1. OVERVIEW

Subject Area	Microbiology
Degree	Bachelor's Degree in Human Nutrition and Dietetics
School/Faculty	Biomedical Sciences
Year	2º
ECTS	6 ECTS
Type	Compulsory
Language(s)	Spanish
Delivery Mode	On-campus and blended
Semester	1º
Coordinating professor	Iris Azami

2. INTRODUCTION

Microbiology is a core subject area worth 6 ECTS credits, delivered over one semester in the second year of the Bachelor's Degree in Human Nutrition and Dietetics.

The overall objective of this subject area is to introduce students to basic aspects of food microbiology and toxicology, the beneficial, harmful and altering effects that microorganisms can have on food and on the people who consume them.

To achieve this objective, students will study the structural, functional, genetic and metabolic characteristics of microorganisms. Students will also learn basic concepts about normal microbiota and their beneficial or pathogenic roles in humans. In addition, students will learn about the pathogenic microorganisms that are transmitted through food and the different diseases they cause, as well as the detection and control methods to guarantee the hygienic quality of food. Finally, microorganisms of interest in the industry of biotechnology will be studied, related to microbiological processes applied in the food industry, as well as in the development of new foods (probiotics, prebiotics, symbiotics).

3. SKILLS AND LEARNING OUTCOMES

Key skills (CB, by the acronym in Spanish):

- CB1: Students have shown their knowledge and understanding of a study area that builds on general secondary school education, and are usually at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.

- CB3: Students have the ability to gather and interpret relevant data (usually within their study area) to form opinions which include reflecting on relevant social, scientific or ethical matters.
- CB4: Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

General skills (CG, by the acronym in Spanish):

- CG11: Be familiar with the microbiology, parasitology and toxicology of food.

Cross-curricular skills (CT, by the acronym in Spanish):

- CT1: Communication: ability to engage in active listening, ask questions and respond in a clear and concise way, as well as to effectively express ideas and concepts. This includes concise and clear written communication.
- CT9: Ability to put knowledge into practice, using the skills acquired in the classroom to mock situations based on real life experiences that occur in the relevant profession.

Specific skills (CE, by the acronym in Spanish):

- CE56: Know the different microorganisms and their classification.
- CE57: Know the structure, function, metabolism and genetics of bacteria and fungi.
- CE58: Know the normal microbiota of humans and the process of infection.
- CE59: Know the groups of microbes considered foodborne illness pathogens and other microorganisms of interest in food biotechnology.
- CE60: Be familiar with diseases of biological origin transmitted through food.

Learning outcomes (RA, by the acronym in Spanish):

- RA1: Learn about the human microbiota and its role in nutrition.
- RA2: Be familiar with the mechanisms involved in the transmission of infectious diseases.
- RA3: Know the major groups of antibiotics for the treatment of infectious diseases.
- RA4: Be familiar with the microbiology of food.
- RA5: Know the main pathogenic microorganisms associated with food-related infections and toxin infections.
- RA6: Know and understand the microbiology of food.
- RA7: Demonstrate knowledge of diseases of biological origin transmitted through food.
- RA8: Know which microbiological processes are applied to food technology.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CB3, CB4, CT1, CT9, CE58	**RA1:** Learn about the human microbiota and its role in nutrition.
CB3, CB4, CT1, CT9, CG11, CE58, CE59,CE69	**RA2:** Be familiar with the mechanisms involved in the transmission of infectious diseases.
CB3, CB4, CT1, CT9, CE56,CE57, CE58, CE59, CE60	**RA3:** Know the major groups of antibiotics for the treatment of infectious diseases.
CB1, CB3, CB4, CT1, CE56, CE59,CE60	**RA4:** Be familiar with the microbiology of food.
CB3, CB4, CT1, CT9, CG11, CE56, CE59, CE60	**RA5:** Know the main pathogenic microorganisms associated with food-related infections and toxin infections.
CB3, CG11, CT9, CE59, CE60	**RA6:** Know and understand the microbiology of food.
CB1, CB4, CT1, CE59, CE60	**RA7:** Demonstrate knowledge of diseases of biological origin transmitted through food.
CB1, CB3, CG11, CE57, CE59	**RA8:** Know which microbiological processes are applied to food technology.

4. CONTENTS

The contents of the Microbiology subject area are as follows:

- Introduction to Microbiology. Classification of microorganisms.
- Structure, function, metabolism and genetics of bacteria and fungi.
- Normal human microbiota. Process of infection. Microbial death.
- Description of groups of microbes considered foodborne illness pathogens.
- Other microorganisms of interest in food biotechnology.
- Diseases of biological origin transmitted through food.
- Microbiological processes in the food industry

The subject area is divided into six learning units, which are then divided into topics (two or three topics depending on the unit):

Topic 1. Introduction to Microbiology. General concepts.

Topic 2. Classification of microorganisms.

Topic 3. Morphology and structure of bacteria and fungi.

Topic 4. Microbial metabolism and genetics

Topic 5. Basic concepts of virology.

Topic 6. Definition of microbiota. Human microbiome and health

Topic 7. Pathogenicity and virulence of bacteria and fungi. Routes of transmission of pathogenic microorganisms.

Topic 8. Major groups of antimicrobials.

Topic 9. Pathogenic bacteria that causes food poisoning and gut infections. Gram-negative bacteria that cause intestinal infections: enterobacteria and others.

Topic 10. Main food-contaminating fungi. Mycotoxins.

Topic 11. Main food-contaminating viruses.

Topic 12. Quality indicator microorganisms. Detecting microbial contamination in food.

Topic 13. Microbiological quality assurance of food.

Topic 14. Microbiology of fermented food.

Topic 15. Microorganisms as producers of food additives and ingredients.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lecture
- Problem-based learning
- Learning based on workshops/labs
- Collaborative learning.

6. LEARNING ACTIVITIES

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

On campus:

Learning activity	Number of hours
Lecture	50
Independent working	46
Problem solving/case studies	30
Spoken presentations by students	5
Workshops and/or lab work	30
Tutorials	14
Knowledge test	5
TOTAL	**150**

Blended learning

Learning activity	Number of hours
Reading of content	10
Online seminars	11
Independent working	50
Problem-solving	30
Workshops and/or lab work	30
Online tutorials	14
Knowledge test	5
TOTAL	**150h**

7. ASSESSMENT

The assessment methods, together with their respective weighting towards the final grade for the subject, are as follows:

On campus:

Assessment method	Weighting
Knowledge test	60%
Learning based on workshops/labs	20%
Learning portfolio	10%
Submission of reports/problems	10%

Blended:

Assessment method	Weighting
Knowledge test	60%
Learning based on workshops/labs	20%
Learning portfolio	10%
Submission of reports/problems	10%

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

9. BIBLIOGRAPHY

The reference work for following this subject area is:
The recommended bibliography is indicated below: