

| Degree | Type | Year |
|-------------------------------------|------|------|
| 2501925 Food Science and Technology | OB | 3 |

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

Although there are no official prerequisites, it is convenient for the student to review the knowledge acquired in the subjects of first, second and third courses:

- Microbiology and Parasitology
- Food Analysis and Quality Control
- Food Toxicology
- Food Microbiology
- Management of Food Safety and Public Health
- Food Processing Methods I and II

Objectives and Contextualisation

Hygiene and Self-Control System integrates different subjects of the Food Science and technology degree. It aims that students can develop a system that allows the food industry to implement and manage rationally the measures and conditions necessary to control hazards and ensure the suitability of a product for human consumption.

General objective:

To identify and analyse the significant hazards that may appear in every one of the stages of production and commercialization of foods. To identify the different factors that can affect the hygienic quality of food to apply

the appropriate control measures and managing all activities to ensure the suitability of a product for human consumption.

Specific objectives:

- Identify, analyse and evaluate the most significant biological, chemical and physical hazards.
- Identify the factors that affect the presence of hazards in food to establish critical limits and monitoring systems as well as shelf-life
- Identify the preventive measures to control the presence or development of hazards in food processing Development and management the system of Hazard Analysis and Critical Control Points
- Development and management of the operational conditions necessary to produce safe food.
- Audit the HACCP and the prerequisites

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.
- Design experiments and interpret the results.
- Design, institute and audit quality systems applicable to food companies.
- Develop individual learning strategies and planning and organisation skills.
- 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.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- 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 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.
- Use IT resources for communication, the search for information within the field of study, data processing and calculations.
- Work individually or in unidisciplinary and multidisciplinary teams and in international contexts.

Learning Outcomes

1. Analyse, summarise, resolve problems and make professional decisions.
2. Apply suitable methods for monitoring the entire food supply chain in order to prevent the presence of biotic and abiotic agents in food.
3. Apply the scientific method to resolving problems.
4. Characterise the principal biotic agents of food-transmitted diseases.
5. Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
6. Design and audit a self-control system in a food company.
7. Design experiments and interpret the results.
8. Develop individual learning strategies and planning and organisation skills.
9. Devise quality systems that fit each of the various business sectors.

10. Discern the circumstances and processes that can lead to the appearance of toxics in water, drinks and foods that are in storage or being processed.
11. Evaluate the effect of technological treatments applied to biological agents and toxic compounds, and ways to control this effect.
12. Evaluate the effect of the intrinsic, extrinsic and implicit properties of foods on the survival and growth capacity of biological agents.
13. Identify and describe the properties of the principal biotic hazards in foods and determine their origin and the factors that determine their presence.
14. Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
15. Recognise and distinguish between pathogenic, spoilage, and industrially-useful microorganisms.
16. Recognise and identify the principal toxic agents, their action mechanisms and their presence, by accident or design, in water, drinks or foods.
17. Recognise points in quality systems that can affect safety and public health.
18. Recognise the health and hygiene requirements of food businesses.
19. Recognise the specific mechanisms for controlling microorganisms in each food.
20. Search for, manage and interpret information from different sources.
21. Use IT resources for communication, the search for information within the field of study, data processing and calculations.
22. 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.
23. Work individually or in unidisciplinary and multidisciplinary teams and in international contexts.

Content

Theoretical content

Unit 1.- Concepts: Food Hygiene. Current trends in hygiene and food safety. The Hazard Analysis and Critical Control Points system and the Prerequisites.

Unit 2.- Legal aspects of food hygiene. Application of European, national, regional and local regulations. Codex recommendations in relation to food hygiene.

Unit 3.- The Hazard Analysis and Critical Point Control (HACCP) system. Technical barriers in its implementation. Key stages in the development of the HACCP system. Study and development of the HACCP system. Team training, product description. Elaboration of the flowchart and its verification. Analysis of hazards and selection of the most significant. Identification of preventive and/or control measures. Identification of the Critical Control Points, establishment of the critical limits, monitoring of PCC and corrective measures. Verification of HACCP. Documents, registries and validation of the Plan.

Unit 4.- Program of control of suppliers. Definition Development of the program. Factors to consider: suppliers and product specifications. Description and registration of activities. The Importance of supplier control. Documents and registers.

Unit 5.- Traceability program. Definition Legal Bases. Benefits and requirements for its implementation. Importance and aspects to be considered in the development of the traceability plan. Documents and registers.

Unit 6.- Design and maintenance of facilities and equipment. Location of the industries. General characteristics in the design of the installations. Characteristics of materials. Description, monitoring and registration of maintenance activities.

