

# HYGIENE AND FOOD SAFETY

## Degree in Human Nutrition and Dietetics (2026-2027)

**Code:** 803989

**Module:** 3

**Subject:** Hygiene and Food Safety

**Type of subject:** Obligatory

**Course:** Third year

**Semester:** Consult calendar

**Department:** Nutrition and Food Science. Departmental Section of Nutrition and Food Science. Faculty of Veterinary

**Credits:** 9 ECTS

### Faculty

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### BRIEF DESCRIPTION

Measures and conditions necessary to control hazards and ensure the acceptability for human consumption of foodstuffs of animal and vegetable origin and beverages.

### SKILLS

They are those corresponding to the Module and Subject to which this course belongs.

#### General Skills

CG.1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 3.4, 4.2, 5.4, 6.1, 6.2, 7.1, 7.2, 7.3, 7.4 y 8.1.

#### Specific Skills

CE.M1.1, 1.5, 1.7, 2.5, 3.1, 3.2, 3.3, 3.4, 3.6, 3.7, 3.8, 4.19, 4.22, y 5.5.

### OBJECTIVES OF THIS SUBJECT

The main objective of the course is to control and prevent hazards associated with food consumption, studying the necessary measures to ensure that

foods are safe, wholesome, genuine and healthy at all stages of the food chain. This objective is broken down into the following specific objectives with which it is intended that the student knows:

1. The hygienic and sanitary aspects of food with emphasis on the sanitary hazards associated with foodstuff and their importance for public health.
2. The advantages of hygienic habits and evaluation and management of procedures tracking the quality and safety of foodstuffs.
3. The hygiene-sanitary parameters related to the marketing of foods of animal and vegetable origin and beverages.
4. Hygienic characteristics of industries and food establishments.
5. Food safety based on risk analysis. Food safety assessment and management and its impact on public health.

## CONTENT

1. General concepts. Concept of hygiene and food hygiene. Concept of food safety. Hygiene and food safety within the Degree of Human Nutrition and Dietetics. Sources of information and relevant bibliography on hygiene and food safety. Legislative aspects on hygiene and food safety.

2. Health hazards associated with food consumption. Biological hazards of bacterial, viral, prion, fungal and parasitic origin. Chemical hazards: contaminants of environmental origin, associated with food processing and storage, food additives. Physical and technological hazards. Nutritional hazards: food allergies and intolerances. In all cases, the responsible agents, reservoirs, transmission mechanisms, foods involved and applicable prevention and control measures are studied to achieve the established food safety objectives (FSO).

3. Food hygiene quality. Concept of food hygiene quality. Use of procedures monitoring the quality and safety of foods based on the introduction of good manufacturing practices (GMP), the hazard analysis and critical control points system (HACPP), and other internationally accepted procedures such as the ISO, IFS, BRC, and others. The correct labelling and traceability of foods as food safety factors. Food differentiated quality figures.

4. Food hygiene and control. Hygiene and sanitary parameters related to the marketing of foods of animal and vegetable origin and beverages (meat and meat products, fish and fishery products, eggs and egg products, fresh and processed fruits and vegetables, edible mushrooms, cereals and derivatives, sugars and sugar products, fats and oils, and alcoholic and non-alcoholic beverages). In all cases, the hazards associated with their consumption, main alterations and adulterations, microbiological criteria and legislation applicable to each type of product are studied.

5. Hygiene of food industries and establishments. Hygiene characteristics of design and construction of food industries and establishments and food processing equipment. Hygiene of food handlers. Hygiene of food packaging, storage and transport. Collective catering. Water in the food industry. Cleaning, disinfection and pest control in the food industry. Residues from food industries. Applicable legal regulations.

6. Food safety. Food safety based on risk analysis: risk assessment, risk management and risk communication. Risk assessment: hazard identification, hazard characterization, exposure assessment and risk characterization. Food alert and crisis management.

## PROGRAM

### THEORETICAL

#### • PART I: GENERAL CONCEPTS

**Lesson 1. Hygiene and Food Safety.** Introduction. Concept of food hygiene. Missions and fields of action. Definition of food safety. Importance of food hygiene and safety within the Degree of Human Nutrition and Dietetics. Didactic objective of the subject and organization of the thematic units that compose the program. Sources of information and relevant bibliography.

