

Guía docente / *Course Syllabus*

2019-20

1. Descripción de la Asignatura / *Course Description*

Asignatura <i>Course</i>	BIOLOGÍA CELULAR (docencia en inglés)
Códigos <i>Code</i>	202102
Facultad <i>Faculty</i>	Facultad de Ciencias Experimentales
Grados donde se imparte <i>Degrees it is part of</i>	Grado en Biotecnología
Módulo al que pertenece <i>Module it belongs to</i>	Fundamentos de biología, microbiología y genética
Materia a la que pertenece <i>Subject it belongs to</i>	Biología celular
Departamento responsable <i>Department</i>	Fisiología, Anatomía y Biología Celular
Curso <i>Year</i>	1º
Semestre <i>Term</i>	1º
Créditos totales <i>Total credits</i>	6
Carácter <i>Type of course</i>	Básica
Idioma de impartición <i>Course language</i>	Inglés
Modelo de docencia <i>Teaching model</i>	B1

Clases presenciales del modelo de docencia B1 para cada estudiante: 27 horas de enseñanzas básicas (EB), 18 horas de enseñanzas prácticas y de desarrollo (EPD) y 0 horas de actividades dirigidas (AD). Hasta un 10% de la enseñanza presencial puede sustituirse por docencia a distancia (también presencial, pero posiblemente asíncrona), de acuerdo con la programación de la Asignatura publicada antes del comienzo del curso.

Number of classroom teaching hours of B1 teaching model for each student: 27 hours of general teaching (background), 18 hours of theory-into-practice (practical group tutoring and skill development) and 0 hours of guided academic activities. Up to 10% of face-to-face sessions can be substituted by online teaching, in accordance with the course schedule published before it begins.

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2. Responsable de la Asignatura / *Course Coordinator*

Nombre <i>Name</i>	Juan Carlos Rodríguez Aguilera
Departamento <i>Department</i>	Fisiología, Anatomía y Biología Celular
Área de conocimiento <i>Field of knowledge</i>	Biología Celular
Categoría <i>Category</i>	Profesor Titular de Universidad
Número de despacho <i>Office number</i>	21.1.07
Teléfono <i>Phone</i>	954349380
Página web <i>Webpage</i>	https://www.upo.es/profesorado/jcrodagu
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3. Ubicación en el plan formativo / *Academic Context*

Breve descripción de la asignatura <i>Course description</i>	<p>This course is included in the training module Fundamentals of Biology, Microbiology and Genetics of the degree in Biotechnology (GBTG). This module contains the introduction to the complexity of the structural and functional design of living organisms (from microorganisms to higher organisms: animals and plants) and the basic properties of these organisms in their energy maintenance and reproduction.</p> <p>This course provides to the students the essentials for understanding the structures and functions of the cells, tissues and organs of animals and plants. The training received in this course is the basis for other courses along the grade, such as Plant Physiology, Animal Physiology, Plant Biotechnology, Animal Biotechnology, or Cell Culture.</p>
Objetivos (en términos de resultados del aprendizaje) <i>Learning objectives</i>	<ul style="list-style-type: none">• To know the basic structure and function of the eukaryotic cells• To understand the functional interaction among different cell organelles• To envisage the response mechanisms of the cell to external stimuli
Prerrequisitos <i>Prerequisites</i>	Essential: <ul style="list-style-type: none">• Previous knowledge of the cell and its internal structure, including main organelles and functions• Previous knowledge of organic chemistry and biochemistry, including main biomolecules
Recomendaciones <i>Recommendations</i>	Recommended: basic computer skills (use of any Office suite and Internet browsing).
Aportaciones al plan formativo <i>Contributions to the educational plan</i>	This course is included in the training module Fundamentals of Biology, Microbiology and Genetics of the degree in Biotechnology (GBTG). This module contains the introduction to the complexity of the structural and functional design of living organisms (from microorganisms to higher organisms: animals and

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	<p>plants) and the basic properties of these organisms in their energy maintenance and reproduction.</p> <p>This course provides to the students the essentials for understanding the structures and functions of the cells, tissues and organs of animals and plants. The training received in this course is the basis for other courses along the grade, such as Plant Physiology, Animal Physiology, Plant Biotechnology, Animal Biotechnology, or Cell Culture.</p>
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4. Competencias / Skills