Unit 7.- Clean and disinfecting program. Definition. Key aspects to be considered in the design of the plan: level of risk, evaluation of dirt, selection of detergents and disinfectants. Factors that affect the effectiveness of disinfectants. Monitoring, corrective measures and control of the plan. Documents and registers.

Unit 8.- Control Plan for pests and other undesirable animals. Definition. The integrated control Pest Plan. Devices used to control pests. Monitoring, corrective measures and control of the plan. Documents and registers.

Unit 9.- Water control plan. Definition of potability. Health criteria of water for human consumption. Characteristics of the facilities. Monitoring, corrective measures and control of the plan. Documents and registers.

Unit 10.- Control plan for allergens and substances that cause intolerance. Information required in the control of suppliers and the labelling of the elaborated product. Measures to avoid cross contamination: Warehouses, processing and cleaning. Monitoring, corrective measures and control of the plan. Documents and registers.

Unit 11.- Plan of control of by-products and waste. Definition of Hygienic aspects in the elimination of waste. Classification, separation, storage and withdrawal. Characterization of by-products and waste. Monitoring, corrective measures and control of the plan. Documents and registers.

Unit 12.- Temperature control plan: Description of the equipment used. Monitoring and calibration activity. Food, equipment and environment temperature records. Corrective measures and control of the plan.

Unit 13.- Training plan for the Handling and Training Staff. Previous staffing skills. Purpose of the plan. Phases to consider in its development, implementation and evaluation. General and specific knowledge. Monitoring, corrective measures and control of the plan.

Unit 14- Guide to Good Hygienic Practices. Recommendations for developing a GHPG. Minimum contents. Official recognition and implementation process of a GHPG.

Unit 15.- Food Defence

Unit 16.- Food Fraud

Unit 17.- Validation of technological treatments and shelf-life

Unit 18.- The audit process of the implementation of the HACCP system and the prerequisites. Classification of the audits.

Practical content

- Laboratory sessions: Analysis techniques and procedures related to the prerequisites: Evaluation of the disinfectant activity in food surfaces and food matrices, evaluation of handwashing, cleaning and disinfection checking techniques, checking of water potability, rapid or classic analytical methods for evaluating the suppliers.
- Computer classroom sessions: tertiary predictive microbiological models: introduction of its application for the establishment of critical limits and shelf-life (to apply in the group case).
- Sessions at the Pilot Plant: Evaluation and audit of the prerequisites: Control of temperatures, warehouse, structures ...
- Classroom sessions: resolution of lab practical activities and individual and/or group activities.

Activities and Methodology

| Title | Hours | ECTS | Learning Outcomes |
|-----------------------------|-------|------|---|
| Type: Directed | | | |
| Case resolution (1 group) | 9 | 0.36 | 1, 20, 5, 8, 6, 10, 13, 19, 18, 15, 16, 9, 23, 21, 12, 11 |
| Classroom practice sessions | 7 | 0.28 | 1, 20, 8, 7, 6, 19, 17, 18, 9, 23, 21, 12, 11 |

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|--|----|------|---|
| Classroom theoretical sessions | 44 | 1.76 | 2, 4, 6, 10, 13, 19, 17, 18, 15, 16, 9, 12, 11 |
| Computer classroom | 2 | 0.08 | 3, 21, 12, 11 |
| Laboratory Sessions | 16 | 0.64 | 1, 3, 2, 20, 7, 6, 22, 13, 19, 18, 16, 21, 12, 11 |
| Pilot Plant session | 1 | 0.04 | 6, 18 |
| Type: Supervised | | | |
| Tutorials | 10 | 0.4 | 1, 2, 20, 4, 6, 10, 13, 19, 17, 18, 16, 9, 12, 11 |
| Type: Autonomous | | | |
| Individual or group Self-learning activities | 58 | 2.32 | 2, 4, 6, 10, 13, 19, 17, 18, 15, 16, 9, 12, 11 |
| Shelf-study | 70 | 2.8 | 2, 20, 4, 8, 6, 10, 13, 19, 17, 18, 16, 9, 21, 12, 11 |

The course development is based on the following activities:

1) Classroom theoretical sessions: consist of lectures supported by ICTs, in explaining the fundamental concepts of the basic themes of the subject.

2) Classroom practices sessions: Laboratory sessions for working analysis techniques and procedures related to the prerequisites. Computer classroom sessions: tertiary predictive microbiological models: introduction of its application for the establishment of critical limits and shelf-life. Sessions at the Pilot Plant: Evaluation and audit of the prerequisites. Classroom sessions to solve lab practical activities and individual activities.

