

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

Code	34111
Name	Food Industries
Cycle	Grade
ECTS Credits	9.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1103 - Degree in Food Science and Technology	Faculty of Pharmacy and Food Sciences	3	Annual

Subject-matter

Degree	Subject-matter	Character
1103 - Degree in Food Science and Technology	16 - Processes of the food industry	Obligatory

Coordination

Name	Department
SOLER QUILES, CARLA MARIA	265 - Prev. Medicine, Public Health, Food Sc., Toxic. and For. Med.

SUMMARY

"Food Industry" is a compulsory subject that is taught in the third year of the Degree in Food Science and Technology, which is taught in the Faculty of Pharmacy, University of Valencia. This course has a total of 9 ECTS credits and is annual.

This subject explains the processes applied in the food industry, with a description of the operations that can be used for treatment, food processing, preservation and packing for each specific foodstuff. First, we study the general characteristics of the meat, its technology and meat products. With the same scheme, we study the fish and fishery products. It continues with the study of milk and dairy products, with an analysis of the main microorganisms could be present in these products. Then describes the processes of various dairy products with special reference to the technological aspects of each one. Next, an issue devoted to eggs and egg products. Then describes the processes related to the vegetables and finally contains a last block that includes the study of different industries such as sugar, oils and fats, spices and beverages.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

OUTCOMES

1103 - Degree in Food Science and Technology

- Control and optimise processes and products in the food industry.
- Manufacture and preserve food.
- Desarrollar nuevos procesos y productos.
- Conocer los procesos industriales de transformación y conservación de los alimentos así como las tecnologías de envasado y almacenamiento.
Conocer los procesos de transformación y conservación particulares de los principales tipos de industrias alimentarias.
- Conocer los mecanismos y parámetros para el control de los procesos y los equipos de la industrial alimentaria. Conocer los sistemas de control y optimización de procesos y productos aplicados a los principales tipos de industrias alimentarias.
- Apply the knowledge of transformation and preservation processes to the development of new processes and products.

LEARNING OUTCOMES

- know how to design and control basic processes of transformation and preservation within the food industry including major emerging technologies
- Know the main industrial processes derived from different specific technologies
- Asses the possible risks arising from the application of industrial processes of food manufacture
- Participate in the development of new products

DESCRIPTION OF CONTENTS



1. Cereals and derived products

- 1.- Cereals: production and consumption. Classification of cereals. Current state of the investigation and industrial situation. (1h)
- 2.- Basic concepts of cereal grains. Methods and equipments for flours and bread dough characterization. Rheology properties during kneaded, fermentation and baking. (4h)
- 3.-Cereal-derived products: Ingredients, additives and adjuvants. Classification and effects. (2h)
- 4.- Process of bakery. Stages, changes produced and teams used. (2h)
- 5.- Instrumental characterization, sensory and nutritional of products derived of cereals. (1h)
- 6.- Application of the cold in bakery. Breads precooked frozen. Process and quality of product (1h)
- 7.- Cereal derived products without gluten. Formulation, process and characteristic of quality. (2h)
- 8.- Pasta. Ingredients and process. Types of pasta. (1h)
- 9.- Innovation in products of bakery. Tendencies in the design of product. (1h)

2. Milk and dairy products. Eggs and egg products(I)

- 10 .- Hygienic- Sanitary of milk Quality. Origin and levels of contamination. Initial microbiota contamination. Chemical contaminants; residues and contaminants. Influence of hygiene in the production and marketing of milk. (1 h)
- 11 .- Milk production. Milk synthesis. Influencing factors of the milk composition: extrinsic and intrinsic factors. Milking: good practices of the process. (1h)
- 12 .- Pre-treatment of milk at the farm. On the farm: filtration, refrigeration, alternative methods of conservation, transportation and quality control. (1h)
13. Treatments in the dairy industry. Clarification, skimming, standardization, homogenization. Pasteurization. Definition. Procedures, temperature process and limiting factors. Types of pasteurization. Packaging. Quality control. Sterilization. Definition. Methods: Conventional, UHT, other systems. Packaging. Quality control. Manufacturing defects. (2 h)
14. Commercialized Milk. Pasteurized and sterilized. Milk shakes and flavored. Mixing process. Fortified milk. Enrichment process. Technological problems. Evaporated milk. Condensed milk. Milk concentration proceedings. Preservation and packaging systems. Quality control. Milk powder: characteristics. Dehydration process. Packaging systems. Manufacturing defects. Crystallization of lactose polymorphism. Quality control. (3 h)