<p>Competencias básicas de la Titulación que se desarrollan en la Asignatura <i>Basic skills of the Degree that are developed in this Course</i></p>	<p>CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio</p> <p>CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio</p> <p>CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética</p>
<p>Competencias generales de la Titulación que se desarrollan en la Asignatura <i>General skills of the Degree that are developed in this Course</i></p>	<p>CG1 - Conocer y comprender los procesos biológicos generales desde un punto de vista molecular, celular, fisiológico y, en su caso, de comunidades, de los seres vivos.</p> <p>CG4 - Comprender el método científico. Conocer, entender y aplicar las herramientas, técnicas y protocolos de experimentación en el laboratorio y adquirir las capacidades de observación e interpretación de los resultados obtenidos.</p> <p>CG5 - Adquirir las habilidades adecuadas a cada una de las materias impartidas, mediante la descripción, cuantificación, análisis y evaluación crítica de los resultados experimentales obtenidos de forma autónoma.</p> <p>CG6 - Trabajar de forma adecuada en un laboratorio biológico, químico o bioquímico, conociendo y aplicando las normativas y técnicas relacionadas con seguridad e higiene, manipulación de animales de laboratorio y gestión de residuos.</p> <p>CG7 - Cultivar y manipular células animales, vegetales y microorganismos.</p> <p>CG9 - Desarrollar los métodos de adquisición, interpretación y análisis de la información biológica junto con una comprensión crítica de los contextos apropiados para sus uso, mediante el estudio de manuales, monografías, ensayos, artículos originales, etc.</p> <p>CG10 - Utilizar la literatura científica y técnica de vanguardia, adquiriendo la capacidad de percibir claramente los avances actuales y los posibles desarrollos futuros</p> <p>CG23 - Saber analizar, sintetizar y utilizar el razonamiento crítico en ciencia.</p>
<p>Competencias transversales de la Titulación que se desarrollan</p>	

en la Asignatura <i>Transversal skills of the Degree that are developed in this Course</i>	
Competencias específicas de la Titulación que se desarrollan en la Asignatura <i>Specific competences of the Degree that are developed in the Course</i>	CE3 - Conocer las características comunes de los procesos fisicoquímicos de transporte: difusión, osmosis, electroforesis, etc. CE12 - Comprender la teoría celular e identificar los distintos componentes celulares y describir los mecanismos moleculares de los principales procesos celulares. CE70 - Deducir posibles funciones de genes, proteínas y metabolitos en función de patrones de expresión, interacciones, localización, o fenotipos de pérdida de función. CE72 - Explicar en un lenguaje científico las bases termodinámicas de la bioenergética celular y el transporte a través de membrana.
Competencias particulares de la asignatura, no incluidas en la memoria del título <i>Specific skills of the Course, not included in the Degree's skills</i>	Skills to be developed and graded within this course (taken from GBTG description) 4.1 Basic and generic skills CB1. To demonstrate proper understanding of high-school-level essentials for this course. CG3. To improve proper use of scientific terms in academic activities including scientific analysis and synthesis. CG6. To show proper proceedings in lab safety and proper basic handling skills using lab equipment. CG9. To understand management of scientific information using scientific databases, scientific papers and patents. CG22. To develop autonomous learning. 4.2 Module skills CE12. To associate the main cellular structural compartments with their functions, realizing the molecular mechanisms underlying regulation of cellular processes. CE13. To understand how the cell cycle enhances successful cell proliferation. CE70. To infer potential functions of genes, proteins and metabolites, according to their location, expression pattern or knockout phenotypes. 4.3 Particular skills CE72. To explain cellular bioenergetics and associated membrane transport according to scientific standards.

5. Contenidos de la Asignatura: temario / *Course Content: Topics*


PARTE I	LECTURES
TEMA 1	CELL COMPARTMENTS
1.1	Cellular membranes build up separate compartments maintaining differential chemical composition.
1.2	Structure of membranes, properties and functions: the fluid mosaic model.
1.3	Alternatives for transport across cellular membranes, simple diffusion vs. selective transport.
TEMA 2	CELLULAR INFORMATION MANAGEMENT
2.1	Nucleus keeps DNA secure.