3) Classroom practices sessions for group self-learning activities of HACCP and Audit: Different sessions of 1,5 h will be performed at the end of the semester. Each group will have to present, with visual support, the most important aspects of the task done, as well as auditing the other group that performs the same task. Assistance is required.

4) Tutorials: The tutorials will be mainly aimed at guiding and resolving the doubts of the students. Tutorials can be done individually or in groups, depending on the objectives, arranging the meeting both in person and via TEAMS.

Non-contact activities

1) Individual or group self-learning activities: the student will have to perform 6 activities. These activities will be presented throughout the course, coinciding with the different theoretical/practical parts. These tasks are applied to different prerequisites. The student will have to do the search for information along with the one provided by the professor. Tasks will be presented documentally with a deadline in function of the difficulty of the case.

2) Group Self-learning activities of HACCP and Audit: students will have one task on a topic posed by the professor, following formal guidelines and contents common to all groups. The task must be submitted in writing via Moodle by the end of the semester. The first part (HACCP) will be presented before the seminar and the second part after the seminar session (Audit).

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

Continuous Assessment Activities

| Title | Weighting | Hours | ECTS | Learning Outcomes |
|---|-----------|-------|------|--|
| First control (individual) | 20% | 3 | 0.12 | 2, 4, 10, 13, 19, 18, 15, 16, 12, 11 |
| Group-based self-learning activities (HACCP case): document and audit | 25% | 0 | 0 | 2, 20, 4, 5, 8, 6, 10, 13, 14, 19, 17, 18, 16, 9, 21, 12, 11 |
| Laboratory activities | 10% | 0 | 0 | 1, 3, 2, 7, 6, 22, 13, 19, 18, 16, 23, 12 |
| Second control (individual) | 30% | 5 | 0.2 | 2, 6, 10, 17, 18, 9, 11 |
| Specific individual or group-based self-learning activities | 15% | 0 | 0 | 2, 20, 8, 6, 10, 13, 19, 18, 16, 21, 12, 11 |

The skills of this subject will be evaluated by:

- First Control: from unit 1 to unit 3, and activities related to individual self-learning and/or the practices carried out in this period with a weight of 20% of the final mark
- Second Control: from unit 4 to unit 18, and activities related to individual self-learning and/or practices carried out during this period, plus the material treated in the seminars, with a weight of 30% of the final mark
- Individual or group-based self-learning activity (prerequisite): It will have a 15% weight of the final mark. If the student does not attend the classroom session on the day of the discussion of the task, the note will be only of a 70%
- Group-based self-learning activities (HACCP case) and audit. Both written work and oral presentation will be valued. It will consider the final tier of the participation of each student. The first activity will have a weight in the final mark of 20% and the second activity with a weight of 5%.
- Attendance at practices and presentation, assessment and assistance to the discussion of the report of the lab sessions will have a weight of 10% of the final mark. If the student does not attend the classroom session on the day of the discussion of the task, the note will be only of 70%.

The student will be graded as "Not evaluable" if the weighting of all conducted evaluation activities is less than $\leq 15\%$ of the final score.

To pass the course is required:

- a) A minimum of 5 points (over 10) in each of the two controls; If this mark is not reached, the student must present to the recovery exam of control not overcome.
- b) A minimum of 5 points (out of 10) in the group self-learning activity (HACCP/Audit task, This part can be recovered, presenting the document again after at least 15 days after its presentation and defence.
- c) A minimum of 5 points (out of 10) in the average of the specific self-learning activities. This part cannot be recovered.
- d) Attendance to a minimum of 80% of the laboratory practical sessions, and 60% of the discussions of the activities of self-learning.

To average the marks of the self-learning activities and the practices, the mark of the controls must be at least 5 points (over 10).

This subject does not include the single assessment system.

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Language list

| Name | Group | Language | Semester | Turn |
|-------------------------------|-------|-----------------|-----------------|---------------|
| (PAUL) Classroom practices | 1 | Catalan/Spanish | second semester | morning-mixed |
| (PAUL) Classroom practices | 2 | Catalan/Spanish | second semester | morning-mixed |
| (PLAB) Practical laboratories | 1 | Spanish | second semester | morning-mixed |
| (PLAB) Practical laboratories | 2 | Spanish | second semester | morning-mixed |
| (PLAB) Practical laboratories | 3 | Spanish | second semester | morning-mixed |
| (SEM) Seminars | 1 | Spanish | second semester | afternoon |
| (SEM) Seminars | 2 | Spanish | second semester | afternoon |
| (SEM) Seminars | 3 | Spanish | second semester | afternoon |
| (TE) Theory | 1 | Catalan/Spanish | second semester | morning-mixed |