

**COURSE DATA****Data Subject**

<b>Code</b>	33944
<b>Name</b>	Tecnological Bases for Foodstuffs
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2021 - 2022

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1205 - Degree in Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	2	First term
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	3	First term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1205 - Degree in Human Nutrition and Dietetics	12 - Foundations of food technology	Obligatory
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	1 - Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
MARTINEZ CULEBRAS, PEDRO V.	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.
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**SUMMARY**

The subject "Technological Bases of Foodstuffs" is a obligatory subject of the second year of the Degree of Human Nutrition and Dietetics and third year of Dual and Joint Degree in Pharmacy and Human Nutrition and Dietetics , which is taught in the Faculty of Pharmacy, University of Valencia. This course has a total of 6 ECTS credits to be given in the first quarter.



Our main goal is for our students to acquire an overview on Food Technology and its relationship with food production, food security and the nutritional and organoleptic quality of food.

We aimed for our students to gain basic knowledge on techniques and tools that are currently being used at the food industry for production, processing, conservation and food packaging. We focus specifically on the challenges food preservation is facing with regards to the chemical, enzymatic and microbiological changes food is prone to experience. The effects of processing, in particular the effects of the preservation methods in nutritional and organoleptic characteristics of food, are also carefully examined. In connexion with this particular topic, new technologies as an alternative to traditional methods of food preservation are also thoughtfully reviewed. These new technologies can also preserve food without significantly altering nutritional and organoleptic characteristics of food.

On the other hand, we also aimed for our students to acquire basic knowledge of technological processes that transform raw materials into food. Flow diagrams and basic operations carried out on the different food industries are analysed and studied: foods from animal origin (meat, eggs, milk, fish products,...), foods from plant origin (cereals and baking, oils vegetable, fruit and vegetables,...), and food and beverage fermented (alcoholic beverages, wine, beer,...).

It is also intended that students get ideas about how to develop new products through the application of novel technologies and the use of traditional and non-traditional raw materials, such as functional foods, organic foods and GM foods.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

- It is recommended that the student present basic notions of general and organic chemistry, biochemistry, biology, and more specifically microbiology, to better understand the biochemical and microbiological processes that occur in food as well as the foundation of the techniques used in the food industry to transform raw materials into food, to develop new food or to keep them.
- It is recommended to study simultaneously with the other 2nd course subjects of the Food Science module (Bromatology and Food)

## OUTCOMES

### 1205 - Degree in Human Nutrition and Dietetics

- Reconocer los elementos esenciales de la profesión del dietista-nutricionista, incluyendo los principios éticos, responsabilidades legales y el ejercicio de la profesión, aplicando el principio de justicia social a la práctica profesional y desarrollándola con respeto a las personas, sus hábitos, creencias y culturas, con perspectiva de género.



- Know, judge and know how to use and apply the sources of information related to nutrition, food, lifestyles and health.
- Recognise one's own limitations and the need to maintain and update professional competence, with particular emphasis on independent and lifelong learning of new facts, products and techniques in the field of nutrition and food, and on motivation for quality.
- Realizar la comunicación de manera efectiva, tanto de forma oral como escrita, con las personas, los profesionales de la salud o la industria y los medios de comunicación, sabiendo utilizar las tecnologías de la información y la comunicación especialmente las relacionadas con nutrición y hábitos de vida.
- Desarrollar la profesión con respeto a otros profesionales de la salud, adquiriendo habilidades para trabajar en equipo.
- Know the changes undergone by food as a result of technological and cooking processes.
- Know about the production systems and the basic systems for the manufacturing, transformation and preservation of the main food products.
- Conocer los procesos de elaboración industrial y conservación de los alimentos.  
Conocer los principales tipos de industrias alimentarias.
- Know about emerging technologies for the transformation and preservation of food and their impact on quality.

