FOOD PROCESSING

Degree in Human Nutrition and Dietetics

2026-27

Code: 803983
Module: 2
General subject: Food Technology
Course type: compulsory
Addressed to: second year students
Department: Departmental Section of Galenic Pharmacy and Food Technology (Veterinary Faculty)
ECTS: 6
Teaching period: second semester
Starting date: 18 January 2027
Timetable: according to schedule
Location: Room 6 (Faculty of Medicine) and laboratories and computer rooms of the Faculty of Veterinary Science
Number of students: those registered in the course

TEACHING STAFF

Coordination: Manuela Fernández Álvarez
manuela@ucm.es

Teachers:

Theoretical lessons:

Manuela Fernández Álvarez
Eva Hierro Paredes
Mª Fernanda Fernández León
Mª Dolores Romero de Ávila Hidalgo

Practical sessions and seminars: Teachers of the Departmental Section of Galenic Pharmacy and Food Technology (Veterinary Faculty)

SHORT DESCRIPTION

The course will address the strategies and industrial processes for the preservation and transformation of foods, their application in the food industry and their impact on the physico-chemical, functional, technological and sensory properties of foods and their components. The course will also analyse the optimal processing conditions to obtain products with an optimum shelf life, with the highest possible retention of nutrients and the lowest possible modification of their sensory properties, while guaranteeing food safety. Finally, the specific technologies used to preserve and prepare different foods will be studied, including the adaptation of processing to different nutritional requirements.

COMPETENCES

General Competences

CG.1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 3.1, 3.2, 3.4, 4.2, 4.3, 4.6, 5.4, 6.1, 6.2, 7.1, 7.3, 7.4 and 8.1.

Specific Competences

CE.M1.1, 1.5, 1.7, 2.2, 2.3, 2.6, 2.7, 3.1, 3.2, 3.3, 3.6, 3.7, 3.8, 4.4, 4.14, 4.19, 4.22 and 5.5.

OBJECTIVES

- To know the concept and functions of food processing.
- To understand the basic technological concepts as well as the structure and situation of the food industry in Spain and in the international context.
- To study the industrial strategies and processes for the preservation and transformation of foods.
- To know the effects of processing on the technological, hygienic, sensory and nutritional properties of foods.
- To study the specific technology for producing the main food products.

SYLLABUS

THEORETICAL LESSONS

- **Section 1. Introduction**

1. Presentation of the course. Content and objectives. The food processing industry. Socio-economic importance.

- **Section 2. Food preservation and transformation**

2. General strategies and methods of food preservation and transformation. Classification. Basic concepts of food processing.
3. Cold preservation. Effect of low temperatures on microorganisms, enzymes, nutrients, biological structures, and sensory properties. Refrigeration. Freezing. Shelf life and safety of chilled and frozen foods.
4. Thermal preservation. Effect of high temperatures on microorganisms. Microbiological thermal death parameters. Effect of heating on enzymes and chemical reactions. Effect on nutrients, biological structures, and sensory properties of foods.
5. Types of heat treatments. Sterilisation. Pasteurisation. Other heat treatments. Equipment. Shelf life and safety of heat-treated foods.
6. Use of electromagnetic radiations in the food industry. Microwave and infrared heating. Effects on foods. Applications.
7. Food irradiation. Effects of irradiation on microorganisms, enzymes, nutrients, biological structures, and sensory properties. Applications.
8. High pressure processing. Effects on microorganisms, enzymes, nutrients, biological structures, and sensory properties. Equipment. Applications.
9. Preservation by lowering a_w. Dehydration. Freeze-drying. Effects on foods. Applications.
10. Chemical preservation. Antimicrobials. Antioxidants.
11. Modified and controlled atmospheres in the food industry. Vacuum packaging. Effects on foods. Applications.
12. New methods for food preservation. Combined methods. Applications.
13. Food transformation. Objectives. Size reduction. Separation. Mixing. Extrusion. Effects on foods. Applications.
14. Fermentations. Starter cultures.
15. Use of enzymes in food processing. Applications.
16. Synthetic foods. Technological aspects. Types. Processing methods. Applications.

- **Section 3. Packaging, Storage, Transportation and Distribution**

17. Food packaging. Functions. Types. Packaging materials and techniques. Interactions between packaging and food.
18. Storage. Transportation. Distribution. Requirements. Influence on shelf life and food safety.

- **Section 4. Food Processing Technology of Selected Foods**

a. Milk and Dairy Products

19. Raw Milk. Obtention, transportation and storage. Common operations in dairy processing.

20. Raw milk for direct consumption. Pasteurised milk. Sterilised milks. Shelf life and storage conditions. Effects of heat treatments on the sensory and nutritional properties of milk. Other treatments for milk preservation. Comparison of milk with plant-based beverages. Types of dairy products.

21. Fermented milks. Yoghourt processing. Effect of processing on sensory and nutritional properties. Shelf life and storage conditions.

22. Cheese. Types. General processing technology. Effect of processing on sensory and nutritional properties. Shelf life and storage conditions.

b. Meat and Meat Products

23. Fresh meat products. Marinated products. Shelf life.

24. Cooked meat products. Shelf life

25. Meat curing. Dry-fermented sausages. Shelf life.

26. Dry cured ham. Shelf life. Low calorie and low sodium products.

c. Fish, Shellfish, and their Products

27. Fish. Sourcing. Handling of fish on board. Cold preservation.

28. Salting, drying, and smoking. Processing methods. Types. Product characteristics. Shelf life and storage conditions.

29. Pickling. Processing methods. Types. Product characteristics. Shelf life and storage conditions. Canned products and semi-preserved products. Technological aspects.

