

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

Code	33989
Name	Food Additives
Cycle	Grade
ECTS Credits	4.5
Academic year	2022 - 2023

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
GAMERO LLUNA, MARIA DESAMPARADOS	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 and 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.

OUTCOMES

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

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 required for 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

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. Biotechnological synthesis of additives. Main microorganisms producers of additives. Bioreactors and processes.

2. Additives for conservation

Topic 3. Antioxidant additives. Autoxidation: autoxidation reactions, preventive measures. Classification of antioxidants: natural and synthetic. Applications and examples.

Topic 4. Additives antimicrobials. General comments. Classification of preservatives, mineral and organic preservatives. Applications and Examples.

Topic 5. pH control agents. General comments. Additives used as pH control agents and classification. Applications and examples.

Topic 6. 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 7. 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 8. Sweeteners. Overview sweeteners. Types of sweeteners: nutritive and low-power sweeteners no nutritive and high-power sweeteners. Applications and examples.

Topic 9. Dyes. Overview dyes. Classification of dyes: natural, synthetic but identical to naturals, natural extracts and synthetic. Applications and examples.

Topic 10. 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 11. Emulsifiers. General comments. Classification: natural and semi synthetic. Applications and examples.

4. Manufacturing aids. Enzymes

Topic 12. 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. Toxicological evaluation and legislation

Topic 13. 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 14. Legislation on food additives. Positive lists. Directives, royal decrees and regulations.

Topic 15. Employment of additives in the different sectors of food industry. Meat industry, dairy industry, bakery industry, post-harvest industry.

6. 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 work that will consist of proposing a working hypothesis on sustainable food in line with the related Sustainable Development Goals (SDGs) and carrying out a practical workshop that supports or refutes it, as well as enhances its ethical and civic competencies through the Service-Learning (APS) methodology, developing outreach workshops that extend their projects beyond the university environment.



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.

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

REFERENCES

Basic

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Additional

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