## LEARNING OUTCOMES

- Understand and critically evaluate the basic processes in the production, processing and preservation of animal and vegetable foods.
- Identify and classify foods and food products. Know their properties, organoleptic characteristics and modifications suffered as a result of technological processes.
- Know the main types of food industries and equipment used in them.
- Understand and critically evaluate emerging technologies for processing and preserving food.

## DESCRIPTION OF CONTENTS

### 1. Introduction to food technology

TOPIC 1. Introduction to Food Technology. What is food technology? Historical development of food technology. Objectives of food technology. Relationship of food technology with other disciplines. Food industry: current situation in Spain. Processes and unit operations. Flowcharts in the food industry.

TOPIC 2. Biochemistry and Microbiology of Foods. Chemical and microbiological food alterations. Use of



enzymes in the food industry. Fermentation: lactic, alcoholic, malolactic, propionic and acetic. Other processes controlled by microorganisms. Starter cultures in the production of fermented foods and beverages.

## **2. Operations of food industry.**

TOPIC 3. Processing operations in the food industry. Changes in volume. Mixtures and moulding. Texture modifications. Chemical and enzymatic treatments. Separation. Other processing operations.

TOPIC 4. Food preservation by heat. Thermal resistance of microorganisms and proteins. Factors influencing the heat treatment of food. Heat conservation techniques. Effect of heat on food.

TOPIC 5. Food preservation by cold. Cooling and freezing. Relationship with spoilage agents. Cooling and freezing systems. Storing and thawing.

TOPIC 6. Food preservation by depression of the water activity. Water activity and microbial growth. Evaporation. Dehydration. Reconstitution of dehydrated foods.

TOPIC 7. Other methods of preservation. Acidity in the conservation. Modified atmospheres. High hydrostatic pressures. Food irradiation. Other techniques.

TOPIC 8. Packaging and storage. Types of packaging. Active and intelligent packaging. Storage.

## **3. Processing of animal products.**

TOPIC 9. Meat and meat products. Meat processing. Slaughterhouses. Meat preparations. Cured meat products. Process technology. Other meat products.

TOPIC 10. Fish and fishery products. Fresh fish: processing and conservation. Fishery products. Shellfish. Fishery byproducts.

TOPIC 11. Eggs and egg products. Processing from start to market. Alteration and preservation of eggs. Egg products.

TOPIC 12. Milk and dairy products. Processing of milk. Heat treatments. Drinking milk. Fermented milks, yogurt, kefir and cheese. Dairy products: butter, cream and ice cream.

## **4. Processing of food from vegetable origin.**

TOPIC 13. Food oils and fats. Industrial preparation of vegetable oils. The specific case of animal fats and oils. Refining.

TOPIC 14. Cereals and derivatives. Cereals. Wheat processing. Grinding industry: flours and semolina. Baking process. Preparation of pasta, cookies, pastries, cakes and breakfast cereals.



TOPIC 15. Fruits, vegetables and their derivatives. Post-harvest technology. Preservation of fruits and vegetables. Fruit and vegetable juices. Canned vegetables. Jams and jellies.

### 5. Processing of special food and beverages.

TOPIC 16. Alcoholic beverages. Alcoholic fermentation. Wine and wine making. Technology of beer production. The alcoholic distillates.

TOPIC 17. Functional, organic and GM foods. Functional foods: definitions and types. Organic food: assessment and marketing. Genetically engineered foods: definition, types and evaluation.

### 6. Practices

1. Heat sterilization of canned food.
2. Production of frozen products.
3. Fruit jam elaboration.
4. Extraction, pasteurization and concentration of juices.
5. Dehydration of foods: spray and freeze drying.

## WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Laboratory practices	15,00	100
Seminars	2,00	100
Tutorials	2,00	100
Development of group work	5,00	0
Development of individual work	5,00	0
Study and independent work	10,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	30,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	10,00	0
<b>TOTAL</b>	<b>147,00</b>	



## TEACHING METHODOLOGY

Method	Hours
Seminars	2
Theory	38
Practice	15
Tutoring	2

Teaching is based on the individual study of the topics above that will be reinforced with the organization of **tutoring**. Prior to the date of tutoring, the student must have prepared the proposed activities to reinforce the learning of specific aspects of the program. **Classes** are taught using audio-visual technical equipment. The student will have this material in the virtual classroom.

