

Degree programme	Type	Course
Microbiology	OB	2

Contact lecturer

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Teaching staff

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Group languages

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

Prerequisites

It is desirable to have coursed or are coursing first semester of the second year of the Degree of Microbiology and the previous integrated laboratory I and II courses.

It is mandatory that the student has passed the safety and biosafety tests that will be found in the Virtual Campus. It is also compulsory to know and accept the operating rules of the teaching laboratories of the Faculty of Biosciences and accomplish all the specific instructions of the teachers.

Objectives

- This course introduces students to the use of basic molecular and immunological techniques for experimentation in a Molecular Biology laboratory.

The specific objectives to be achieved are defined in the following points:

- Apply fractionation and biochemical analysis techniques.
- Perform nucleic acid extraction and electrophoresis techniques.
- Use basic recombinant DNA techniques such as restriction endonucleases, DNA cloning in vectors, DNA transformation, etc.
- Recognize the methodologies for labeling DNA probes and apply specific detection techniques for these labeled probes by DNA-DNA hybridization.
- Correctly use and apply PCR and/or quantitative PCR techniques.
- Employ immunological techniques of precipitation and agglutination or ELISA and distinguish their applicability in the identification and typing of microorganisms.
- Integrate knowledge of molecular biology, biochemistry, microbiology, and immunology for the

cloning, overexpression, purification, and detection of a protein of bacterial origin.

Learning outcomes

- CM17 (Critically evaluate experimental results in the field of microbiology for their presentation clearly and concisely.) Critically evaluate experimental results in the field of microbiology for their presentation clearly and concisely.
- CM18 (Integrate knowledge and skills for the design of experiments in the field of microbiology and other biosciences, and the interpretation of their results, working individually and in teams.) Integrate knowledge and skills for the design of experiments in the field of microbiology and other biosciences, and the interpretation of their results, working individually and in teams.
- KM25 (Describe the theoretical foundations and instrumentation used in basic and advanced experimental techniques in microbiology and other related sciences, including sterilization and microbial load reduction procedures in industrial, clinical and experimental environments.) Describe the theoretical foundations and instrumentation used in basic and advanced experimental techniques in microbiology and other related sciences, including sterilization and microbial load reduction procedures in industrial, clinical and experimental environments.
- KM26 (Identify the principles and standards of good laboratory and biosafety practices.) Identify the principles and standards of good laboratory and biosafety practices.
- SM25 (Manage computer resources for the treatment of experimental data within the field of microbiology and other biosciences.) Manage computer resources for the treatment of experimental data within the field of microbiology and other biosciences.
- SM26 (Apply conventional microbiological techniques that allow differentiating and characterizing different microbial groups and manipulate materials and samples under aseptic conditions.) Apply conventional microbiological techniques that allow differentiating and characterizing different microbial groups and manipulate materials and samples under aseptic conditions.
- SM28 (Use different indicators and tests based on microorganisms or their components for industrial, sanitary, biotechnological purposes or to assess environmental impacts.) Use different indicators and tests based on microorganisms or their components for industrial, sanitary, biotechnological purposes or to assess environmental impacts.

Contents

The subject will be organized in two distinct parts:

- Monographic methodological sessions lasting approximately three and four hours depending on each session and scheduled weekly in 3 groups of 3 or 4 sessions depending on each module.
- Integrated practice, lasting 19-hours that will be intensive for one week

MODULE 1

Sessions 1, 2 and 3. Cell fractionation techniques and biochemical analysis. Characterization of the fractions by enzymatic markers. Techniques of cold labeling probes, of dot blot and hybridization.

MODULE 2

Sessions 4 and 5. Nucleic acid and restriction techniques.

Session 6. PCR techniques.

Session 7. Techniques for detecting interactions between DNA and protein.

MODULE-3

Sessions 8 to 11. Precipitation of immunoglobulins with ammonium sulfate. Determination of the concentration of antibodies in serum by ELISA. Separation of splenocytes by density gradient. Determination of phagocytosis by a monocyte cell line using the flow cytometry technique.

INTEGRATED PRACTICE

Sessions 1 and 2. Cloning of a bacterial gene and overexpression of the gene product.
 Session 3. Purification and quantification of the protein.
 Sessions 4 and 5. Detection of the protein by Western blot.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Classroom sessions	2	0.08	CM17, CM18, KM25, KM26, SM28
Comprehensive reading of the practice manual	4	0.16	CM18, KM26, SM26, SM28
Study	4	0.16	CM18, KM25, KM26
Laboratory sessions	53	2.12	CM17, CM18, KM25, KM26, SM25, SM26, SM28
Tutorship	1	0.04	CM17, CM18, KM25, KM26, SM28
Writing reports or questionnaires	6.5	0.26	CM17, CM18, KM25, SM25, SM26, SM28

The subject will be taught in small groups of students.

To acquire the specific competencies of the subject attendance to the practical sessions is mandatory. If a student for justified and unforeseeable reasons does not attend a practice session(s), he/she must communicate to the responsible teacher and present the corresponding certificate as soon as possible to the Degree coordinator. It is understood for justified cause those enclosed in the Faculty of Biosciences evaluation criteria (section 1).

The students will have a manual of the course before the beginning of the practical sessions. The student must bring his/her gown, laboratory glasses, a notebook, and the manual (available in the Virtual Campus or where indicated by the teaching staff).

The students will work in small groups. At the beginning of each session, the teacher will make a brief theoretical explanation of the content of the practice and the experiences to be carried out.

To achieve a good performance and acquire the competencies corresponding to this course, the student must make a comprehensive reading of the practice manual, familiarizing with the practices that will be carried out in each session as well as with the methodology that should apply in each case.

