Introduction to Microbiology, Immunology and Cell Cultures

Code: 106826
ECTS Credits: 6

2025/2026

Degree	Type	Year
Nanoscience and Nanotechnology	OB	2

Contact

Name: Maria del Carme Nogues Sanmiquel

Email: carme.nogues@uab.cat

Teachers

José Ramón Palacio Cornide

Jose Luis Corchero Nieto

Teaching groups languages

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

Prerequisites

This subject does not need any requirements.

Objectives and Contextualisation

The subject Introduction to Microbiology, Immunology and Cell Culture, is taught in the 2nd semester of the 2nd year of the degree of Nanoscience and Nanotechnology in the Faculty of Sciences. This is a subject with a certain degree of specialization that is divided into three large blocks (Microbiology, Immunology and Cellular cultures) in which the students is expected to acquire some basic notions to begin with the methodologies used in the culture and manipulation of bacterial cells, in immunology laboratories and in cultures and manipulation of eukaryotic cells. That is why it is a subject with an important practical component.

Objectives of the subject:

1) To know the bacterial cell

2) To know the basic methodologies used in a Microbiology laboratory

3) To know the basic concepts of Immunology

4) To know the basic methodologies used in a Immunology laboratory

5) To know the basic equipment of a Cell Culture Laboratory

6) To know the basic methodologies used in a Cell Culture Laboratory

Learning Outcomes

1. CM22 (Competence) Identify innovations in nanobiotechnology and their economic and social impact on the field of health.
2. CM23 (Competence) Identify the ethical and social responsibilities of developing bionanotechnology.
3. KM37 (Knowledge) Describe fundamental techniques in cell culture, the biology of microorganisms and the immune system.
4. SM32 (Skill) Use digital tools and documentary sources to obtain, analyse and present information from a critical perspective in the field of nano biotechnology, both orally and in writing.
5. SM33 (Skill) Use the basic methodologies used in microbiology, immunology, cell culture and molecular biology.

Content

Theory program

Microbiology

1. Introduction to Microbiology
2. Levels of organization
3. The bacterial cell
4. Techniques for observing microorganisms
5. Isolation and culture techniques of microorganisms
6. Techniques for sterilization and preservation of microorganisms

Immunology

1. Basic principles of immunology: innate immunity and acquired immunity. The immune system: anatomy, cells, and molecules.
2. Components of innate immunity. Mechanisms of innate immunity. Connection between innate and acquired immunity.
3. Components of acquired immunity. Mechanisms of acquired immunity.
4. Immune response to pathogens

Cell Cultures

1. Introduction to cell cultures
2. Types of cell cultures
3. Physical and biological conditions for cell cultures
4. Cell characterization techniques
5. Biocompatibility study techniques

Practical Program

Microbiology

1. Microorganism counting
2. Methods for isolating microorganisms
3. Microorganism observation
4. Microorganism identification
5. Ubiquity and microbial diversity

Immunology

1. Separation of peripheral blood leukocytes
2. Cell counting using a Neubauer chamber and vital staining
3. Determination of cell concentration and viability in the sample

Cell Cultures

1. Culturing a cell line
2. Freezing/thawing a cell line
3. Induction and detection of apoptosis in a cell line
4. Detection of actin filaments. Fluorescence microscopy observation.
5. Confocal laser scanning microscopa observation of cells incubated with nanoparticles.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classes teoricas	31	1.24	CM22, CM23, KM37, SM33, CM22
Laboratory classes	27	1.08	SM32, SM33, SM32
Type: Supervised			
Personalized tutorials	4	0.16	CM22, CM23, KM37, SM32, SM33, CM22
Type: Autonomous			
Individual study	77	3.08	CM22, KM37, SM32, SM33, CM22
Laboratory quizzes	4.5	0.18	KM37, SM32, SM33, KM37

The subject of Microbiology, Immunology, and Cell Cultures consists of theoretical master classes and practical laboratory sessions.

The theoretical master classes (31 h) will be conducted using audiovisual material prepared by the professor, which students will have access to on the Virtual Campus (CV) of the UAB before the sessions.

The practical classes are designed to help students learn how to use laboratory instruments and complement their theoretical training. Students will participate in a total of 9 practical sessions, totalling 27 h. They will work in groups of 2. In some sessions, they will need to fill out a sheet with the results. At the end or during the practical sessions, the results from different groups will be shared and discussed collectively.

In the case of the cell culture module, students will need to submit a PowerPoint presentation. In this assignment, they should present the results and discuss whether they meet the expected outcomes, providing reasoning.

