1. OVERVIEW

Subject Area	General Microbiology
Degree	Bachelor's Degree in Biotechnology
School/Faculty	School of Biomedical and Health Sciences
Year	Second
ECTS	9
Type	Compulsory
Language(s)	Spanish and English
Delivery Mode	On campus
Semester	S1-S2
Academic Year	25-26
Coordinating professor	Alejandro Barriga Torrejón
Teacher	Beatriz Moreno García

2. INTRODUCTION

General Microbiology is a compulsory subject worth 9 ECTS and is taught yearly in the second year of the Bachelor's Degree in Biotechnology and the Combined Degree in Pharmacy and Biotechnology. A total of 6 ECTS are taught in the first term, while 3 ECTS come in the second.

The general aim of this subject area is to teach students knowledge about microbiology in general including bacteriology, mycology and virology. Students will therefore learn the different aspects of microorganisms with clinical, biotechnological, industrial, and ecological significance.

To achieve this objective, students will study the structural, functional, genetic, and metabolic characteristics of the different microorganisms. Students will also learn the main microbiological genres and species of clinical and biotechnological importance, as well as those which form part of the human microbiota. The subject also covers manipulation, detection, culture and analysis techniques for microorganisms, as well as different methods of diagnosis, treatment and prevention of diseases caused by microorganisms. Finally, students will learn the current varied biotechnological uses of microorganisms.

General Microbiology is multidisciplinary and transversal with the rest of the subjects studied on this degree course. To understand the concepts in this subject, we recommend having passed Biochemistry, Genetics and Biology in the first year. We also recommend studying the second-year subject, Molecular Genetics in parallel.

3. LEARNING OUTCOMES (RA, by the acronym in Spanish)

KNOWLEDGE (CON, by the acronym in Spanish)

CON02. Recognise the structure, organisation, and function of tissues, organs and systems, viruses and cells, as well as the processes which occur in them. Know the fundamentals of microbial growth and metabolism, the different groups of microorganisms and their capacity to create diseases.

- Know the basic laboratory techniques, being familiar with the different instruments and techniques used in microbiology and know how to perform simple microbiological diagnosis techniques.
- Recognise the different cell types and their basic components using a microscope.
- Know the structure and biology of viruses, viroids, and prions and understand the viral replication processes and the interactions between viruses and cells.

ABILITIES (HAB, by the acronym in Spanish)

HAB02. Use samples and laboratory techniques all the while maintaining the appropriate safety and quality measures in each laboratory.

- Obtain and process samples for microbiological study.

SKILLS (COMP, by the acronym in Spanish)

COMP02. Identify and describe the structure and function of the different types of cells both in unicellular and multicellular organisms.

COMP06. Develop the skills needed to use the most common equipment, instruments and basic techniques in biotechnology, following quality standards and current biosecurity regulations.

COMP20. Identify and analyse the characteristics of the microorganisms and their biotechnology applications.

4. CONTENTS

This subject deals with the following topics:

- Introduction to Microbiology. Classification of microorganisms.
- Structure, function, metabolism, and genetics of bacteria and fungi.
- Normal microbiota of the human being. Process of infection. Microbial death.
- Obtaining microbiological samples for subsequent analysis.
- Introduction to virology. Virus and its importance in biotechnology.

To teach this content, this subject has been divided into 4 blocks which contain different topics:

Block I. General aspects of microbiology

Topic 1. Introduction to Microbiology.

Topic 2. Morphology and structure of prokaryotes and fungi.

Topic 3. Microbial metabolism.

Topic 4. Microbial genetics.

Topic 5. Microbial diversity, taxonomy and ecology.

Topic 6. Microbiota.

Topic 7. Infections and intoxication of microbial origin.

Topic 8. Antibiotics.

Block II: Microbiological diversity

Topic 9. Eukaryotic microorganisms: fungi, protists and algae.

Topic 10. Gram-positive bacteria: *Firmicutes*.

Topic 11. Gram-positive bacteria: lactic acid bacteria.

Topic 12. Gram-positive bacteria: actinobacteria.

Topic 13. Other phyla of gram-positive bacteria.

Topic 14. Gram-negative bacteria: proteobacteria.

Topic 15. Gram-negative bacteria: spirochetes.

Topic 16. Other phyla of gram-negative bacteria.

Topic 17. Archaea.

Block III: Virology

Topic 18. Classification of viruses and sub-viral agents.

Topic 19. Viral structure.

Topic 20. Viral genetics.

Topic 21. Viral infection cycle.

Topic 22. Biotechnological applications of viruses.

Topic 23. Bacteriophage viruses.

Topic 24. Viral infection patterns.

Topic 25. Human pathogen viruses*

*This topic will include subsections corresponding to the main viral classifications and families.

This subject area also contains a theory/practical content block.

Practical block

Topic P1. Microbiology laboratory.

Topic P2. Sterilisation, disinfection and asepsis.

