UAB
Universitat Autònoma de Barcelona

Cell Biology

Code: 103980
Credits: 6

2026/2027

Degree programme	Type	Course
Biology	FB	1

Contact lecturer

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Teaching staff

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Group languages

You can consult this information at the end of the document.

Prerequisites

Since Cell Biology is a first-semester subject of the Bachelor's Degree in Biology, there are no prerequisites for taking it. However, it is recommended that students have previous knowledge of basic biology, so that they can follow the classes. This would mostly include general aspects of cell structures and their organic composition (proteins, nucleic acids, carbohydrates, and lipids), as well as the main cellular metabolic pathways.

In addition, since most scientific information sources are in English, it is advisable to have a good grounding in this language.

Objectives

Cell Biology is a basic subject of the Bachelor's Degree in Biology at the Autonomous University of Barcelona. The course aims to establish sound knowledge of the structural organization, functioning and regulation of eukaryotic cells.

The basic knowledge provided by the subject of Cell Biology is essential in order to follow many other courses in the study plan. This is the main reason why this subject is scheduled for the first semester of the first year of the study plan.

The following are the specific training goals of this subject:

- To recognize the main differences between prokaryotes and eukaryotes.

- To describe the structure, composition, and main features of cell membranes.

- To explain the organization and composition of other elements of the cell surface.

- To describe the transport processes through cell membranes.

- To describe the structure, composition, and function of the different compartments of eukaryotic cells, as well as the relationships between them.

- To explain the role of mitochondria in cell bioenergetics.

- To describe the protein classification systems and their intracellular distribution pathways.

- To describe chromatin composition and its organization throughout the cell cycle.

- To list the cytoskeleton elements and describe their composition and structure.

- To explain the contribution of the cytoskeleton to the cell shape and movement.

- To identify and describe molecules, structures and processes involved in the cell communication with other cells and their external environment.

- To identify molecules involved in the cell cycle regulation and explaining their role.

- To list and describe the different mitotic and meiotic phases and to compare both types of cell divisions.

- To relate the functioning of eukaryotic cells with the occurrence of some diseases.

- To integrate and apply knowledge of theory when interpreting and resolving basic cell biology experiments.

- To use the appropriate scientific terminology in the field of cell biology.

Learning outcomes

- CM09 (Integrate theoretical and practical knowledge in the field of cell biology to understand and respond to experimental problems in cell biology.) Integrate theoretical and practical knowledge in the field of cell biology to understand and respond to experimental problems in cell biology.
- CM10 (Evaluate as a team and collaboratively solve problems and practical cases in the field of cell biology, developing interpersonal and collaborative work skills inherent to the professional environment.) Evaluate as a team and collaboratively solve problems and practical cases in the field of cell biology, developing interpersonal and collaborative work skills inherent to the professional environment.
- KM14 (Describe the structure and function of the different parts of a cell and its mitotic and meiotic structure.) Describe the structure and function of the different parts of a cell and its mitotic and meiotic structure.
- KM15 (Identify specific bibliographic sources in cell biology and its applications (assisted reproduction techniques) that allow, in an autonomous manner, to develop and extend the knowledge acquired.) Identify specific bibliographic sources in cell biology and its applications (assisted reproduction techniques) that allow, in an autonomous manner, to develop and extend the knowledge acquired.
- SM10 (Apply the methodologies used in cell biology to solve problems and practical laboratory cases related to broad aspects of cell biology, cytogenetics and reproduction techniques.) Apply the methodologies used in cell biology to solve problems and practical laboratory cases related to broad aspects of cell biology, cytogenetics and reproduction techniques.
- SM11 (Carry out cellular biology analyses using specialised laboratory tools.) Carry out cellular biology analyses using specialised laboratory tools.

Contents

The contents of this subject will include the following points:

BLOCK I-INTRODUCTION

Unit 1. Organization of prokaryotic and eukaryotic cell.

BLOCK II- CELL SURFACE

Unit 2. Structure and composition of the plasma membrane.

Unit 3. Transport of molecules through the membrane.

Unit 4. Extracellular matrix and cell wall.

Unit 5. Unions and cell adhesion.

BLOCK III- CYTOSKELETON

Unit 6. Microfilaments.

Unit 7. Microtubules.

Unit 8. Intermediate filaments.

BLOKC IV- INTRACEL·LULAR COMPARTMENTS

Unit 9. Introduction to the intracellular compartments and protein sorting.

Unit 10. Nucleus.

Unit 11. Cytosol.

Unit 12. Introduction to the endomembrane system. Endoplasmic reticulum.

Unit 13. Golgi apparatus. Basics of vesicular transport.

Unit 14. Endosomes, lysosomes, and vacuoles.

