Universitat Autònoma de Barcelona

2021/2022

Cellular Culture

Code: 100887
ECTS Credits: 3

Degree	Type	Year	Semester
2500252 Biochemistry	OB	2	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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 different types of cell cultures most used

3) 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

PROGRAM OF THEORY CLASSES*

1. Introduction to cell cultures

2. Cell cultures according to origin

3. Other types of cell cultures

4. Organization of culture laboratory and biosafety

5. Physical and biological conditions of cultures

6. Basic techniques of a culture laboratory

7. Specialized techniques of a culture laboratory.

PROGRAM OF LABORATORY*

1. Subculture of an adherent cell line

2. Growth control of a cell culture

3. Freezing and thawing cells

4. Detection of microtubules by immunofluorescence

5. Detection of apoptotic cells

6. Alteration of the cell cycle by drugs

*Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.

Methodology

The subject of Cell cultures consists of master classes using audiovisual media, practical classes in the laboratory and problem classes*.

Master classes:

Lectures will be made using audiovisual material prepared by the teacher, material that the students will have at their disposal in the Virtual Campus (CV) of the UAB before each session. Students will also have in the CV the schedule of the subject and, it is recommended, that the students consult the audio-visual material and the books recommended in the Bibliography section of this teaching guide in order to consolidate the contents explained in class.

Practical classes:

The practical classes are designed so that the students learn to use laboratory instruments and complement the theoretical training. The students will complete a week of practices of 16 h in total. The students will work in groups of 2, and at the end of the practices will be valued and the results obtained in the different practices will be discussed. Each pair will have to give a report showing and discussing the results obtained by both the couple and the practice group. The objective of this activity is to promote the scientific reasoning as much individual as in team.

*The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
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

To pass the course you will need to obtain a minimum overall score of 5 points out of a maximum of 10 possible points. The scheduled assessment activities are*:

1) Theory exam. It will consist of two distinct parts. In the first part, the student will have to demonstrate his knowledge on different concepts taught in the theory classes, this part will represent 40% of the mark. In the second part, a case study will be presented, and the student will have to determine what experiments should be done to achieve the expected results. This part will represent 20% of the grade of the subject

2) Laboratory practices. It will represent 20% of the grade of the subject. Attendance at 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 are explained. Delays of 10 minutes in the practical sessions reduce the mark by 0.1 points for each delay (it will not be possible to do the questionnaire, see below), when the delay is more than 30 minutes the penalty will be 0.3 points. Students will obtain the grade of "Not Evaluable" when the absence is greater than 20% of the sessions. For the proper functioning and understanding of the practices, the student must read the practice script for each session, so each day must complete a questionnaire before the start of the session on issues related to the practice of the day. This questionnaire will be assessed with a maximum grade of 0.1 points per day with a maximum of 0.4 points.

Laboratory practices are done in pairs. Students will be required to submit a power point of the results obtained and will have to discuss both their results (couple) and those of the "practice class" group in comparison with the expected results. The work will have a maximum value of 10 points. Delivery will be via CV

3) Examination of techniques used in the laboratory. It will represent 20% of the grade of the subject. There will be a written exam on the different techniques that have been used and the different results that have been obtained throughout the practices.

Subject note = theory (40% + 20%) + practices (20% + 20%)

Retake process

To participate in the recovery, students must have previously been assessed in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject or module. Therefore, students will obtain the grade of "No Avaluable" when the assessment activities performed have a weighting of less than 67% in the final grade.

There will be a retake exam for students who have not passed more than 3.99 in the knowledge exam, which has a value of 40%. "Practical case" exams (20% of the mark) and "practice" exams (20% of the mark) will not be retaken.

*Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

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 (in paper and online)

* A. Doyle and J.B. Griffiths Eds. Cell and Tissue Culture: Laboratory procedures in biotechnology. John Wiley & Sons Ltd. 1999. (no new editons)

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

Software

No software is used