UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: BIOLOGY
Type: BASIC
Degree: 409 - CHEMISTRY
Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY
Year: 1
Main language: Spanish
Use of additional languages: Occasionally some simple text or in the slides of the master classes
Web site:

Code: 57303
ECTS credits: 6
Academic year: 2022-23
Group(s): 20 23
Duration: First semester
Second language: English
English Friendly: Y
Bilingual: N

Lecturer: **DAVID AGUSTIN LEON NAVARRO** - Group(s): **20 23**

Building/Office	Department	Phone number	Email	Office hours
Facultad de Ciencias y Tecnologías Químicas. Lab Bioquímica. Ciudad Real	QUÍMICA INORG., ORG., Y BIOQ.	926052114	davidagustin.leon@uclm.es	Monday and Friday from 1:00 p.m. to 2:00 p.m. Monday from 4:00 p.m. to 8:00 p.m.

2. Pre-Requisites

It is recommended to have general knowledge of Biology and Chemistry.

3. Justification in the curriculum, relation to other subjects and to the profession

The subject Biology belongs to the basic training module of the Degree in Chemistry. It is located in the first year of the degree and is the first to be taught in the field of Biological Sciences, so students are able to successfully take subsequent subjects such as Bioche

With this subject, the Chemistry student takes a tour of the different levels of structural and functional organization of the cell. The fundamental principles of molecular and cellular biology, energy transformation and cell signaling are studied, all of them treated at a ba

4. Degree competences achieved in this course

Course competences

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
E03	Handle chemicals safely and with respect to the environment
E12	Understand the chemistry of the main biological processes
G05	Acquire and adapt new knowledge and techniques of any scientific-technical discipline with incidence in the chemical field
T02	Domain of Information and Communication Technologies (ICT)
T03	Proper oral and written communication
T04	Ethical commitment and professional ethics

5. Objectives or Learning Outcomes

Course learning outcomes

Description
Being able to predict the thermodynamically favorable sense of a process in biological systems.
Understand the importance of coupled processes in living things.
Know how cell membranes are structurally and functionally organized.
Know how to describe the structure and functions of cellular organelles and cytoskeleton.
Know how to describe the organization of genetic material in prokaryotic and eukaryotic cells.
Know how to describe the sequence of events that takes place in cell signaling.
Know how to explain the influence that water exerts, due to its properties, on biomolecules.
Know how to explain the control points of the cell cycle and the consequences of escaping to these controls.
Know how to identify the structure and function of biological molecules.
Know how to identify the stages of the eukaryotic cell cycle and describe its main processes.
Know how to recognize different types of signaling molecules.
Being able to compare the general characteristics of prokaryotic and eukaryotic cells and contrast plant and animal cells.
Analyze the central role of ATP in the global energy metabolism of the cell.
Know the strategies used in the acquisition of energy: photosynthesis, chemosynthesis, breathing.
Know how to explain the control points of the cell cycle and the consequences of escaping to these controls.

