

Integrated Laboratory Class 6

Code: 100923
ECTS Credits: 3

2024/2025

Degree	Type	Year
2500253 Biotechnology	OB	3

Contact

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Teachers

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

It is recommended that students are simultaneously taking or have already taken the theory courses corresponding to the contents of the laboratory practices:

Bioinformatics

Immunology

Advanced Experimental Techniques

Virology

To be able to attend it, it is necessary for the student to justify having passed the biosafety and security tests that he will find in the Virtual Campus and be knowledgeable and accept the operating regulations of the laboratories of the Faculty of Biosciences.

Objectives and Contextualisation

The Integrated Laboratory 6 is the last subject of a group of 6 that are distributed over the 6 semesters corresponding to the first three years of the Degree in Biotechnology.

The training objectives of these subjects focus on the acquisition of competences within the framework of the practical training of the student.

The contents are organized in a growing order of complexity and associated to the needs and progress of the theoretical contents of the Degree.

The Integrated Laboratory 6 has as its training objectives the acquisition of practical skills in 4 specific contents:

- Bioinformatics
- Immunology
- Advanced Instrumental Techniques
- Virology

Learning Outcomes

1. CM24 (Competence) Review the general safety standards of a biotechnology laboratory.
2. KM23 (Knowledge) Recognise the key microscopic characteristics that distinguish prokaryotic cells from eukaryotic cells, and animal cells from plant cells.
3. KM24 (Knowledge) Explain the theoretical foundation and appropriate techniques for the structural and functional characterization of proteins and nucleic acids.
4. SM20 (Skill) Use the basic techniques of manipulation, separation, detection and analysis of proteins and nucleic acids.
5. SM20 (Skill) Use the basic techniques of manipulation, separation, detection and analysis of proteins and nucleic acids.
6. SM21 (Skill) Use prokaryotic and eukaryotic cell culture techniques and techniques for the manipulation of biological systems.
7. SM21 (Skill) Use prokaryotic and eukaryotic cell culture techniques and techniques for the manipulation of biological systems.
8. SM22 (Skill) Use analytical methodologies for the assay of biological activity of cellular components.
9. SM22 (Skill) Use analytical methodologies for the assay of biological activity of cellular components.

Content

The subject is structured in 4 types of contents:

Bioinformatics

3 sessions of 4 hours, in principle, in the computer room.

The student will carry out a miniproject that will consist of discovering a new gene, and characterizing it, using bioinformatics tools. As a "new gene", we understand one that has not been previously annotated.

The student will have to put into practice the knowledge acquired in the subject of Bioinformatics, for example: study of the characteristics of the starting protein, database searches, and advanced BLAST searches, multi-alignments and phylogenetic trees, prediction of Three-dimensional structure, study of domains, comparison and structural classification

Immunology

3 4-hour sessions in the laboratory that will include the following analyses:

1. Separation of mononuclear cells with density gradient.
2. T-cell proliferation test and analysis by flow cytometry
3. Precipitation and agglomeration of serum immunoglobulins.
4. Quantification of human immunoglobulins by Elisa.
5. Analysis of the premium system's lytic function (calculation CH50)

Advanced Instrumental Techniques

3 sessions of 4 hours, two are on the laboratory and the last one at the computers room.

Session 1: Microscopy

Session 2: Plasmid transformation

Session 3: Cytometry

Session 4 : Calculation of Minimum inhibitory Concentration (MIC)

Session 5: Computer session: Results analysis: ImageJ and Flowing Software

Session 3:

Titration of tyrosine of a protein

Study of the interaction of DNA with the bromide of ethid by means of spectrofluorimetry.

Quantitative PCR: theoretical and practical foundation, analysis of results, obtaining a fusion curve and calculation of the amplicon T_m .

Virology

Organization of 5-day weeks: 4 sessions of 3 hours from Monday to Thursday and a 4-hour session on Friday (which includes a seminar of presentation and analysis of the results by the students that are carried out in the laboratory)

Organization of weeks of 4 days: 4 sessions of 4 hours from Tuesday to Friday (which includes a seminar of presentation and analysis of the results by the students that are carried out in the laboratory)

Internship:

1. Quantification and inactivation by temperature of viral suspensions.
2. Obtaining viral lysates: infection and amplification.
3. Detection of viruses in wastewater: purification of viral genomes and identification of viruses by specific amplification of viral genes.
4. Neutralization of viruses by antibodies.
5. Observation of viruses by transmission electron microscopy.
6. Approach and execution of a practical problem.

For safety reasons, these practices are performed with bacteriophages, which cannot infect or transduce mammalian cells, and with non-infectious viral nucleic acids. All material delivered to students is free of viruses that can infect or transduce mammals. In any case, the basic techniques of manipulation in a Virology laboratory are comparable to those used when working with bacterial viruses or eukaryotic viruses and, therefore, the proposed objectives can be perfectly achieved.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
supervised	52	2.08	
Type: Autonomous			
Presentations	7.5	0.3	
Study	6	0.24	
results analysis and resolution of questionnaires	7	0.28	

The attendance to the classes of this subject is obligatory since they imply an acquisition of competitions based on the practical work.

The students are divided into 4 practice groups.

Bioinformatics

The sessions will be taught in the computer room.

For the accomplishment of the practices the students will work in pairs under the supervision of the responsible professor.

During the three practical sessions, the resolution of the proposed miniproject will be made where the student will have to apply the tools used in the Bioinformatics subject to the discovery and characterization of an unnamed protein. In the resolution of this case, the student is expected to be able to correctly use the computer tools he knows, ask himself the right questions, prepare a work script and, finally, make a compilation presentation on power point of the information found, along with its interpretation.

Immunology,

Advanced experimental techniques and

Virology

Practical classes of laboratory and data analysis.

