Information about the subject

Degree: Bachelor of Science Degree in Biotechnology

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 1101102 **Name:** Cell Biology

Credits: 6,00 **ECTS Year:** 1 **Semester:** 1

Module: Fundamentals of Biology

Subject Matter: Biology **Type:** Basic Formation

Field of knowledge: Science

Department: Basic and Cross-disciplinary Sciences

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

1101	Isaias Salvador Sanmartin Santos **(Responsible Lecturer)**	ISAIAS.SANMARTIN@UCV.ES
	Cristina Medina Trillo	cristina.medina@ucv.es
271D	Cristina Medina Trillo **(Responsible Lecturer)**	cristina.medina@ucv.es

Module organization

Fundamentals of Biology

Subject Matter	ECTS	Subject	ECTS	Year/semester
Biology	12,00	Cell Biology	6,00	1/1
		Plant and Animal Biology	6,00	1/1
Animal physiology	6,00	Animal Physiology	6,00	2/2
Plant Biology	6,00	Plant Physiology	6,00	2/1
Microbiology	6,00	Microbiology	6,00	2/1
Virology	6,00	Virology	6,00	3/2

Recommended knowledge

High school general knowledge of biology is recommended, but not required.

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1 The student has understood and assimilated the contents of the subject.

R2 The student is able to solve problems or case studies related to the subject contents, by using different resources (bibliographic, IT, etc.)

R3 The student is able to work in a laboratory, carrying out basic operations correctly and taking into account the corresponding safety standards. He/she understands the planning, development and purpose of the experience, and is able to contrast and validate the obtained results.

R4 The student seeks bibliographic information from different sources and can analyze it with a critical and constructive spirit.

R5 The student collaborates with the teacher and his/her peers throughout the learning process; he/she works in a team; treats everyone with respects, is proactive and fulfills the organization rules of the course.

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB1	Students acquire and understand knowledge in their field of study based on general secondary education but usually reaching a level that, although supported on advanced text books, also includes aspects involving state-of-the-art knowledge specific to their area.			x	
CB2	Students are able to apply knowledge to their work in a professional way and have the competences enabling them to state and defend views and opinions as well as perform problem-solving tasks in their field of study.	x			
CB3	Students are able to collect and interpret relevant data (generally in their field of study) and give opinions that involve reflection on relevant social, scientific or ethical issues.		x		
CB4	Students can communicate information, ideas, problems and solutions to a specialized or non-specialized audience.	x			
CB5	Students develop the necessary learning skills to undertake further studies with a high level of autonomy.			x	

GENERAL		Weighting			
		1	2	3	4
CG01	Capacity to analyze and synthesize.			x	

SPECIFIC		Weighting			
		1	2	3	4
CE22	Knowing and understanding contents, principles and theories related to biotechnology.			x	

CE23	Knowing how to use laboratory equipment and to carry out basic operations for each discipline including: safety measures, handling, waste disposal and activity register.				x
CE24	Knowing basic and instrument laboratory techniques in the different areas of biotechnology.			x	
CE25	Knowing how to analyze and understand scientific data related to biotechnology.			x	
CE26	To understand and identify the mechanisms that influence genetic inheritance				x
CE30	Solving and analyzing problems posed by biotechnology.			x	
CE31	Describing and calculating important variables of processes and experiments.		x		
CE34	Knowing main characteristics of Molecular biosciences and biotechnology communication.	x			

TRANSVERSAL		Weighting			
		1	2	3	4
CT02	Capacity to organize and plan.		x		
CT03	Mastering Spanish oral and written communication.		x		
CT05	Knowing and applying Basic ITC skills related to Biotechnology.		x		
CT06	Capacity to manage information (capacity to look for and analyze information coming from different types of sources).		x		
CT07	Problem solving.			x	
CT08	Decision making		x		
CT09	Capacity to work in interdisciplinary and multidisciplinary team.		x		
CT10	Interpersonal skills.			x	
CT11	Understanding multicultural and diverse environment	x			

CT12	Critical and self-critical capacity.		x		
CT13	Ethics.		x		
CT14	Capacity to learn				x
CT15	Capacity to adapt to new situations				x
CT16	Capacity to produce new ideas (creativity)			x	
CT17	Leadership abilities		x		
CT18	Taking initiatives and enterprising spirit	x			
CT19	Capacity to apply theoretical knowledge			x	
CT20	Research skills			x	
CT21	Sensitivity to environmental issues	x			

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2	75,00%	Written test
R1, R2, R4, R5	20,00%	Submission of papers
R3, R5	5,00%	Laboratory test

Observations

According to the general evaluation and qualification regulations, the preferred evaluation system will be by means of continuous evaluation:
·Assignments: The assessment of this item consists of a series of active work activities to be carried out in the classroom or through the virtual classroom, following a process of continuous assessment.
·Theoretical classes: active participation will be assessed by means of attendance and the delivery of the activities carried out during the classroom session itself.
·Laboratory Practices: active participation will be assessed through attendance at each laboratory session.
·Activities in the Virtual Classroom: active participation in collaborative work activities will be assessed, as well as the completion and delivery of independent work activities, within the stipulated deadlines, carried out in the virtual classroom or equivalent digital media.

This subject cannot be assessed by means of a single assessment.

