COURSE DATA

DATA SUBJECT

Code: 33985
Name: Food Chemistry
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1103 - Degree in Food Science and Technology	Facultat de Farmàcia i Ciències de l'alimentació	2	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1103 - Degree in Food Science and Technology	Food chemistry	COMPULSORY

COORDINATION

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SUMMARY

Food Chemistry is a mandatory subject, carrying 6 ECTS in the second year, second semester of the Degree in Food Science and Technology. It is part of Module 2: Food Science, which includes other subjects such as Bromatology and Food Analysis.

To gain insight into the physicochemical changes that can occur in foods and act on them, producing the desired changes, the first thing we need is to know are the characteristics of their components. Food Chemistry studies the different substances that can become part of the food, their structure, characteristics, physicochemical properties and reactions that may be involved and their possible interactions with other food components. Therefore, nutrients are studied (water, carbohydrates, lipids, proteins, vitamins and minerals) and other non-nutritional substances for the human organism, such as pigments, flavourings and food additives.

Foods derived from biological systems, i.e. from two main sources, animals and plants, undergo changes along time, in some cases due to their own cellular metabolism. In addition, the transformation undergone during processing and/or storage of foods requires a detailed study for each type of food, as these stages are influenced by their specific characteristics.

In short, the subject of Food Chemistry deals with the study of:

a) Components of food: structure, physicochemical properties, reactions.

b) The changes incurred during processing and/or storage of food.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Subjects of the basic module, essentially, Biochemistry and Chemistry (General and Organic). It is advisable to do concurrently Food Science.

COMPETENCES / LEARNING OUTCOMES

1103 - Degree in Food Science and Technology

Acquire knowledge to design and/or improve food.

Acquire the knowledge and skill needed to elucidate the causes of organoleptic and/or nutritional modifications of components and/or food.

Adquirir capacidad de utilizar adecuadamente las fuentes de información y comunicación disponibles.

Be familiar with discipline-specific terminology.

Capacidad de interpretar datos relevantes.

Determine the influence of physical and chemical factors on the components of food.

Develop skills to undertake further study.

Know how to apply the knowledge acquired to the preparation and preservation of food.

Know the physico-chemical properties, chemical reactions and technological functions of the components of food.

Poseer y comprender los conocimientos en el área de Ciencia y Tecnología de los Alimentos.

Saber aplicar esos conocimientos al mundo profesional, contribuyendo al desarrollo de los Derechos Humanos, de los principios democráticos, de los principios de igualdad entre mujeres y hombres, de solidaridad, de protección del medio ambiente y de fomento de la cultura de la paz.

The ability to transmit ideas, problems and solutions within the study area of modern languages and their literatures.

DESCRIPTION OF CONTENTS

1. Main components in foods: structure, physical-chemical properties, reactions in foods

Item 1. Food Chemistry. Concept. Relationship with other subjects. Literature.
Item 2. Water. Physical constants and structures of water and pure ice. Water-solute interactions. Water activity and alterations in foods.
Item 3. Carbohydrates. Classification. Starch and modified starches.
Item 4. Browning in foods I. Classification. Caramelisation and ascorbic acid degradation.
Item 5. Browning in foods II. Maillard reaction.
Item 6. Components of dietary fibre. Prebiotics of interest. Other functional properties of carbohydrates.
Item 7. Lipids. Physical properties of fatty acids and fats.
Item 8. Lipid alterations. Classification. Lipid oxidation. Other lipid alterations. Frying process.
Item 9. Modifications of fats and oils. Functional properties of lipids.
Item 10. Proteins. Modifications of proteins during processing and storage. Functional properties.
Item 11. Enzymes. Classification and action in foods. Enzymatic browning.

2. Minor components in foods: structure, physical-chemical properties, reactions in foods

Item 12. Minerals and anti-nutritional factors. Modification of mineral content during food processing. Anti-nutritional factors: nature, mechanism of action and mitigation.
Item 13. Hydrosoluble vitamins. Structure and stability.
Item 14. Liposoluble vitamins. Structures and stability.
Item 15. Pigments and aroma compounds in foods. Pigments: structures and stability. Aroma compounds: concept, impact compounds and aroma compounds generated in enzymatic and non-enzymatic reactions. Off-flavours. Food flavouring.
Item 16. Food additives. Concept and classification. Description of additives.

3. Food of animal and plant origin: changes undergone during processing and/or storage

Item 17. Meat. Post-mortem changes. Effects of thermal treatment. Meat products.
Item 18. Fish. Post-mortem changes. Changes during processing.
Item 19. Egg and egg products. Functional properties. Changes during storage. Changes during processing.
Item 20. Milk. Effects of thermal treatment. Dairy products. Changes during their elaboration.
Item 21. Cereals. Changes during storage of grain and flour. Changes during baking and storage of bread.
Item 22. Fruits and vegetable. Changes during ripening, storage and processing.
Item 23. Fermented beverages. Changes during their elaboration. Alterations.

