

Food Mycology

Code: 103260
ECTS Credits: 3

Degree	Type	Year	Semester
2501925 Food Science and Technology	OT	4	1

Contact

Name: Francisco Javier Cabañes Saenz
Email: javier.cabanes@uab.cat

Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Maria Rosa Bragulat Arará

Prerequisites

There are no official prerequisites, but students are advised to review the basic concepts of Microbiology and Food Microbiology.

Objectives and Contextualisation

This is an elective subject. Students will acquire the knowledge and practical skills of Food Mycology. Topics covered include the significance of fungi in foods, conditions that influence their development, the main yeasts and moulds associated with food, the methods for fungal enumeration, isolation and identification.

The training offered by the subject is based on previous knowledge acquired in compulsory subjects as Microbiology and Parasitology (1st year) and Food Microbiology (3rd year). It is also oriented to its applications in other subjects as Food Safety and Public Health.

The specific training objectives are:

- To introduce the student to the basic concepts of Food Mycology.
- To provide knowledge of fungal isolation and identification techniques and methods in foods.
- To recognize and understand the role of yeasts and moulds associated with foods across many aspects (positive and negative impact), its use as food or for fermentation, its role as food and beverage spoilers and as source of mycotoxins and mycotoxicosis.

Competences

- Analyse, summarise, resolve problems and make professional decisions.
- Apply the principles of processing techniques and evaluate their effects on the quality and safety of the product.

- Apply the scientific method to resolving problems.
- Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
- Identify food hazards, their nature (physical, chemical, biological and nutritional), their origin or causes, their effects, and suitable methods for controlling them throughout the food supply chain so as to reduce risks to consumers.
- Identify pathogenic, spoilage, and industrially-useful microorganisms, along with the conditions that are favourable or unfavourable to their growth in foods and in industrial and biotechnological processes.
- Select the appropriate analytical procedures (chemical, physical, biological and sensory) in accordance with the objectives of the study, the characteristics of the analytes and the fundamental principles of the technique.
- Show understanding of the mechanisms by which raw materials deteriorate and the reactions and changes that take place during storage and processing, and apply the methods for controlling this.

Learning Outcomes

1. Analyse, summarise, resolve problems and make professional decisions.
2. Apply the scientific method to resolving problems.
3. Characterise the principal biotic agents of food-transmitted diseases.
4. Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
5. Describe the role of microorganisms as agents of food spoilage.
6. Evaluate the effect of technological treatments applied to biological agents and toxic compounds, and ways to control this effect.
7. Evaluate the effect of the intrinsic, extrinsic and implicit properties of foods on the survival and growth capacity of biological agents.
8. Identify and apply suitable microbiological methods to the study of bacteria, fungi and viruses in foods.
9. Identify and describe the properties of the principal biotic hazards in foods and determine their origin and the factors that determine their presence.
10. Recognise and distinguish between pathogenic, spoilage, and industrially-useful microorganisms.
11. Recognise the specific mechanisms for controlling microorganisms in each food.
12. Select suitable microbiological analysis procedures in keeping with the objectives of the study.
13. Select, collect and send samples for microbiological and toxicological analysis, and write the corresponding report for the receiving laboratory.
14. Use the basic preparatory and analytic techniques of a toxicology and microbiology laboratory, always applying the basic safety regulations, and write the corresponding expert report.

Content

The subject is structured into the following sections:

Introduction. General characteristics. Structures and nutrition. Taxonomy. The kingdoms of fungi. Kingdom Fungi.

Methods for fungal isolation and identification (yeasts and molds) Culture media. Molecular detection and identification.

Mucorales. Ascomycetes: *Aspergillus*, *Penicillium*, *Fusarium* and other genera of interest. Current identification.

Fungi and food spoilage. Factors affecting the growth of fungi in food: intrinsic and extrinsic factors: water activity, temperature, and pH. Xerophilic fungi. Preservatives and resistance.

Mycotoxins and mycotoxigenic fungi. Control. Detection methods.

Useful fungi: Fermentations. Harvesting and cultivation of mushrooms.

Laboratory-session content:

- Conidiogenesis.
- Detection, isolation and identification of fungi from food samples.
- Methods for identification to species/genus level.