6. Units / Contents

Unit 1: Introduction to cells. Cell types: prokaryotic and eukaryotic. General structure of a bacterium. Eukaryotic animal and plant cell.
Unit 2: The chemical bases of life. Chemical bonds. Biomolecules: water, carbohydrates, lipids, proteins and nucleic acids.
Unit 3: Use of energy by cells. Definition and types of energy. Laws of thermodynamics. Free energy. Conveyors. Enzymes activated and coupled reactions.
Unit 4: The flow of genetic information. The structure of eukaryotic genes. Packaging of the eukaryotic genome. DNA replication. Transcription: RNA synthesis. Translation: protein synthesis.
Unit 5: The plasma membrane. Structure of the plasma membrane. Plasma membrane differentiations. Small molecule transport. Vesicle-mediated transport.
Unit 6: Endomembrane system. Overview. Endoplasmic reticulum: types. Functions of the rough endoplasmic reticulum. Glycosylation in the rough endoplasmic reticulum. Verification of correct folding. Membrane biosynthesis in the endoplasmic reticulum. Transportation to the Golgi complex. Golgi complex. Lysosomes.Differentiations of the plasma membrane. Small molecule transport. Vesicle-mediated transport.
Unit 7: Structure and function of the mitochondria. Organization and function of the mitochondria. Importation of proteins into the mitochondria. Importation of lipids into the mitochondria. Transport across the inner mitochondrial membrane. Cellular respiration.
Unit 8: Structure and function of the chloroplast. Organization and function of the chloroplast. Importation of proteins to the chloroplast. Photosynthesis.
Unit 9: Cell nucleus. Nuclear envelope. Transport through the nuclear envelope. Chromatin Nucleolus
Unit 10: Cytoskeleton Overview. Microtubules. Microtubule organization centers. Microtubule functions. Cilia and flagella. Intermediate filaments: structure and function. Microfilaments. Motor proteins. Role of microfilaments in muscle contractility, in cytokinesis and in cellular locomotion.
Unit 11: Cell signaling. General principles. Receptors coupled to protein G. Receptors coupled to ion channels. Enzyme-coupled receptors.
Unit 12: Cell cycle. Phases of the cell cycle. Cell cycle control. Cyclin-dependent protein kinases and anaphase promoter complex. Start control point. G2 / M checkpoint. Transition from metaphase to anaphase.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB01 E12 G05	1.16	29	N	-	They have a duration of 55 minutes. PowerPoint presentations and student mobile terminals are used as audience response systems.
Workshops or seminars [ON-SITE]	Combination of methods	CB01 CB03 E12 G05 T02 T03	0.44	11	Y	N	Different types of activities are proposed in the seminars, including: activities based on just-in-time learning methodology, observation of electron microscopy micrographs, problem solving, information search and study of three-dimensional structures of biomolecules and macromolecules.
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CB03 E03 G05 T04	0.48	12	Y	Y	The practices will be developed in the laboratory and through them different practical aspects related to the subject will be covered. This activity is mandatory. If a student does not carry out the practices in due course, the activity will not be able to be recovered later and the subject cannot be passed.
Progress test [ON-SITE]	Assessment tests	CB01 E12 G05	0.04	1	Y	N	First partial test that allows evaluating the theoretical contents covered up to that moment. It takes place coinciding with the equator of the subject. The test takes place during class time and consists of multiple choice questions.
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 E12 G05	3.6	90	N	-	Preparation of seminars and study of progress tests.
Progress test [ON-SITE]	Assessment tests	CB01 E12 G05	0.04	1	Y	N	Second progress test that takes place during the last days of theory class. Students are examined for the theoretical contents studied after the first theoretical progress test. The test takes place during class time and consists of multiple choice questions.
Progress test [ON-SITE]	Assessment tests	CB01 CB03 G05	0.04	1	Y	N	Evaluation of the practical contents by means of a theoretical test.
							Discussion and resolution of concepts and doubts. They take

Group tutoring sessions [ON-SITE]	Group tutoring sessions	T03	0.12	3	N	place a few days before the theory and practical progress tests. If less than 1 hour is needed to clarify all doubts, the rest of the time is used in class attendance (theory). They will be notified well in advance.
Final test [ON-SITE]	Assessment tests	CB01 CB03 E12 G05 T03	0.08	2	Y	N Integrative final test that covers all the theoretical contents covered during the course. The final test includes short answer questions. The final test coincides with the ordinary call for the subject.
		Total:	**6**	**150**		
		Total credits of in-class work: 2.4				**Total class time hours: 60**
		Total credits of out of class work: 3.6				**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Progress Tests	12.00%	0.00%	The evaluation of laboratory practices will be based on a theoretical exam that will take place at the end of laboratory practices period. This test will include short and multiple choice questions. The qualification obtained in the 2021-22 academic could be maintained as long as it has been approved in such course. However, the student with the passed test can repeat it if he wishes
Progress Tests	20.00%	0.00%	Second theoretical progress test
Final test	0.00%	100.00%	The student will examine the theoretical and practical contents and the activities carried out during the seminars
Final test	33.00%	0.00%	Integrative test that covers all the theoretical contents covered during the course.
Assessment of problem solving and/or case studies	15.00%	0.00%	The evaluation of the seminars will be based on the results obtained in the different seminars.
Progress Tests	20.00%	0.00%	First theoretical progress test
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

o pass the subject it is necessary for the student to meet the following conditions:
a) have completed the practices.
b) have obtained a grade equal to or greater than 5 when adding the weighted grades of the different activities carried out during the course.

Non-continuous evaluation:

To pass the subject, it is necessary for the student to meet the following conditions:
a) have completed the practices.
b) have obtained a grade equal to or greater than 5 in the final test.

Specifications for the resit/retake exam:

In the resit / retake exam, the qualifications obtained in the seminars and in the practical exam are kept as long as they have been previously approved. Theoretical progress test scores are not preserved. The student therefore examines all the theoretical contents shown during the course.
The resit /retake exam allows to recover the activities of seminars and test of progress of practices if these were not passed previously.
As a summary, the value of the extraordinary call will be:
a) 73% if the student examines the theoretical contents.
b) 85% if the student takes the theoretical content and the practical progress test
c) 100% if the student examines the theoretical contents, the practical progress test and the seminars.