**Lesson 2. Legislative Aspects of Hygiene and Food Safety.** Principles and general requirements of food legislation. National, European and international organizations related to food. The white paper of food safety. Food safety and nutrition law. Use of Internet for access to food legislation.

#### • PART II: HAZARDS ASSOCIATED WITH FOOD CONSUMPTION

**Lesson 3. Conventional and Emerging Hazards Associated with Food Consumption.** Types of hazards: biological, chemical, physical and technological, nutritional and other potential hazards. Origin and incorporation in the food chain. Health and economic impact of these hazards on public health.

**Lesson 4. Biological hazards.** Main microbial groups of importance in food. Concept of foodborne toxi-infections. Main foodborne bacterial toxi-infections and their importance for public health. Incidence, factors involved and strategies to reduce their incidence.

**Lesson 5. Biological hazards of bacterial origin I.** Foodborne toxi-infections produced by *Clostridium* spp., *Bacillus* spp., *Staphylococcus* spp. and *Listeria* spp. Pathogenicity mechanisms. Reservoirs. Food involved. Prevention and control measures.

**Lesson 6. Biological hazards of bacterial origin II.** Foodborne toxi-infections produced by *Salmonella* spp., *Shigella* spp., *Yersinia* spp. and pathogenic strains of *Escherichia coli*. Mechanisms of pathogenicity. Reservoirs. Implicated foods. Prevention and control measures.

**Lesson 7. Biological hazards of bacterial origin III.** Foodborne toxi-infections produced by *Vibrio* spp., *Aeromonas* spp., *Plesiomonas* spp., *Campylobacter* spp., *Arcobacter* and *Helicobacter* spp. Pathogenicity mechanisms. Reservoirs. Foods involved. Prevention and control measures.

**Lesson 8. Biological hazards of viral origin.** Main foodborne enteric viruses: foods involved. Prevention and control mechanisms.

**Lesson 9. Biological Hazards of Prion Origin.** Animal and human transmissible spongiform encephalopathies: main characteristics of prions. Mechanisms of pathogenicity. Prevention and control measures.

**Lesson 10. Biological Hazards of Fungal Origin.** Mycotoxins: definition and characteristics. Main mycotoxins of interest in food: aflatoxins, ochratoxin A, patulin, trichothecenes, zearalenone, fumonisins. Foodstuffs involved. Prevention and control measures.

**Lesson 11. Biological Hazards of Parasitary Origin.** Characteristics of the main parasites (protozoa and helminths) of food transmission. Protozoa: amoebae, flagellates and sporozoa. Helminths: nematodes, trematodes and cestodes. Food involved. Prevention and control measures.

**Lesson 12. Chemical Hazards. Contaminants of Environmental Origin (I).** Associated with industrial activity: Halogenated aromatic hydrocarbons. Perfluoroalkylated substances. Heavy metals and other trace elements. Substances from materials in contact with food. Radioactive isotopes Food involved. Prevention and control measures.

**Lesson 13. Chemical Hazards. Contaminants of Environmental Origin (II).** Associated with agricultural and livestock activities: pesticides. Antibiotics. Growth promoters: foodstuffs involved. Prevention and control measures.

**Lesson 14. Chemical Hazards: Contaminants Associated with Food Processing and Storage.** Biogenic Amines. Lipid degradation products, N-Nitrosamines, Polycyclic aromatic hydrocarbons. Heterocyclic amines, Amino-imidazo-azarenes, Acrylamide and compounds from the Maillard reaction. Foodstuffs involved. Prevention and control measures.

**Lesson 15. Chemical Hazards: Technological Ingredients.** Additives: justification for their use. General criteria regulating the use of food additives. Problems derived from their use in human health. Flavorings. Technological adjuvants. Enzymes. Applicable legislation. Control measures.

**Lesson 16. Physical and Technological Hazards.** Foreign bodies. Irradiated foods and food ingredients and other technological treatments (high pressures, light pulses and ultrasound): problems derived from their presence or use for human health. Prevention and control measures.

**Lesson 17. Nutritional hazards.** Food allergies and intolerances: importance for human health and foods

involved. Prevention and control measures. Impact on the food industry and collective restoration.

#### • PART III: THE HYGIENE QUALITY OF FOOD PRODUCTS

**Lesson 18. Food Quality.** Concept of quality. Food hygiene quality. Evolution of quality management systems. Introduction to integrated quality management in the food industry: quality control and assurance systems. Origin and legal framework.