3. Dairy products. Eggs and egg products(II)

15. Dairy Products. Cream and Butter.. Process. Continuous manufacturing methods. Canning and preserving. Manufacturing defects and alterations. Fermented milks: Yogurt. Preparatory treatment of the milk. Production processes and systems. Types of yogurt. Problems in processing. Quality control. BIO and other milk products acidophilic. Technology cheesemaking. Definitions. Preparatory treatment of the milk. Curd obtaining. Syneresis. Pressing process. Salted cheese. Water activity in cheese. Control and preservation of the brine. Maturation: stakeholders.. Factors determining maturity. Effects of contaminant microbiota. Toxicological problems of the cheese. Additives and antifungal treatments. Packaging. Ice Cream. Features. Types of ice cream. Processes. (3 h)
- 16 .- Eggs and egg products. Fresh egg. Treatment of fresh egg as raw material for the preparation of derivatives. Liquid egg products. Frozen egg products. Dehydrated. (1h)



4. vegetal foods (I)

- 17 .- Postharvest physiology and technology. Introduction. Objectives. Production of fruits and vegetables, the need for post-harvest preservation. (1 h)
- 18 .- Respiration process. Respiratory metabolism, its influence on post-harvest preservation and the deterioration of plants. (2h)
- 19 .- Ethylene. Ripening hormone, synthesis and metabolism. Involvement of ethylene in the regulation of fruit ripening. Control. (1.5 h)
- 20 .- Ripening. Overview of ripening process and control. Ripening climacteric and non-climacteric. (1.5 h)
- 21 .- Compositional changes. Physiological and biochemical changes during ripening and preservation of fruits and vegetables. (1 h)
- 22 .- Modified and controlled atmospheres. Principle of preservation of fruits and vegetables for the control of environmental gases. Mode of action and applications in the preservation of fruits and vegetables. (1.5 h)
- 23 .- Low temperatures preservation. Temperature control in the conservation of fruits and vegetables. Methods and applications. Chilling injury and control. (1.5 h)
- 24 .- Transpiration. Control of water loss in the preservation of fruits and vegetables. Physical principles. Control systems. (1.5 h)
- 25 .- Postharvest Pathology. Major damage and decay during storage of fruits and vegetables. Systems and methods of control. (1.5 h)
- 26 .- Fresh cut vegetable products. Chopping produce. Physiology of plant products. Handling and storage technologies. Microbiological control. (2h)

5. Vegetal Foods (II)

- 27 .- Elaboration of canned vegetables. Overview of a line of canned vegetables feature. Examples of major types of canned vegetables. New vegetal products: cold soups. Overview of a packaging line feature fruits. Examples. (1h)
- 28 .- Elaboration of juices and nectars. Classification. Extraction of juices. Treatments juices. Processing systems, aseptic packaging and storage. Examples of obtaining lines of the main types of juices. Storage of semi-finished products: purees. (1h)
- 29 .- Elaboration of jams, preserves and jellies.. Processing and packaging process. Examples of production lines feature. Additives used in the manufacture of jams and marmalades. (1h)
- 30 .- Alcoholic beverages. Wine. Process. Types. Beer. Process. Types. Spirits and liqueurs. Processes and types. (1h)
- 31 .- Oils and fats. Oils and fats. Introduction. Olive oil: definition and classification. System of olive oil extraction. Oils from oilseeds. Extraction. Fats of animal origin. Refining of fats and oils. (1h)



6. Meat, fish and derivative products

32.- Industry of the meat: Production and consumption.. (1h)

33.- Classification and functional properties of the muscular proteins: Proteins miofibrilares, sarcoplásmicas and of the stroma
Conversion of the muscle in meat: Syndrome of the swine stress.
Maduration of the meat. Factors that affect to the quality of the meat for the direct consumption and the industrialisation. (2h)

34 .- Cured chemistry: Ingredients and additives. Curing effects on meat properties. Industrial curing processes: dry and wet curing.Nitrite alternatives. (1h)

35.- Raw cured meat products. Technology and preservation. Raw materials. Types of products. Alterations (1h)

36.- Cured sausages. Types of products. Basic knowledge in the preparation of meat batters. Selection of raw materials. Technological processing. Industrial processes. Alterations. (2h)
s. (1.5 h)

37.- Dry cured ham: Types of products. Selection and classification of ham pieces for processing. Basic knowledge in dry curing. Industrial processes. Biochemical changes during curing and drying and their effect on sausage quality. Alterations.. (1.5h)

38.- Fish and seafood. Characteristics of technological interest. Major industrial arts of fishing and shellfishing. Subsequent alterations to capture. Unit operations of the technology of fish.. (1h)

39.- Salted, drying and smoking. Technological aspects of manufacturing. Final product characteristics. Performance. Marketing (1h)

7. Laboratory sessions

1.- Explanation of the equipment in the pilot plant of the IATA used for the manufacture of cereal-derived products. Preparation of manufacturing.

