COURSE DATA

Data Subject	
Code	33989
Name	Food Additives
Cycle	Grade
ECTS Credits	4.5
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1103 - Degree in Food Science and Technology	Faculty of Pharmacy and Food Sciences	4	First term

Subject-matter

Degree	Subject-matter	Character
1103 - Degree in Food Science and Technology	37 - Food additives	Optional

Coordination

Name	Department
CABRERA PASTOR, ANDREA	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.
GIL PONCE, JOSE VICENTE	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.

SUMMARY

Food Additives is an elective subject at fourth course of Food Science and Technology, which is taught in the Faculty of Pharmacy, University of Valencia. This course has a total of 4.5 ECTS taught in the first quarter.

Food additives are a basic and indispensable tool in food manufacturing. Today, there is a wide variety of additives and without them would be practically impossible to obtain optimal food production with hygienic security guarantees and quality standards that currently are required. Among the most important groups of additives, there are antioxidants, antimicrobials, colorants, sweeteners, flavor enhancers, thickener sand gelling agents, emulsifiers, etc. The overall objective of the subject is precisely to present the different types of additives and processing aids used in the food industry as well as their roles and rules of use. Therefore most of the course is devoted to describing the composition, characteristics, most

important roles in food and rules of use of each of the additive groups above mentioned. In addition, the graduate in Food Science and Technology must have knowledge about general questions, such as the definitions of additive and processing aid and learn to differentiate them. Another objective of this course is to provide knowledge about the toxicology studies leading to additive authorization, issues of safety and labeling and other issues surrounding the legislation of additives. Thus the subject of food additives listed as one of the educational content of interest that must exist within the degree of Food Science and Technology.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

To study this subject is of interest to have basic knowledge of food chemistry and biochemistry that will allow understand the theoretical concepts of food additives, their composition and mode of action and their participation in food processing.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1103 - Degree in Food Science and Technology

- Know the role of food additives in the design and innovation of new food ingredients, products and processes.
- Know the additives arising from new knowledge on their natural sources or resulting from food biotechnology.
- Know the methods used for the manufacture of additives.
- Know the toxicological aspects of additives.
- Know legislation on additives.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

SKILLS TO ACQUIRE

Understand and critically evaluate the role of food additives in the design and innovation of new ingredients, food products and processes.

Understand and critically evaluate the general aspects of the use of additives and processing aids such as definitions and classification of
additives and processing aids

Knowing the composition, physicochemical characteristics and the most important functionality of the different types of permitted
additives and processing aids in food processing and manufacturing.

To know toxicological studies requiredfor the authorization of additives, use legal criteria,safety aspects, positive lists, labeling agencies to
perform these functions as well as other issues related to additives legislation.
SOCIAL SKILLS AND ABILITIES

Critical thinking that allows them to argue and defend judgments with integrity and tolerance.
Ability to work individually and in groups, in concert.

Ability to apply knowledge to practice.

Ability to build a written or an oral form understandable and organized

DESCRIPTION OF CONTENTS

1. Introduction, toxicological evaluation and legislation

Topic 1. Introduction to the subject. Some milestones of the use of food additives. Definitions of additive and processing aid and differences. Benefits of the use of additives. Conditions of employment and food security.
Topic 2. Toxicological evaluation. Justification for the use of additives: the need and safety. Toxicological evaluation of additives. Daily intake (ADI). Labelling. Examples of additives questioned.
Topic 3. Legislation on food additives. Positive lists. Directives, royal decrees and regulations.

2. Additives for conservation

Topic 4. Antioxidant additives. Autoxidation: autoxidation reactions, preventive measures. Classification of antioxidants: natural and synthetic. Applications and examples.

Topic 5. Additives antimicrobials. General comments. Classification of preservatives, mineral and organic preservatives. Applications and Examples.

Topic 6. pH control agents. General comments. Additives used as pH control agents and classification. Applications and examples.

Topic 7. Additives used in bakery. General comments. Types o additives used in bakery: emulsifiers, wetting agents and enzymes. Applications and Examples

3. Additives for organoleptic effects

Topic 8. Flavorings and flavor enhancers. Overview flavorings. Classes flavors: natural, concentrated aromas, synthetic nature-identical and synthetic. Biotechnological advances in the production of aromas. Overview of flavor enhancers. Classes flavor enhancers. Applications and examples.

