

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

There are no official prerequisites; however, it is advisable for students to review the concepts that refer to the microbial world, studied previously.

Objectives

This is a compulsory course in the second year of the Degree in Microbiology, which introduces students to the basic knowledge of prokaryotic diversity, with special emphasis on the structural and ecophysiological characteristics of the large prokaryotic groups we know, and their importance.

The main objective of the course is to provide basic training for the study of the microbial diversity, physiology, and metabolism of the main prokaryotic groups.

The specific objectives of the course are the following:

- Recognize the diversity of prokaryotic microorganisms
- Identify the principles of classical and molecular taxonomy.
- Distinguish the characteristics that define the different taxonomic groups, their structural particularities, their ecophysiological characteristics, and their importance.
- Apply the knowledge studied to carry out the identification and characterization of the main prokaryotic groups.

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.
- SM14 (Discover the role of microorganisms as causative agents of diseases in humans, animals and plants and the processes used to control them.) Discover the role of microorganisms as causative agents of diseases in humans, animals and plants and the processes used to control them.

Contents

THEORY

Unit 1. Introduction to prokaryotic diversity

What do we mean by prokaryotic diversity? Phylogeny and implications in taxonomy.

Unit 2. Microbial systematics

Classification, nomenclature and identification. Classification systems. Polyphasic taxonomy: phenotypic, genotypic and phylogenetic methods. Classification units. Species concept for prokaryotes. Bergey's Manual of Systematic Bacteriology. Culture collections.

Unit 3. Diversity of Bacteria I: The deep-branching bacterial **groups**

Bacterial groups adapted to life at high temperatures and high radiation. Ecophysiological characteristics and key genera.

Unit 4. Diversity of Bacteria II: **Cyanobacteriota**, **Chlorobiota**, **Chloroflexota**, **Planctomycetota**, **Spirochaetota**, **Bacteroidota**

General characteristics of the different groups, ecological importance and key genera.

Unit 5. Diversity of Bacteria III: **Pseudomonadota**, **Campylobacterota**, **Bdellovibrionota**, **Desulfobacterota**, **Myxococcota**

Morphological, physiological and metabolic diversity. Main members of the different groups and their significance.

Unit 6. Diversity of Bacteria IV: *Bacillota*, *Actinomycetota* and *Mycoplasmata*

Morphological and ecophysiological characteristics of the main groups and applied importance. Key genera.

Unit 7. Diversity of Archaea

Structural peculiarities of archaea. Phylogeny and metabolism. Main groups and key genera. Applied importance.

Unit 8. Extension of prokaryotic diversity

What do we know about the diversity of prokaryotes? Current tools available to assess the hidden diversity of bacteria and archaea. Phylogenetic groups dominated by uncultured microorganisms. Distribution and characterization.

SEMINARS

Introduction to identification techniques through the resolution of 6 practical cases:

- Methods of isolation of microorganisms
- Techniques of microscopic observation
- Methods for identification and characterization of microorganisms

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Bibliography search	5	0.2	CM09, KM15, SM13, SM14
Preparation of oral presentation	9	0.36	CM10, KM15, SM13, SM14
Individual/group tutorials	2	0.08	KM15, SM13, SM14
Learning consolidation: study	20	0.8	CM09, KM15, SM13, SM14
Theory lectures	18	0.72	CM09, KM15, SM13, SM14
Text reading	10	0.4	CM09, KM15, SM13, SM14
case-resolution seminars	6	0.24	CM10, KM15, SM13, SM14

The Diversity of Prokaryotes course consists of two modules, which have been programmed in an integrated way so that the student will have to relate throughout the course the content and activities programmed to achieve the indicated skills in the section of the same name of this guide.

Several learning strategies will be combined:

Theory classes. These master or expository classes represent the main activity to be performed in the classroom, and allow the acquisition of basic concepts by a large number of students, in relatively little time, attending these classes, which will have to be complemented with the study of the topics explained. For the teaching of each subject, presentations like PowerPoint and diverse teaching material will be used and delivered to the students.

Case-resolution Seminars. These are sessions of work for groups with a small number of students, based on working methodological aspects, through the study of practical cases. For the resolution of the practical cases, groups of 5 students will work on a specific case, which will be presented orally and, later, will be discussed in the classroom collectively. In this methodology, the teacher has a conductive role, through questions that encourage reflection and debate among students. Attendance at the seminar sessions is mandatory. In case of absence for unjustified reasons, there will be a penalty in the seminar module grade.