To pass the subject, it is necessary for the student to meet the following conditions:
a) have completed the practices.
b) When adding the qualifications, weighted according to their value, of the different activities carried out during the course, the final result must be equal to or greater tha

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours
Workshops or seminars [PRESENCIAL][Combination of methods]	11
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	12
Progress test [PRESENCIAL][Assessment tests]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Progress test [PRESENCIAL][Assessment tests]	3
Final test [PRESENCIAL][Assessment tests]	2

Unit 1 (de 12): Introduction to cells. Cell types: prokaryotic and eukaryotic. General structure of a bacterium. Eukaryotic animal and plant cell.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 2 (de 12): The chemical bases of life. Chemical bonds. Biomolecules: water, carbohydrates, lipids, proteins and nucleic acids.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3

Unit 3 (de 12): Use of energy by cells. Definition and types of energy. Laws of thermodynamics. Free energy. Conveyors. Enzymes activated and coupled reactions.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3

Unit 4 (de 12): The flow of genetic information. The structure of eukaryotic genes. Packaging of the eukaryotic genome. DNA replication. Transcription: RNA synthesis. Translation: protein synthesis.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4

Unit 5 (de 12): The plasma membrane. Structure of the plasma membrane. Plasma membrane differentiations. Small molecule transport. Vesicle-mediated transport.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3

Unit 6 (de 12): Endomembrane system. Overview. Endoplasmic reticulum: types. Functions of the rough endoplasmic reticulum. Glycosylation in the rough endoplasmic reticulum. Verification of correct folding. Membrane biosynthesis in the endoplasmic reticulum. Transportation to the Golgi complex. Golgi complex. Lysosomes.Differentiations of the plasma membrane. Small molecule transport. Vesicle-mediated transport.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 7 (de 12): Structure and function of the mitochondria. Organization and function of the mitochondria. Importation of proteins into the mitochondria. Importation of lipids into the mitochondria. Transport across the inner mitochondrial membrane. Cellular respiration.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 8 (de 12): Structure and function of the chloroplast. Organization and function of the chloroplast. Importation of proteins to the chloroplast. Photosynthesis.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 9 (de 12): Cell nucleus. Nuclear envelope. Transport through the nuclear envelope. Chromatin Nucleolus

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 10 (de 12): Cytoskeleton Overview. Microtubules. Microtubule organization centers. Microtubule functions. Cilia and flagella. Intermediate filaments: structure and function. Microfilaments. Motor proteins. Role of microfilaments in muscle contractility, in cytokinesis and in cellular locomotion.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 11 (de 12): Cell signaling. General principles. Receptors coupled to protein G. Receptors coupled to ion channels. Enzyme-coupled receptors.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 12 (de 12): Cell cycle. Phases of the cell cycle. Cell cycle control. Cyclin-dependent protein kinases and anaphase promoter complex. Start control point. G2 / M checkpoint. Transition from metaphase to anaphase.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Progress test [PRESENCIAL][Assessment tests]	1

Global activity

Activities	hours
Workshops or seminars [PRESENCIAL][Combination of methods]	11
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	12
Progress test [PRESENCIAL][Assessment tests]	1
Progress test [PRESENCIAL][Assessment tests]	4
Final test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Class Attendance (theory) [PRESENCIAL][Lectures]	29
Total horas:	60

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Bruce Alberts et al.	Introducción a la Biología Celular	Medica panamericana		978-607-7743-18-7	2012	Libro muy recomendable para la asignatura. Posee un texto claro y muy sencillo con ilustraciones que audan a comprender los principales procesos celulares.
Cooper & Hausman	La célula	Marban		978-84-16042-63-0	2017	Libro recomendable para cursar la asignatura
Alberts, Bruce.Wilson, John.Hunt, Tim.Montes Castillo, Juan Francisco.Llobera i Sande, Miquel.	Biología Molecular de la célula	omega		978-84-282-1638-8	2016	Este libro es muy recomendable para aquellos que quieran conocer las características estructurales y funcionales de la célula. Posee una extensa información muy bien estructurada lo que permite su lectura para aquellos que se incian en el estudio de la célula.
Geoffrey M. Cooper, Robert E. Hausman	The Cell: A Molecular Approach	Sinauer		1605355631	2015	The Cell, Seventh Edition provides a balance of concepts and details that meets the needs of today's students and their teachers. Written by an active scientist and experienced educator, this textbook combines readability and cohesiveness with comprehensive and up-to-date science
Bruce Alberts, Dennis Bray, Karen Hopkin, Julian Lewis, Alexander D. Johnson, Martin Raff, Keith Roberts, Peter Walter	Essential Cell Biology	Taylor & Francis Group		0815345739	2016	Essential Cell Biology provides a readily accessible introduction to the central concepts of cell biology, and its lively, clear writing and exceptional illustrations make it the ideal textbook for a first course in both cell and molecular biology
Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter,	Molecular Biology of the Cell	Garland Science		1317563751	2017	As the amount of information in biology expands dramatically, it becomes increasingly important for textbooks to distill the vast amount of scientific knowledge into concise principles and enduring concepts.As with previous editions, Molecular Biology of the Cell, Sixth Edition accomplishes this goal with clear writing and beautiful illustrations