

Degree programme	Type	Course
Biotechnology	OB	3

Contact lecturer

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Group languages

You can consult this information at the [end](#) of the 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

In order to attend the practical sessions, students must provide evidence of having passed the biosafety and laboratory safety tests available on the Virtual Campus, and must be familiar with and accept the operating rules of the laboratories of the Faculty of Biosciences.

Objectives

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 students.

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

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

Contents

The course is structured in 4 types of contents:

Bioinformatics

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

Students will carry out a mini-project consisting of the identification and characterization of a previously unannotated gene using bioinformatics tools. A "new gene" is defined here as a gene that has not been previously annotated.

Students will have to put into practice the knowledge acquired in the course 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, domain analysis, structural comparison and classification.

Immunology

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

Practical sessions:

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 lytic activity of the complement system (calculation CH50)

Advanced Instrumental Techniques

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

Practical sessions:

1. Microscopy
2. Plasmid transformation
3. Cytometry
4. Calculation of Minimum inhibitory Concentration (MIC)
5. Computer session: Results analysis: ImageJ and Flowing Software

Virology

4 sessions of 4 hours each. The Thursday session includes 2 hours at the UAB Microscopy Service, and the final practical session includes a seminar in which students present one of the laboratory practicals, together with an analysis of the results obtained, as well as the individual practical examination.

Practical sessions:

1. Quantification and inactivation by temperature of viral suspensions.
2. Production of 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. Design and execution of an experimental virology problem.

For safety reasons, these practical sessions are performed with bacteriophages, which cannot infect or transduce mammalian cells, and with non-infectious viral nucleic acids. All materials provided to students are free of viruses capable of infecting or transducing mammalian cells. 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 intended learning objectives can be fully achieved.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
results analysis and resolution of questionnaires	7	0.28	CM24, KM23, KM24, SM20, SM21, SM22

Presentations	7.5	0.3	CM24, KM23, KM24, SM20, SM21, SM22
supervised	52	2.08	CM24, KM23, KM24, SM20, SM21, SM22
Study	6	0.24	CM24, KM23, KM24, SM20, SM21, SM22

Attendance at the classes of this course is mandatory, as they involve the acquisition of competencies based on practical work.

Students are divided into four practical groups.

Bioinformatics

The sessions will be held in the computer classroom.

During the practical sessions, students will work in pairs under the supervision of the teaching staff responsible for the course.

Throughout the three practical sessions, students will develop the proposed mini-project, in which they will apply the tools used in the Bioinformatics course to the discovery and characterization of a previously unannotated protein. In carrying out this project, students are expected to be able to use the bioinformatics tools correctly, formulate appropriate research questions, develop a work plan and, finally, prepare a PowerPoint summary presentation of the information obtained, together with its interpretation.

Immunology, Advanced Experimental Techniques and Virology

Laboratory practical classes and data analysis.

Students will carry out the experimental work in groups of two to three people under the supervision of the teaching staff responsible for the course.

The laboratory protocols and, where applicable, the response questionnaires will be available in the course Moodle classroom.

Before attending a practical session, students must have read the protocol and be familiar with the objectives of the practical activity, its theoretical background, and the procedures to be carried out.

Students must have successfully completed the laboratory safety and biosafety tests.

For the practical sessions, students must bring:

- The laboratory protocol and, where applicable, the questionnaire.
- A notebook for recording experimental observations and results.
- A laboratory coat.
- Safety glasses.
- A permanent marker.
- A calculator.

The practical session schedule can be consulted on the website of the Faculty of Biosciences.

The allocation of students to practical groups can be consulted in the Biotechnology Degree section of 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

Continuous assessment activities

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

Bioinformatics

Assessment will be based on the submission, through Moodle, of the results obtained during the practical sessions in the form of a PowerPoint presentation.

The submission deadline will be the last practical session. This work will be presented to the instructor and the rest of the class in a short oral presentation (5-10 min) and uploaded to the Virtual Campus.

This PowerPoint presentation will account for 25% of the final course grade. Of this 25%, 20% will correspond to the professor's assessment and 5% will be obtained through peer assessment of the work presented.

Immunology

The assessment is based on two components:

1. The individual completion of a written test consisting of multiple-choice and short-answer questions (60% of the Immunology module grade), which will be held once all laboratory sessions have been completed, in a single examination for all students.
2. The preparation of a report for each practical session (maximum length of one page per practical), in which the results obtained will be described, analysed and discussed (40% of the Immunology module grade). This report must be submitted within one week after the final laboratory session.

Together, these two assessment components account for 25% of the final course grade.

Advanced instrumental techniques.

The assessment will be done by means of the resolution of a report that students must submit to the teaching staff no later than 15 days after completing the sessions (20% of the overall course grade), as well as on the assessment of students' attitude and work during the sessions (5% of the overall course grade).

Virology

The assessment consists of two activities:

1. An individual written test comprising multiple-choice questions with four possible answers (18% of the final course grade).
2. An oral presentation of one of the experimental practical activities, in which the content and organization of the presentation, the quality of the slides, and the quality of the communication will be assessed (7% of the final course grade).

Global assessment of the subject.

Attendance at 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 5.0 or higher and obtain a minimum grade of 3.5 in each module. Students who do not attain the minimum qualification in one or more of the module will receive a maximum final grade of the subject of 3.5 points out 10.

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

Repeating students will only be required to complete and be assessed in those modules that they did not pass during their first enrolment (grade below 4.0). For modules that have been passed, the grade will be retained for a maximum of three enrolments.

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 72% of the final grade of the subject. The attitude during the practices and attendance will be the remaining 28%.

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

*Any irregularity committed during an assessment activity (**academic misconduct, plagiarism, or improper use of AI, unless such use is expressly authorized in the course syllabus**) that may lead to a significant alteration of the grade will result in that activity being graded as 0. If the course syllabus stipulates that obtaining a minimum mark in this assessment is an essential requirement to pass the course, or if multiple irregularities occur in the assessment activities of the same course, the final grade for the course will be 0. Furthermore, disciplinary proceedings may be initiated against any student who incurs any of these irregularities.*

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/encore/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>

<https://alphafoldserver.com/>

<https://search.foldseek.com/search>

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/>

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(PLAB) Practical laboratories	431	Catalan/Spanish	second semester	afternoon

(PLABs) Suport a les pràctiques de laboratori	431	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	432	Catalan/Spanish	second semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	432	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	433	Catalan/Spanish	second semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	433	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	434	Catalan/Spanish	second semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	434	Catalan/Spanish	second semester	afternoon