

Cellular Culture

Code: 100887
ECTS Credits: 3

Degree	Type	Year	Semester
2500252 Biochemistry	OB	2	1

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

There are not

Objectives and Contextualisation

Cell Culture course is taught in the 2nd semester of the 2nd year of the Biochemistry studies in the Faculty of Biosciences. This is a subject with a certain degree of expertise that is intended to acquire a basic knowledge to work in a cell culture laboratory. It is therefore a subject with an important practical component.

Course objectives:

- 1) To know the basic equipment of a laboratory cultures.
- 2) To know the basic methodologies used in cell cultures.

Competences

- Apply general laboratory security and operational standards and specific regulations for the manipulation of different biological systems.
- Apply the principal techniques used in biological systems: methods of separation and characterisation of biomolecules, cell cultures, DNA and recombinant protein techniques, immunological techniques, microscopy techniques, etc.
- Collaborate with other work colleagues.
- Design and prepare laboratory protocols, including health and safety aspects.
- Design experiments and understand the limitations of experimental approaches.
- Interpret experimental results and identify consistent and inconsistent elements.
- Process cells and tissues to obtain purified sub-cellular organelle preparations, and characterise them biochemically and structurally.
- Think in an integrated manner and approach problems from different perspectives.

Learning Outcomes

1. Apply techniques for culturing eukaryotic cells.

2. Assess experimental data in relation to the values published in the scientific literature.
3. Collaborate with other work colleagues.
4. Design experiments and understand the limitations of experimental approaches.
5. Explain the fundamental theory behind basic and advanced techniques in biochemistry.
6. Explain the fundamental theory behind microscopy and centrifuging techniques, and the instrumentation used.
7. Interpret experimental results and identify consistent and inconsistent elements.
8. Monitor and interpret experiment protocols from a critical perspective.
9. Think in an integrated manner and approach problems from different perspectives.
10. Use the appropriate methodology for studying the different types of biological samples.
11. Use the established methods for eliminating the different types of waste products from a biochemistry and molecular biology laboratory.

Content

Lectures

0. Key events in the development of cell culture

1. Basic equipment and organization of a cell culture laboratory
2. Basic principles of cell cultures
3. Physicochemical conditions and cell culture media
4. Cryopreservation
5. Cell lines and production
6. Characterization
7. Contamination
8. Quantification, cytotoxicity tests and cell death
9. Synchronization
10. Immortalization
11. Surfaces and scale up
12. Organ cultures

Program of practical sessions

- Subculture of cell lines
- Cytogenetic and immunolabelling characterization
- Establishment of a cell growth curve
- Freezing and thawing in different conditions. Recovery rate.

Methodology

The Cell Culture course consists of theory lectures and practical classes in the laboratory.

The theoretical lectures will be conducted using audiovisual material prepared by the teacher. This material will be accessible to the students in the UAB Moodle before the session.

The practical classes are designed to teach students in the use of laboratory instruments and to complement the theory knowledge. Students will do five practice sessions of 16 h in total. Students will work in groups of two persons, and at the end of each practice should fill out a sheet with their results. These sheets will be in possession of teachers and will be used to evaluate the students work, together with the final report compiled by the students that should be submitted to the teacher 15 days after the completion of the sessions.

Activities

Title	Hours	ECTS	Learning Outcomes
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Type: Directed

Laboratory practices	16	0.64	2, 3, 8, 7, 11, 10
Lectures	10	0.4	1, 4, 5, 6, 9
Type: Supervised			
Tutorials	6	0.24	1, 2, 3, 8, 4, 5, 6, 7, 9, 11, 10
Type: Autonomous			
Study	35	1.4	1, 2, 3, 8, 4, 5, 6, 7, 9, 11, 10

Assessment

Assessment

To pass the subject, you must obtain a minimum overall score of 5 points with a maximum of 10 possible points. The scheduled evaluation activities are:

1) First theory exam. It will represent 35% of the value of the subject. In this exam approximately, half of the subject taught in the theoretical classes will be evaluated. An ≥ 4 grade in the first theoretical exam allows to do an average with the resolution of a problem/case exam. Qualifications ≤ 3.99 oblige to submit to there take process of this part of theory.

2) Resolution of a problem/case theory exam. It will represent 35% of the mark of the subject. In this exam approximately, half of the subject taught in the theoretical classes will be evaluated. An ≥ 4 grade in this exam allows to do an average with the first theory exam. Qualifications ≤ 3.99 oblige to submit to the retake process of this part of theory.

3) Laboratory practices. It will represent 12,5% of the mark of the subject. Attendance to practical laboratory sessions is mandatory. Punctuality is very important because during the first 30 minutes of each session the different methodologies that will be used during the practice will be explained. Delays of 10 minutes in the practical sessions reduce the score by 0.1 points for each delay questionnaire cannot be done, see below), when the delay exceeds 30 minutes, the penalty will be 0.3 points. Students missing more than 20% of programmed sessions will be graded as "No Avaluable". For the good functioning and understanding of the practices, the student must read the practical's document corresponding to each session, so every day they will have to complete a questionnaire before the start of the session about questions related to the practice of the day. This questionnaire will be evaluated with a maximum score of 0.1 point per day with a maximum of 0.4 points. Values lower than 0.4 will be subtracted into the note in this block. The practices are done in pairs. The students will have to give a dossier of the results obtained and will have to discuss both their results (couple) and those of the group "class of practices" compared to the expected results. The work will have a maximum value of 10 points. The delivery will be made through the campus virtual.

4) Exam of techniques used in the laboratory. It will represent 12,5% of the mark of the subject. There will be a written exam about the different techniques that have been used throughout the practices. The exam will be held on the same day of the second theoretical exam. Note of the subject = theory (35% + 35%) + practices (12,5% + 12,5%)

Retake process

To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course or module. Thus, the student will be graded as "No Avaluable" if the weighting of all conducted evaluation activities is less than 67% of the final score.

There will be a retake process for students who have not taken more than 3.99 in one of the two theory exams, and for students who, once the average has been done with the other qualifications of the subject, do not

receive a qualification equal to or greater than 5. Students will only have to retake the exam not passed. It will not be possible to retake neither the practical exam, nor the examination of the resolution of a problem since both exams have a weight inferior to 15% in the final grade of the subject.

To raise the final grade.

The students who want to raise the final grade can present themselves to the first, the second or the two theory exams. There will be no retaken exams for practice, nor for resolution of a problem, since the two exams have a weight less than 15% in the final grade of the subject. The presentation to the exam to improve the grade implies a resignation, on the part of the student, of the grade that had obtained in the previous exam.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Examination of the techniques used in practices	12,5%	0.5	0.02	1, 2, 3, 8, 5, 6, 7, 9, 11, 10
Laboratory report	12,5%	4	0.16	1, 2, 4, 7
Resolution of a problem / case	35%	1.5	0.06	2, 6, 7, 11, 10
Written exam	35%	2	0.08	8, 4, 5, 6, 7, 9, 10

Bibliography

* R.I. Freshney. Culture of Animal Cells: A manual of basic technique and specialized applications. 7th Ed. Wiley-Liss, Inc. 2016. Free access to 6th edition from UAB.

* A. Doyle and J.B. Griffiths Eds. Cell and Tissue Culture: Laboratory procedures in biotechnology. John Wiley & Sons Ltd. 1999.

* J.P. Mather and D. Barnes Eds. Animal Cell Culture Methods. Methods in Cell Biology. Academic Press. 1998.