In these seminar activities, the use of Artificial Intelligence (AI) is permitted but in a restricted manner. Therefore, for this subject, the use of AI is allowed exclusively in support tasks, such as bibliographic or information searches, text correction or translations. The student must clearly identify which parts have been generated with this technology, specify the tools used and include a critical reflection on how these have influenced the process and the final result of the activity. The lack of transparency in the use of AI in this assessable activity will be considered a lack of academic honesty and may lead to a partial or total penalty in the grade of the activity, or greater sanctions in serious cases.

Tutorials. Tutorials can be done in groups or individually. The first ones will be programmed at the request of the students. The objective of these sessions is to resolve doubts, clarify concepts, establish the knowledge acquired, and facilitate the study of the students. They can also be used to solve doubts that students have about the preparation of practical cases. The sessions of tutorials will not be master classes. Likewise, the students will be able to perform individual tutorials in the offices of the teaching staff responsible for the course: Eloi Parladé (C3/411) and Maira Martínez Alonso (C3-329).

Additional information: Students will have at the Moodle space all the documentation delivered by the teacher for the good monitoring of the course. He / she will also be able to consult the teaching space of the Degree Coordination to obtain updated information.

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
Final exam	42	2	0.08	CM09, KM15, SM13, SM14
Midterm exam	28	1.5	0.06	CM09, KM15, SM13, SM14
Cas-resolution seminars assessment	30	1.5	0.06	CM09, CM10, KM15, SM13, SM14

The evaluation of the course will be individual and continued through the following tests:

Assessment of the theory lectures module (70% of the overall grade). Throughout the course two written tests will be scheduled, which will be cumulative; That is to say, the second test will include all the theoretical contents of the subject. The first test will have a weight of 40% and the second of 60%. If the student obtains in the second test a note superior to the first one, the final note of this module will be the one of the second test. Each test will include short answer questions and multiple-choice and/or true/false test questions.

Assessment of case-resolution seminars module (30% of the overall grade). The evaluation of this activity will consist of the following tests: a) Preparation and oral presentation of the practical case, in the class seminars, for each group of work, and b) Written tests consisting of multiple choice questions that will include the different aspects treated in the classes of seminars. These tests will have a weight of 6 and 4 points, over 10, respectively. Only the average will be considered if the score of a) and b) is equal or superior to 4.

Final Considerations:

- To pass the subject, you must obtain a qualification of 5 or higher in each module. Students who do not pass any of the modules will be able to retake them on the scheduled date for the final evaluation of the subject. The re-assessment of the theory module will consist of an overall examination of the subject matter that will include short answer questions and multiple-choice and/or true/false test questions. The re-assessment examination of the seminar module will involve a multiple-choice question test on the presentations of all practical cases worked in the seminar sessions.
- To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two-thirds of the final score of the course. Thus, the student will be graded as Non-evaluable if the weighing of all conducted evaluation activities is less than 67% of the final score.
- Students who can not attend an individual assessment test for a justified cause and provide the corresponding documentation will be entitled to take the test in question on another date.
- Students wishing to improve the final grade of the course will waive the qualification previously obtained, and all the written tests, corresponding to the different modules of the subject, will have to be examined, on the day set for the final evaluation.
- From the second enrolment, the repeating students will not have to carry out the activities, nor the evaluations of those skills that have been passed, corresponding to the case-resolution seminars module. That is, the mark obtained in this module will be saved, as long as they have been passed.

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 evaluation

This subject considers the single assessment system that 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, as well as 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 final grade for the subject and must be equal to or greater than 5 to average with the seminars module. The single assessment will be done on the same day as the subject's assessment 2.

The evaluation of the seminar 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 seminar module is compulsory attendance for all sessions. It is required to have passed the seminar module (grade of 5 or higher) to pass the subject.

Bibliography

Recommended books:

- Brown JW. 2015. Principles of microbial diversity. 1st ed. ASM Press.

- Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA. 2015. Brock Biología de los Microorganismos. 14ª ed. Pearson Education. Electronic resource.
- Madigan MT, Bender KS, Buckley DH, Sattley WM, Stahl DA. 2021. Brock Biology of Microorganisms. 16th ed. Pearson SA.
- Martín A, Béjar V, Gutiérrez JC, Llagostera M, Quesada E. 2019. Microbiología Esencial. 1ª ed. Editorial Médica Panamericana. Electronic resource.
- Ogunseitan O. 2008. Microbial diversity. Form and function in Prokaryotes. Blackwell Publishing. Electronic resource.
- Staley JT, Reysenbach AL. 2002. Biodiversity of microbial life: foundation of earth's biosphere. Willey-Liss, Inc, New York.
- Willey J, Sherwood LM, Woolverton CJ. 2009. Microbiología de Prescott, Harley y Klein. 7th ed. MacGraw-Hill.
- Willey JM, Sandman KM, Wood DH. 2023. Prescott's Microbiology. 12th ed. MacGraw-Hill.
- Willey JM, Sandman KM. 2021. Prescott's Principles of Microbiology. 2nd ed. MacGraw-Hill. Electronic resource.

