

Course Unit	Food Microbiology Laboratories	Field of study	Biology and Biochemistry
Bachelor in	Food Engineering	School	School of Agriculture
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	2
Level	1-1	ECTS credits	6.0
Code	9087-641-1203-00-23		
Workload (hours)	162	Contact hours	T - TP - PL - TC - S - E - OT - 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) Paula Cristina Azevedo Rodrigues

### Learning outcomes and competences

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

1. Know the microbial morphology and structure
2. Know the main factors influencing the microbial growth and its control
3. Know the potential effects of pathogenic microorganisms in human health
4. Know basic and applied microbiology techniques: how to isolate, grow, measure, observe and identify microorganisms in the laboratory
5. Interpret the main microbiological criteria for the microbiological quality of food
6. Recognize the importance of microorganisms in food production

### Prerequisites

Before the course unit the learner is expected to be able to:  
General knowledge in biology.

### Course contents

1. Introduction to the study of microbiology. 2. Microbial Nutrition and metabolism. 3. Microbial growth. 4. Growth control. 5. Growth of microorganisms in foods. 6. Pathogenic microorganisms. 7. The microbiological quality foods. 8. Detection and quantification of microorganisms in foods. 10. Methods of microbial identification. 11. Microorganisms and food production.

### Course contents (extended version)

1. Introduction to the study of microbiology.
2. Microbial Nutrition and metabolism.
  - Differentiation of microorganisms according to their nutritional requirements.
  - Energy metabolisms in microorganisms
3. Microbial growth.
  - How to measure microbial growth.
  - The influence of environmental factors on growth.
4. Microbial growth control.
  - Physical and chemical agents in the control of growth.
5. Growth of microorganisms in foods.
  - Food spoilage.
  - Control of factors that influence food spoilage.
6. Foodborne diseases.
  - Pathogenic microorganisms.
  - Infections and intoxications.
7. The microbiological quality of foods for human consumption.
  - Indicator microorganisms and the safety and quality of food.
  - Microbiological criteria.
  - The main foodborne pathogens.
8. Detection and quantitation of microorganisms in food.
9. Methods of microbial identification.
10. Microorganisms and food production.

### Recommended reading

1. Doyle, M. P. , and Buchanan, R. L. Food Microbiology: Fundamentals and Frontiers, 4th edition, ASM, 2012
2. INSA. Interpretação de resultados de ensaios microbiológicos - Valores-guia. Instituto Nacional de Saúde Dr. Ricardo Jorge, 2019
3. Jay, J. M. , Loessner, M. J. , Golden, D. A. Modern Food Microbiology, 7ª ed. , Springer, EUA, 2022
4. Yousef A. E. , Waite-Cusic J. G. , Perry J. J. Analytical Food Microbiology: A Laboratory Manual, 2nd ed. , Wiley, 2022
5. Revistas da especialidade: Food Control; Food Microbiology; International Journal of Food Microbiology; Foodborne Pathogens and Disease

### Teaching and learning methods

Theory will be exposed and case studies will be discussed in 1 lesson (one hour) per week. Laboratory work will be developed in one lesson (three hours) per week, and will be based on the analysis and application of normative references and legislation.

### Assessment methods

1. Continuous/final assessment - (Regular) (Final)
  - Laboratory Work - 5% (Student's attendance and laboratorial skills.)
  - Intermediate Written Test - 35% (Two written tests on laboratorial contents. Average mark > 9,5)
  - Intermediate Written Test - 30% (Written test on TP contents.)
  - Final Written Exam - 30% (Final exam of TP contents.
  - Mark of TP component (Average written test+final exam) > 9,5)
2. Final assessment - (Student Worker) (Final)
  - Final Written Exam - 40% (Written exam on practical contents. Mark > 9,5)
  - Final Written Exam - 60% (Written exam on theoretical-practical contents. Mark > 9,5)
3. Recourse assessment - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 60% (Written exam on TP contents. Mark > 9,5)
  - Final Written Exam - 40% (Written exam on practical laboratorial contents. Mark > 9,5)

**Language of instruction**

1. Portuguese
2. Portuguese, with additional English support for foreign students.

**Electronic validation**

Paula Cristina Azevedo Rodrigues	Maria Letícia Miranda Fernandes Estevinho	Elsa Cristina Dantas Ramalhosa	Paula Cristina Azevedo Rodrigues
19-01-2024	22-01-2024	22-01-2024	22-01-2024