Unit 15. Mitochondria.

Unit 16. Peroxisomes.

BLOCK V- CELLULAR REGULATION

Unit 17. Cell signaling.

Unit 18. Cell cycle.

Unit 19. Mitosis.

Unit 20. Meiosis.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Laboratory Practicals	12	0.48	CM09, SM10, SM11
Individual study	70.5	2.82	CM09, KM14
Self-learning content work	10	0.4	KM14, KM15
Theory classes	36	1.44	CM09, KM14, KM15
Problem-based classes	2	0.08	CM09, SM10
Problem resolution work in groups	16	0.64	CM10, SM10

The subject of Cell Biology includes Theory classes, Problem-based classes, and Laboratory Practicals. Below, the organization and teaching methodology for these three types of training activities are described.

Theory classes

The content of the Theory program will be taught mainly in the form of formal lectures with audio-visual support. This will include PowerPoint presentations containing an index for each unit with the most important points that will be described, illustrative schematics of the contents, and microscope images of cells or their components, to familiarize students with their real structure and organization.

The teacher will make supplementary audio-visual material available to the students through the Moodle classroom of the subject, to help them follow the lectures. Students are recommended to bring this material to class as a support when taking notes. Some animations and videos related to cellular processes described in specific units will also be displayed.

Students will be advised to consult the recommended books listed in the Bibliography section of this Study Guide on a regular basis, to consolidate and, if necessary, clarify the contents described. In addition, it will also be recommended that they consult the links made available through the Moodle classroom in order to access to additional videos and animations that, due to time constraints or content prioritization, cannot be shown in class.

As well as in the follow-up to lectures, students will be also expected to play an active role in preparing certain course contents by developing transferable and generic competences related to independent learning. Specifically, students will be required to prepare some units of the program based on guidelines provided by the teacher. These guidelines will consistof a detailed index of the contents and the most important concepts that the students must acquire.

Problem-based classes

During these sessions, students will present to the rest of the class the solutions of experimental problems related to the contents of the of the Theory program. These exercises must have been previously working on in work teams outside the classroom, as scheduled for that class. In general, no additional programmed content will be included in these sessions, as their main aim is to consolidate and facilitate comprehension of the contents already presented in the Theory classes, and to familiarize students with interpreting scientific data and problem-solving through real experimental situations.

At the beginning of the semester, the teacher will provide the students with a dossier containing all the exercises to work on over the course, along with a calendar of presentations. In each of these sessions, the teacher will ask several students to explain the solution to a problem to the rest of the class. The students who give these presentations will be chosen by the teacher, who will ensure that all groups get involved in these presentations throughout the course.

In these sessions, regardless of who presents the solutions to the problems, the participation of other classmates/groups will be requested and encouraged to discuss the results or addressing other possible valid answers. This will also ensure that all students have understood the exercise.

Laboratory Practicals

These sessions are of mandatory assistance, and they are intended to provide an applied view of the knowledge acquired in the Theory classes to the students as well as favoring their learning of how to use basic laboratory instruments. Specifically, these classes will be organized in six sessions of two hours each one. The students, in groups of maximum two people, will carry out simple experiments related to the contents of the subject's program.

At the beginning of the course, the teacher will provide the Laboratory-Practicals script to the students through the Virtual Campus. Students will have to bring it printed in the several sessions in order to follow the activities and protocols established for each class. This script will contain *the General Regulations of the Laboratory Practicals* that students will have read and follow throughout all sessions.

In addition, before assisting to these practical sessions, students must have passed the corresponding Biosafety Tests and submit the corresponding certifying documentation.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Exam of the first part of the Theory classes	35%	1.5	0.06	KM14, KM15
Exam of the second part of the Theory classes	35%	1.5	0.06	KM14, KM15
Delivery of the problems worked in group and indiviual resolution of a problem in the exam	10%	0.5	0.02	CM09, CM10, SM10
Laboratory Practicals evaluation	20%	0	0	SM10, SM11

Students' progress in acquiring competences on the course will be monitored through continuous assessment or by a single term-end examination as detailed below.

Assessment of contents taught in Theory classes

The contents taught in Theory classes will have a weight of 70% of the final grade for the subject.

In case of following a continuous assessment, students will have to perform two Interim Tests which the students will have to take individually. These tests will consist of a series of objective questions to show whether the students have assimilated the concepts required to pass the subject, and whether they know how to integrate and interrelate them. These tests will also include questions on the units that students will have prepared on their own to evaluate the corresponding learning outcomes.

The First Interim Test will have a weight of 35% of the final mark and will focus on the contents taught up to that moment plus two units that students will have to prepare independently.

