

Degree programme	Type	Course
Microbiology	OB	3

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Group languages

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

Prerequisites

There are no official prerequisites, however:

- Students are advised to review the scientific-theoretical contents on which this subject is based.
- It is convenient to be attending simultaneously or has taken the subjects of Clinical Microbiology, Food Microbiology, and Molecular Microbiology.
- The student must have passed the safety and biosecurity tests in the laboratories. The test is answered in the corresponding educational space of the UAB intranet. The pdf documents generated when passing the tests must be delivered to the teacher on the first day of class. The student needs to be informed and to accept the rules of operation of the laboratories of the Faculty of Biosciences.
- It is essential to wear a coat and safety glasses. If not, the student will not allow access to the laboratory.

Objectives

This is a compulsory subject of the Microbiology Degree, which introduces students both in the use of a set of analytical techniques in the field of health and food as in the genetic manipulation of microorganisms and in the

application of microbiology of other molecular techniques associated with the subject of Molecular Microbiology.

The specific training objectives to achieve from this subject are the following:

- Apply different techniques for the isolation and/or identification of indicator and pathogenic microorganisms in the clinical, food and plant health field.
- To use methodologies for the incorporation of exogenous DNA into bacteria.
- Distinguish the use of different microbial vectors and their application in genetic manipulation and the study, at the molecular level, of microorganisms.
- Identify mutagenesis and recombination processes to obtain new bacterial strains.
- To use tools based on genetic fusions for the quantification of the expression of bacterial genes or for the determination of the interaction between two proteins.
- Provide the student autonomy within a Microbiology laboratory and the ability to design experimental processes aimed at solving a given problem, thus integrating all the theoretical and practical knowledge acquired.

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.
- SM27 (Develop appropriate methodologies to sample, characterise and manipulate microbial populations and communities in natural and artificial ecosystems.) Develop appropriate methodologies to sample, characterise and manipulate microbial populations and communities in natural and artificial ecosystems.
- 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 is organized in two different modules that are carried out intensively according to the detailed

schedule showed in the calendar of the Microbiology degree (UAB intranet).

The contents of each of the two modules are the following:

Analytical Module

- Serological techniques for the diagnosis of infectious diseases
- Chromatographic tools for the identification of microorganisms
- Molecular methods for the identification of pathogens
- Diagnosis of parasitic infections
- Antimicrobial sensitivity test
- Study of fungi (recognition of fungi of biosanitary interest, food, etc.)
- Food safety: detection of indicators and pathogens

Molecular Module

The molecular module is organized in two parts including different content and methodology.

SECTION I: Practical sessions

Duration: 5 sessions. This section allows the student to know the basic techniques of DNA transfer in bacteria, mutagenesis mechanisms commonly used for the genetic modification of prokaryotes and procedures that facilitate the study and determination of gene expression and its regulation in bacteria. All these contents will be grouped in 3 practices that are listed below.

Practice 1: Construction of a bacterial vaccine

Practice 2: Application of genetic fusions with gene indicators for the study of gene expression

Practice 3: Random mutagenesis by using transposons

SECTION II: Autonomous resolution of a practical case

Duration: 4 sessions. In this case, the student will design and execute autonomously, under the supervision of the teacher, an experimental procedure to solve a practical case.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Study	8.5	0.34	CM18, KM26, SM28
Reading of the practices Guide	3	0.12	CM17, CM18, KM25, KM26
Laboratory introduction	1	0.04	CM17, CM18, KM25, KM26, SM25
classroom supervision	3	0.12	CM17, CM18, KM25, KM26, SM25, SM26, SM27, SM28
Written reports	8.5	0.34	CM17, CM18, KM25, KM26, SM25, SM28
Practical sessions	49	1.96	CM17, CM18, KM25, KM26, SM25, SM26, SM27, SM28

The subject will be taught in the laboratory and in small groups of students.

For each session is mandatory for the student to bring their own lab coat, lab glasses and the Guide that will be available on the UAB intranet or where the teacher indicates. The student also has to bring a notebook with sewed sheets, where each student will write down the observations made.

The students will have Guide of the subject before starting the classes. In order to achieve good performance and acquire the competences corresponding to this subject, it is essential that the student makes a comprehensive reading of the subject's Guide, familiarizing with the practices that will be carried out in each session as well as with the methodology that will be applied in each case.

At the beginning of each session, the teacher will make a brief theoretical explanation of the content of the practice and the experiments to be carried out by the students, as well as the specific security and biosafety measures and the treatment of the different chemical and biological waste generated.

In the case of Section II of the Molecular Module, the methodology of the puzzle will be applied. The students will receive at the beginning of the course the bibliography necessary for the resolution of the practical case. Working groups and expert groups will be established. In this section the students, under the supervision of the teachers, will define the activities to be carried out to solve the cases raised.

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
Written tests	40%	1.5	0.06	CM18, KM25, KM26
Laboratory work	17,5%	0	0	CM17, CM18, KM25, KM26, SM25, SM26, SM27, SM28
Written reports	37,5%	0	0	CM17, CM18, KM25, KM26, SM25
Oral tests	5%	0.5	0.02	CM17, CM18, KM25, KM26

The evaluation of the subject will be continued. Each of the modules will represent 50% of the final mark of the subject. The specific assessment of each module will be done in the following way:

Analytical module

The evaluation of the analytical module will be carried out in two different parts:

Assessment SECTION I: Individual presentation of a technical report about the work carried out (45% of the final score of the module). The report will assess the ability to integrate concepts (application of theoretical knowledge in practice), experimental design, interpretation of the results obtained and the capacity for synthesis. Each of these parameters will represent 25% of the report's note. The report must be submitted the week after the end of the sessions of SECTION I. Also in this section, the work carried out in the laboratory will be considered: autonomy, the initiative at work and the ability to work in conditions of safety, biosafety and quality in Microbiology (5% of the note in SECTION I).