Other useful reference books:

- The Prokaryotes.

Rosenberg E, DeLong EF, Lory S, Stackebrandt E, Thompson F (Editors). 2013-14. The Prokaryotes. Fourth Edition. 11 vol. Springer, New York. Electronic resource.

- Volume 1: The Prokaryotes: Prokaryotic Biology and Symbiotic Associations
- Volume 2: The Prokaryotes: Applied Bacteriology and Biotechnology
- Volume 3: The Prokaryotes: Prokaryotic Physiology and Biochemistry
- Volume 4: The Prokaryotes: Prokaryotic Communities and Ecophysiology
- Volume 5: The Prokaryotes: Human Microbiology
- Volume 6: The Prokaryotes: Alphaproteobacteria and Betaproteobacteria
- Volume 7: The Prokaryotes: Firmicutes and Tenericutes
- Volume 8: The Prokaryotes: Actinobacteria
- Volume 9: The Prokaryotes: Gammaproteobacteria
- Volume 10: The Prokaryotes: Deltaproteobacteria and Epsilonproteobacteria
- Volume 11: The Prokaryotes: Other Major Lineages of Bacteria and the Archaea

- The Prokaryotes: a handbook on the Biology of Bacteria

Dworkin M, Falkow S, Rosenberg E, Schleifer KH, Stackebrandt E (Editors). 2006. Third Edition. 7 vol. Springer, New York. Electronic resource.

- Volume 1: Symbiotic Associations, Biotechnology, Applied Microbiology
- Volume 2: Ecophysiology and Biochemistry
- Volume 3: Archaea. Bacteria: Firmicutes, Actinomycetes
- Volume 4: Bacteria: Firmicutes, Cyanobacteria
- Volume 5: Proteobacteria: Alpha and Beta Subclasses
- Volume 6: Proteobacteria: Gamma Subclass
- Volume 7: Proteobacteria: Delta and Epsilon Subclasses. Deeply Rooting Bacteria

- Bergey's Manual® of Systematic Bacteriology

Garrity G (Ed.) 2001-2012. Bergey's Manual of Systematic Bacteriology. Second Edition. 5 vol. Springer, New York.

Volume package:

- Volume 1: Boone DR, Castenholz RW (Eds.). 2001. Bergey's Manual of Systematic Bacteriology, Second Edition. Volume One: The Archaea and the Deeply Branching and Phototrophic Bacteria. Springer, New York.
- Volume 2: Brenner DJ, Krieg NR, Staley JT (Eds.). 2005. Bergey's Manual of Systematic Bacteriology, Second Edition, Volume Two: The Proteobacteria. Springer, New York.
- Volume 3: De Vos P, Garrity G, Jones D, Krieg NR, Ludwig W, Rainey FA, Schleifer K-H, Whitman WB (Eds.). 2009. Bergey's Manual of Systematic Bacteriology: Volume 3: The Firmicutes. Springer, New York.
- Volume 4: Krieg NR, Ludwig W, Whitman WB, Hedlund BP, Paster BJ, Staley JT, Ward N, Brown D (Eds.). 2010. Bergey's Manual of Systematic Bacteriology, Second Edition. Volume 4: The Bacteroidetes, Spirochaetes, Tenericutes (Mollicutes), Acidobacteria, Fibrobacteres, Fusobacteria, Dictyoglomi, Gemmatimonadetes, Lentisphaerae, Verrucomicrobia, Chlamydiae, and Planctomycetes. Springer, New York.
- Volume 5: Goodfellow M, Kämpfer P, Busse H-J, Trujillo M, Suzuki K-I, Ludwig W, Whitman WB (Eds.). 2012. Volume 5: The Actinobacteria. Springer, New York.

- Bergey's Manual® of Systematics of Archaea and Bacteria

Whitman WB (Ed.). 2015. Bergey's Manual of Systematics of Archaea and Bacteria (digital Ed.). First Edition. John Wiley & Sons, Inc. <http://wileyonlinelibrary.com/ref/bergeysmanual>

In this link, it can be found an infographic prepared by the Library Service to facilitate the location of electronic books:

https://bibcercador.uab.cat/discovery/search?search_scope=CourseReserves&vid=34CSUC_UAB:VU1&query=c

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
(TE) Theory	72	Catalan	second semester	morning-mixed
(SEM) Seminars	721	Catalan	second semester	morning-mixed
(SEM) Seminars	722	Catalan	second semester	morning-mixed