COURSE DATA

DATA SUBJECT

Code: 34006
Name: Food Microbiology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1103 - Degree in Food Science and Technology	Facultat de Farmàcia i Ciències de l'alimentació	3	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1103 - Degree in Food Science and Technology	Food microbiology	COMPULSORY

COORDINATION

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SUMMARY

The subject **Food Microbiology** is mandatory in the third year of the Degree of Science and Food Technology, which is taught in the Faculty of Pharmacy and Food Sciences of the University of Valencia. This course includes a total of 6 ECTS credits to be taught in the first quarter of the academic year.

The main objective of this subject is to deepen in the study of the role of microorganisms as causative agents of infections and food-borne intoxication and their participation in food spoilage.

The knowledge of the harmful potential of microorganisms, both in terms of health and economy, is an extraordinarily important part of the list of competences required by professionals involved in food science, so that they can devise strategies that lead to the production and preservation of safe food.

On the other hand the subject also tackles, from a practical standpoint, the most important techniques for the isolation and identification of the major groups of microorganisms that cause disease in humans.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Basic module subjects, mainly Biology and Microbiology

COMPETENCES / LEARNING OUTCOMES

1103 - Degree in Food Science and Technology

Apply preventive measures against the transmission of foodborne microbial diseases.

Conocer y manejar las fuentes de información básica relacionadas con la Microbiología.

Dominio de las técnicas de muestreo, su diagnóstico e identificación de microorganismos en alimentos.

Know about foodborne pathogenic microorganisms.

Know and understand the epidemiology of foodborne microbial diseases.

Know food-contaminating microorganisms.

Know food-spoiling microorganisms.

Master the techniques of cultivation, isolation and identification of microorganisms in food.

Master the use of sampling techniques for the microbiological analysis of food.

DESCRIPTION OF CONTENTS

1. PART I. INTRODUCTION

TOPIC 1. Food as a substrate for microorganisms. Factors influencing the growth and activity of microorganisms: pH, water, redox potential, type of nutrients, and inhibitory substances.

2. PART II. CONTAMINATION OF FOOD

TOPIC 2. Sources of microbial contamination in raw materials and processed foods. Soil and marine sediments. Water. Air. Products of animal and plant origin. Plants. Animals (domestic and wild). Humans.

Waste effluents (fertilizers and water). Industrial equipment and instrumentation. Ingredients. Other foods (product-to-product). Packaging and wrapping.

TOPIC 3. General principles of food spoilage. Food suitability for consumption. Causes of spoilage. Classification according to durability. Factors influencing the multiplication of microorganisms in food. Chemical modifications caused by microorganisms.

TOPIC 4. Important microorganisms in food microbiology (I). Fungi and yeasts. General characteristics: morphology, growth conditions, physiological properties, and most important genera.

TOPIC 5. Important microorganisms in food microbiology (II). Bacteria. General characteristics: morphology, growth conditions, physiological properties, and most important genera.

3. PART III. MICROBIOLOGICAL SPOILAGE OF FOOD

TOPIC 6. Spoilage of meat and meat products. Spoilage of fish and other marine foods.

TOPIC 7. Spoilage of vegetables and fruits. Spoilage of cereals and derived products.

TOPIC 8. Spoilage of milk and dairy products. Spoilage of eggs.

TOPIC 9. Spoilage of canned foods. Spoilage of sugars and sugar products

4. PART IV. METHODOLOGY

TOPIC 10. Detection of microorganisms and their toxins in food. Sampling protocol. Microorganism isolation. Direct and indirect counts. Classical methods and new methodologies adapted to microbiological analysis of food.

5. PART V. FOODBORNE DISEASES

TOPIC 11. Introduction. Types of diseases. Associated factors. Pathogenic and toxigenic microorganisms in food. Determinant factors of pathogenicity.

TOPIC 12. Diseases caused by bacteria (I). Main genera and species of Gram-positive bacteria: *Streptococcus, Enterococcus, Staphylococcus, Listeria, Clostridium, Bacillus.*

TOPIC 13. Diseases caused by bacteria (II). Main genera and species of Gram-negative bacteria: *Salmonella, Shigella, Yersinia, Escherichia, Campylobacter, Aeromonas, Vibrio, Brucella, Coxiella, Francisella*.

TOPIC 14. Diseases and intoxications of not caused by bacteria (I). Viruses. Main genera: Poliovirus, Hepatitis A Virus, Hepatitis E Virus, Norovirus, Rotavirus.

