Quality Systems and Environmental Management Tools

Code: 103244
ECTS Credits: 6

2025/2026

Degree	Type	Year
Food Science and Technology	OB	4

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Have previously studied subjects of hygiene, food technology and human nutrition.

Objectives and Contextualisation

1. Describe the fundamental concepts, the historical foundations and the bibliographic bases.

2. Demonstrate that you know the fundamental bases of industrial ecology and waste management.

3. Identify the different wastewater treatment systems and their characterization.

4. Interpret the different types of atmospheric pollutants and their treatments.

5. Demonstrate that you know the different quality assurance and security programs and your organization.

5. Interpret the corresponding certificates and documentation.

6. Discriminate the relevant information and the audit procedure.

7. Analyze the safety certification, its bases and its application.

Competences

- Adopt an ethical stance and attach importance to quality in work.
- Apply the principles of biology and chemical engineering to describe, analyse, control and optimise the processes of food transformation and conservation.
- Apply the processes of evaluation, management and communication of food risk to all agrofood sectors.
- 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.
- Design, institute and audit quality systems applicable to food companies.
- Develop individual learning strategies and planning and organisation skills.
- Plan by-product and waste treatment and recycling systems from criteria of sustainability and respect for the environment.
- Provide auditing and legal, scientific and technical advisory services to the agri-food industry.
- Search for, manage and interpret information from different sources.
- 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 sensitivity to environmental, sanitary and social issues.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Work individually or in unidisciplinary and multidisciplinary teams and in international contexts.

Learning Outcomes

1. Adopt an ethical stance and attach importance to quality in work.
2. Apply the scientific method to resolving problems.
3. Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
4. Compare the various quality systems applicable to process and product.
5. Describe the environment-related problems of the food industry.
6. Develop individual learning strategies and planning and organisation skills.
7. Enumerate all the stages of the food supply chain that lead to the attainment of overall food quality, including those of workers' safety.
8. Explain the toxic and environmental hazards deriving from food-processing by-products.
9. Identify conformities, non-conformities and irregularities during an audit process.
10. Identify the principal environmental risks related to businesses in the dairy, meat, fishing and aquaculture, eggs and egg products and fruit and vegetable sectors, and also to group catering businesses, and apply suitable measures for controlling these risks.
11. Identify the underlying principles, the characteristics and the uses of the different systems for treating waste in the form of liquids, solids and gases.
12. Interpret and justify the scope of quality reports.
13. Interpret findings from trials used in studies on quality.
14. Propose traceability and documentation methodologies for processes and products.
15. Search for, manage and interpret information from different sources.
16. Show sensitivity to environmental, sanitary and social issues.
17. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
18. Validate standardised work procedures .
19. Work individually or in unidisciplinary and multidisciplinary teams and in international contexts.

Content

1. Introduction. Basics Bibliography.

2. Tools for minimization. Industrial Ecology, Cleaner Production, Life Cycle Analysis.

3. Waste management. Type of waste, waste management and coding, main waste treatments: composting, anaerobic digestion, thermal treatments.

4. Waste water management and treatment. Characterization of wastewater, main physical, chemical and biological parameters. Main basic operations of wastewater treatment: primary treatments, biological processes, chemical processes.

5. Emissions to the atmosphere. Main atmospheric pollutants: particles, gases and odors. Main basic operations of atmospheric emission treatment.

6. Global quality assurance. Quality assurance programs. Staff and organization.

7. Audits and accreditation. Certificates and documents. Specific cases of certification. Foods with healthy properties, GMOs and others.

8. Food quality and safety. The quality standards applied to food safety.

9. From HACCP to security certification. BRC, IFS, ISO 22000 standards and others.

10. Supplier relationship - client. The audit of the system.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Seminars	11	0.44	1, 4, 3, 16, 7, 8, 9, 12, 13, 14, 19, 18
Theoretical teaching in environmental management tools	18	0.72	2, 1, 15, 16, 5, 6, 11, 13, 19
Theoretical teaching in quality and food safety	18	0.72	2, 1, 15, 4, 16, 6, 7, 8, 9, 12, 13, 14, 19, 18
Type: Autonomous			
Cases of the subject	71	2.84	2, 1, 15, 4, 3, 16, 6, 7, 8, 9, 12, 13, 14, 19, 18
Problems worked in class	30	1.2	2, 1, 15, 3, 16, 5, 6, 11, 19

Seminars

9 hours of seminars and discussion of problems:

- 6 hours seminars to solve problems related to environmental management tools.
- 4 hours of seminars related to the auditable standards of quality and food safety. The dynamics of the works and the rules of accomplishment will be defined.