Topic 9. Sweeteners. Overview sweeteners. Types of sweeteners: nutritive and low-power sweeteners no nutritive and high-power sweeteners. Applications and examples.

Topic 10. Dyes. Overview dyes. Classification of dyes: natural, synthetic but identical to naturals, natural extracts and synthetic. Applications and examples.

Topic 11. Thickeners and gelling agents. General comments. Classification: seaweed extracts, seed extracts, plant extracts, extracts of cereals, vegetable products extracts, extracts of microorganisms. Cellulose derivatives. Applications and examples.

Topic 12. Emulsifiers. General comments. Classification: natural and semi synthetic. Applications and examples.

4. Manufacturing aids. Enzymes

Topic 13. Manufacturing aids. Enzymes. General comments and classification of manufacturing aids. Enzymes. Health and legal aspects of using enzymes. Applications of enzymes in the food industry.

5. Practicals

PRACTICAL 1.
USE OF THICKENERS AND GELLING AGENTS. Stabilization of emulsions. Synergies between hydrocolloids. Development of a product like a sweet pastry.

PRACTICAL 2. DETERMINATION OF ADDITIVES IN FOOD. Rapid detection of preservatives and adulterants in milk. Determination of ascorbic acid (vitamin C) on flour. Determination of sulfites in meat.

PRACTICAL 3.
MAILLARD REACTION OF SUCROSE, GLUCOSE AND FRUCTOSE ON FLOUR. Variations in color intensity.

PRACTICAL 4.
PREPARATION OF CANDIES. Preparation of jelly beans and other candies.

PRACTICAL 5. ASSESSMENT OF PRESERVATIVE IN FOODS. Determination of nitrate and nitrite in vegetables

PRACTICAL 6. FOOD COLOURS. Dyes wine. Arata assay. Determination of natural colorants. E-160a.

Identifying dyes by thin layer chromatography (TLC)

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	25,00	100
Laboratory practices	15,00	100
Seminars	2,00	100
Tutorials	1,00	100
Development of group work	10,00	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	20,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	7,50	0
TOTAL	**110,50**	

TEACHING METHODOLOGY

The theoretical teaching methodology is based on the delivery of lectures along with the performance, presentation and defense of individual and collective reports. Individual study of the topics above will be strengthened by organizing tutorials. Prior to the date of tutoring, the student must have prepared the proposed activities to reinforce the learning aspects specific agenda. The seminars are group work that will include the delivery of a report on the subject of work and a public exhibition in the classroom.

The seminars are group works that will consist of the approach of a working hypothesis on sustainable food in line with the Sustainable Development Goals (SDG) related to the subject, and with the lines of action of the AGROALNEXT call of the Generalitat Valenciana (GVA) based on the supply of healthy, safe and sustainable food in line with the circular economy. A practical workshop will be held to support or refute it. It could also contemplate the development of dissemination workshops that extend their projects beyond the university environment through the Service-Learning methodology. Coordinated seminars will take place on topics selected and related to the course and must follow the guidelines on coordinated seminars available at the web page of the Degree.

During practice, students can extend and implement the knowledge. It will be distributed a booklet of practices with the necessary materials and the development of each of the perfectly organized practices. The teacher will monitor the practice, will address the doubts in the implementation and provide guidance on how to make reports, organizing results and conclusions

EVALUATION

a) Production, 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) To make a **written test** to ensure knowledge and understanding of theoretical minimum content established for the subject (60%). Voluntary continuous evaluation will be carried out with various tests throughout the course.It is required to obtain a minimum of 5 points out of 10 in the average of all the tests to eliminate contents. The content of the official exam will refer to the subject not evaluated in the previous continuous evaluation tests or to the entire subject in the event that the student has not taken the continuous evaluation tests or has not obtained the minimum grade required to eliminate content.

c) Evaluation of **laboratory** work by teacher supervision, the ability to solve experimental problems and, eventually, 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 throughout the semester (10%).

In order to pass the subject is necessary to obtain minimum 4.5 points out of 10 on the theoretical part of the subject and that the global mark is minimum 5 points out of 10.

The activities of practices, tutorials and seminars, are of MANDATORY ATTENDANCE and, therefore, NOT RECOVERABLE, in accordance with the provisions of Article 6.5 of the Regulation of Evaluation and Qualification of the UV for Bachelor and Master degrees. If it is not possible to attend any of these activities for justified reasons, it must be communicated in advance. In this way, the person in charge of the subject will determine the actions to be carried out.