Topic P3. Virology laboratory.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lecture.
- Collaborative learning.
- Project-based learning.
- Learning based on workshop teaching

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

Learning activity	Number of hours
Lectures	48
Asynchronous master lectures	18
Case Studies	7.5
Oral presentations	2.25
Written reports and essays	11.25
Tutorials	22.5
Independent working	75
Workshops and/or lab work	24
Research (scientific/case studies) and projects	7.5
On-campus knowledge tests	9
TOTAL	225

7. ASSESSMENT

The assessment methods, together with how much they each count towards the final grade for the subject area, are as follows:

Assessment system	Weighting
On-campus knowledge tests	60%
Spoken presentations	5%
Reports and written work	12%
Case study/problem scenario	7%
Laboratory work	16%

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

7.1. Ordinary exam period

To pass the subject area in the ordinary exam period you must obtain a grade of 5.0 or more out of 10.0 in the final grade (weighted average according to the percentages in the table above) for the subject area. The continuous assessment system for the learning activities requires attendance to at least 50% of the classes. Also take into account that there are compulsory activities and/or those with a minimum mark:

It is compulsory for students studying degrees on-campus to accredit attendance to at least 50% of classes. This requirement qualifies students for the right to obtain academic counselling, support and monitoring from the professor. Failure to accredit attendance to at least 50% of the classes by any of the means proposed by the University will mean that the professor awarding a fail to the student for that subject area in the ordinary exam period in accordance with the grading system outlined in these regulations. All of the above, without prejudice to the other requirements or higher attendance percentages that other faculties may stipulate in their learning guides or internal regulations. Regulations for the assessment of official degree programmes, Art. 1 point 4.

(*https://universidadeuropea.com/documents/1798/6.__Reglamento_evaluacion_titulaciones_oficiales_grado_UEM_v2.pdf*)

7.2. Extraordinary exam period (resits)

To pass the subject area in the extraordinary exam period (resits), the students must obtain a mark equal to or above 5.0 out of 10.0 in all parts of the subject assessment they did not pass during the ordinary exam period.

The student must submit the activities not passed in the ordinary exam period taking into account the corrections or comments made by the teacher. The student must also submit any activities which were not submitted.

The final grade will be the average of the partial marks in each of the activities passed (with a mark equal to or higher than 5 out of 10). The marks for the assessable activities the student passed in the ordinary exam period will be maintained for calculating this grade.

8. TIMELINE

The timeline with delivery dates of assessable activities in the subject area is indicated in this section:

Assessable activities	Date
On-campus knowledge tests	Week 12, Week 21 -22, Week 41 -42
Prelaboratory tests	Weeks 5 and 31
Laboratory practice	Weeks 6-7 and 32
Laboratory practice report	Weeks 7, 33
OSPEs (Objective Structured Practical Examination)	Week 8
IBL (Inquiry-Based Learning)	Weeks 13-15
CBL (Challenge-Based Learning)	Week 14
Presentation of viruses with biotechnological applications	Weeks 32-33

The timeline may be subject to modifications for logistical reasons of the activities. Students will be informed of any changes in due time and course.

9. BIBLIOGRAPHY

The reference work for following this subject area is:

- Madigan, M.T., Martinko J.M., Bender K.S., Buckley D.H. and Stahl, D.A. (2021) **Brock. Biology of microorganisms (16th edition).** Pearson.
- Flint, J., Racaniello V.R., Rall, G.F., Hatziioannou, T. and Skalka, A.M. (2020) **Principles of Virology.** 5th edition.
- Willey, J. (Author), Sandman, K., and Wood, D. (2019). **Prescott's Microbiology.** McGraw-Hill Education.
- Solomon, E.P., Berg, L.R. and Martin, D.W. (2018). **Biology (11th edition).** Cencage learning.

The recommended bibliography is indicated below:

- Murray, P.R, Rosenthal K.S. y Pfaller, M.A. (2025) Medical microbiology (10th edition). Elsevier.
- Knipe, D.A. y Howley, P. (2013) Fields Virology. 6th Edition. Lippincott, Williams & Wilkins.
- Cowan, M. K. (2012). Microbiology: a systems approach. McGraw-Hill.
- Tyan, K.J. Sherris Medical microbiology, 7ª edition.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

The Educational Guidance and Diversity Unit (ODI in Spanish) offers support throughout your time at university to help you with your academic achievement. Other cornerstones of our educational policy are the inclusion of students with special educational needs, universal access in all our university campuses and equal opportunities.

This ODI unit offers students:

1. Support and monitoring through counselling and personalised student plans for those who need to improve their academic performance.
2. Curricular adaptations to uphold diversity, with assistance for those students who require specific educational support, leading to equal opportunities without significant changes to methodology or evaluation.
3. We offer students a range of extracurricular educational resources to reinforce skills which will enhance their personal and professional development.
4. Career guidance by offering tools and advice to students with doubts regarding their professional careers or those who believe they have chosen the wrong line of study.

Students who need educational support can contact us at:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degree courses and the learning process.

These surveys will be available in the surveys area of your virtual campus or by email.

Your opinion is essential to improve the quality of the degree.

Many thanks for taking part.