

**Academic Year/course: 2022/23**

## 27118 - Cell Culture

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 27118 - Cell Culture

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 446 - Degree in Biotechnology

**ECTS:** 6.0

**Year:** 3

**Semester:** Annual

**Subject Type:** Compulsory

**Module:**

## 1. General information

### 1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

- To train the student in the preparation of cell cultures and the design of experiments with said cultures.
- To develop the ability to analyze experimental results in the area of Cell Biology.
- To encourage teamwork and the organization of tasks in a cell culture laboratory.

These approaches and objectives are aligned with Sustainable Development Goals 3 and 9 of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of learning outcomes of the subject provides training and competence to contribute to some extent to its achievement.

## 2. Learning goals

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate the achievement of the expected learning outcomes through the following assessment activities:

1) Evaluation of the student's work in the laboratory:

a) Continuous evaluation of the work carried out daily in the laboratory and practice reports; presentation and interpretation of the results obtained will be assessed. The reports will have a maximum length of 40 pages. This section will account for 40% of the final grade.

c) Oral presentation and debate with classmates and the teacher about one of the practice session. This section will represent 10% of the final grade.

2) Written test. The test will consist of a series of problems or cases and questions about the practical contents of the subject. This assessment will account for 50% of the final grade. A minimum grade of 4.5 will be required in this test to pass the course.

Given the experimental nature of the subject, it is considered compulsory to carry out the practice sessions in the laboratory to pass the subject through the evaluation system indicated above. However, in addition to the evaluation modality indicated in the previous point, the student will have the possibility of being evaluated in a global test, which will be eminently practical and which will judge the achievement of the learning results indicated above.

## 4. Methodology, learning tasks, syllabus and resources

## 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, laboratory classes,

Students are expected to participate actively in class throughout the semester. This is an essentially practical course. Students are expected to acquire basic skills for the maintenance and use of cell cultures.

Further information regarding the course will be provided on the first day of class.

## 4.2. Learning tasks

The course includes the following learning tasks:

- 1) Lectures on the basis and uses of cell culture and fundamentals of the techniques used in laboratory sessions.
- 2) Laboratory sessions (12) will allow the student to develop the ability to plan experiments and analyze results, as well as to solve practical questions.
- 3) Elaboration of a written report describing and discussing the results obtained in practical sessions.
- 4) Oral presentation and discussion of a technique and the results obtained in the laboratory sessions.

## 4.3. Syllabus

The course will address the following topics:

- Topic 1. Introduction to cell culture. Usefulness and applications of cell cultures. Limitations. Cell inspection with the (inverted) microscope. Cell viability and counting. Light microscope, phase-contrast microscope, fluorescence microscope. Freezing and thawing cells. Liquid nitrogen storage.
- Topic 2. Culture of animal cells. Basic techniques of cell culture. Cell isolation and purification. Maintenance of cell cultures. Characterization and cryopreservation. Cell immortalization techniques and their problems. Security in biological laboratories.
- Topic 3. Engineering cells. Introduction. Marker genes. DNA-transfection techniques. Primary cultures and cell lines. Transduction. Infection. Techniques to introduce exogenous proteins into cells.
- Topic 4. Tissue biotechnology, Strategies. Stem cell culture *versus* specialized cell cultures. Purification and culture of stem cells. Cell differentiation techniques. Primary co-cultures. Organoids.
- Topic 5. Applications of cell cultures: Cells as protein factories: generation of monoclonal antibodies by hybridomas, recombinant proteins, vaccines, etc.
- Topic 6. Contaminations: Detection and elimination.
- Topic 7. Methods for the analysis of viability and cell proliferation.

## 4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Facultad de Ciencias website <https://ciencias.unizar.es/grado-en-biotecnologia>.

Introductory lectures will take place in the first weeks of the semester. Laboratory classes will be held in Laboratory 1 (Dpt. Biochemistry, Molecular and Cell Biology, Building A, 2nd Floor).

Students will be assigned to a group at the beginning of the semester. Session dates for each group will be communicated in the Moodle platform. Dates for oral exposition and deadlines for laboratory reports will also be communicated in this platform.

## 4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27118>