COURSE DATA

DATA SUBJECT

Code: 33180
Name: Cellular technology
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1111 - Grado en Biotecnología	Facultat de Ciències Biològiques	3	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1111 - Grado en Biotecnología	Cellular and molecular methodology	COMPULSORY

COORDINATION

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SUMMARY

"Cellular Technologies" is a subject that is part of the module "Instrumental Methods in Biotechnology" within the Area of "Cellular and Molecular Methods". This subject is taught in the third degree courses in Biotechnology and is mandatory. Like all the subjects in the Matter of Cellular and Molecular Methods, "Cellular Technologies" is clearly methodological and provides a broad overview of the main techniques used in Cell Biology for handling and mark cells. Given that the other subjects of this module have molecular approach, the course of "Cellular Technologies" give an approach that is more focused on issues that deal with direct microscopic analysis of cells.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1102 -

Know how to grow and maintain cells in vitro.

Know how to use immunological techniques in qualitative and quantitative tests.

Saber utilizar las técnicas microscópicas en sus distintas aplicaciones.

1111 - Grado en Biotecnología

Actuar con autonomía en el aprendizaje, tomando decisiones fundamentadas en diferentes contextos, emitiendo juicios en base a la experimentación y el análisis y transfiriendo el conocimiento a nuevas situaciones

Apply analytical, synthetic and critical thinking skills in the application of the scientific method.

Colaborar eficazmente en equipos de trabajo, asumiendo responsabilidades y funciones de liderazgo y contribuyendo a la mejora y desarrollo colectivo

Conocer las bases químicas y moleculares del funcionamiento celular

Conocer las herramientas para la manipulación de células así como las principales técnicas microscópicas y sus aplicaciones

Conocer y comprender, desde el propio ámbito de la titulación, las desigualdades por razón de sexo y género en la sociedad; integrar las diferentes necesidades y preferencias por razón de sexo y de género en el diseño de soluciones y resolución de problemas

Contribuir en el diseño, desarrollo y ejecución de soluciones que den respuesta a demandas sociales, teniendo en cuenta como referente los Objetivos de Desarrollo Sostenible

Demostrar razonamiento crítico y autocrítico en el ámbito de la titulación, considerando aspectos tales como la ética profesional, los valores morales y las implicaciones sociales de las diferentes actividades realizadas

Participate in multidisciplinary teams, engaging in teamwork and collaboration.

Propose creative and innovative solutions to complex situations or problems, typical of the area of ¿¿¿¿connection, to donate responses to the various professional and social needs

Que el estudiantado demuestre su capacidad para calcular correctamente los parámetros relevantes de un proceso o un experimento mediante la representación de los datos experimentales

Saber comunicarse de manera efectiva, tanto de forma oral como escrita, adaptándose a las características de la situación y de la audiencia

Saber cultivar y mantener células in vitro

Ser capaz de observar e interpretar los resultados obtenidos a través de microscopios ópticos

Use English to write reports and to interpret information from protocols, manuals and databases.

Work in laboratories, including safety procedures, waste management and accurate activity logging.

DESCRIPTION OF CONTENTS

1. CONVENCIONAL LIGHT MICROSCOPY

Introduction. Theory of image formation with converging lenses. Optical aberrations of the lenses. The Light microscope. Brightfield microscopy.

2. NON-CONVENTIONAL LIGHT MICROSCOPY

Darkfield microscopy. Phase contrast microscopy. Interference contrast microscopy, optical Nomarsky. Polarized light microscopy

3. FLUORESCENCE MICROSCOPY

Confocal microscopy. Two-photon microscopy

4. ELECTRON MICROSCOPY

Introduction. Elements of the transmission electron microscope. Image formation in the electron microscope.

5. SAMPLE PROCESSING

Sample processing for light and transmission electron microscopy. Fixing and manipulation of biological samples. Embedding and sectioning.

6. CELL LABELING TECHNIQUES

The overall process of staining of biological material. Dyes. Staining of fixed cells and living cells.

7. HISTOCHEMICAL LABELING TECHNIQUES

Detection of intracellular carbohydrates, lipids, nucleic acids and metals. Detection of enzymatic activities in the cells: histoenzymology.

8. IMMUNOCYTOCHEMICAL LABELING TECHNIQUES

Fundamentals and applications. Detection and localization of antigens at the subcellular level.

9. AUTORADIOGRAPHICAL LABELING TECHNIQUES

Pulse-chase experiments for the detection of cellular activity and for tracking of metabolic processes. Radioligands and receptor study.

10. CELL CULTURES

Cultures types. Primary cell cultures and organotypical cultures. Cell lines. Applications.

11. CELL ANALYSIS TECHNIQUES

Flow cytometry. Applications.

12. CELL MANAGING

Patch-clamp techniques. Intracellular injection of markers in both live and fixed cells. Extracellular injections of tracers. Reporters. Genetically modified organisms.

13. PRACTICES

PRACTICE 1: Cell Cultures I. Cell lines.
PRACTICE 2: Cell cultures II. Primary cell cultures and explants
PRACTICE 3: Fixation
PRACTICE 4: Embedding and sectioning
PRACTICE 5: Stainings and analysis

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	28,00
Laboratory	15,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	8,00
Independent study and work	0,00
Preparation of lessons	34,50
Preparation for assessment activities	25,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

The acquisition of knowledge by the student, will be based on four topics:

1. Theory classes.

Theory classes consist of one hour classroom sessions where the teacher orally transmitted knowledge of the subject to the student. This transmission is supported at all times of the materials the teacher deems appropriate for each topic. In the lectures, the teacher will encourage student participation by asking questions or approach issues and questions arising out of debate. Virtual Classroom will be used as a tool where the teacher can provide students with all learning materials it deems appropriate to supplement the lectures.

2. Practical classes.

Practical classes will consist of laboratory sessions of three hours in which students work and learn the methodology needed for cell manipulation and analysis. All kinds of practices are closely related and allow adequate visualization of the work in the laboratory of cell biology, from the collection of samples, processing, staining, and finally his observation-study using optical or confocal microscope.

3. Seminars.

The seminars in this subject arise as follows. Students in small groups prepare a seminar on a topic related to the subject that the teacher proposes to the beginning of the course. To do this, they will always have the help of the teacher. Finally, it will be a two hour sessions where students from each group will present orally

the seminar who prepared the rest of students.

4. Student's class work.

Should be considered as all the work that the student engaged in the preparation of the course regardless of attendance at lectures, practicals, seminars, tutorials and exams. Includes various activities. On one side are the hours of study each week to be spent to expand and consolidate the knowledge acquired in the classroom and in practice. It also includes additional work that the teacher can plan for the student to perform throughout the semester to supplement the lectures and practices (answering questionnaires, editing pictures or diagrams that provide the teacher on some issues, present written work, conduct literature searches ...). All this extra work may arise in some cases as individual work and in others as a collective work to be done in small groups. As a complement to all of the above, the methodology also includes group tutorials, considering them as one-hour sessions that will allow the teacher to monitor the degree of student learning. These sessions will be open to dialogue and participation of all students, where questions and doubts will be asked and resolved or where topics of interest related to the knowledge of the subject will be discussed.

EVALUATION

To evaluate the knowledge acquired in the course, students will conduct a written test raising questions of both the topics covered in the lectures and practices undertaken during the course. To pass the course, students must get a minimum of 5 out of 10 in this test. This test will count 90% in the final grade for the course, 10% of the grade correspond to the seminar.

REFERENCES

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