UAB
Universitat Autònoma de Barcelona

Microbial Physiology and Metabolism

2026/2027

Code: 101019
Credits: 6

Degree programme	Type	Course
Microbiology	OB	2

Contact lecturer

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Group languages

You can consult this information at the end of the document.

Prerequisites

Students must have successfully completed Microbiology and Biochemistry from the Microbiology degree, or subjects of equivalent content.

Objectives

The aim of this course is to provide students with an integrated understanding of the processes that govern the growth of prokaryotic cells and their adaptation to changing environments. The first part of the course introduces the main components involved in cellular construction and growth, including biosynthesis, macromolecular polymerization, structure formation, transport processes, and secretion. The course then examines the different mechanisms by which prokaryotic cells obtain the energy required to sustain these processes. In this section, students learn to predict the feasibility of specific metabolic reactions and to determine the energetic yield of different metabolic strategies. Throughout the course, students are introduced to tools for the analysis of annotated prokaryotic genomes, enabling them to explore the metabolic capabilities, growth mechanisms, and adaptive strategies of different microorganisms using genomic information available in public repositories.

Learning outcomes

- CM09 (Critically review the scientific contributions of women to the study of microorganisms and other sciences related to microbiology.) Critically review the scientific contributions of women to the study of microorganisms and other sciences related to microbiology.
- CM10 (Integrate knowledge and skills from the field of microbiology, working individually and in groups to prepare and present in writing or orally and publicly a scientific work either in English or in one's own language.) Integrate knowledge and skills from the field of microbiology, working individually and in groups to prepare and present in writing or orally and publicly a scientific work either in English or in one's own language.
- KM15 (Describe the metabolic and functional diversity of the microbial world, distinguishing the characteristics that define the different taxonomic groups.) Describe the metabolic and functional diversity of the microbial world, distinguishing the characteristics that define the different taxonomic groups.
- SM13 (Relate the basic genetic components, structures and processes of replicative microorganisms and entities with their functions and the different ecophysiological mechanisms of adaptation to their environment.) Relate the basic genetic components, structures and processes of replicative microorganisms and entities with their functions and the different ecophysiological mechanisms of adaptation to their environment.

Contents

1.- Composition of the bacterial cell.

2.- Diversity and relative abundance of cellular components

3.- Cellular Envelopes

4.- Structure and formation of the cytoplasm components.

5.- Protein secretion i prokaryotes.

6.- Energetic cost of cellular construction

7.- Bioenergetics and electron transport chains

8.- Use of organic substrates

9.- Fermentative metabolism

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Tutorial	5	0.2	CM09, CM10, KM15, SM13
Problem-solving sessions	10	0.4	CM09, CM10, KM15, SM13
Literature search	20	0.8	CM09, CM10, KM15, SM13
Theory lectures	30	1.2	CM09, CM10, KM15, SM13
Seminars	5	0.2	CM09, CM10, KM15, SM13
Study	31	1.24	CM09, CM10, KM15, SM13
Problem solving	25	1	CM09, CM10, KM15, SM13
Text readings	20	0.8	CM09, CM10, KM15, SM13

Teaching is organized through a combination of lectures, problem-solving sessions, and participatory seminars.

Lectures. The lectures are designed to enable students to progressively acquire the knowledge required to develop a structured understanding of the functioning of prokaryotic cells. Course contents are delivered in the classroom using teaching materials made available to students through the Moodle virtual learning environment.

Problem-solving sessions. These sessions are devoted to the interactive application, together with the instructor, of the tools and concepts associated with the more practical aspects of the course. They are conducted in smaller groups than the lecture sessions to encourage active participation.

Seminars. The seminars consist of supervised discussions of selected scientific articles related to the course contents. The articles are distributed in advance together with a questionnaire based on their content. Students are required to complete and submit the questionnaire before the seminar discussion takes place.

In this course, the use of Artificial Intelligence (AI) technologies is permitted as part of the learning process, provided that the final work reflects a substantial contribution by the student in terms of analysis and critical reflection. Students must clearly identify any content generated using AI, specify the tools employed, and include a critical reflection on how these technologies influenced both the development process and the final outcome of the activity. Failure to disclose the use of AI will be considered a breach of academic integrity and may result in a reduction of the activity grade or more severe disciplinary measures, depending on the seriousness of the 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
Participation in programmed activities	10%	0	0	CM09, CM10, KM15, SM13
Exam 1. Theory (60%) + Seminars (40%)	45%	2	0.08	CM09, CM10, KM15, SM13
Exam 2. Theory (60%) + Problems (40%)	45%	2	0.08	CM09, CM10, KM15, SM13

Assessment will be carried out through two exams each contributing 45% of the final grade. Each of the exams will cover theory (60% weight) and problem-solving (40% weight) contents. The remaining 10% of the grade will complement the exam scores only if both exams have been successfully passed, and will be based on the level of participation in the problem-solving sessions, requiring the completion of the assigned tasks within the established deadlines. To pass the subject the student must obtain 5 or higher in each exam. If the event of failing to pass any of the exams, a reassessment exam is scheduled at the end of the semester. To participate in the reassessment exam, students must have been previously assessed in a set of activities the weight of which equals a minimum of two thirds of the total grade of the subject or module. Students will obtain the \"Not Evaluable\" qualification when the evaluation activities carried out have a weight lower than 67% of the final grade. Students that, having passed the exams, want to improve their grades may also take the reassessment exam. In the event of taking the reassessment exam, students implicitly renounce to their previously obtained grades.

Any irregularity committed during an assessment activity (including academic fraud, plagiarism, or the unauthorized use of AI, unless such use is explicitly permitted in the course guide) that may lead to a

significant alteration of the assessment outcome will result in a grade of 0 for that assessment activity. If the course guide establishes that obtaining a minimum grade in that assessment activity is a compulsory requirement for passing the course, or if multiple irregularities are detected in different assessment activities within the same course, the final course grade will be 0. Furthermore, disciplinary actions may be initiated against any student found to have committed such irregularities.

SINGLE ASSESSMENT

Single common exam that includes both, theory and questions corresponding to classroom practices. The single assessment consists of a single exam that includes the contents of the entire theory program with a weight of 60% and seminars/problem-solving with a weight of 40%. The grade obtained in this exam constitutes 90% of the final grade of the subject. The remaining 10% corresponds to the evidence of classroom practices.

The delivery of evidence corresponding to seminars/problem-solving will follow the same procedure followed for the continuous assessment. The single assessment exam will be performed in the same date fixed in the calendar for the last continuous assessment exam and the same recovery system will be applied as for continuous assessment. The same criterion for \"not assessable\" will be applied as in continuous assessment.

Bibliography

Brock Biology of Microorganisms, Global Edition (16a. ed.) 2021. By: Michael T. Madigan, Jennifer Aiyer, Daniel Buckley, W. Sattley, David Stahl. Pearson Educación. ISBN: 978-1-292-40479-0, ebook ISBN: 978-1-292-40506-3.

https://bibcercador.uab.cat/permalink/34CSUC_UAB/avjcib/alma991010567908206709

Software

There is no specific software associated with 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
(TE) Theory	72	Catalan	first semester	morning-mixed
(SEM) Seminars	721	Catalan	first semester	afternoon
(SEM) Seminars	722	Catalan	first semester	afternoon