The Second Interim Test will include the rest of the contents (although some questions can also indirectly refer to aspects of the units evaluated in the first test). This test will also include two units that students must prepare independently. The weight of this second test in the final mark will be 35%.

In case of not passing these tests, or wanting to improve the mark obtained, students will be able to perform a Recovery Exam of the contents corresponding to any of these parts (or both). Each one of these tests will include the contents related to the two previousInterim Tests and therefore its weight will again be 35%+35% of the final mark.

Students who request a single term-end examination will be able to take a Single term-end Exam that will integrate the whole theoretical content of the subject and will represent 80% of the grade. This test will take place on the same day that the other students take the Second Interim Test. These students will also be able to perform a Recovery Exam of this content which will again have a weight of 80% on the final mark and take place concurrently to the Recovery Exam of the students that follow continuous evaluation.

Assessment of contents taught in Problem-based classes

The contents related to these classes will have a weight of 10% of the final mark.

In this part, students' ability when solving experimental problems related to the Theoretical content of the

subject will be evaluated.

In each session, several students will be asked to orally present the solutions to the exercises programmed for that session. These students will be chosen by the teacher to ensure that all groups will be eventually involved in these presentations. With the purpose of ensuring that all students had participated in the teamwork necessary to solve these exercises, in these exhibitions the teacher will ensure that the students who present the resolutions had worked and had understood the problem (independently whether the answer is correct or not).

To ensure that the previous relative work has been done in a team, before each one of these problem sessions, students will have to submit their written answers of the scheduled exercises through the Moodle classroom (a single submission each group).They will also have toindividually answer a questionnaire related to the functioning of the teamwork tasks. This questionnaire will be prepared by the teacher and will be made available to the students through the Virtual Campus. All students must individually fill it and evaluate the participation oftheir team-mates. The aim of this questionnaire is to supervise the functioning of the work groups and to be able to detect those students who do not participate or who interfere in the teamwork. These tasks will have a weight of the 1% of the subject grade. In the event that a group does not send the solutions of the corresponding problems according to the stablished schedule, all members of that group will receive a 0 for this part.

In case of detecting a negative evaluation by the components of a group on one of its members indicating a lack of participation in the teamwork, this student will receive a 0 in the grade obtained in this part of the subject.

On the other hand, students will have to individually resolve a problem of similar characteristics to the ones worked on during the course together with the Second Interim Exam (in the case of following a continuous assessment) or together with the Single term-end Exam (in case of requesting a single term-end examination). The mark obtained in this exercise will represent 9% of the final grade for the subject.

Assessment of contents taught in Laboratory Practicals

At the end of each Laboratory lesson, students will have to individually answer a questionnaire that will contain questions related to the corresponding class. The resulting average of all marks obtained from thesetests will have a weight of 20% on the final mark of the subject.

Attendance to all six Laboratory sessions is mandatory and students must be prompt. If a student arrives late or does not attend to a given session, he/she will have the option of recovering the corresponding lesson another day by their own and under his/her responsibility (that is, they may try to attend to another session programmed for another group as long as that group is not full). In case all remaining groups are full, or that practical lesson is no longer taught, this unjustified absence will entail a penalty on the mark of this part of the subject:

- Non-attendance to one or two sessions (without justification) will imply a reduction of the average mark of this part of the subject by 25% or 50%, respectively.

- Non-attendance to more than two sessions (without justification), will imply obtaining a 0 in this part of the subject. This will represent failing the subject.

Otherwise, if a student does not attend a programed session for extenuating circumstances(i.e. health problem, death of a first- or second-degree relative, an accident, or unavoidable competitions in the case of elite student athletes), she/he will have to contact the coordinator of the subject and provide the official documentation (respectively: official medical certificate that explicitly confirms the inability to carry out the exam, police statement, justification from the competent sports organization.). This way, the coordinator will ensure that the student recovers the session in another group. Nevertheless, under no circumstances will the Laboratory Practicals (and therefore the subject) be approved if attendance to a minimum of 50% of the sessions is not met, even if absences are justified.

Moreover, if a student assist to the Laboratory Practicals without having passed the corresponding Biosecurity Tests, they will obtain a 0 in this part and therefore suspend the subject.

Since the attendance to the Laboratory Practicals is mandatoryand its evaluation is carried out within the time frame intended for their development, these contents will be evaluated in the same way by all students enrolled in the subject independently whether they do continuous assessment or single term-end examination.

Globally, the maximum mark that can be obtained after completing all these activities will be 10 points (out of 10). And to be able to pass the subject, the following conditions must be fulfilled:

- Obtaining a mark equal to or greater than 3,5 points (out of 10) in each Interim Test or in the corresponding parts of the Recovery Exam (in case of following continuous assessment).

