparation for assessment activities	18,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Theory classes will consist of 3 sessions per week where the contents of the course will be exposed by the teacher and doubts that could arise will be solved in common. Voluntary reading a series of scientific literature that dealt with the contents of the subject will be proposed. The practices will be developed in 10 sessions of two hours with a demonstrative content and will be expanded next years in the course Tecnologies Cel·lulares

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EVALUATION

During the course, work will be done as suggested by the professor, and this will be 5% of the final grade. The final theory exam will consist of a written test, accounting for 65% of the final grade. Practical work will be assessed by means of a written test, accounting for 30% of the final grade. Attendance at practical classes or completion of substitute activities is compulsory. Grades for assignments and projects will transfer to the second examination period, but passing both the theory and practical exams separately in the same period is mandatory to pass the course. Failure to take either the theory or practical exam in a given examination period will result in a grade of 'NOT PRESENT', even if points are received for the other assessments.

REFERENCES

Básicas:

- Alberts et al., Essential cell biology. 5th edition. Norton & Company (2018)
- Alberts et al., Molecular biology of the cell. 6th edition. Garland Science (2014)
- Cooper. The cell: a molecular approach. 8th edition. OUP USA (2019)
- Paniagua et al. Biología celular y molecular. 4ª edición. McGraw-Hill Interamericana de España S. L. (2017)

Barresi and Gilbert, Developmental biology. 12th edition. Sinauer Assoc (2019)

Lodish et al. Molecular cell biology. 8th edition. MH Freeman (2016)

Rhodin. Histology: a Text and Atlas. Oxford University Press (1974)

Pawlina and Ross. Histology, a text and atlas: with correlated cell and molecular biology. 8th edition. Lippincott

Raven (2018) Trends in Cell Biology. ed. Cell Press.