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2.2	Nuclear envelope and nuclear pores enable two-way communication with the cytosol.
TEMA 3	INTRACELLULAR TRAFFIC
3.1	Protein and lipid traffic is carefully regulated through the endomembrane system.
3.2	From protein quality control at endoplasmic reticulum to selective protein delivery at Golgi apparatus.
3.3	Protein tagging and turnover.
3.4	Traffic of secretory and endocytic vesicles, membrane recycling.
TEMA 4	FUELING THE CELL.
4.1	Mitochondrial membranes are designed to use oxygen safely.
4.2	Main bioenergetic processes take place inside mitochondrial compartments.
4.3	Oxygen under control produces energy: respiratory chain, ATP synthesis and also heat production.
4.4	Oxygen out of control generates free radicals and cell damage.
TEMA 5	CELLULAR MOVEMENT
5.1	The cytoskeleton supports intracellular structures with three different components: actin, tubulin and filaments.
5.2	Polymerization and depolymerization enable cell movement (cilia and flagella) and cell crawling.
TEMA 6	CELL SIGNALLING
6.1	Cellular respond to external stimuli and carry out genetic programs based on them.
6.2	Cell signaling basic principles. Intracellular receptors vs. cell surface receptors, signal transduction and intracellular signaling pathways.
TEMA 7	CELL RENEWAL
7.1	Cellular proliferation is a strictly controlled process.
7.2	Cell cycle control and checkpoints prevent abnormal cell proliferation.
7.3	Distribution of the cellular information (mitosis) and its control.
7.4	Distribution of the cellular resources: cytokinesis.
7.5	Cell survival and cell death: apoptosis.
PARTE II	LAB PRACTICALS
TEMA 8	LAB TRAINING ESSENTIALS
8.1	Course presentation.
8.2	Handling and dispensing liquids.
8.3	How to properly use pipetting devices.
8.4	Basic lab safety guides.
TEMA 9	DATABASES
9.1	Searching in scientific databases
TEMA 10	MICROSCOPY & OSMOSIS
10.1	Fundamentals of microscopy.
10.2	Observation of samples under the light microscope.
10.3	Alterations of plasma membrane ionic equilibrium and its consequences on cell structure.
TEMA 11	CELL FRACTIONATION I
11.1	Isolation of subcellular components of biological samples.
11.2	Different methods used in cell fractionation.

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11.3	Enhancing lab safety.
TEMA 12	CELL FRACTIONATION II
12.1	Cytochemical markers, purity and enrichment calculations.
TEMA 13	CASE STUDY
13.1	Practical cases selected from the scientific literature.

6. Metodología y recursos / *Methodology and Resources*

Metodología general <i>Methodology</i>	This course accounts for 6 ECTS credits (i.e. 150 hours) distributed as follows: * Activities in-class 45 hours (28 sessions lectures + 17 hours labs). * Activities off-class 90 hours (homework). * Seminars 10 hours. * Evaluation 15 hours (exams, tests, questionnaires)
Enseñanzas básicas (EB) <i>General teaching</i>	a) Lectures Basic teaching focuses on the theoretical principles of Cell Biology. Q&A and practical examples will be used to reinforce the understanding of the concepts to be learnt. These sessions will cover the main aspects of the topics, paying attention to the most complex concepts. Session dynamics include frequent student interaction and problem-solving proposals. Some of these, and also others not covered by basic teaching sessions, may be proposed as homework. Before the lecture sessions, reading the associated handbook content is strongly recommended. You will get familiar with the main terms and ideas. Thus, following the lecture will be much easier. During the sessions, the instructor will solve the questions and doubts raised in class. Lectures are quite interactive sessions and student participation is strongly promoted. Attendance to basic teaching sessions is voluntary although strongly recommended.
Enseñanzas prácticas y de desarrollo (EPD) <i>Theory-into-practice</i>	b) Practices These sessions include practical contents complementary to those in lectures. As a rule, there is no redundant content. Consequently, practical contents will not be covered or review in lectures. Before the lab sessions, lab brochures or hands out documentation must be read and understood in advance (completion of a questionnaire may be required). During the lab sessions, the lecturer will make a brief introduction to the goals of the session and the methodology to be used. The student will get familiar with laboratory techniques, lab safety and different pieces of equipment. Students will obtain their own results, and learn from the conclusions from the experiments. After the lab sessions, the conclusions including experimental work in the lab sessions (and some related non-experimental tasks) will be proposed as graded homework. Attendance to these sessions is compulsory unless absence is properly justified (written evidences may be required).
Actividades académicas dirigidas (AD) <i>Guided academic activities</i>	No tiene.


