

Academic Year/course: 2022/23

## 30825 - Food Technology II

### Syllabus Information

---

**Academic Year:** 2022/23

**Subject:** 30825 - Food Technology II

**Faculty / School:** 105 - Facultad de Veterinaria

**Degree:** 568 - Degree in Food Science and Technology

**ECTS:** 6.0

**Year:** 3

**Semester:** Second semester

**Subject Type:** Compulsory

**Module:**

## 1. General information

### 1.1. Aims of the course

One of the specific objectives of the degree in Food Science and Technology is to provide the food industry with qualified technicians for the management of both quality control and production departments. It is within the scope of this professional profile where the subject "Food Technology II" is framed. As a level 2 subject "Food Processing and Engineering" it contributes to achieve the competences and skills of the same, specifically: (i) "identify and assess the problems associated with different foods and their processing and propose those measures necessary to solve them"; (ii) "know and interpret the fundamentals of food industry processes, as well as the most novel technical aspects of each process and/or product, related to its composition, functionality and processing"; (iii) "elaborate, transform, sanitize and preserve food"; (iv) "establish process control tools". With this approach, the general objective of this course is for students to acquire the fundamental knowledge and skills that will enable them to interpret, evaluate and select the different systems, methods, processes and equipment most suitable for the industrialization of the various food groups. "These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning outcomes of the subject provides training and competence to contribute to some extent to their achievement"

- SDG 4. Quality education.
- SDG 5. Gender equality.
- SDG 7. Affordable and clean energy.
- SDG 9. Industry, innovation and infrastructure.
- SDG 12. Responsible production and consumption.
- SDG 15. Sustainable ecosystem living.

### 1.2. Context and importance of this course in the degree

The topic is closely linked to "Food Technology I", which is taught in the fifth semester. Both subjects allow students to complete their training in topics related to food handling, equipment, and facilities for food processing and storage, as well as the most common control and data acquisition systems in the food industry. Passing this discipline will enable students to follow the subjects dedicated to the study of the Science and Technology of specific food groups, located in the seventh semester, and will be of great interest for the Pilot Plant Practicum in which the knowledge and skills acquired in this subject are fundamental.

### 1.3. Recommendations to take this course

In addition to the basic training subjects, this course requires having taken the subjects "Production of Raw Materials in the Food Industry", "Bromatology", "Food Chemistry and Biochemistry", "Food Microbiology", "Fundamentals of Chemical Engineering", "Basic Operations in the Food Industry", as well as "Food Technology I" with which it is closely related.

On the other hand, due to the fact that a tutored work will be carried out in coordination with the subjects "Food Legislation" and "Applied Food Hygiene", it is considered essential to take the three subjects simultaneously.

## 2. Learning goals

## 2.1. Competences

### BASIC AND GENERAL COMPETENCES:

CG1 - Manage information, search for sources, information gathering and analysis, etc.  
GC2 - Use ICTs  
GC3 - Working in a team  
GC4 - Thinking and reasoning critically.  
GC5 - Work autonomously and perform self-evaluation.  
GC6 - Respect diversity and plurality of ideas, people, and situations.  
GC7 - Transmit information orally and in writing in both Spanish and English.  
CG10 - Adapt to new situations and solve problems.  
CB1 - That students have demonstrated to possess and understand knowledge in an area of study that starts from the basis of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study.  
CB2 - That students know how to apply their knowledge to their work or vocation in a professional manner and possess the competencies usually demonstrated through the development and defense of arguments and problem solving within their field of study.

### SPECIFIC COMPETENCES

CE3 - Identify the physical, chemical, and microbiological agents that cause food spoilage and select the most appropriate strategies for their prevention and control.  
SC4 - Identify and evaluate the physicochemical, sensory, and nutritional characteristics of food, their influence on the processing, and on the quality of the final product.  
SC5 - Elaborate, transform, and preserve food considering quality and safety standards, integrating environmental management.  
CE13 - Communicate knowledge in food science and technology, using the fundamental concepts, methods and tools of this discipline.

## 2.2. Learning goals

The student, in order to pass this topic, must demonstrate the following results:

1. Is able to analyze the advantages, disadvantages, and limitations of the equipment and facilities with which different operations and processes (preservation, transport, packaging) are carried out in the food industry.
2. Is able to foresee the effects that the different technological processes exert on the raw material and, as a consequence, on the quality parameters of the processed food.
3. Is able to solve problems of calculation and optimization of the most common treatments in the food industry (whether the data and graphs are expressed in Spanish or English).
4. Is able to evaluate the problems associated with different foods and their processing and propose the necessary measures to solve them.
5. Is able to evaluate and analyze the operation and control systems of different equipment used in food processing.
6. Is able to elaborate a project and defend it orally (in Spanish or English), working in a team, in which the elaboration process of food is detailed from a technological point of view.

