Universitat Autònoma de Barcelona

2021/2022

Environmental Microbiology

Code: 100824
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

Exceptionally some classes may be taught in a non-vehicular language

Teachers

Maria Ramos Martínez Alonso
Jordi Mas Castella

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 Ecology courses.

Objectives and Contextualisation

The Environmental Microbiology is an optional course, of the degree of Environmental Biology. 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 tranformations 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:

. Understand the role of microorganisms as agents of environmental change
. Recognize microorganisms as indicators of alteration of an ecosystem
. Understand microbial processes aimed to solve environmental problems.

Competences

- Develop analysis and synthesis skills.
- Develop bioassays and apply biotechnological processes.
- Diagnose and solve environmental problems regarding the biological environment.
- Identify and use bioindicators.
- Obtain information, design experiments and interpret results.

Learning Outcomes

1. Apply knowledge of the biology and distribution of certain species of microorganisms, principally bacteria, in order to use them as bioindicators of contamination and other environmental impacts.
2. Apply the metabolic processes of microorganisms, principally bacteria, to industrial processes related to the environment.
3. Develop analysis and synthesis skills.
4. Obtain information, design experiments and interpret results.
5. Recognise and use the properties of microorganisms, principally bacteria, to remedy problems of contamination and other environmental impacts.

Content

1. Introduction to Environmental Microbiology

2. Aerobiology: The atmosphere. Bioaerosol dispersion. Methods in aerobiology.

3. Microbial interactions with inorganic pollutans: 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 pollutans

8. Biological control of pathogens and pests

*Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.

Methodology

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: 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 find 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.

*The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory work	16	0.64	1, 2, 3, 4, 5
Lectures	28	1.12	1, 2, 5
Organised isits	4	0.16	1, 5
Type: Supervised			
Tutorials	3	0.12	1, 2, 5
Type: Autonomous			
Bibliographic search	17	0.68	4
Individual reading	16	0.64	4

Individual study	45	1.8	1, 2, 3, 4, 5
Preparation of Laboratory work	15	0.6	1, 3, 4, 5

Assessment

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 two types of questions:

Short answer questions aimed at assessing whether the key conceptual objectives have been achieved.

Multiple choice and / or true / false test questions, which will allow to evaluate a large part of the subject.

Assessment of the laboratory work module (20% 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

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

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.

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.

*Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Laboratory work assessment	30%	2	0.08	1, 4, 5
Theory assessment: Part 1	35%	2	0.08	1, 2, 3, 5

Theory assessment: Part 2	35%	2	0.08	1, 2, 3, 5

Bibliography

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Software

No specific software is needed in this subject.