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7. Criterios generales de evaluación / Assessment

<p>Primera convocatoria ordinaria (convocatoria de curso) <i>First session</i></p>	<p>El 40% de la calificación procede de la evaluación continua. El 60% de la calificación procede del examen o prueba final.</p> <p>a) Topic-specific assignments (20% of the overall course score) will contain questions falling within these categories:</p> <ul style="list-style-type: none"> • Problem solving <p>This component will be evaluated by online topic-specific quizzes. This component evaluates:</p> <p>Basic and generic skills:</p> <ul style="list-style-type: none"> * CB1. To demonstrate proper understanding of high-school-level essentials for this course. * CG22. To develop autonomous learning. <p>Module skills</p> <ul style="list-style-type: none"> * CE12. To associate the main cellular structural compartments with their functions, realizing the molecular mechanisms underlying regulation of cellular processes. * CE13. To understand how the cell cycle enhances successful cell proliferation. * CE70. To infer potential functions of genes, proteins and metabolites, according to their location, expression pattern or knockout phenotypes. <p>Particular skills</p> <ul style="list-style-type: none"> * CE72. To explain cellular bioenergetics and associated membrane transport according to scientific standards <p>b) Practices (20% of the overall course score) Evaluation of these in-class sessions will be based mainly on online quizzes.</p> <ul style="list-style-type: none"> * CG6. To show proper proceedings in lab safety and proper basic handling skills using lab equipment. * CG9. To understand management of scientific information using scientific databases, scientific papers and patents. * CG22. To develop autonomous learning. <p>These quizzes will contain questions falling within one of these categories:</p> <ul style="list-style-type: none"> • Short answer • Long answer • Calculated answer • Pair matching • Combinations • Fill-in blanks • Scrambled answers • Multiple choice • True/False • Problem-solving <p>c) Participation Participation is extra credit (5%) intended to upgrade those course grades falling in boundaries (C to B, or B to A grades). Participation will be graded according to Contributions to</p>
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	<p>discussions, Answers to questions, Behavior and Attitude during the sessions.</p> <p>The exam (60% of the overall course score) will contain questions falling within these categories:</p> <ul style="list-style-type: none"> • Problem solving • Short answer • Pair matching • Combinations • Fill-in blanks • Multiple choice • True/False <p>This component evaluates:</p> <p>Basic and generic skills:</p> <ul style="list-style-type: none"> * CB1. To demonstrate proper understanding of high-school-level essentials for this course. * CG22. To develop autonomous learning. <p>Module skills</p> <ul style="list-style-type: none"> * CE12. To associate the main cellular structural compartments with their functions, realizing the molecular mechanisms underlying regulation of cellular processes. * CE13. To understand how the cell cycle enhances successful cell proliferation. * CE70. To infer potential functions of genes, proteins and metabolites, according to their location, expression pattern or knockout phenotypes. <p>Particular skills</p> <ul style="list-style-type: none"> * CE72. To explain cellular bioenergetics and associated membrane transport according to scientific standards.
<p>Segunda convocatoria ordinaria (convocatoria de recuperación) <i>Second session (to re-sit the exam)</i></p>	<p>According to University regulations, those students failing the course will have a resit exam to evaluate all course competences with full score opportunities. The resit exam accounts for 100% of the overall course score. The exam will contain questions falling into one of these categories:</p> <ul style="list-style-type: none"> • Problem-solving • Short answer • Long answer • Calculated answer • Pair matching • Combinations • Fill-in blanks • Scrambled answers • Multiple choice • True/False
<p>Convocatoria extraordinaria de noviembre <i>Extraordinary November session</i></p>	<p>Se activa a petición del alumno siempre y cuando éste esté matriculado en todas las asignaturas que le resten para finalizar sus estudios de grado, tal y como establece la Normativa de Progreso y Permanencia de la Universidad.</p> <p>Se evaluará del total de los conocimientos y competencias que figuren en la guía docente del curso anterior, mediante el sistema de prueba única.</p> <p>According to University regulations, those students failing the course will have a resit exam to evaluate all course competences with full score opportunities. The resit exam accounts for 100% of the overall course score. The exam will contain questions falling</p>

