FOOD CHEMISTRY AND BIOCHEMISTRY

<table>
<thead>
<tr>
<th>MODULE</th>
<th>CONTENT</th>
<th>YEAR</th>
<th>TERM</th>
<th>CREDITS</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Science</td>
<td>Food Chemistry and Biochemistry</td>
<td>2nd</td>
<td>1st</td>
<td>6.0</td>
<td>Mandatory subject</td>
</tr>
</tbody>
</table>

**LECTURER(S)**

- Concepción Aguilera García
- Ángel Gil Hernández
- Miguel Navarro Alarcón

**DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT**

Food Science and Technology

**PREREQUISITES and/or RECOMMENDATIONS (if necessary)**

Having studied the subjects of General Chemistry, Biochemistry, Applied Physics and Physical Chemistry, and Microbiology

**BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE??)**

- Chemical and biochemical fundamentals in food science.
- Chemical properties of foods.
- Changes in food (chemical and biochemical alterations).
- Classification, definition, functions, and the legislative criteria for the use, safety and dosage of food additives

**GENERAL AND PARTICULAR ABILITIES**

- That students can apply their knowledge to their work or vocation professionally.
• Ability to gather and interpret relevant data to make judgments.
• Potential to communicate information, ideas, problems and solutions to a specialized and unskilled audience.
• To understand and improve the user des-level in the field of ICT.
• Ability to express oneself correctly in Spanish
• Troubleshooting.
• Teamwork
• Ability to apply theoretical knowledge to practice.
• Capacity for analysis and synthesis
• Critical thinking.
• Develop skills of research initiation.
• Motivation for quality.
• Ability to organize and plan.
• Ability to manage information.
• Sensitivity to environmental issues.
• To know models of food production, composition and physical, physico-chemical and chemical properties, to determine its nutritional value and functionality
• Learning of the analytical techniques and food analysis to ensure optimal conditions for human consumption.
• Understanding and appreciation that food is one of the cornerstones of the cultural identity of a society.
• To inform, educate and advise legal, scientific and technically public administration, the food industry and consumers to design intervention strategies and training in the field of science and food technology.

OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

• Properly handling of raw and processed products to minimize and/or prevent chemical and biochemical changes.
• Acquiring the ability to describe and explain the changes in food due to the processes of production, conservation and deterioration.
• Appropriate use of additives according to food law.

DETAILED SUBJECT SYLLABUS

THEORETICAL PROGRAM

1. INTRODUCTION TO THE STUDY OF CHEMISTRY AND BIOCHEMISTRY OF FOODS. Concept and objectives of the Chemistry and Biochemistry of foods. Evolution and historical development. Relations with other sciences. Frontiers and prospects of Chemistry and Biochemistry of foods. Literature.
5. FOOD LIPIDS. Molecular structure and functions of food lipids. Crystallization of the fats. Physical properties of fats. Emulsifying power of fats: structure of the emulsifier fats and emulsifying additives of lipid nature. Food
emulsions: structure, stability and causes of destabilization. Modified fats: hydrogenation, inter- and intra-
esterification processes and structured fats. Distribution of lipids in major food systems: meat, fish, milk, egg, 
milk and vegetables. Composition of fat and oil in foods of animal and vegetable origin.
6. FOOD ADDITIVES: overview, definition of additive and processing aid. Classification, definition and functions 
of different types of food additives. Legislative criteria of use, safety and dosing guidelines.
Use of buffers. Use of bases. Use of phosphates as moisturizers in muscular systems. Use of molten salts for 
8. DYEST. Natural dyes: chlorophylls, carotenoids, anthocyanins, betalains and others. Artificial dyes: 
9. THE TASTE OF FOOD: primary flavors of food. Relationship between chemical structure and taste of food. 
Sapid structures more characteristics of certain flavors of foods.
10. THE AROMA OF FOODS. Relationship between structure and function of food flavorings. Primary flavors of 
foods. Theory lace-receptor coupling. Influence of different constituents in the aroma. Threshold as a matter of 
perception and flavor impact. Main biosynthetic pathways of the natural flavors of food. Generation of flavor in 
fermented foods. Flavor generation by the food processing.
11. MONOSACCHARIDES, DISACCHARIDES AND DERIVATIVES. Structure and function of carbohydrates in 
food. Monosaccharides and disaccharides of food. Functional properties of monosaccharides and disaccharides. 
In food. Sweetening power of monosaccharides and disaccharides. Food sweeteners: relationship between 
sweet taste and chemical structure. Sweetening power. Inverted syrups. Sweetener additives. Intense 
sweeteners and polyols: types, structure, characteristics and applications.
Dextrins. Cidoamloises. Starch derivatives. Modified starches: type, collection, structure, properties and 
applications. Biophysical and biochemical changes that occur during thermal and chemical gelatinization of 
starches.
14. POLYSACCHARIDES: GUMS. Pectins. Plant exudates gums: Arabic gum and tragacanth gum. Seed gums: 
guar gum and locust bean gum. Seaweed gums: alginates, carrageenans and agar-agar. Bacterial gums: 
xanthan gum.
15. MINERALS. Introduction. Principles of chemistry of minerals: concept of speciation, solubility in aqueous 
systems, and minerals and acid-base chemistry. Mineral composition of food: influencing factors and 
use of minerals. Specific bioavailability characteristic elements. Effects of processing on mineral content of 
foods. Chemical and functional properties of minerals in foods.
16. VITAMINS. Distribution of vitamins in food. Influence of type of food and maturing on the vitamin content of 
food. Influence of different technological processes and cooking on the vitamin content of foods. Bioavailability of 
vitamins. Adding vitamins to foods. Main food market supplemented.
17. INTRODUCTION TO THE ENZYMEOLOGY OF FOOD. Introduction. Food enzymes of interest: carbohydrate 
hydrolases, lipases, proteases. Other enzymes of interest in food: isomerases, oxidoreductases, lyases and 
ligases.
18. ALTERATIONS OF FOOD. Overview.
19. OXIDATION OF LIPIDS: INTRODUCTION. General classification of oxidative pathways of food. 
Mechanisms of chemical oxidation of foodstuffs. Regulatory factors and preventing of the chemical oxidation. 
Other lipid oxidative pathways. Evaluation of the oxidation of a fat. Frying process. Causes that affect the 
average life of frying oils and maintenance of quality. Parameters for assessing the quality of a frying fat.

THEORETICAL PROGRAM
1. SEMINARS / WORKSHOPS. Exhibition of works by students on additives. Seminar on functional foods.
2. LABORATORY PRACTICE
2.1. Practice 1. Assessing the quality of a meat product
• Determination of its total fat content as well as its chromatographic profile.
• Determination of its total protein content.
• Measurement of its collagen levels.
2.2. Practice 2. Determination of polyphenoloxidase activity in fruit mesocarp
2.3. Practice 3. Enzymatic determination of lactose in milk.
2.4. Practice 4. Determining of the concentration of lactate in meat

READING

KEY LITERATURE

- Química de los alimentos, 4ª edición. Baduí Dergal, S. Editorial Pearson, México, 2006

**ADDITIONAL LITERATURE**


**RECOMMENDED INTERNET LINKS**

- [http://www.nutricion.com](http://www.nutricion.com)
- [http://www.puleva.es/pf/index.html](http://www.puleva.es/pf/index.html)
- [http://www.AESAN](http://www.AESAN)
- [http://www.senba.es/](http://www.senba.es/) (libros editados, recursos didácticos en red, otras web de interés)
- [http://seenweb.org/](http://seenweb.org/)