## 2.3. Importance of learning goals

They contribute together with the rest of the competences acquired in the subjects of the subject "Food Processing and Engineering" to the training of the students for the performance of the professional profile "Food Processing" that the students will be able to exercise in the industries belonging to the different food sectors. They also contribute, together with the other disciplinary subjects, to the training of students for the performance of the professional profiles of: "Food Safety", "Development and innovation of processes and products in the food field" and "Teaching and Research in Food Science and Technology". Finally, the strengthening of generic or transversal competences of instrumental, interpersonal, and systemic types will contribute, together with the rest of the subjects, to the integral formation of future graduates in Food Science and Technology.

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

- 1. Written test of theoretical knowledge, consisting of 20-30 multiple-choice questions and 3-6 short questions.** Passing this test will accredit the achievement of learning outcomes 1, 2 and 4. It will be evaluated according to the following criteria and levels of demand: the grade will be from 0 to 10 and the result will represent 55% of the student's overall grade in the subject, 35% corresponding to the multiple-choice questions and 20% to the short questions. Students will have 3 self-evaluations in the ADD to check their state of assimilation of concepts of this part throughout the course, but they will not be reflected in the final grade of the course.
- 2. Written test of resolution of practical assumptions, consisting of 1-4 short questions according to the guidelines and formats described in the theoretical classes and seminars.** The passing of this test will accredit the achievement of learning outcomes 3 and 5. It will be evaluated according to the following criteria and levels of demand: the grade will be from 0 to 10 and the result will represent 105% of the student's final grade in the course.
- 3. Evaluation through the ADD or on paper with multiple-choice questions (10-20 questions) of each of the practices carried out (practice 1 to 3).** Different aspects treated in the practical sessions will be evaluated (identification of

components of the equipment and sensors, results obtained). Passing this test will accredit the achievement of learning outcomes 1, 2 and 5. Tests one and two will be carried out on the dates established in the examination calendar prepared by the center. Test three will take place after the completion of each practical and will be scheduled throughout the course.

**4. Presentation and defense of an integration work on the elaboration process of a food from a technological point of view.**

It will be evaluated on the basis of several grades:  
 - Group grade obtained in the third tutorial of the work based on the following material prepared by the students: processing stages; control and processing parameters of the equipment that could be used throughout the whole process of production and storage of the same; probes available in the equipment used and probes needed to control each of the stages. In addition, the inclusion and reflection in the work of aspects dealt with in the theory will be valued. This activity will be carried out throughout the course in parallel to the teaching of the subject and 3 seminars of one hour each will be established to work on the work. The third seminar will be used to evaluate the tutored work from a technological point of view. The prepared materials can be delivered in Spanish or English. In addition, the activity will be carried out in practice 4 (test 3) related to the integration work will be evaluated.  
 - Individual grade of a question that will be asked in the theory exam (test 1) about the integration work.  
 - Individual grade that will be obtained from the presentation and defense of the integration work, since the quality of the presentation will be valued, as well as the answer to the questions posed individually to each of the members of the group of the integration work and/or to the questions asked to their classmates. This grade will take into account the overall work done integrating with the subjects of "Applied Food Hygiene" and "Food Legislation".

For those students who do not choose to carry out the Integration Work in group, this one will realize individually a processed line of a product, which will present and defend to the teacher the day of the test of evaluation of the subject in the date that is indicated in the academic calendar.

The result of the tutored work will suppose 25% of the global qualification, being granted, 10% to the group mark of the tutorial 3, 8% to the mark of the exam and 7% to the mark of the presentation and defense of the work of integration).

Passing this test will accredit the achievement of learning outcomes 1, 4 and 6. The timing of this test is indicated in the attached calendar.

**Evaluation criteria and levels of demand**

**1. Written test of theoretical knowledge:** it will be necessary to obtain a minimum grade of 5 out of 10. In multiple-choice questions, those answered incorrectly will not be negatively evaluated. In the case of short questions, the relevance of the content and the capacity of synthesis will be especially valued. Those questions that demonstrate a deep and/or conceptual ignorance of the subject will be negatively evaluated. Students will have 3 self-assessments in the ADD to check their state of assimilation of concepts of this part throughout the course, but they will not be reflected in the final grade of the subject.