- Obtaining a mark equal to or greater than 3,5 points (out of 10) in the Single term-end Exam or in the Recovery Exam (in case of following single term-end examination).

- Obtaining an average mark equal to or greater than 4 points (out of 10) from the questionnaires performed in the Laboratory sessions.

- Obtaining anoverall mark of $\geq$5 (out of 10) for all evaluations received.

ADDITIONAL ASPECTS

If a student decides to take the Recovery Exam to improve the mark obtained, they will forfeit all previously earned Theory marks.

To be eligible for the resit exam, students must have been assessed in activities that account for at least 67% of the final grade. Otherwise, they will receive the grade Not Assessable.

In the case of students who do not pass the subject in a given academic year, the marks obtained in the Problem-based classes and the Laboratory Practicals will be retained for subsequent academic years, provided the competences associated with these components have been achieved (i.e., obtaining more than 5 points out of 10 in each). If the required competences have not been met, students will be required to repeat the evaluation activities to obtain the corresponding grade. This exemption will remain valid for a period of three additional enrolments.

Students who are unable to attend an exam due to extenuating circumstances (i.e. health problem, death of a first- or second-degree relative, an accident, or unavoidable competitions in the case of elite student athletes) and who provide official documentation to the degree coordinator (respectively: official medical certificate that explicitly confirms the inability to carry out the exam, police statement, justification from the competent sports organization), will be entitled to perform the test on another day. Both the bachelor's degree coordinator and the responsible teacher will do as much as possible to resolve these situations.

In this course, the use of artificial intelligence (AI) technologies is permitted exclusively as a support tool, such as for literature searches or language revision. The use of AI for content generation in any assessable activity is not allowed. Any work that includes AI-generated content beyond the permitted uses will be considered a breach of academic integrity and may result in a partial or total penalty in the assessment of the activity.

Any irregularity in an assessment activity (academic fraud, plagiarism, or misuse of AI) that may lead to a significant change in the grade will result in a mark of 0 for that activity. In cases of repeated offences, those involved will fail the course. In addition, disciplinary proceedings may be initiated against any student who engages in such irregularities.

Recording images, audio, or any other type of content from teaching sessions is not permitted without the express authorization of the teaching staff. This measure aims to protect image rights, the intellectual property of the content delivered, and the privacy of all participants. Any unauthorized recording may lead to the application of disciplinary measures established in the current university regulations, including those set out in

Article 14.4 of the LCU, which may involve the loss of the right to the ordinary assessment sitting of the course and temporary expulsion from the university for up to one month, among other sanctions depending on the severity of the events.

Bibliography

Alberts B, Heald R, Johnson A, Morgan D, Raff M, Roberts K, Walter P, Wilson J. Molecular Biology of the Cell. 7th Edition. Garland Science, 2022.

Last edition of the book in Spanish:

Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P. Biología Molecular de la Célula. 6ª Edición. Ediciones Omega S.A., 2016.

Alberts B, Hopkin K, Johnson A, Morgan D, Roberts K, Walter P, Heald R. Essential Cell Biology. 6th Edition. W. W. Norton & Company. 2023.

Last edition of the book in Spanish:

Alberts B, Bray D, Hopkin K, Johnson A, Lewis J, Raff M, Roberts K, Walter P. Introducción a la Biología Celular. 5ª Edición. Editorial Médica Panamericana, 2021.

Online open access available at the UAB library:

https://bibcercador.uab.cat/discovery/fulldisplay?docid=alma991007029139706709&context=L&vid=34CSUC_UA

Cooper GM, Hausman RE. The Cell: A Molecular Approach. 9th Edition. Oxford University Press, 2022.

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Cooper GM. La Célula. 8ª Edición. Marbán Libros S.L. 2021

Lodish H, Berk A, Kaiser CA, Krieger M, Bretscher A, Ploegh H, Amon A, ScottMP. Molecular Cell Biology. 9th Edition. WH Freeman and Company, 2021

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Lodish H, Berk A, Matsudaira P, Kaiser CA, Krieger M, Scott MP, Zipursky SL, DarnellJ. Biología Celular y Molecular. 9ª Edición. Editorial Médica Panamericana, 2023.

Online open access available at the UAB library:

https://bibcercador.uab.cat/discovery/fulldisplay?docid=alma991007006029706709&context=L&vid=34CSUC_UA

Software

No special software is used.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of

teaching	Group	Language	Semester	Shift
(TE) Theory	11	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	111	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	111	Catalan/Spanish	first semester	morning-mixed
(PAUL) Classroom practices	112	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	112	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	113	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	114	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	115	Catalan/Spanish	first semester	morning-mixed