Lab sessions are conducted to:

4. Laboratory sessions

Lab sessions are conducted to: a) identify or quantify the content of a component in food
b) assess the modification of food by processing and/or storage
c) observe the effect of certain properties of food components
These include:
- Modification of the myoglobin colour of meat.
- Assessment of water retention capacity in meat.
- Evaluation of the effect of heating on soluble proteins in dairy products.
- Evaluation of fermentation in dairy products:
a) Determination of lactose
b) Determination of acidity
- Assessment of frying oil quality:
a) Colorimetric assay
b) Measurement of capacitance
- Evaluation of flour strength. Pelshenke index. Effect of glutathione.
- Determination of Brix degrees in juices.
- Evaluation of fruit maturity index.
- Determination of hydroxymethylfurfural in honey.
- Determination of tartrazine in a commercialized food colouring.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	38,00
Seminar	2,00
Laboratory	15,00
Total hours	**57,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	28,00
Independent study and work	62,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Theoretical classes: explanatory and/or demonstrative sessions of contents, with a total of 38 hours/course. The classes will be taught with the help of technical audiovisual material that the student will

have previously available in the virtual classroom. At the end of each subject, the professor will be able to use ICT tools to reinforce the most relevant concepts. Also, throughout the term, the student will be provided with links to activities and resources to facilitate the study of the subject in open educational platforms.

Seminars: students gain insight through interaction and activities. One coordinated seminar will take place (considering 2 hours of assistance) on topics provided by the teacher and related to the course, and must follow the guidelines on coordinated seminars available at the web page of the Degree. The development of the seminar will be monitored through tutorials, to be agreed upon between the teacher and the students. The seminars will be presented in writing and explained orally by the students. After the oral presentation, discussion will take place with the other students, chaired by the teacher.

Practical lessons (laboratory): There will be 4 sessions of practical laboratory classes of four hours duration. The practices will be carried out in pairs. At the beginning of each session, the students will individually present an outline of the experimental procedure related to the practices to be performed that day. At the end of the practical sessions, students must complete, individually, the report of results with the appropriate interpretations, which must be delivered at the end of the practices, through the virtual classroom.

Tutorials: students can attend tutorials either individually or in a group. Two tutorials of one hour each will take place. Several activities, literature reading, and short questions will be dealt per groups and delivered on the online platform at the end of each session. Additionally, students' queries about the subject will be discussed and solved, and subject concepts and terminology will be reinforced through activities available in open-access educative platforms.

During the activities, both theoretical and practical, examples of the applications of the subject's contents in relation to the Sustainable Development Goals (SDG) will be indicated. By doing this, it is intended to provide knowledge, skills and motivation to the students in order to understand and address these SDGs, while promoting reflection and criticism.

EVALUATION

The evaluation of the learning of knowledge, competences and skills will be carried out in the form of continuous evaluation throughout the four-month period.

1. Acquisition of theoretical/practical concepts and their expression through written tests (80%).

a) For students with an attendance to theory classes of 90% or more (34 hours minimum) with delivery and evaluation of the activities to be worked on during those hours, a grade of 30% is assumed in this section. The exam will count 50% instead of 80%.

The examination material includes the topics presented in the theoretical classes and in the continuous evaluation activities. There will be a written test per call (2 h of duration) with open and short answer questions, alternative answer (true-false) with reasoning, multi-answer or multiple-choice or multiple-choice questions. It will also include identification of chemical structures of relevant compounds In the event that wrong answers are penalized, it will be indicated. Correctness in the expression of concepts (including spelling) and terminology used will be taken into account.

b) those who do not take the continuous evaluation (as explained in section a) must take the exam indicated above. In this case the exam counts for 80%. It is necessary to obtain a 5 out of 10 in the written exam to add the rest of the marks obtained in the course and pass the subject.

2. Practical report, as well as the previous preparation of the sessions (5%). The attendance to the practical sessions, the daily presentation of the experimental procedure scheme and the results report are essential to pass the course. The attendance to the practical sessions and the daily presentation of the outline of the experimental procedure and the report of results is essential to pass the course.

3. Tutorials (5%): the completion of the assignments proposed for each session will be assessed, which will have to be handed in on paper or, if indicated, to the virtual classroom.

4. Seminars (10%): the evaluation of coordinated seminars will take into account the written work, exposition, defense and proposed activities according to the regulations available on the web of the Degree. The level of understanding of the contents, as well as the skills for its exposition and discussion, will be valued. Attendance to seminars is mandatory to pass the subject.

Notes:
(i) 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
(ii) The subject will be considered as passed if the mark corresponding to the written theoretical/practical test reaches the established minimum and if a score equal or greater than 5.0 (out of 10) is numerically reached with the sum of the marks obtained in the evaluable activities of the subject.adjetivo

(iii) Attendance of laboratory sessions, seminars and tutorials is compulsory to pass the subject.

(iv) The daily delivery of the experimental procedure schemes and results¿ report is compulsory to pass the subject.

(v) Students who in the first call do not pass the written test, will keep their marks corresponding to seminars, tutorials and report from lab sessions until the second call of the same year.

(vi) Students retaking the subject will keep their attendances and marks corresponding to seminars and tutorials. The attendance and marks corresponding to the laboratory sessions will be kept for the following two years after their completion. After this period, lab sessions will have to be retaken.

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- http://www.efsa.europa.eu/ http://www.eufic.org/index/es/ Revistas: Alimentaria (a través de las BBDD de la UV) Revistas: Revista española de nutrición humana y dietética
- https://www.renhyd.org/index.php/renhyd Objetivos de Desarrollo Sostenible - ONU https://www.undp.org/es/sustainable-development-goals