Note: 15 minutes of a class, as per the schedule established by the institution/program, will be reserved for students to complete evaluations of the teaching performance and the subject/module

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

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Delivery of practical laboratory results	5	1.5	0.06	CM23, SM32, SM33
Laboratory exam	20	1	0.04	CM23, KM37, SM32, SM33
Theory exam	75	4	0.16	CM22, CM23, KM37, SM33

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

Theory:

Represents 75% of the final grade for the subject and is evaluated through two exams.

First theory exam: Represents 37.5% of the final grade and covers approximately half of the material taught in theoretical classes. A score $\geq$4.5 in the first theoretical exam allows averaging with the second theory exam. Scores $\leq$4.49 require taking the recovery exam for this part of theory.

Second theory exam: Represents 37.5% of the final grade and covers approximately half of the material taught in theoretical classes. A score $\geq$4.5 in the second theoretical exam allows averaging with the first theory exam. Scores $\leq$4.49 require taking the recovery exam for this part of theory.

Practicals:

Represent 25% of the final grade and are assessed through a single exam and the presentation of results obtained during practical sessions. Attendance in laboratory practicals is mandatory. There are a total of 9 sessions. Non-attendance in one, two, or three sessions reduces the practical grade by 20%, 50%, and 80%, respectively. Non-attendance in 4 or more practical sessions results in a "Not Present" for this block.

Laboratory quizzes: They account for 5% of the final grade for the course. Each day, one or more quizzes will be conducted on the cultivation block practices.

Subject grade calculation: Theory exam (37.5% + 37.5%) + Practical exam(20%) + laboratory quizzes (5%)

Recovery: To participate in the recovery, students must have been previously evaluated in a set of activities whose weight corresponds to at least two-thirds of the total grade for the subject or module. Therefore, students will receive the qualification of "Not Evaluable" when the assessment activities performed have a weight lower than 67% in the final grade. There will be a recovery exam for students who have not obtained a score higher than 4.49 in any of the three exams (two theory exams and one practical exam), and for students who, after averaging with other subject grades, do not achieve a score equal to or higher than 5. Students only need to retake the exam they did not pass.

For this subject, the use of Artificial Intelligence (AI) technologies is permitted exclusively for support tasks, such as bibliographic or information searches, and text correction. Students must clearly identify which parts have been generated using this technology, specify the tools used, and include a critical reflection on how these have influenced the process and the final outcome of the activity. Lack of transparency in the use of AI in this assessable activity will be considered academic dishonesty and may result in partial or total penalties in the activity grade, or more severe sanctions in serious cases.

Bibliography

Relevant Bibliography

Microbiology:

*Madigan, MT, JM Martinko, PV Dunlap, DP Clark. 2015. Brock Biology of Microorganisms. 14ª ed. Pearson Educación, S.A. (en paper i electrònic)

*Willey, J, LM Sherwood, CJ Woolverton. 2009. Microbiología de Prescott, Harley y Klein. 7ª ed. MacGraw-Hill-Interamericana de España. ISBN: 978-84-481-6827-8.(en paper i electrònic)

*Jennifer Louten. 2016. Essential human virology. Elsevier Ed. ISBN: 978-0-12-800947-5

*Microbiología: conceptos esenciales. Jordi Barbé García [i 39 més]. Editorial Médica Panamericana | 2019

Immunology:

*Inmunología J.Kuby, J.A. Owen, J. Punt, S.A. Strandord 7ma Ed 2014 (en paper i electrònic)

*L. Fainboim, J. Geffner. *Introducción a la Inmunología Humana.* 6ª edición, 2011, Editorial Panamericana. ISBN:978-9500602709 (en paper i electrònic)

*J. R. Regueiro, C. López Larrea, S. González Rodríguez, E. Martínez Naves. *Inmunología: Biología y patología del sistema inmunitario,* 4ª edición, 2010, Editorial Panamericana. ISBN: 978-8498350036

Cell Cultures

* A. Doyle and J.B. Griffiths Eds. *Cell and Tissue Culture: Laboratory procedures in biotechnology.* John Wiley & Sons Ltd. 1999. ISBN: 978-0471982555 (no hi ha cap nova edició)

* R.I. Freshney. *Culture of Animal Cells: A manual of basic technique.* 7th Ed. Wiley-Liss, Inc. 2010. (biblioteca 6e ed. en paper i electrònic). ISBN: 978-1-118-87365-6

* J.P. Mather and D. Barnes Eds. *Animal Cell Culture Methods.* Methods in Cell Biology. Academic Press. 1998.(en paper i electrònic). ISBN: 978-0124800403

Software

No software will be used

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	1	Catalan/Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	2	Catalan/Spanish	second semester	morning-mixed

(PLAB) Practical laboratories	3	Catalan/Spanish	second semester	morning-mixed
(TE) Theory	1	Catalan/Spanish	second semester	afternoon