IMPORTANT: The final exam of theoretical contents is an exam of multiple-choice questions. In order to average with the rest of the evaluation instruments, it is required to obtain at least 45% of the points in this test. If this minimum is not reached, the marks obtained for the delivery of work and laboratory practices cannot be added to the final grade. This subject cannot be assessed by means of a single assessment. Attendance to the laboratory sessions is compulsory, but if an absence occurs, it must be duly justified. In any case, each absence will subtract a 20% from the practical grade. At the end of each laboratory practice session, the student must sign the "laboratory attendance sheet" to record the attendance to the session.

The use of tools based on artificial intelligence (AI) is subject to the teacher's criteria, who may establish specific limits or conditions depending on the training or assessment activity.

MENTION OF DISTINCTION:
In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with 9 Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1	Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.
M2	Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.
M3	Activities carried out in spaces with specialized equipment.
M4	Supervised monographic sessions with shared participation..
M5	Application of multidisciplinary knowledge.
M6	Personalized and small group attention. Period of instruction and/or guidance carried out by a tutor to review and discuss materials and topics presented in classes, seminars, readings, papers, etc.
M7	Set of oral and/or written tests used in initial, formative or additive assessment of the student

M8 Group preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical , practical and/or small-group tutoring sessions. Work done on the university e-learning.

M9 Student's study: Individual preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical, practical and/or small-group tutoring sessions. Work done on the university e-learning platform.

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R1, R2, R5	37,45	1,50
PRACTICAL CLASSES M2	R1, R2, R5	4,15	0,17
LABORATORY M3	R3, R5	10,40	0,42
SEMINAR M4	R2, R4	4,00	0,16
TUTORIAL M6	R1, R5	2,00	0,08
ASSESSMENT M7	R1, R2	2,00	0,08
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
AUTONOMOUS GROUP WORK M8	R2, R3, R5	17,90	0,72
AUTONOMOUS INDIVIDUAL WORK M9	R1, R2, R4	72,10	2,88
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
DIDACTIC UNIT 1 - INTRODUCTION TO CELLULAR BIOLOGY.	DNA and the flow of genetic information. Structure and function of DNA and proteins. The microscope and the cell theory. Model organisms. Origin and evolution of cells.
DIDACTIC UNIT 2 - THE PLASMA MEMBRANE.	The membranes: components and structure. Transport across membranes, ion channels, membrane potential, and nerve cells.
DIDACTIC UNIT 3-MITOCHONDRIA AND CHLOROPLASTS.	Mitochondria and chloroplasts. Oxidative phosphorylation. Electrochemical gradient and chemiosmotic hypothesis. Origin of mitochondria and chloroplasts.
DIDACTIC UNIT 4 - COMPARTMENTS AND INTRACELLULAR TRANSPORTATION.	Cellular organelles and their integration in cell function. The cell nucleus. Endoplasmic reticulum, Golgi, Lysosomes. Endocytosis and exocytosis. Distribution and transportation of proteins.
DIDACTIC UNIT 5 - CELLULAR COMMUNICATION.	Cell signaling. G protein-coupled receptors. Enzyme-coupled receptors.
DIDACTIC UNIT 6 - CYTOSKELETON AND MOBILITY.	Components of the cytoskeleton. Microtubules, microfilaments and intermediate filaments. Cytoskeleton and cell motility.
DIDACTIC UNIT 7 - THE CELL DIVISION CYCLE.	The cell cycle. Mitosis. Meiosis Mendelian Genetics.
DIDACTIC UNIT 8 - EXTRACELLULAR MATRIX, CELLULAR JOINTS AND TISSUES.	Extracellular matrix and cell-cell interactions. Cell-cell junctions.
Laboratory practices.	Practical sessions in the laboratory.

Organization of the practical activities:

	Content	Place	Hours
PR1.	Microscope handling, observation and staining of prokaryotic and eukaryotic cells	Laboratory	4,40
PR2.	Transformation of cells with fluorescent proteins in vitro	Laboratory	3,50
PR3.	Observation of mitosis	Laboratory	1,50
PR4.	Case studies	Lecture room	2,00
PR5.	Solving problems in cell biology	Lecture room	3,15

Temporary organization of learning:

Block of content	Number of sessions	Hours
DIDACTIC UNIT 1 - INTRODUCTION TO CELLULAR BIOLOGY.	4,00	8,00
DIDACTIC UNIT 2 - THE PLASMA MEMBRANE.	3,00	6,00
DIDACTIC UNIT 3-MITOCHONDRIA AND CHLOROPLASTS.	3,00	6,00
DIDACTIC UNIT 4 - COMPARTMENTS AND INTRACELLULAR TRANSPORTATION.	4,00	8,00
DIDACTIC UNIT 5 - CELLULAR COMMUNICATION.	3,50	7,00
DIDACTIC UNIT 6 - CYTOSKELETON AND MOBILITY.	2,50	5,00
DIDACTIC UNIT 7 - THE CELL DIVISION CYCLE.	4,00	8,00
DIDACTIC UNIT 8 - EXTRACELLULAR MATRIX, CELLULAR JOINTS AND TISSUES.	1,00	2,00
Laboratory practices.	5,00	10,00

References

Basic bibliography:

·Bruce Alberts, Dennis Bray et al. Introducción a la Biología Celular. 5ª edición, 2021. Editorial Médica Panamericana.

Further reading:

·Cooper Geoffrey, M . “La Célula”, Ed. Marban.

·Alberts B et al., “Molecular Biology of the Cell”, Garland Science Publishing.

·Lodish H et al., “Molecular Cell Biology”, WH Freeman.

·Karp G.: Biología Celular y Molecular. McGraw-Hill.

·Pubmed: http://www.ncbi.nlm.nih.gov/pubmed