Assessment SECTION II: Individual written multiple-choice test and/or short questions (45% of the final score of the module). The written test will be done on the last day of practices of the first week of the module. The other 5% of the qualification in SECTION II will consider the work done in the laboratory: autonomy, initiative at work and the ability to work in conditions of safety, biosafety and quality in microbiology.

In addition, the attitude of the student in the laboratory will be evaluated, punctuality, material previously worked at home by the student, as well as his/her work in the laboratory. This evaluation can mean a penalty of up to 20% compared to 100% of the final mark of the analytical module.

To pass this module, it will be necessary to pass each section with a score equal to or greater than 5. Students who do not pass one or both of the module's assessments can retrieve them on the scheduled date at the end of the semester by performing a written test.

Molecular module

The evaluation of the molecular module will be carried out in two differentiated parts

Assessment SECTION I: In the evaluation of this section, two aspects will be taken into account, on the one hand, the qualification obtained in a test that each group will perform during the last session and that will represent 35% of the final mark of the module. On the other hand, the achievement of the goals scored and the work done in each of the sessions will be valued, representing this part 15% of the total module.

Assessment SECTION II: In this section, 10% of the total module will be determined by the achievement of the marked objectives and the work done in the laboratory. Another 10% will correspond to an oral test to be held in the last practical session. The remaining 30% will correspond to the completion of a report on the resolution of the practical case. The delivery of the report is mandatory and will take place at the end of the following week after the conclusion of the section II sessions. The performance of the report must follow the guidelines that are explained in a document that is accessible on the Virtual Campus of the subject.

To pass this module, it will be necessary to pass each section with a score equal to or greater than 5. Students who do not pass one or both of the module's assessments can retrieve them, on the scheduled date at the end of the semester, by performing an associated written test to the sessions that did not exceed previously.

On the other hand, and as in the analytical module, a maximum of 20% will be penalized with respect to 100% of the final mark of the molecular module. Untruthful attitudes of the student in a laboratory, such as impropriety, non-compliance with the regulations of security or biosecurity, the non-work of autonomous work (outside the sessions) indicated by the teaching staff.

The final grade of the subject will be calculated as the weighted average of the marks reached in each one of the modules that make up this subject, being a necessary condition to pass each one of the modules with a note greater than or equal to 5.

In order to acquire the specific competences of the subject, attendance to the practical classes is mandatory. In the case that a student for a justified and unpredictable cause does not attend to a session/s, he must notify the teacher responsible for the subject and submit the corresponding proof as soon as possible. Health problems are justified (the corresponding medical justification must be attached) or serious personal problems (death of a second-degree relative, accident, an official sport competition, etc.) as is considered in the rules of the Faculty. Since attendance to the programmed activities in this subject is mandatory, in order to be able to pass it, a global attendance of at least 80% of the scheduled sessions is required and the minimum established score is required.

The student will obtain the \"Non-Valuable\" qualification when he/she has attended less than 80% of the programmed sessions. Students who do not obtain the minimum qualification required to be able to pass each one of the modules of the Integrated Laboratory V, will not approve the subject. In this case, the maximum final grade of the subject will be 4. From the second course, the repeating students may only be evaluated the concrete modules that were not passed in previous courses. In the case of passing the modules in this new course, the final mark of the subject will be the weighted average of the mark of the module/s passed in this academic course with the mark/s of the modules passed in previous courses. In the case of not approving the pending modules, the maximum final grade of the subject will be 4.

Single assessment

The students who choose the single assessment must do the laboratory practices in face-to-face sessions since they are mandatory teaching activities.

The single assessment consists of a final exam that may contain multiple choice questions, short questions and/or problems to develop on theoretical and practical contents of the subject. This final assessment will correspond to the written tests of the Section II of the Analytical Module (45% of the final score of the module) and the test of the Section I of the Molecular Module (35% of the final mark of the module).

This single assessment test will be held coinciding with the same date for the last continuous assessment test. The same criterion will be applied to pass the subject as for the continuous assessment.

The continuous assessment of the individual and teamwork, the daily follow-up of the laboratory notebook, the oral exam of the Molecular Module, and the written reports of the Analytical and Molecular Modules will be done on the same dates set for the continuous assessment.

The same retake system as for the continuous assessment will be applied. The revision of the final qualification follows the same procedure as for the continuous assessment.

Use of Artificial Intelligence

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

Any irregularity committed in an assessment activity (academic fraud, plagiarism, or improper use of AI, unless such use is expressly authorized in the course guide) that may lead to a significant alteration of the grade will result in that assessment being graded with a 0.

If the course guide stipulates that obtaining a minimum grade in this assessment activity 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 commits any of these irregularities.

Bibliography

The students will have a Guide of the subject where the objectives of each session will be detailed together with the protocols that will be used. The literature associated with each of the different sessions will also be recorded in the Guide.

Software

No specific software is needed in this subject.

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	731	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	731	Catalan	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	731	Catalan	first semester	afternoon
(PLAB) Practical laboratories	732	Catalan	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	732	Catalan	first semester	afternoon
(PLAB) Practical laboratories	733	Catalan	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	733	Catalan	first semester	afternoon