

Course Unit	Microbiology		Field of study	-	
Bachelor in	Pharmacy		School	School of Health	
Academic Year	2023/2024	Year of study	1	Level	1-1
Type	Semestral	Semester	2	ECTS credits	5.0
		Code		9549-803-1204-00-23	
Workload (hours)	135	Contact hours	T -	TP 30	PL 30
		TC -		S -	E -
		OT 7,5		O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Cristina Sofia Gomes Caleja, Maria Leticia Miranda Fernandes Estevinho, Maria Lurdes Antunes Jorge

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Identify the main landmarks in the development of microbiology and appoint the scientists associated with it;
2. Understand the fundamentals of microorganisms' biology and their diversity;
3. Understand the kinetic and the energy of growth and cell death;
4. Understand the effect of environmental factors and anti-microbial agents in microbial growth;
5. Apply the knowledge about the metabolism of microorganisms in the changes they mediate;
6. Understand the basic mechanisms underlying the adaptability proliferation of microorganisms in the human host;
7. Train the students in the use of basic microbiological techniques and prepare them to respond adequately when confronted with real and new problems.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Not applicable.

### Course contents

Lectures: Introduction to Microbiology as a science. The position of microorganisms in the living world. Morphology and structure of bacteria. Morphology and structure of moulds. The virus - distribution and structure. Protozoa Microorganisms. Nutrition and growth. Bacteria with clinical importance. Moulds with clinical importance. Practical Lessons: Ubiquity and microbial characterization. Pure culture obtention. Microbial morphology. Feces exam. Evaluation of growth. Antibigram.

### Course contents (extended version)

1. Lectures Introduction to Microbiology as a science
  - Microbiology as an experimental science
  - The diversity and ubiquity of microorganisms
  - Microbiology's Evolution
2. The position of microorganisms in the living world
  - Living Beings' Classification
  - Classification of microorganisms based on the sources of energy, carbon and electron donors
  - Global description of microorganisms
3. Morphology and structure of bacteria
  - Size, form and arrange of bacterial cells
  - Cellular organization in Prokaryotes
4. Morphology and structure of moulds
  - Systematic study of Moulds
  - Systematic study of yeasts
5. Viruses - structure and distribution
  - Viruses and parasitism
  - Structure and Composition of Viruses
  - Bacterial Viruses
6. Protozoa
  - Generalities in parasitology
  - Urogenital and Intestinal Protozoa
  - Blood and Tissue Protozoa
  - Secondary pathogenic Protozoa
  - Cestoda
  - Trematode
  - Nematodes
7. Microorganisms' growth, nutrition and metabolism
  - Nutrition categories. Anaplerosis pathway
  - Regulation of metabolism. Importance of operons
  - Methods for quantitative assessment of microbial growth
  - Growth in a closed system
  - Environmental factors affecting microbial growth
  - Control of microorganisms
8. Bacterial Genetics : Genetic transfer and recombination Bacteria with clinical importance
9. Moulds with clinical importance
10. Practice Introduction
  - General rules in Microbiology Laboratory
  - Asepsis / methods of sterilization
11. Microorganism Ubiquity
  - Bacteria observation
  - Moulds observation
  - Protozoa observation
12. Microbial Characterization
  - Observation of colonies
13. Isolating Methods and pure culture obtention
14. Microbial morphology
15. Feces exam
16. Growth evaluation
17. Antimicrobial susceptibility testing (AST)

### Recommended reading

1. Ferreira, W. F. C. , Sousa. , J. C. F. , Lima, N. (2010). Microbiologia ( 2ª ed). Lisboa: Ed. Lidel.

**Recommended reading**

2. Black, J. B. (2012). Microbiology: Principles and Explorations, ( 8ª ed. ). United States : J. Wiley Press
3. Cappuccino, J. , & Sherman, N. (2013). Microbiology: A Laboratory Manual (10ª ed). San Francisco: Benjamin Cummings
4. Madigan, M. T. , Martinko, J. M. , S. D. , Clark, D. P. (2010). Brock Biology of Microorganisms (13ª ed. ). San Francisco: Pearson Benjamin-Cummings.
5. Tortola, G. J. , Funke, R. J. , Case, C. L (2012). Microbiologia (11ª ed). Londres: Artemed.

**Teaching and learning methods**

Lectures - methodology exhibition, using the media. Is encouraged participation of students, with placement of issues and presentation / discussion of cases.  
 Practical classes - carrying out practical laboratory with development of one or more reports using the bibliography of specialty (books, papers, etc. ).

**Assessment methods**

1. Regular Students - (Regular) (Final, Supplementary, Special)
2. Student Worker - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 75% (Teorical contents. minimum 8. 5 marks.)
  - Final Written Exam - 25% (Practical contents: no minimum note)

**Language of instruction**

Portuguese

**Electronic validation**

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02-04-2024	17-04-2024	17-04-2024	17-04-2024