**Lesson 19. Hazard Analysis and Control Critical Point System (HACCP) I.** Origin and legislative aspects of HACCP. Basic concepts and principles. Guides of good hygiene practices. Prerequisite programs. Logical sequence for the application of the HACCP system. Constitution of the HACCP team. Product description and expected use. Elaboration of the flow chart. On-site verification of the flow chart.

**Lesson 20. Hazard Analysis and Control Critical Point System (HACCP) II.** Basic principles of HACCP. Glossary of terms and basic concepts. Identification and enumeration of hazards observed in each phase. Determination of PCCs. Decision tree of control critical points. Control critical limits for each PCC. Establishment of a monitoring system for each PCC. Establishment of corrective actions. Establishment of verification procedures and documentation and registration systems. Application of HACCP in hospital catering.

**Lesson 21. Food Safety Certification Schemes.** ISO 9000 and ISO 22000, BRC, IFS and Global GAP Standards. Objective. Fundamentals. Structure of the standards. Certification process.

**Lesson 22. Labeling and Traceability as Food Safety Factors.** Concept and objectives. Legislative situation. Importance and phases for the implementation of the traceability system. The obligatory labeling. Nutrition and health declarations on food. Consumer protection: regulation on food information provided to the consumer.

**Lesson 23. The Concept of Differentiated Food Quality.** Figures of differentiated quality: Protected Designation of Origin (PDO), Protected Geographical Indication (PGI). Other figures of differentiated food quality. Concept, objectives, use and scope of these figures. Current situation and regulations.

#### • PART IV: HYGIENE AND FOOD CONTROL

##### Block 1: Hygiene and food control of animal origin

**Lesson 24. Preserved Meats.** Cold preserved meats. Meats packaged in modified atmospheres. Minced meats and meat preparations: hazards associated with their

consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 25. Meat Products.** Heat-treated and non-heat-treated. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 26. Milk.** Raw milk. Heat-treated milks. Concentrated and pasteurized milk. Sterilized and UHT milk. Totally or partially dehydrated preserved milks: powdered, evaporated and condensed milk. Hazards associated with its consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 27. Dairy Products.** Fermented milks. Yogurt, cream, butter, cheeses, ice creams, sorbets and dairy desserts: hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 28. Fish.** Fresh fish. Determination of the fish freshness. Frozen fish and fish packaged in modified atmospheres: hazards associated with its consumption. Intoxications by scombroid, tetratoxin and ciguatoxin. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 29. Fish Products.** Processed fish products: smoked, pickled, salted and heat-treated. Other products: fermented, gelled, structured and protein concentrates. Mollusks and crustaceans. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 30. Eggs and Egg Products.** Fresh eggs. Egg quality at origin. Egg products. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

## **Block 2: Hygiene and food control of vegetal origin**

**Lesson 31. Vegetables and Fruits.** Fresh and minimally processed. Pickles. Canned and semi-canned vegetables. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 32. Edible and Poisonous Mushrooms.** Cultivated and wild mushrooms. Hazards associated with their consumption. Poisoning by the consumption of mushrooms. Alterations. Microbiological criteria. Current legislation.

**Lesson 33. Cereals and Cereals Products.** Cereals, flour, bread, pasta, and bakery products. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

## **Block 3: Hygiene and Food control of other foods**

**Lesson 34. Sugars and sugar products.** Sugar, cocoa, chocolate, candies, chewing gum, confectionery and sweets, nougat and marzipan, honey and bee products. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 35. Oils, Fats and Derivatives.** Vegetable oils: olive oil and other oils. Hydrogenated and transformed fats, margarines. Edible fats. Other vegetable fats. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 36. Non-alcoholic beverages.** Bottled waters. Stimulating beverages. Refreshing drinks. Juices. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 37. Alcoholic Beverages.** Wine and Beer. Liquors and spirits. Hazards associated with their consumption. Most frequent alterations, adulterations and frauds. Microbiological criteria. Current legislation.

**Lesson 38. Novel Foods for New Needs.** Functional foods and ingredients, Novel foods and food ingredients. Genetically Modified Foods (GMOs), nanofoods: current situation. Importance for human health. Safety assessment of nanotechnology in food. Problems of social perception of the use of GMOs and nanotechnology.

