

Course Unit	Microbiology	Field of study	Biology and Biochemistry
Bachelor in	Environmental Engineering	School	School of Agriculture
Academic Year	2022/2023	Year of study	1
Type	Semestral	Semester	2
Level	1-1	ECTS credits	5.5
Code	9099-309-1204-00-22		
Workload (hours)	148,5	Contact hours	T 30 TP - PL 30 TC - S - E - OT 20 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) Ermelinda Lopes Pereira, Maria Leticia Miranda Fernandes Estevinho

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. Symbiosis. Silage. Pratices: Ubiquity and microbial characterization. Pure culture obtention. Microbial morfology. Evaluation of growth. Biochemical tests.

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 Prokaryots.
4. Morphology and stucture of fungi:
 - Systematics of phylamentous fungi.
 - Systematics 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' nutrition and growth:
 - 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.
9. Symbiosis Silage.
10. Practice Introduction:
 - General rules in Microbiology Laboratory.
 - Asepsis / methods of sterilization.
11. Microorganism Ubiquity:
 - Bacteria observation.
 - Moulds observation.
12. Microbial Characterization:
 - Observation of colonies.
13. Isolating Methods and pure culture obtention.
14. Microbial morphology.
15. Growth evaluation.
16. Biochemical tests.

Recommended reading

1. Madigan, M. T. , Martinko, J. M. , Stahl, D. and Clark, D. P. (2010). Brock Biology of Microorganisms (13th edition). Benjamin Cummings.
2. Tortola, G. J. , Funke, R. J. and Case, C. L. (2012). Microbiologia (11ª edição). Artemed, London.
3. Black, J. B. (2012). Microbiology: Principles and Explorations (8th edition). Wiley.

Recommended reading

4. Cappuccino, J. and Sherman, N. (2013). Microbiology: A Laboratory Manual (10th Edition). Benjamin Cummings.
5. Ferreira, W. F. C. e Sousa, J. C. F. (2010). Microbiologia Vol I, II e III (1ª edição). Lidel, Edições Técnicas.

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)
 - Final Written Exam - 70% (Theorical contents; minimum 8. 5 marks.)
 - Intermediate Written Test - 30% (Practical Contents; Mean of the two tests. Minimum 8. 5 marks.)
2. Student Worker - (Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 70% (Theorical contents; minimum 9. 5 marks.)
 - Final Written Exam - 30% (Practical Contents; Minimum 8. 5 marks.)

Language of instruction

Portuguese

Electronic validation

Ermelinda Lopes Pereira, Maria Letícia Miranda Fernandes Estevinho	Paula Cristina Azevedo Rodrigues	Artur Jorge de Jesus Gonçalves	Paula Cristina Azevedo Rodrigues
08-12-2022	09-12-2022	10-12-2022	11-12-2022