

Degree programme	Type	Course
Environmental Sciences	OP	4

Contact lecturer

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Prerequisites

It is necessary to know Catalan or Spanish as the different teaching activities are taught in these languages.

Although there are no official prerequisites, students are advised to review concepts that refer to the microbial world, previously studied in the Microbiology and Microbial.

Group languages

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

Objectives

Environmental Microbiology is an optional course, of the degree of Environmental Sciences. It is a diverse discipline that ranges from the study of pathogens in drinking water to the relationship between microorganisms and geochemistry. Microorganisms are intimately involved in the geochemical cycles, transport, and transformations of the elements in nature, including pollutants. Learning and understanding these processes allow us to use microorganisms to solve environmental problems.

The objectives of the subject are:

- . Describe the role of microorganisms as agents of environmental change
- . Recognize microorganisms as indicators of alteration of an ecosystem
- . Identify microbial processes aimed at solving environmental problems.

Learning outcomes

- CM40 (Interpret the relationships between microbial dynamics and the different processes of pollution and/or affectation of the natural environment.) Interpret the relationships between microbial dynamics and the different processes of pollution and/or affectation of the natural environment.
- KM51 (Identify organisms and biological processes in their environmental context.) Identify organisms and biological processes in their environmental context.
- KM52 (Identify the basic aspects that play a role in the dynamics and relationships between biological populations within natural system management.) Identify the basic aspects that play a role in the dynamics and relationships between biological populations within natural system management.
- SM51 (Safely use techniques and instruments for the analysis of biological samples in the field and/or laboratory.) Safely use techniques and instruments for the analysis of biological samples in the field and/or laboratory.

Contents

1. Introduction to Environmental Microbiology
2. Aerobiology: The atmosphere. Bioaerosol dispersion. Methods in aerobiology.
3. Microbial interactions with inorganic pollutants: Nitrates. Acid mine drainage. Heavy metals.
4. Biofilms: Surface colonization. Biofilm structure. Biofouling. Biodeterioration. Biotechnological applications.
5. Drinking water: Treatment. Water quality testing. Waterborne microbial diseases
6. Biological treatment of solid and liquid wastes: Landfills. Composting. Anaerobic digestion of solid waste. Wastewater treatment.
7. Biodegradation and bioremediation of organic pollutants
8. Biological control of pathogens and pests

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Individual Study	45	1.8	CM40, KM51, KM52
Laboratory work	16	0.64	CM40, KM51, KM52, SM51
Lectures	30	1.2	CM40, KM51, KM52
Tutorials	3	0.12	CM40, KM51, KM52
Preparation laboratory work	15	0.6	CM40, KM51, KM52
Organised visits	4	0.16	CM40, KM52
Bibliographic search	15	0.6	CM40, KM51, KM52
Individual reading	16	0.64	CM40, KM51, KM52

Teaching methodology and training activities

The course of Environmental Microbiology consists of three modules, which have been programmed in an integrated way, so the student will have to relate throughout the course the content and activities programmed in order to achieve the skills indicated in this Guide. The three modules are the following:

Theoretical lectures: Within this module, lectures represent the main activity to be carried out in the classroom and allow to transmit basic concepts to a large number of students in relatively short time. They will be complemented with Power Point presentations and diverse teaching material that will be delivered to the students through the Moodle space.

Laboratory work: The objectives of these activities are:

- A) facilitate the understanding of the knowledge exposed in the theoretical lectures

B) acquire manual skills

C) to interpret the results

D) integrate theoretical and practical knowledge

Attendance at the laboratory work is mandatory in order to be able to acquire the skills of the subject. For attending the laboratory classes it is necessary that the student pass the biosafety and safety tests that will be found in the Moodle space and to know and accept the working rules of the laboratories of the Faculty of Biosciences. In addition, he/she must comply with the regulations of work in a laboratory of Microbiology that he/she will find indicated in the Practical Handbook.

In order to achieve a good performance and to acquire the skills corresponding to this activity it is essential that the student makes a comprehensive reading of the practices proposed before their completion.

Organised visits. A visit to wastewater treatment plant have been programmed in order to bring the student closer to a real situations. This is a mandatory activity.

Additional information:

In order to support the training activities indicated above, students will be able to take individual tutorials with the teaching staff.

For a good follow-up of the course, the student will have in the Moodle space all the documentation indicated in the previous points.

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
Theory assesement: part 2	0,08	2	0.08	CM40, KM51, KM52
Laboratory work assesement	0,08	2	0.08	CM40, KM51, KM52, SM51
Theory assesement: part 1	0,08	2	0.08	CM40, KM51, KM52

Continuous evaluation

The modules that can be evaluated in the subject are two: theory and practices. Attendance to the organised visit is a mandatory activity.

The assessment of the course will be individual through the following tests:

Assessment of the theoretical classes module (70% of the global mark): During the course, two written tests of evaluation of this module, which are eliminatory, will be programmed. Each of the exams will have a weight of 35% of the global mark, but it will only be averaged if the score of the tests is greater than 4, otherwise the student will have to re-assess modul in the scheduled date for the retake of the course at the end of the semester.

Each test will consist of multiple choice and / or true / false test questions, which will allow to evaluate a large part of the subject; and/or short answer questions aimed at assessing whether the key conceptual objectives have been achieved.

Assessment of the laboratory work module (30% of the overall mark). The evaluation of this activity will consist of two tests:

A) Practical skill, which will consist of the delivery of different practical results to the teacher during each laboratory session (10%).

B) Written exam, solving problems related with the work done in the laboratory (20%).

Final considerations:

To pass the course you must obtain a score of 5 or higher in each module and assist to the organised visit. Non attendance to the visit implies no overcome the subject

Students who do not pass any of the written tests of the modules will be able to retake them in the scheduled date for the assessment of the subject at the end of the semester, as long as they have been evaluated in a minimum of 2/3 of these activities. The re-assessment of the theory module will be done in a single written global test.

Also on this same date, students wishing to improve their grade may present to an overall examination of the course, which will include questions from all three modules. In this case, the presentation of the student in the re-assessment examination involves the renunciation of the qualification previously obtained. Students who wish to take the grade improvement test must communicate this in writing, via email, on the date established by the teaching staff.

It will be considered that a student will obtain the Non-Evaluable qualification if he / she carries out less than 2/3 of the evaluation activities.

Any irregularity in an assessment act (academic fraud, plagiarism or improper use of AI, unless this use is expressly authorized in the teaching guide), which may lead to a significant variation in the grade, means that this act will be graded with a 0. In the event that the teaching guide provides that in order to pass the subject it is an essential requirement to have obtained a minimum grade in this assessment act or that several irregularities occur in the assessment acts of the same subject, the final grade for this subject is 0. Apart from this, a disciplinary process may be initiated against the student who incurs any of these irregularities.

Single assessment

The single assessment consists of a single summary test in which the contents of the entire theory program of the subject will be assessed. The test will consist of short-answer questions aimed at assessing whether the key conceptual objectives of the subject have been achieved and multiple-choice and/or true/false test-type questions, which will allow a large part of the content to be assessed. The grade obtained in this synthesis test will account for 70% of the overall grade for the subject and must be equal to or greater than 5. The single assessment will take place on the same day as the 2nd part of the subject.

The evaluation of the laboratory work and organized visit module will follow the same process as the continuous evaluation. The grade obtained will account for 30% of the final grade of the subject. The practice module is compulsory attendance at all sessions as well as the field trip. It is a requirement to have passed the internship module (grade 5 or higher) and to have attended the field trip to take the single assessment test.

Bibliography

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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