## **• PART V: HYGIENE AND CONTROL IN FOOD INDUSTRIES AND ESTABLISHMENTS**

**Lesson 39. The Food Industry as a Risk Factor in the Production of Food.** Hygiene design and maintenance of industries. Hygiene design of facilities, equipment and utensils in contact with food. Infrastructure and maintenance plan: Basic information, activities, controls and records. Current legislation.

**Lesson 40. Personnel hygiene.** Food handlers. Concept and importance. Training plan for food handlers: Basic information, activities, controls and records. Current legislation.

**Lesson 41. Hygiene of Packaging, Storage and Transport.** Materials and articles destined to come into contact with food. Hygiene requirements for storage and transport in the supply chain. Transport of perishable foods. Types of vehicles for the transport of perishable goods. Current legislation.

**Lesson 42. Water: An Essential Element in the Food Industry.** Concept and importance of water for human consumption in the food industry. Supply systems. Drinking water supply plan: Basic information, activities,

controls and records. Sanitary criteria that determine the quality of drinking water. Current legislation.

**Lesson 43. Importance of Cleaning and Disinfection in the Food Industry.** Characteristics of cleaning and disinfection operations. Stages and methods of cleaning and disinfection. CIP cleaning. Cleaning and disinfection plan: Basic information, activities, controls and records. Current legislation.

**Lesson 44. Pest and Waste Control.** Pests associated with the food industry. Pest control plan: Basic information, activities, controls and records. Preventive and eradication measures of pests. Management of waste generated by food industries. Current legislation.

**Lesson 45. Retail and Collective Catering establishments.** Concept and importance of the retail and Collective Catering sectors in the supply chain. Hygiene standards for retail establishments. Traditional and deferred Collective Catering. Cook-chill and cook-freeze systems. Hygiene requirements for prepared food establishments. Current Legislation.

#### • PART VI: EVALUATION AND MANAGEMENT OF FOOD SAFETY

**Lesson 46. Food Safety based on Risk Analysis (I).** Concept, objectives and fundamental principles. Regulatory framework for risk analysis. World Trade Organization. Codex Alimentarius. European Food Safety Authority. Spanish Agency for Food Safety and Nutrition. Elements of risk analysis: risk assessment, risk management and risk communication.

**Lesson 47. Risk Assessment.** Concept. Stages of risk assessment. Hazard identification. Hazard characterization. Exposure assessment. Risk characterization.

**Lesson 48. Risk Management.** Concept. Stages of risk management. Adequate level of protection. Food safety objectives. Performance objectives and criteria. Precautionary principle. Monitoring and review of decisions taken.

**Lesson 49. Risk Communication.** Concept. Risk communication objectives. Communication strategies.

**Lesson 50. Food Alert and Crisis Management.** Rapid alert systems. Types of notifications. Management of food alerts. Emergency situations. Crisis management.

## PRACTICAL PROGRAM

**Faculty:** Paloma Morales Gómez, Estefanía Muñoz Atienza and Amaia Iriando de Hond (Coordinators), María Marín Martínez, Isabel González Alonso, Luis M. Cintas Izarra, Ana Isabel Haza Duaso, Carlos Celaya Carrillo,

José M<sup>a</sup> Martínez Corbacho, Juan Borrero Pino, Aina García García, Claudio Alba Rubio.

- **HACCP in Hospital Catering:** Practical workshops: 5 groups/20 students. Schedule: **16:00-20:00 h.** Month: December.

**Case study No. 1:** Hospital menu: description of meals, list of ingredients and other materials and flow chart. Identification of hazards and control measures.

**Case study No. 2:** Preparation of a HACCP plan: Significant hazards and control measures. CCP. Critical limits. Monitoring measures. Corrective measures. Verification measures. Identify types of documents and records.

- **Introduction to Agrifood Certification:** Practical workshops: 5 groups/20 students. Schedule: **13:30-15:30 h.** Month: February.

**1st Practical:** Introduction to Agri-Food certification: GFSI standards certification.

**2nd Practice:** IFS Food standard certification.

**3rd Practice:** Qualification requirements for GFSI standards auditors.

**4th Practical:** Practical exercises.

- **Seminars:** current Lessons related to the program of the subject (20 groups/5 students). Schedule: **13:30-15:30 h.** Month: March.