**2. Written test of resolution of practical assumptions:** the approach of the problem, its adequate resolution and the interpretation of the result in the part corresponding to the problems of class and seminars will be equally valued.

**3. Evaluation of the practical exercises.** It will be done through the ADD or on paper after each practical. Test type questions answered incorrectly will not be negatively evaluated. A grade higher than 5 out of a maximum of 10 points must be obtained to be considered passed.

**4. Integration work.** A grade higher than 5 out of a maximum of 10 points must be obtained in each of the phases of development of the work to be considered passed. The quality of the material prepared and the discussion raised during the third tutorial, the results obtained in practice 4 related to the integration work as well as the answer to the question of the theory exam and the quality of the presentation and defense of the integration work will be evaluated. The grade will be from 0 to 10 and will represent 25% of the final grade (10% corresponding to the group grade of tutorial 3, 8% to the exam grade and 7% to the grade of the presentation and defense of the integration work). The presentation and defense of the work in English will be positively valued.

The overall grade will be obtained from the sum of the different tests carried out (up to 55% in the written test of theoretical knowledge, 10% with the practical problems, 10% with the evaluation of the practices and 25% with the integration work) being necessary to pass all the parts to pass the course.

Schematically, the overall grade for the course is obtained from the sum of the different tests:  
 - Theory: 55% Theory: 55% Theory: 55% Theory: 55% Theory: 55% Theory: 55%  
 - Problems: 10%  
 - Practical: 10%  
 - Integration work: 25%: (10% tutoring and practical 4, 8% exam question, 7% presentation and defense of the work together with Applied Food Hygiene and Food Legislation).

The overall grade will be obtained from the weighted average of the four exercises, being necessary to obtain a value higher than 5.0 in each of the parts to pass. For the overall grade of the course, the results obtained in the tests passed will be maintained until the end of the academic year.

Grading system: according to the Regulations of the Learning Assessment Standards of the University of Zaragoza (Governing Council Agreement of December 22, 2010), the results obtained by the student will be graded according to the following numerical scale from 0 to 10, with one decimal place, to which the corresponding qualitative grade may be added:

0 - 4.9 : Fail (SS)  
 5.0 - 6.9 : Pass (AP)  
 7.0 - 8.9 : Notable (NT)  
 9.0 - 10 : Outstanding (SB)

The mention of "Matrícula de Honor" may be awarded to students who have obtained a grade equal to or higher than 9.0. Their number may not exceed five percent of the students enrolled in the corresponding academic year.

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. It favors the understanding of the different chemical and physical processes that occur in the environment. A wide range of teaching and learning tasks are implemented, such as theory sessions, laboratory sessions, assignments, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

Students must follow the regulations described in:

- Prevention: A guide for students at the University of Zaragoza:  
[https://uprl.unizar.es/sites/uprl.unizar.es/files/archivos/Procedimientos/guia\\_preventiva\\_para\\_estudiantes.pdf](https://uprl.unizar.es/sites/uprl.unizar.es/files/archivos/Procedimientos/guia_preventiva_para_estudiantes.pdf)
- Manual de seguridad en los laboratorios de la Universidad de Zaragoza y normas marcadas por la Unidad de Prevención de Riesgos Laborales:

[https://uprl.unizar.es/sites/uprl.unizar.es/files/archivos/Procedimientos/manual\\_de\\_seguridad\\_en\\_los\\_laboratorios\\_de\\_la](https://uprl.unizar.es/sites/uprl.unizar.es/files/archivos/Procedimientos/manual_de_seguridad_en_los_laboratorios_de_la)  
<https://uprl.unizar.es/inicio/manual-de-procedimientos>

In addition, students will follow as well any instructions related to biosecurity given by the professor

### 4.2. Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (3.7 ECTS): 37 hours (1 hour per session). It is scheduled to deliver the documentation for each lesson at least 1 week in advance.
- Pilot Plant sessions (1.9 ECTS): 19 hours (3-4 hours per session). They will be held in sessions of 3-4 hours.
- Seminars (troubleshooting and cases) (0.4 ECTS): 4 hours (2 hours per session).
- Development of coordinated work in collaboration with the subjects of "Legislación alimentaria" and "Higiene Alimentaria Aplicada". It will include 3 tutorials of 1 hour for each group.