2.- Manufacture of bread (mould and bar). Kneaded, division, formed, fermentation and baking. Manufacture of beaten dough.

3.- Use of different flours depending on final product.

4.- Preparation of fruit cremogenate; explanation of the used equipment

5.- Manufacture of refreshing drink based on dispersed fruits.

6.- Practical work related to post harvest of fruits and vegetables and visit a industry of preserving of fruit and vegetables

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	56,00	100
Laboratory practices	25,00	100
Seminars	3,00	100
Tutorials	3,00	100
Development of group work	7,00	0
Development of individual work	5,00	0
Study and independent work	15,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	53,00	0
Preparing lectures	25,00	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	10,00	0
TOTAL	222,00	

TEACHING METHODOLOGY

Lectures: explanatory meetings of content. Classes are taught using audio-visual technical equipment.

Seminars: Four seminars will be conducted on topics provided by the teacher and related matter. The development of the seminar will be monitored through tutorials, to be agreed between the teacher and students. The seminars will be presented in writing and submitted by students. After the oral presentation speaking time will be the other students, moderated by the teacher.

Practical lessons (laboratory): There will be 6 practical sessions in IATA.

Tutorials: Four tutorials will be made, of one hour each for group of students. Students resolve questions given previously in the virtual platform.

During the activities, both theoretical and practical, examples of the applications of the contents of the subject in relation to the Sustainable Development Goals (SDG) will be indicated, as well as in the proposals of topics for the coordinated seminars. This is intended to provide students with knowledge, skills and motivation to understand and address these SDGs, while promoting reflection and criticism.



EVALUATION

- a) Producing, presentation and defense of works related to the contents explained and discussed in the classroom related to one of the subjects studied during the semester (coordinated seminars). Written work will be evaluated and the level of understanding of the content and skills to their exposure, advocacy and discussion. (10%).
- b) Make a written test to ensure knowledge and understanding of theoretical minimum content established for the subject (60%).
- c) Evaluation of laboratory work by means teacher supervision, the ability to solve experimental problems and the ability to make very detailed and organized reports of experimental results. The written test will include questions about practical contents. (20%).
- d) Evaluation of the work during the tutorials and the ability to solve the proposed activities (10%).

It is necessary to reach 50% both in the qualification in the written test and in the final qualification to pass the subject.

Attendance at practices is obligatory for passing the exam except for those students that have undertaken these classes in the two previous academic courses. Unjustified non-attendance to tutorials and coordinated seminars imply zero points in the corresponding evaluation section.

REFERENCES

Basic

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- Ordoñez, J.A., Cambero, I., Fernández, L., García, M.L., de la Hoz, L., Selgas, M.D. (1998). Tecnología de los alimentos. Volumen II. Alimentos de origen animal. Ed. Síntesis S.A., Madrid.
- Potter, N.N., Hotchkiss, J.H. (1999). Ciencia de los alimentos. Ed. Acribia S.A., Zaragoza.
- 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.
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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.

ADDENDUM COVID-19

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

1. Contents

The contents initially included in the teaching guide are maintained.

2. Volume of work and temporal planning of teaching



The workload for the student is maintained, derived from the number of credits, but the methodology of the activities changes with respect to the conventional teaching guide, due to the current situation that makes it necessary to adopt a hybrid teaching model.

3. Teaching methodology

- **Theoretical teaching:** it will be carried out through synchronous sessions (synchronized videoconferences on BBC, or other technology indicated by the Center) and face-to-face. The distribution of students will be done in groups, so that 50% will be in the Faculty classroom while the other 50% will go online, alternating their attendance by weeks. The class will always be held following the schedule (date and time) approved by the Center Board.
- **Tutorials:** They will all be face-to-face according to the dates set by the course calendar.
- **Coordinated or non-coordinated seminars:** They will all be face-to-face according to the dates set by the course calendar.

Practical classes: They will be face-to-face and according to the course calendar. In case of need to modify to comply with the security regulations against COVID 19, the capacity of students in the sessions could be limited to 50% establishing shifts in each group and / or testing audiovisual material prior to the student for the previous introduction of the practical part, hanging said information in the virtual classroom

If a state of total confinement took place, all face-to-face teaching would be carried out online.

4. Evaluation

If the evolution of the current pandemic allows it, it will be face-to-face and in the terms indicated in the teaching guide. Only in case this is not possible, the evaluation will be carried out through the virtual classroom with tasks or online questionnaires with single or multiple choice questions, which can be complemented with short questions and/or on certain occasions through an oral exam through video conferencing.

The relative weight of theory, practices and seminars is maintained as indicated in the teaching guide.