TOPIC 15. Diseases and intoxications of not caused by bacteria (II). Toxin-producing fungi. Types of toxins. Implicated foods. Detection and control methods.

6. PART VI. ANTIBIOTIC RESISTANCE

TOPIC 16. Transmission of antibiotic resistance through food. Current data. Importance of its control in livestock and agriculture. Consequences for human health.

7. PART VII. LABORATORY PRACTICES

1. Aerobic plate count
2. Detection and counting of lactose positive Enterobacteriaceae
3. Detection and counting of *Escherichia coli*
4. Detection of Salmonella
5. Detection and counting of sulphite-reducing *Clostridium*
6. Detection and counting of *Staphylococcus aureus*
7. Detection and counting of *Enterococcus*
8. Identification of microorganisms using miniaturized methods
9. Detection of antibiotic residues in milk
10. Microbiological control of the air
11. Microbiological control through membrane filtration

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	38,00
Seminar	2,00

Laboratory	15,00
Total hours	**57,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	9,00
Independent study and work	75,00
Preparation of lessons	5,00
Preparation for assessment activities	1,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Theory (4.56 ECTS, 114 hours):

Lectures and active learning methodologies aimed at providing the student with basic knowledge.

Attendance: 38 hours; Preparation and study: 76 hours

Practical Classroom (workshops, problems) (0.44 ECTS, 11 hours):

There will be two seminars on topics provided by the teacher and related to the module. The seminars will be submitted in writing and orally presented by students. Following the oral presentation the work will be opened for discussion among students, and moderated by the teacher. Attendance is mandatory. Attendance: 2 hours; Preparation and study: 9 hours

Laboratory Sessions (0.8 ECTS, 20 hours):

They will be conducted in small groups and attendance is mandatory. Attendance: 15 hours; Preparation and study: 5 hours

Tutorial Sessions (0.08 ECTS, 2h):

They will be structured in small groups and attendance is mandatory for first-year students and recommended for repeating students. Students will have the opportunity to ask questions about the course, and / or answer questions raised by the teacher

Examinations (0.12 ECTS, 3 hours):

Attendance: 3 hours

TOTAL: 150 hours: 60 hours of attendance, 90 hours out of class

The competences and learning outcomes to be achieved in this subject integrate the Sustainable Development Goals (SDGs) promoted by the United Nations (Agenda 2030). Among others, the one referred to the reduction of the communicable and noncommunicable diseases (especially those mediated by water and food) and the development of vaccines to combat them (Objective 3: Health and Well-being) together with that of a Quality Education model (Objective 4)

EVALUATION

Students will be assessed on their theoretical knowledge through a test/exam and/or active learning methodologies representing 70% of the final grade. The minimum grade to pass the course will be 5 out of 10. In addition, the exam must be balanced and without serious deficiencies in concepts or important parts of the subject. **Oral exams may be part of the evaluation**

The assessment of laboratory sessions will contribute to the final grade by 20% and it is required at least to obtain a score of 5 out of 10 to pass the course. The mark for laboratory sessions will include a test / exam and mandatory attendance.

This activity is **MANDATORY AND NON-RECOVERABLE**, in accordance with the provisions of article 6.5 of the UV Evaluation and Qualification Regulations for Bachelor's and Master's degrees. In the event that, for **justified reasons**, it is not possible to attend, it must be communicated **sufficiently in advance**, so that the person in charge of the subject can assign the student a session in another group. Students will not be able to pass the course without doing and passing the laboratory practicals.

If the student does not pass the theoretical part, **the practical grade (passed) will only be maintained during the following two academic years whether the student enrolls in the subject or not**. After this time, **the student must repeat them again,** requesting inclusion in a group of practices.

Conducting and attendance the seminars is compulsory and its assessment will contribute to the final grade by 10%.

Evidence of copying or plagiarism in any of the assessable tasks will result in failure to pass the subject and in appropriate disciplinary action being taken. Please note that, in accordance with article 13. d) of the Statute of the University Student (RD 1791/2010, of 30 December), it is the duty of students to refrain from using or participating in dishonest means in assessment tests, assignments or university official documents.

In the event of fraudulent practices, the **Action Protocol for fraudulent practices at the University of Valencia** will be applied (ACGUV 123/2020):

https://www.uv.es/sgeneral/Protocols/C83sp.pdf

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