UAB
Universitat Autònoma de Barcelona

Microbial Physiology and Metabolism

Code: 101019
ECTS Credits: 6

2025/2026

Degree	Type	Year
Microbiology	OB	2

Contact

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Teaching groups languages

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

Prerequisites

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

Objectives and Contextualisation

The aim of the course is to provide the student with an overall vision of the operation of the different processes that allow growth of prokaryotic cells as well as their adaptation to a changing environment. In the first part of the course, the main elements of the process of structure building and cell growth are presented hierarchically: biosynthesis, polymerization of macromolecules, formation of structures, transport and secretion processes. Emphasis is made in the quantitative assessment of the impact of thiese processes on global growth expenditure. The subject describes the different mechanisms of energy generation necessary to cover growth expenses. In this part, students learn how to make predictions about the viability of certain metabolic reactions, as well as the tools to determine the energy performance of different types of metabolism. Finally, the student is introduced to some of the elements needed to carry out microbial physiology studies: work with continuous bioreactors, analysis of metabolic budgets and calculation of metabolic rates from steady state data.

Learning Outcomes

1. CM09 (Competence) Critically review the scientific contributions of women to the study of microorganisms and other sciences related to microbiology.
2. CM10 (Competence) 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.
3. KM15 (Knowledge) Describe the metabolic and functional diversity of the microbial world, distinguishing the characteristics that define the different taxonomic groups.
4. SM13 (Skill) 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.

Content

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

Activities and Methodology

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

Teaching is carried out through a combination of theory lectures, problem solving sessions, and seminars.

Theory lectures. The theory classes are designed to allow the student to incorporate the elements required to achieve a structured knowledge of the prokaryotic cell function. The contents are taught in the classroom using teaching resources available to the student through moodle.

Problem-solving sessions. These sessions are strictly dedicated to work out, interactively and in small groups, procedures aimed at determining the coherence of experimental data, making metabolic balances and formulating predictions about the viability of different types of metabolism.

Seminars. In the seminars, students carry out a supervised discussion of selected scientific articles related to the content of the subject. The articles are distributed previously together with a questionnaire related to their content. Questionnaires must be completed and delivered before the start of the seminar.

In this course, the use of Artificial Intelligence (AI) technologies is allowed as part of the work development, provided that the final outcome clearly demonstrates the student's meaningful contribution through personal analysis and reflection. Students must clearly indicate which parts were generated using AI, specify the tools employed, and include a critical reflection on how these tools influenced both the process and the final result. Failure to be transparent about the use of AI will be considered a breach of academic integrity and may result in a grade penalty or more severe sanctions in serious cases.

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

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
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
Participation in programmed activities	10%	0	0	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.

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.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(SEM) Seminars	721	Catalan	first semester	afternoon
(SEM) Seminars	722	Catalan	first semester	afternoon
(TE) Theory	72	Catalan	first semester	afternoon