The students carry out the experimental work in groups of 2-3 students and under the supervision of the responsible professor.

The practical protocols and, where appropriate, the questionnaires for response, will be available in the Moodle classroom of the subject

Before beginning a practical session the student must have read the protocol and know therefore the objectives of the practice, the foundations and the procedures that must be carried out.

You must have passed the safety and biosecurity test at the laboratory.

In the practical sessions you have to take:

- Protocol and, if applicable, the questionnaire.
- A notebook to collect the information of the experimental work.
- Laboratory baton.
- Safety glasses.
- Permanent marker
- Calculator.

The calendar of internships can be consulted on the web page of the Faculty of Biosciences.
The distribution of the students in the groups of practices can be consulted in the Space of the Degree in Biotechnology in the Virtual Campus.

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
Advanced Instrumental Techniques. Solution of the questionnaire and work in the laboratory	25%	0	0	CM24, KM23, KM24, SM20, SM21, SM22
Bioinformatics: power point presentation and work in the classroom	25%	0	0	SM22
Immunology. Resolution of the questionnaire, report and work in the laboratory.	25%	1	0.04	CM24, SM20, SM22
Virology Written test quiz questions and oral presentation	25%	1.5	0.06	CM24, KM23, SM21, SM22

Bioinformatics

The evaluation will be done through the delivery through Moodle of the results obtained. The format will be presented in PowerPoint. The deadline for delivery will be at the end of the last practice session. This powerpoint presentation will allow you to obtain a 25% of the final mark of the subject. This work will be presented to classmates the last day of class in a brief presentation (5-10 min). This oral presentation will allow you to obtain a 20% of the final mark of the subject. 5% of the final mark of the subject will be obtained from the peer evaluation of the submitted work.

Immunology

The evaluation is based on three criteria:

- 1) Individual resolution of a written questionnaire with multiple-choice questions and developmental questions (60% of the grade of the Immunology module) that will be carried out once all laboratory sessions are finished, in a single test for all students
- 2) A report on each practice (maximum length of one page per practice) where the results obtained will be described, analysed and discussed (30% of the grade of the immunology module). This report must be delivered within a maximum period of one week after the last laboratory session
- 3) The attitude and work of the student in the laboratory sessions (10% of the grade of the immunology module).

Advanced instrumental techniques.

The assessment will be done by means of the resolution of a report that the student must give to the teacher, no later than 15 days after completing the sessions, (20% of the overall grade of the subject) also the attitude of work will be evaluated (5% of the overall grade of the subject).

Virology

The assessment involves two activities: an individual written test (18% of the overall grade of the subject) and an oral presentation of an experimental section in which the content and organization of the exhibition, the quality of the slides and the quality of the communication will be evaluated (7% of the overall grade of the subject).

Global assessment of the subject.

Attendance to the activities programmed in the Integrated Laboratories courses is mandatory. Absence at any of the sessions must be justified. Absences may not exceed 20% of the programmed activities. To pass the subject, you must obtain a final grade equal to or greater than 5 and obtain a minimum grade of 3.5 in each group of contents. Students who do not attain the minimum qualification in one or more of the groups of contents will receive a maximum final grade of the subject of 3.5 points out of 10.

It will be considered that a student obtains the non-evaluable qualification when he has attended less than 20% of the programmed sessions.

Repeat students will only have to perform and be evaluated of the groups of contents that had not been exceeded in the first enrollment (<4). For groups of content passed, the note will be saved for a maximum of three registrations

Single assessment

For those students who take the single assessment is compulsory to do the laboratory practices (PLAB) in the scheduled sessions with the rest of the group.

The single assessment consists of a single synthesis test with questions from all the integrated laboratory modules on the day scheduled in the academic calendar. The grade obtained in the synthesis test is 86.5% of the final grade of the subject. The attitude during the practices and attendance will be the remaining 13.5%.

The same retake system will be applied as for the continuous assessment.

Bibliography

Virology

Bibliography and web links are indicated in the practice protocols or, where appropriate, in the Teaching Guide of the corresponding theory subject.

A. Granoff and R.G. Webster. Encyclopedia of virology (on-line Ed.) Academic Press. London.

<http://www.sciencedirect.com/science/referenceworks/9780123744104>

Cann, Alan J. 2015. Principles of molecular virology. 6th ed. ISBN 9780128019467. Elsevier Academic Press (https://cataleg.uab.cat/iii/encre/record/C__Rb1949706)

[Encyclopedia of virology \[Recurs electrònic\] / editors in chief B.W.J. Mahy and M.H.V. van Regenmortel Llibre digital a la UAB](#)

<https://www.sciencedirect.com/are.uab.cat/referencework/9780123744104/encyclopedia-of-virology>

For other modules bibliography is included in the practice protocols.

Software

Programas:

Jalview: <https://www.jalview.org/>

MEGA X: <https://www.megasoftware.net/>

Notepad++: <https://notepad-plus-plus.org/downloads/c/>

Icn3d: <https://www.ncbi.nlm.nih.gov/Structure/icn3d/icn3d-3.2.0.zip>

PyMol: <https://pymol.org/2/>

Páginas web y Webservers:

<https://www.ncbi.nlm.nih.gov/>

<https://services.healthtech.dtu.dk/>

<https://www.expasy.org/>

<https://bio.tools/>

<https://www.ebi.ac.uk/services>

Immunology

It is not necessary to use specific programs in this subject.

Virology

It is not necessary to use specific programs in this subject.

Advanced Instrumental Techniques

Image J: <https://imagej.nih.gov/ij/>

Flowing Software: <https://bioscience.fi/services/cell-imaging/flowing-software/>

Language list

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	431	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	432	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	433	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	434	Catalan/Spanish	second semester	afternoon

PROVISIONAL