## TEACHING ACTIVITIES

### Seminars

Seminars are mandatory. The contents of the program will be complemented by 18-20 seminar sessions. Students will be asked to prepare a paper on Lessonal issues related to hygiene and food safety. Students will be distributed in small groups (5 students) and will be supervised by a tutor. The work done will be presented orally. In addition, they will present a two-page summary of the work, which will be available to all students on the Virtual Campus of the subject. These seminars will be carried out using the cooperative learning methodology. During the presentation session the professor will act as moderator and will stimulate the discussion among the students. Students who do not participate in the seminar sessions will have to take a multiple-choice exam on issues related to the Lessons taught in the seminars.

### Practical classes

Practical classes are mandatory. They include workshops on Introduction to Agri-food Certification. In addition, workshops will be given on the application of HACCP in

Hospital Catering. In these sessions students will be distributed in groups of 18-20 students. Before the practical session the student must read the practice to be developed that day. For this purpose, he/she will have a script or practice notebook deposited in the Virtual Campus of the subject. At the end of the practical sessions, they will submit the completed practical notebook with the results and incidences. Students who do not complete the practical sessions will have to do a practical work on a Lesson related to the workshops given.

## EVALUATION CRITERIA

The following evaluation criteria will be used to assess the various competencies:

### Master classes:

The acquisition of knowledge will be evaluated, for this purpose a first partial exam of the contents of the program will be held in January. In the regular June exams, there will be 3 types of exams: first partial exam, second partial exam (only for those students who have passed the first partial exam) and final exam. The exam questions will be on Lessons of the program and will be short questions to be developed. The note of the first partial exam will be kept until the extraordinary exam. In order to obtain the average grade between the first and second partial exams, both partial exams must be passed (5).

In the extraordinary call in July there will be two types of exams: second partial exam (students who have passed the first partial exam in the ordinary call or have failed the second partial exam in the ordinary call) and final exam.

**The average note obtained from the exams of the master classes will correspond to 70% of the final note.**

**Seminars:** written work, summary, oral presentation and assistance will be evaluated, as well as teamwork, skills and attitudes of the student.

**Practical classes:** attendance, team work, the practical script with the results obtained and the student's attitude and ability in the experimental development will be evaluated. The average note obtained from the seminars and practical classes will correspond to **30%** of the final note.

**Final note:** 70% of the average note obtained in the exams of the master classes + 30% average note obtained in the practical sessions and seminars. In order to pass the course (minimum note, 5) and make the sum of the notes obtained in the practical sessions and

seminars, it will be obligatory to have passed the theoretical part of the course.

### Attitude to follow in case of a voluntary or accidental violation of the rules for conducting the exam.

The voluntary or accidental infringement of the rules for conducting the exam prevents the assessment of the same, so the offending student will be presented to oral examination of the subject to establish their knowledge of the subject. If intentionality in the cheating is confirmed, it will be considered very serious misconduct, and will be brought to the attention of the Services Inspectorate to take the disciplinary measures it considers appropriate.

## REFERENCES/ RELATED INTERNET LINKS

Through the Virtual Campus of the UCM, bibliographic resources and other documents of interest for the learning of the subject included in the program will be provided.

### Basic Legislation

1. REGULATION (EC) No 178/2002 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. Official Journal of the European Union núm. L 31, February 1, 2002.
2. REGULATION (EC) No 852/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the hygiene of foodstuffs. Official Journal of the European Union núm. L 139, April 30, 2004.
3. REGULATION (EC) No 853/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 laying down specific hygiene rules for on the hygiene of foodstuffs of animal origin Official Journal of the European Union núm. L 139, April 30, 2004.
4. COMMISSION REGULATION (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs. Official Journal of the European Union núm. L 338, December 22, 2005.

### **Websites of interest related to the Lessons covered**

- EFSA (European Food Safety Authority):  
[www.efsa.europa.eu](http://www.efsa.europa.eu)
- AESAN (Agencia Española de Seguridad Alimentaria y Nutrición):  
[www.aecosan.msssi.gob.es](http://www.aecosan.msssi.gob.es)
- EUROPEAN UNION:  
<http://europa.eu>
- Comunidad de Madrid:  
[www.madrid.org](http://www.madrid.org)
- Ministerio de Sanidad, Servicios Sociales e Igualdad:  
[www.mssi.gob.es](http://www.mssi.gob.es)
- Ministerio de Agricultura, Alimentación y Medio Ambiente:  
[www.magrama.gob.es](http://www.magrama.gob.es)
- World Health Organization (OMS):  
[www.who.org](http://www.who.org)
- Codex Alimentarius:  
[www.codexalimentarius.net](http://www.codexalimentarius.net)

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