30. Restructured fish products. Types. Processing methods. Shelf life and storage conditions.

d. Cereals and Cereal-Based Products

31. Storage of cereals. Dry and wet milling.

32. Baking. Cereals for bread making. Baking systems. Processing of different types of bread.

33. Pasta. Types of pasta. Processing technology. Rice. Processing methods and types.

34. Confectionery. Types of confectionery products. Chemical sponging agents.

e. Fruits, Vegetables, and their Products

35. Fresh vegetables. Refrigeration. Modified and controlled atmosphere preservation. Freezing. Minimally processed products. Effects on sensory and nutritional properties. Shelf life and storage conditions.

36. Canned fruits and vegetables. Operations. Other methods of fruit and vegetable preservation. Effects on sensory and nutritional properties. Shelf life and storage conditions.

37. Fruit and vegetable juices. Processing technology. Concentrated juices. Other products. Effects of processing on sensory and nutritional properties. Shelf life and storage conditions

f. Oils and fats

38. Olive oil. Processing technology. Effects on sensory and nutritional properties.

39. Seed oils. Processing technology. Refining operations. Effects of processing on sensory and nutritional properties. Margarine.

g. Alcoholic Beverages

40. Wine. Red, white and rosé wine technology. Sherry wines. Sparkling wines. Low alcohol wines.

41. Beer. Types of beer. Brewing process. Low-alcohol beers. Gluten-free beers. Other special beers.

42. Spirits. Types. General processing technology.

PRACTICAL SESSIONS

The course includes 4 practical sessions of compulsory attendance:

- Fractionation and obtention of different soy derivatives.
- Production of curd.
- Calculation of thermal treatments using the modified general method. Preparation of

canned vegetables.

- Calculation of thermal treatments by the modified general method. II. Optimisation of the treatment.

SEMINARS

Each student will have to prepare and present a small group seminar and attend a minimum number of other presentations.

TEACHING METHODOLOGY

Lectures will be given in the classroom. Practical sessions will be held in the laboratory and in the computer room. Students will also prepare, present, and attend seminars on relevant topics related to the course.

All teaching activities will be supported by audiovisual techniques, as well as the UCM Virtual Campus, where students will have access to teaching material, resources, and other documents of interest.

EVALUATION CRITERIA

There will be a final exam on the contents of the subject, for which there will be two calls. The exam will consist of a maximum of 12 questions, which may include essay questions, short answer questions and/or test type questions. The score obtained in the exam will account for 75% of the overall final grade. The minimum score to pass the exam is 5 points.

The preparation, presentation and attendance to seminars will account for 20% of the overall final grade. Successful completion of these activities is a mandatory requirement to pass the course. It will be necessary to obtain a minimum score of 5 in the preparation and presentation of the work. If a student does not present the work, the activity cannot be passed, even if they have participated in its preparation. The score will not be included in the final grade of the students if the exam has not been passed.

The student's active participation in all the activities will account for 5% of the overall final grade. This item is a bonus and will not be included in the final grade if the exam, the seminars and the practical sessions are not passed.

To pass the course, students must have attended all the practical sessions and a minimum number of seminars.

Students who voluntarily or accidentally break the rules of the exam will be required to take an oral exam. Intentional infringement will be considered very serious misconduct and will be reported to the UCM Service Inspection for disciplinary action.

RECOMMENDED LITERATURE

General literature

- Belitz, H.D., Grosch, W., Schieberle, P. (2012). Química de los alimentos. Acribia, Zaragoza.
- Fellows, P. (2007). Tecnología del procesado de los alimentos: principios y prácticas. Acribia, Zaragoza.
- Matthews, K.R., Montville, T.J. (2009). Microbiología de los alimentos. Introducción. Acribia, Zaragoza.
- Ordóñez, J.A., García de Fernando, G.D. (2019). Tecnologías alimentarias, Vol.1 (Fundamentos de Química y Microbiología de los Alimentos), Vol. 2 (Procesos de conservación) y Vol. 3 (Procesos de transformación). Síntesis, Madrid.

Specialized literature

- Boto, J.A., Boto, M. (2017). La cerveza. Universidad de León, León.
- Casp, A. (2014). Tecnología de los alimentos de origen vegetal, 2 Vols. Síntesis, Madrid.
- Coles, R., McDowell, D., Kirwan, M.J (2004). Manual de Envasado de Alimentos y Bebidas. AMV, Madrid.
- Feiner, G. (2018). Manual de productos cárnicos: Ciencia práctica y tecnología. Acribia, Zaragoza.
- Hall, G.M. (2001). Tecnología del procesado del pescado. Acribia, Zaragoza.
- Hoseney, R.C. (1991). Principios de Ciencia y Tecnología de los cereales. Acribia, Zaragoza.
- Ordóñez, J.A. (1998). Tecnología de los alimentos Vol. II., Alimentos de origen animal. Síntesis, Madrid.
- Puig, E. (2016). El vino. UOC, Barcelona.
- Varnam, A.H., Sutherland, J.P. (1996). Bebidas: Tecnología, química y microbiología.

Acribia, Zaragoza.
- Walstra, P., Geurts, T.J., Noomen, A., Jellema, A., Van Boekel, M.A.J.S. (2001). Ciencia de la leche y tecnología de los productos lácteos. Acribia, Zaragoza.

The student will also be provided with information on websites, mailing lists and other online resources related to the contents of the course.