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
Test type questionnaire of Module 2	20%	2	0.08	CM17, CM18, KM25, KM26, SM25, SM28
Questionnaire of Module 1	20%	0	0	CM17, CM18, KM25, KM26, SM25, SM28
Prior knowledge of activities to practical sessions	10%	0	0	CM18, KM25

Laboratory work performance during the Integrated practice	6%	0	0	CM17, SM26
Test type questionnaire of Module 3	20%	1	0.04	CM17, CM18, KM25, KM26, SM25, SM28
Integrated practice's test type questionnaire	24%	1.5	0.06	CM17, CM18, KM25, KM26, SM26, SM28

The evaluation of the subject is continuous and distributed in the different sections:

MODULE 1:

The assessment is through a questionnaire referred to sessions 1, 2, and 3. This questionnaire must be submitted when indicated by the teaching staff. To pass this module the qualification obtained in the questionnaire must be equal to or greater than 5.

MODULE 2:

A questionnaire is made at the end of the practical sessions. The questionnaire allows for assessing if the student has reached the competencies associated with the module. To pass this module the obtained score in the questionnaire must be equal to or greater than 5.

MODULE 3:

This module is assessed by conducting a questionnaire at the end of session 12. To pass this module the score obtained in the questionnaire must be equal to or greater than 5.

INTEGRATED PRACTICE:

The assessment of integrated practice is composed of two distinct aspects:

- A) 8 points out of 10 come from the qualification obtained in a questionnaire.
- B) 2 points out of 10 are obtained by the achievement in the laboratory of the objectives set in each session.

To pass this module, the final qualification must be equal to or greater than 5.

PRIOR KNOWLEDGE OF ACTIVITIES TO PRACTICAL SESSIONS:

This section takes into account the prior knowledge of the students before beginning the practical session that derives from the previous comprehensive reading of the practice manual.

The assessment is done using random questionnaires delivered at the beginning of some sessions. The final grade of this section is the average grade of the different tests carried out.

The final grade of the subject is the weighted average of the grades obtained in each of the different sections taking into account that each module will represent 20% of the final grade of the subject and the integrated practice will correspond to 30%. The remaining 10% depends on the qualification obtained in the previous knowledge section.

Note that it is possible to penalize with a maximum of 40% with respect to 100% of the final qualification of the subject incorrect attitudes of the student in the laboratory such as lack of punctuality, not performing autonomous work indicated by the teacher, non-respectful behavior with colleagues or teachers, improper use of laboratory equipment and equipment, etc.

To pass the course you must obtain a final grade equal to or greater than 5, being necessary to overcome each of the modules and the integrated practice.

Students who do not pass the evaluation of the different modules or the integrated practice should perform the scheduled retake examination at the end of the semester, opting for a maximum score of 8 points on the 10 possible of recovered module(s).

Students who do not obtain the minimum qualification required to pass each of the integrated laboratory modules will not pass the subject. In this case, the maximum final grade for the subject will be 4.

In the second enrollment, the students can only perform the non-passed modules. The students should contact the coordinator of their pending module(s). In the case they pass the module(s) in this new enrollment, the final grade of the course will be the weighted average of the grades of the passed module(s) in this academic year with those of passed module(s) in previous registrations. In case of not overcoming the module(s), the maximum final grade of the subject will be 4.

Given that attendance at the scheduled activities is mandatory, absence from any of them must be justified and communicated to the person in charge of the subject and to the coordinator of the Degree as defined in the Methodology section. To pass the subject, a global attendance of at least 80% of the scheduled sessions is required, as well as obtaining the minimum mark set for each module. Therefore, it is considered that a student obtains the qualification of "not evaluable" when he has attended less than 80% of the scheduled sessions.

SINGLE ASSESSMENT:

The students who take advantage of the single evaluation must attend the laboratory sessions scheduled in the degree calendar since these are compulsory. The single evaluation consists of a test, which will be divided into four questionnaires on the contents covered in modules 1, 2, 3, and the integrated practice. Each of the questionnaires will have a score of 10 points and it will be necessary to obtain a grade equal to or greater than 5 in each of them to pass it and therefore pass the subject. The final mark of this will be the weighted average of the four parts of the test, where the mark of the questionnaires of modules 1, 2, and 3 will have a relative weight of 22% each, while the part associated with the integrated practice will correspond to 34% of the total subject. In case of not passing any of the modules, a recovery evaluation will be scheduled under the same conditions as the former. It will be necessary to pass each module separately in order to average the qualification, which in all cases must be equal to or greater than 5.

Use of Artificial Intelligence (AI):

For this course, the use of AI is permitted solely for support tasks, such as literature or information searches, text correction or translation, or other uses as determined by the instructor.

Students must clearly indicate which parts were generated using AI, specify the tools used, and include a critical reflection on how these tools influenced both the process and the final outcome.

Failure to transparently disclose the use of AI in an assessed activity will be considered academic dishonesty and may result in partial or total penalization of the activity grade, or more severe sanctions in serious cases.

Any irregularity committed during an assessment activity (academic fraud, plagiarism, or misuse of Artificial Intelligence, unless explicitly authorized in the course guide) that could lead to a significant change in the grade will result in a mark of 0 for that assessment activity. If the course guide establishes that obtaining a minimum grade in that activity is a mandatory requirement for passing the course, or if multiple irregularities occur within the same course, the final grade for the course will be 0. In addition, disciplinary proceedings may be initiated against the student.

Bibliography

Students will have a practice manual of the course that details the objectives of each session along with the protocols that will be used. Also in the dossier, will be recorded the bibliography associated to each one of the different sessions.

Software

The usual Microsoft environment programs will be used.

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
(PAUL) Classroom practices	721	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	721	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	721	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	722	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	722	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	723	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	723	Catalan/Spanish	first semester	morning-mixed