**The labs** are raised in a pilot plant in which students can relate to certain industrial techniques as making preserves, freeze-dried products, frostbite, which favors the relationship between knowledge and its application to practice. Be provided a booklet prior to procedures, as well as a number of issues and problems that students must meet and provide the teacher within a certain time.

**Coordinated seminars** will be conducted on topics suggested by the teacher and related to the subject. Seminar preparation will be supervised by the teacher. The work should be submitted in writing and will be presented by students. In the case of the Double Degree in Pharmacy and NHD, the seminars will be not coordinated, and will be voluntary. They will consist in the public presentation of a topic related to the subject. Attendance is mandatory for the rest of the students.

During the classes, application examples of the subject contents in relation to the **Sustainable Development Goals (SDG)** will be indicated, as well as, in the topic proposals for coordinated seminars. Thereby, it is intended to provide students with knowledge, skills, and motivation to understand and address these SDGs.

## EVALUATION



The acquisition of knowledge, abilities and skills will be assessed throughout the following evaluable tests.

- 1) **Written tests.** Make a written test to ensure knowledge and understanding of theoretical minimum content established for the subject (60%). In the case of the students of the Double Degree in Pharmacy and NHD that do not realize the seminar, the written test is worth 70%.
- 2) **Lab sessions and practices.** Evaluation of laboratory work by monitoring the work of the same, the ability to solve experimental problems encountered and the ability to make very detailed and organized reports of experimental results. The written test will include questions about practical contents. (20%).
- 3) **Seminars.** The following items will be taken into account for their assessment: written work, level of understanding of the contents, as well as the skills for its exposition, defense and discussion (10%). In the evaluation of the not coordinated seminars in the Double Degree in Pharmacy and NHD the exposure, defense and discussion of the work will be valued and will also represent a 10% of the total evaluation.
- 4) **Tutorials.** Evaluation of the work during the tutorials, the ability to solve the proposed activities and the level of involvement (10%).

It is necessary to acquire 4.5 out of 10 points in the written test that includes questions of theory and practice to pass the subject.

Attendance at practices, tutorials and seminars is mandatory to pass the subject. It is not obligatory for repeaters during the two subsequent courses to its realization. During this time the califications will be preserved.

## REFERENCES

### Basic

- Ordoñez, J.A., Cambero, I., Fernández, L., García, M.L., de la Hoz, L., Selgas, M.D. (1998). Tecnología de los alimentos. Volumen I. Componentes de los alimentos y procesos. Ed. Síntesis S.A., Madrid.
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- Ordoñez, J.A., García de Fernándo, G., Selgas, M.D., García, M.L., Cambero, I., Fernández, L. Fernández M, Hierro, E (2014). Tecnología de los alimentos de origen animal. Volumen 1. Ed. Síntesis S.A., Madrid
- Fellows, P. (2007). Tecnología del procesado. Ed. Acribia S.A., Zaragoza.
- Jeantet, R. Croguennec T., Brulé, G. (2010). Ciencia de los Alimentos. Volumen I. Estabilización biológica y físico-química. Ed. Acribia S.A., Zaragoza.
- Jeantet, R. Croguennec T., Brulé, G. (2010). Ciencia de los Alimentos. Volumen II. Tecnología de los productos alimentarios. Ed. Acribia S.A., Zaragoza.



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- Vanaclocha, A. C. (2014). Tecnología de los alimentos de origen vegetal. Volumen 1. Ed. Síntesis S.A., Madrid.
- Vanaclocha, A. C. (2014). Tecnología de los alimentos de origen vegetal. Volumen 2. Ed. Síntesis S.A., Madrid.