Autonomous activities: preparation of the subject based on material that will be given by the professor or bibliography to be able to work later on Cases of Study in class.

Practical works

- Preparation of the subject based on material that will be given by the professor or bibliography to be able to work later, with cases of study in class.
- Work based on the discussion between suppliers and clients in different situations of conflict, related to quality audits and food security. This work will be carried out in a group. Finally, these works will be presented in class for 10 minutes.

Use of AI

In this course, the use of Artificial Intelligence (AI) technologies is permitted as an integral part of the development of the work, provided that the result reflects a significant contribution from the student in terms of analysis and personal reflection. The student must identify which parts were generated using this technology, specify the tools used, and include a critical reflection on how these influenced both the process and the outcome of the activity. Lack of transparency in the use of AI will be considered academic dishonesty and may result in a grade penalty or more serious sanctions in severe cases.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance to mandatory activities	10% of the final grade	0	0	1, 4, 16, 5, 7, 8, 11, 9, 12, 14, 19, 18
Oral presentation of the deliverables	10%	0	0	17, 2, 1, 15, 3, 16, 6, 19, 18
Practical work on The vision of the supplier and the client of food products in relation to quality and food safety	15% of the final grade	0	0	17, 2, 1, 15, 4, 3, 16, 6, 7, 8, 9, 12, 13, 14, 19, 18
Resolution of problems related to cases Environmental management tools	15% of the final grade	0	0	2, 1, 15, 3, 16, 5, 6, 11, 10, 19
Theoretical evaluation of environmental management tools	25% of the final grade	1	0.04	1, 16, 5, 11
Theoretical evaluation on quality and safety	25% of the final grade	1	0.04	4, 16, 7, 8, 9, 12, 14, 18

The student's evaluation will be carried out based on the following distribution:

1.- Theoretical tests (theoretical exam) 50%

1.1.- Environmental management tools exam 25%

1.2.- Quality exam 25%

2.- Practical tests (cases and problems) 40%

2.1.- Oral presentation 10%

2.2.- Written works 30%

3.- Attendance at mandatory activities 10%

Two theoretical exams will be carried out, with short or multiple-choice questions, for each of the two parts of the subject. Passing each of the theoretical exams is necessary to pass the subject.

The practical tests will be derived from:

• Continuous evaluation of attendance at practices.

• Completion of practical work and case resolutions presented throughout the semester.

• Oral presentations.

Once the first part of the subject (environmental management tools) has been completed, a partial exam will be taken, representing 25% of the grade for the subject. When the theoretical content is completed, a second partial exam (quality and safety) will be taken, representing the other 25% of the theoretical grade.

Students who do not pass either part of the subject will have to take a new theoretical exam to recover the part they did not pass. Once the subject has been evaluated, each student will be told which part they pass or must recover. To participate in the recovery, students must have been previously evaluated in activities whose weight is equivalent to a minimum of two-thirds of the total grade for the subject.

A student will be considered not evaluable if they have participated in evaluation activities representing $\leq$15% of the final grade.

This subject does not contemplate a single evaluation system.

Bibliography

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Martínez-Costa M., Martínez-Lorente A.R., Choi T.Y. 2008. Simultaneous consideration of TQM and ISO 9000 on performance and motivation: An empirical study of Spanish companies. Int. J. Production Economics 113:23-39.

Metcalf & Eddy. Ingenieria de aguas residuales. Tratamiento vertido i reutilización. McGraw Hill Inc. 1998

Nemerow, N.L., Dasgupta, A. Tratamiento de vertidos Industriales peligrosos. Ediciones Diaz de Santos. 1998.

Peavy, H.S., Rowe, D.R., Tchobanoglous, G. Environmental Engineering. McGraw Hill Inc. 1985.

Trienekens J., Zuurbier P. 2008. Quality and safety standards in the food industry, developments and challenges. Int. J. Production Economics 113:107-122.

Wark, K., Warner, C.F. Contaminación del aire. Origen y control. Ed. Limisa. 1998.

Software

We will not use any specific software for this subject.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	1	Catalan/Spanish	first semester	morning-mixed