Attendance at practices, tutorials and seminars is mandatory to pass the subject. Attendance is NOT mandatory for repeating students who have completed these activities in the two courses after their completion, during which the grades will be kept. Non-attendance without justified cause in the tutorials or in the coordinated seminars will imply a zero in the corresponding evaluation section, on the other hand, the non-presentation of the coordinated seminar will imply the failure of the subject, except for the repeating students who have attended and presented in previous courses.

Evidence of copying or plagiarism in any of the assessable tasks will result in failure to pass the subject and in appropriate disciplinary action being taken. Please note that, in accordance with article 13. d) of the Statute of the University Student (RD 1791/2010, of 30 December), it is the duty of students to refrain from using or participating in dishonest means in assessment tests, assignments or university official documents. In the event of fraudulent practices, the “Action Protocol for fraudulent practices at the University of Valencia” will be applied (ACGUV 123/2020): https://www.uv.es/sgeneral/Protocols/C83sp.pdf.

REFERENCES

Basic

- Ash, M. y Ash, L. (2008). Handbook of Food Additives. Ifis, New York
Barbosa-Cánovas, G. y col. (1999). Conservación no térmica de alimentos. Ed. Acribia. Zaragoza.
Barros Santos, C (2009). Los aditivos en la alimentación de los españoles y la legislación que regula su autorización y uso. Visión Libros. Madrid.
Branen, L.A., Davidson, P.M., Salminen, S. (1999). Food additives. Marcel Dekker, Inc., New York and Basel.
Cabal, E. (1999). Guia de los aditivos usados en alimentación. Mandala ediciones. Madrid
Calvo, M. (1991). Aditivos alimentarios. Propiedades, aplicaciones y efectos sobre la salud. Ed. Librería General. Zaragoza
Cubero, N (2002). Aditivos alimentarios. Mundi Prensa, Madrid
Elmadfa I., Muskat E., Fritzsche D. (1999). Guia de los aditivos, conservantes y colorantes. RBA Libros.
Madrid, A. (1987). Manual de utilización de los aditivos en alimentos y bebidas. AMV Ediciones. Madrid.
Madrid, A. (2000). Los aditivos en los alimentos. AMV: Mundi Prensa, Madrid.
Multon, J.L., Lepetre, F. (2000). Aditivos y auxiliares de fabricación en las industrias alimenticias. Ed. Acribia, Zaragoza.
Organización de consumidores y usuarios (2005). ¿Veneno en su plato? Usos y riesgos de los aditivos alimentarios. OCU Ediciones , Madrid
Saltmarsh M. (2008). Essential Guide to Food additives. RSC Advancing the chemical sciences.
Sanz Pérez B. (1999). Aditivos alimentarios. Ed Everest.

Additional

- Andrée Voilley and Patrick Etievant.(2006) Flavour in Food. CRC Press
Ashurst, P.R. (1995). Food Flavourings. Blackie Aacademic and Professional
Attokaran, M (2012). Natural food flavors and colorants. Blackwell Plubishing
Bell, G.A; Watson, A.J.(1999). Tastes and Aromas. UNSW Press
Boletin Oficial del Estado (BOE), (2001). Código Alimentario Español (4. Edición actualizada). Madrid.
Clydesdale, FM.(1996). Food Additives: Toxicology, Regulation, and Properties. CRC press
Davidson, P.M;Sofos, J.N, Branen, A.L (2005). Antimicrobials in Food. Taylor and Francis
Dickinson, E and Vliet TV (2002). Food Colloids. Biopolymers and Materials. RSC
Dickinson,E and Leser M.E (2006).Food Colloids. Self-Assembly and Material Science. RSC Publishing
FAO/OMS. (1997). Comité Mixto de Expertos en Aditivos Alimentarios. Ginebra. Guía Práctica. Aditivos, Conservantes y Colorantes. Ed. Obelisco. Barcelona
O'Donnell K, Kearsley M (2012). Sweeteners and Sugar Alternatives in Food technology. Blackwell Plubishing
Santos Buelga, C; Escribano-Baylon MT; lattanzio, V. (2010) Recent advances in polyphenol research, Volume 2. Blackwell Plubishing
Rousell, N.J and Gould, G.W. (2003). Food Preservatives. Kluwer Academic/Plenum Publishers

Watson, D.H.(2002). Food Chemical Additives. CRP Press.