#### **Additional**

- Casp, A., Abril, J. (1999). Procesos de Conservación de Alimentos. Ed. AMV y Mundi-Prensa, Madrid.
- Bartholomai, A. (2001). Fábricas de alimentos: Procesos, equipamientos, costos. Ed. Acribia, S.A. Zaragoza.
- Varnam, A.H., Sutherland, J.P. (1998). Carne y productos cárnicos. Ed. Acribia S.A., Zaragoza
- Cauvain, S.P., Young, L.S. (2007). Fabricación de pan. Ed. Acribia S.A., Zaragoza.
- Varnam, A.H., Sutherland, J.P. (1997). Bebidas. Tecnología, química y microbiología. Ed. Acribia S.A., Zaragoza.
- Grainger, K., Tattersall, H. (2007). Producción de vino. Desde la vid hasta la botella. Ed. Acribia S.A., Zaragoza.
- Sikorski, Z.E. (1994). Tecnología de los productos del mar: recursos, composición nutritiva y conservación. Ed. Acribia, S.A. Zaragoza.
- Dendy, D.A.V., Dobraszczyk. (2004). Cereales y productos derivados. Química y Tecnología. Ed. Acribia S.A. Zaragoza.
- Aparicio, R., Harwood, J. (2003). Manual del aceite de oliva. AMV Ediciones. Madrid.
- Walstra, P., Geurts, T.J., Normen, A., Jellema, A., van Boekel, M.A.J.S. (2001). Ciencia de la leche y tecnología de los productos lácteos. Ed. Acribia S.A. Zaragoza.
- Tirilly, Y., Bourgeois, C.M. (2001). Tecnología de las hortalizas. Ed. Acribia, S.A. Zaragoza.
- Jay, J.M., Loessner, M.J., Golden D.A. (2009). Microbiología moderna de los alimentos. Ed. Acribia, S.A., Zaragoza.

#### **ADDENDUM COVID-19**

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

### **3. Teaching methodology**

**Lectures:** an on-line teaching methodology is proposed with video conferences using synchronous videoconferences by the tool Blackboard Collaborate (BBC) according to subject schedule. Materials for the classes will be uploaded to the Virtual Classroom (AC) of the subject according to the development of



the classes by the BBC. Use of the Virtual Classroom forum to answer questions.

**Activities by AC:** to increase the weight of the continuous assessment, 3 evaluable activities will be proposed to be delivered before the exam date through the "Task" option of the VC. To carry out these tasks, the Virtual Classroom "Questionarios" tool will be used, as well as other pedagogical and technological tools (Padlet, Kahoot, etc.).

For the resolution of doubts, a forum will be enabled in the VC, and, if necessary, BBC videoconference.

**Tutorial system:** the virtual program of tutorials will be maintained (attention in 48 working hours by email). Personal tutorials will be replaced by BBC videoconferences.

**Tutorials in groups:** the face-to-face modality of this activity will be maintained. Activities will be proposed in the "Task" option of the VC for their presentation and resolution of doubts. In case of not being able to do it in person as a consequence of the pandemic, the group tutoring will be carried out by synchronous BBC videoconference at the scheduled time.

**Coordinated seminars:** they will be carry out on-line by synchronous BBC videoconference at the scheduled time.

**Practices:** the face-to-face modality will be maintained in the IATA pilot plant, giving explanations prior to the practice by asynchronous BBC videoconference in the VC. Other ways to explain practices could be by uploading a Power Point sound file or using notes to the V C. In case of not being able to do in person as a result of the pandemic, practical classes will be replaced by viewing didactic videos and exercises proposed through the "Task" option in the VC.

#### **4. Assessment**

The weight of the continuous assessment will be increased by 10% (3 evaluable tasks).

The weight of the written test (theory + practice) will be reduced from 80% to 70%. The written test will be face-to-face. In case of not being able to do it in person as results of the pandemic, the written examination will consist of two parts, a multiple-choice test and another test of short questions, using the "Questionarios" tool from the VC.

The weight in the final assessment of tutorials in groups (10%) and coordinated seminars (10%) will be maintained.