The coordinated work will be done in coordination with the subjects of "Legislación alimentaria" and "Higiene Alimentaria Aplicada", in groups of 5-7 persons. Students will have to assess from legal, hygienic and technological terms the development process of a product.

The project is divided into two phases: in the first one, students will have to present the control and processing parameters for each of the stages, considering the equipment that could be used throughout the production and storage process available at the Pilot Plant; the probes that such equipment may have, as well as the probes that may be needed to control each of the stage. These materials will be discussed with students during the 3 tutorial sessions. In addition, in the third tutorial session, the results obtained in practice 4 will be assessed. In the second phase, the coordinated work will be defended at a joint session of the three subjects referenced above; it constitutes an additional practice session. Prior to the defense of the work, it will be presented to the professors to prepare the debate.

Students will have 2 hours of tutoring per week.

All material both theoretical and practical sessions will be available to students in the ADD (<https://moodle2.unizar.es/add/>).

### 4.3. Syllabus

The course will address the following topics:

#### Section I. Introduction

- Lectures:
  - Topic 1. Introduction (0.1 ECTS).
  - Topic 2. Cleaning, sorting and grading. Resizing (0.2 ECTS).
  - Topic 3. Transport and pumping (0.2 ECTS).

#### Section II. Food processing by heat, ionization and other non-thermal technologies.

- Lectures:
  - Topic 4. Food preservation by heat. Applications (blanching, pasteurization, sterilization, extrusion). Equipment and facilities. Process Control (0.7 ECTS).
  - Topic 5. Food preservation by ionizing radiation. Sources and facilities. Applications. dosimetry control

(0.2 ECTS).

Topic 6. Food preservation by new technologies. Applications. Equipment and facilities. Process Control (0.2 ECTS).

- Practice sessions:  
PRACTICE 1. Canning processing. Retort setting up and management (0.4 ECTS).  
PRACTICE 2. Pasteurization / sterilization of a liquid product. (0.4 ECTS).
- TUTORING 1 for carrying out the coordinated work.

### Section III. Food processing by lowering the temperature and by modifying the atmosphere.

- Lectures:  
Topic 7. Food preservation by lowering the temperature. Cooling and freezing systems. Cold chain. Applications. Equipment and facilities. Process Control (0.9 ECTS).  
Topic 8. Food preservation by controlling the atmosphere. Types. Applications. Equipment and facilities. Process Control (0.1 ECTS).
- Practice sessions:  
PRACTICE 3A. Preparation of frozen green beans. Management and characterization of tunnel freezer. Components of the liquid nitrogen freezer (0.3 ECTS).  
PRACTICE 3B. Components of cooling and freezing systems: the freezing/cooling/maturation chambers, indirect cooling system and refrigerator (0.1 ECTS).  
PRACTICE 4A. Activity of the coordinated work at pilot plant (0.3 ECTS)  
PRACTICA 4B. Review of the results from Practice 4A (0.1 ECTS).
- SEMINAR. Cooling load calculations (0.3 ECTS).
- TUTORING 2 for carrying out the coordinated work (0.1 ECTS).

### Section IV. Food processing by lowering the water activity. Chemical food preservation.

- Lectures:  
Topic 9. Food preservation by lowering the water activity. Applications. Equipment and facilities. Process control. Reconstitution of food (0.7 ECTS).  
Topic 10. Chemical Food Preservation. Smoked, salting and brining (0.1 ECTS).
- TUTORING 3 for carrying out the coordinated work.

### Section V food packaging.

- Lectures:  
Topic 11. Packaging. Materials and manufacturing. Filling and sealing. Aseptic packaging. Active packaging. Smart packaging. Edible films and coatings (0.3 ECTS).
- Practice sessions:  
PRACTICE 5. Presentation and oral discussion of the integrated work together with the subjects of "Legislación Alimentaria" and "Higiene Alimentaria Aplicada" (0.3 ECTS).

## **4.4. Course planning and calendar**

For further details concerning the timetable, classroom and further information regarding this course please refer to the "Facultad de Veterinaria" website (<http://veterinaria.unizar.es>).

## **4.5. Bibliography and recommended resources**

<--?PHP echo "[http://biblos.unizar.es/br/br\\_citas.php?codigo=".\\$codasig."&year=2020](http://biblos.unizar.es/br/br_citas.php?codigo=)"; ?-->  
<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=30825>