*"*Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents."*

Methodology

This subject applies the following methodology:

- Lectures: These lectures allow the acquisition of the basic scientific-technical knowledge of the subject; this knowledge must be complemented with a fuller study of the topics covered. Attendance and participation will be assessed.

- Laboratory sessions: practical sessions in the laboratory aim to enhance and apply the theoretical and conceptual knowledge acquired in the lectures. These sessions encourage students to improve technical skills, and reinforce theory with practice.

Students will be issued with a Manual of Laboratory-Practical Sessions at the beginning of the course. To ensure satisfactory performance and acquire the skills corresponding to this subject, it is essential that students read this manual in detail, familiarizing themselves with the practical work to be carried out in each session, as well as with the methodology that should be applied in the various sessions. Students will work individually.

- Small group work and seminar presentation: this activity aims to encourage group work, as well as to enhance the ability to synthesize, communicate and argue for a case of scientific problem. All necessary material for this activity will be provided in advance. Students will prepare a presentation in the classroom. An open discussion and an assessment of the acquired knowledge will be held in the seminar room.

-Tutorials: there are informative sessions on the content, development and objectives of the different activities. In tutorials, students have the opportunity to clarify any doubts about the course.

All teaching materials used during the course will be posted on the Campus Virtual platform. Before each session, students will find the presentations (in pdf format) used in class by the teacher, as a support for taking notes. Students must inform themselves of the news and information published on the Campus Virtual.

The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory sessions	11.5	0.46	1, 2, 3, 14, 8, 12, 13
Lectures	10	0.4	1, 2, 3, 5, 8, 9, 11, 10, 12, 7, 6

Seminar	3	0.12	1, 2, 4, 9, 12
Type: Supervised			
Tutorials	1	0.04	1
Type: Autonomous			
Case resolution, preparing presentations	16	0.64	1, 2, 3, 4, 5, 8, 9, 11, 10, 12, 7, 6
Study	32	1.28	3, 5, 14, 8, 9, 11, 10, 12, 13, 7, 6

Assessment

Assessment is individual and continuous through different activities:

- Laboratory sessions (20% of the overall grade): a continuous assessment will be carried out during the laboratory sessions. Maximum score: 20 points.

- Small group work and seminar presentation (20% of the overall grade): Students will work in small groups. They will prepare an exposition about a scientific article selected and provided in advance by the teacher. The activity will end with an open discussion and an assessment of the acquired knowledge. Maximum score: 20 points.

- Multiple choice test 1 (30% of the overall grade): on finishing all the teaching and training activities and on the date specified in the course program, students will take a multiple choice test on course content. Maximum score: 30 points.

- Multiple choice test 2 (25% of the overall grade): on finishing all the teaching and training activities and on the date specified in the course program, students will take a multiple choice test on course content. Maximum score: 25 points.

- Participation and attitude (5% of the overall grade): during the activities, participation and attitude will be assessed. Maximum score: 5 points.

For an average grade for assessment activities to be applicable, the minimum combined grade from the scores obtained in the two multiple choice tests must be at least 25.

To pass the subject, a global score of at least 50 points/100 is required.

Students who do not meet the minimum-grade requirements for the multiple choice tests (minimum 25 points) or who fail to take the multiple choice tests, will be able to retake them on the date scheduled for subject reassessment.

If students do not submit both multiple choice tests, they will be graded as Non-assessable.

Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Laboratory sessions	20	0	0	1, 14, 12, 13
Seminar	20	0	0	1, 2, 4

Written test 1	30	0.8	0.03	3, 5, 8, 9, 11, 10, 7, 6
Written test 2	25	0.7	0.03	3, 5, 8, 9, 11, 10, 12, 7, 6

Bibliography

Textbooks:

-Encyclopedia of Food Microbiology (Second Edition)

<http://www.sciencedirect.com/science/referenceworks/9780123847331>

- Pitt JI, Hocking AD, 2009. Fungi and Food Spoilage. Ed. Springer, London.

- Samson RA, Hoekstra ES, Frisvad JC. 2004. Introduction to food- and airborne fungi. Centraalbureau voor Schimmelcultures.

- Soriano del Castillo JM. 2007. Micotoxinas en alimentos. Ed. Díaz de Santos.

Software

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