	<p>into one of these categories:</p> <ul style="list-style-type: none"> • Problem-solving • Short answer • Long answer • Calculated answer • Pair matching • Combinations • Fill-in blanks • Scrambled answers • Multiple choice • True/False
<p>Crterios de evaluaci3n de las ense~anzas b1sicas (EB) <i>General teaching assessment criteria</i></p>	<p>Durante la evaluaci3n continua: Answers to assignments must be based on scientific hypotheses. Answers must be original. Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the assignment. Repeated plagiarism may lead to fail the course. Minimal grammatical and vocabulary competences are essential (B1 level).</p> <p>Participation is extra credit intended to upgrade those course grades falling in boundaries (C to B, or B to A grades). Participation will be graded according to Contributions to discussions, Answers to questions, Behavior and Attitude during the sessions.</p> <p>Durante el examen o prueba final (1ª convocatoria): Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers showing multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade.</p> <p>Some questions may include several related parts. Answers to these questions must be coherent.</p> <p>Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations.</p> <p>Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the exam. Repeated plagiarism may lead to fail the course.</p> <p>Durante el examen o prueba final (2ª convocatoria): Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers showing multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade.</p> <p>Some questions may include several related parts. Answers to these questions must be coherent.</p> <p>Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations.</p> <p>Plagiarism will be prosecuted leading to dismiss the grade or even</p>

	get a fail in the exam. Repeated plagiarism may lead to fail the course.
<p> Criterios de evaluación de las enseñanzas prácticas y de desarrollo (EPD) <i>Theory-into-practice assessment criteria</i> </p>	<p> Durante la evaluación continua: Answers to quizzes must be based on scientific hypotheses and experimental data obtained in the laboratory. Answers must be original. Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the assignment. Repeated plagiarism may lead to fail the course. Durante el examen o prueba final (1ª convocatoria): Answers to quizzes must be based on scientific hypotheses and experimental data provided. Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers showing multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade. Some questions may include several related parts. Answers to these questions must be coherent. Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations. Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the exam. Repeated plagiarism may lead to fail the course. Durante el examen o prueba final (2ª convocatoria): Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers showing multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade. Some questions may include several related parts. Answers to these questions must be coherent. Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations. Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the exam. Repeated plagiarism may lead to fail the course. </p>
<p> Criterios de evaluación de las actividades académicas dirigidas (AD) <i>Criteria of assessment of guided academic activities</i> </p>	<p> Durante la evaluación continua: No ADs. Durante el examen o prueba final (1ª convocatoria): No ADs. Durante el examen o prueba final (2ª convocatoria): No ADs. </p>
<p> Puntuaciones mínimas necesarias para aprobar la Asignatura <i>Minimum passing grade</i> </p>	<p> 1ª convocatoria: Basic teaching and practices must be passed separately. A minimum of 5 points out of 10 must be obtained in each section in order to get the weighted score (exam 60% + practices & assignments 40%). Fail to reach these minimums score leads to the resit exam. </p>

	2ª convocatoria: A minimum of 5 points out of 10 must be obtained in the exam to pass the course.
Material permitido <i>Materials allowed</i>	No electronic equipment is allowed during exams. This includes but not restricted to, tablets, cell phones, laptops or non-medical earphones. ID with photo (National ID, passport or UPO student card) may be required during exams.
Identificación en los exámenes <i>Identification during exams</i>	En cualquier momento de la realización de una prueba de evaluación los profesores podrán requerir la acreditación de la identidad de cualquier estudiante, mediante la exhibición de su carnet de estudiante, documento nacional de identidad, pasaporte u otro documento válido a juicio del examinador. Si no lo hiciese, el estudiante podrá continuar la prueba, que será calificada solo si la documentación es presentada en el plazo que el examinador establezca.
Observaciones adicionales <i>Additional remarks</i>	This course is not a language course. At least B1 level of English language is needed to follow this course properly, although B2 level is strongly recommended. In all written tests (exams and quizzes) minimal grammatical and vocabulary competences are essential (B1 level).

Los estudiantes inmersos en un programa de movilidad o en un programa de deportistas de alto nivel, así como los afectados por razones laborales, de salud graves o por causas de fuerza mayor debidamente acreditadas, tendrán derecho a que en la convocatoria de curso se les evalúe mediante un sistema de evaluación de prueba única. Para ello, deberán comunicar la circunstancia al profesor responsable de la asignatura antes del fin del periodo docencia presencial.

Students enrolled in a mobility program or a program for high-level athletes, as well as students affected by work or serious health problems or reasons of force majeure duly accredited, will have the right to be evaluated during the first session through a single test evaluation system. To do this, they must report changes in their circumstances to the program coordinator before the end of the teaching period.

8. Bibliografía / Bibliography

Course handbook	<ul style="list-style-type: none"> Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter (2015) "Molecular biology of the cell (6th Ed.)", <i>Garland Science</i>
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