

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

<b>Code</b>	33988
<b>Name</b>	Food Analysis
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2022 - 2023

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1103 - Degree in Food Science and Technology	Faculty of Pharmacy and Food Sciences	3	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1103 - Degree in Food Science and Technology	13 - Food analysis	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
MANYES FONT, LARA MARIA	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.
MAÑES VINUESA, JORGE	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.

**SUMMARY**

“Food analysis” is a compulsory subject which is taught with a load of 6 ECTS in the third year, second semester, of the Degree in Food Science and Technology. It is part of Module 2: Food Science, which includes other areas such as Food Science and Food Chemistry.

This course is intended to convey basic knowledge of food analysis for the student's Degree in Food Science and Technology to acquire a solid foundation in this area.

In the first part of the course are taught the general aspects of food analysis, as are the concepts of types of analysis, protocol analysis, sample and sampling, etc. The central block of the course focuses on the nutritional analysis of food components of interest to determine the centesimal composition and labeling of food. The final block includes the analysis of other food components that may be beneficial to health or, on the contrary, their content may be controlled in them.

The practical part of the course is developed in lab sessions in which the student uses various analytical



methodologies.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

Highly recommended to have passed Chemical Analysis, Food Science (Bromatology) and Food Chemistry. Moreover, basic module subjects, mainly biology, chemistry (general, organic and analytical), biochemistry and statistics.

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

### 1103 - Degree in Food Science and Technology

- Capacidad de interpretar datos relevantes.
- Develop skills to undertake further study.
- Know how to apply that knowledge to the professional world contributing to the development of human rights, democratic principles, the principles of equality between women and men, solidarity, protection of the environment and promotion of the culture of peace, from a gender perspective.
- Analyse food.
- Poseer y comprender los conocimientos en el área de Ciencia y Tecnología de los Alimentos.
- Be familiar with discipline-specific terminology.
- Adquirir capacidad de utilizar adecuadamente las fuentes de información y comunicación disponibles.
- Capacidad para transmitir ideas, problemas y soluciones dentro de su área de estudio.
- Know general aspects preliminary to the analysis and apply them to the specific field of food.
- Acquire knowledge of the approach, methodology and development of food analyses in order to assess their application to specific cases.
- Acquire skills for searching, selecting, preparing, improving and evaluating procedures of food analysis.
- Know how to apply the main analytical methodologies (physical, chemical and sensory) appropriate to the object and purpose of the analysis proposed.

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



Get used and correctly handle the terminology of the subject.

- Be able to correctly interpret and discern the relevant data.
- To know the aspects to consider prior to food analysis.
- Be able to choose the appropriate methodology for the analysis of foods depending on the object and purpose of each case.
- To know and handle the main basic and specialized bibliographic sources relating to food analysis.
  - Acquire the ability to synthesize and organize properly, the information from different sources.
- Be able to adequately express, both orally and in writing, the knowledge gained and relate them with previous ones.
- Have the ability to prepare reports of studies related to the subject.
- Acquire critical and creative (initiative and autonomy) which, together with scientific rigor, to evaluate and solve problems.
- Attitude of cooperation through teamwork, and exchange of experience.
- Know how to apply/develop knowledge and skills acquired with a personal attitude that fosters the development of human rights.

## DESCRIPTION OF CONTENTS

### 1. General aspects of food analysis

1. INTRODUCTION. Description of the subject. Related courses. Subject guidelines.
2. ANALYSIS OF FOOD. Purpose and types of analysis.
3. PROTOCOL OF ANALYSIS. Type of samples and sampling. Sample preparation. Validation of analytical methods.
4. ANALYTICAL TECHNIQUES COMMONLY USED IN FOOD ANALYSIS.

### 2. Analysis of food components of nutritional interest

5. WATER. Determination of water content. Water activity.
6. CARBOHYDRATES. Methods of determination. Fiber: concept and determination.
7. LIPIDS. Determination. Study of the composition of the fat fraction. Determination of the quality status of the fat fraction.
8. PROTEINS. Direct and indirect methods. Amino acid analysis. Indices of protein quality.
9. MINERALS. Methods of determination. Speciation.
10. VITAMINS. Water- and fat-soluble vitamins: extraction, separation and determination.

**3. Other topics of interest**

11. FOOD ADDITIVES. Colorants, preservatives and sweeteners qualitative and quantitative analysis.
12. ORGANIC ACIDS and COMPONENTS GENERATED BY THE PROCESSING. Analysis of low molecular weight acids, acrylamide, hydroxymethylfurfural and furan.
13. CONTAMINANTS AND RESIDUES in food. Identification and determination by liquid and gas chromatography coupled to mass spectrometry.
14. COMPOUNDS WITH ANTIOXIDANT ACTIVITY. Analysis of the total antioxidant power and phenols in matrices of food interest.
15. OMIC TECHNIQUES. Fundamentals of transcriptomics, proteomics and metabolomics. Food analysis applications.
16. QUALITY AND ACCREDITATION IN FOOD ANALYSIS LABORATORIES. National accreditation entity. Accreditation process. ISO standards. Quality system documents.
17. ANTISEPTICS IN DRINKING WATER. Bleach titration. Determination of free and combined active chlorine.

**4. Laboratory practice sessions**

- Determination of the centesimal composition of a food product. Elaboration of a label.
- Oils and fats identification by gas chromatography.
- Infrared spectrophotometry in drinks.
- Colorants in cool drinks by chromatographic techniques.
- Determination of antioxidant activity: polyphenols in foods and dietary supplements.
- Chlorine analysis of public water.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Laboratory practices	15,00	100
Seminars	2,00	100
Tutorials	2,00	100
Development of group work	20,00	0
Development of individual work	2,00	0
Study and independent work	64,00	0
Readings supplementary material	2,00	0
Preparation of practical classes and problem	2,00	0
<b>TOTAL</b>	<b>147,00</b>	



## TEACHING METHODOLOGY

**Lectures:** explanatory meetings and /or demonstration of content, with a total of 38 hours/course. Classes are taught using audio-visual technical equipment. The student will previously have available this material in the virtual platform , as well as of the statements of the problems.

**Seminars:** This is to construct knowledge through interaction and activity. Two coordinated seminars will be conducted on topics provided by the teacher, and must follow the guidelines on coordinated seminars available at the web page of the Faculty. The development of the seminars will be monitored through tutorials, to be agreed between the teacher and students. The seminars will be presented in writing and defended by the students. After the oral presentation, the other students may participate in a discussion time, moderated by the teacher.

**Practical classes (laboratory):** There will be 4 sessions of hands-on lab, three of four hours and one of three hours. Practices are conducted in pairs.

At the end of the lab sessions, students must fill, in pairs, the report according to the elaboration guide, both available in the virtual platform, and it must be delivered printed in less than one week.

**Tutorials:** Personal and/ or group attention. Two tutorials will be performed, of one hour each, for every students group. Short questions and/or problems previously available in the virtual platform will be discussed in the group and students will raise doubts about the subject.

**Individual or group work and study:** Developing the capacity of individual and in group learning.

During the activities, both theoretical and practical, examples of the applications of the contents of the subject in relation to the Sustainable Development Goals (SDG) will be indicated, as well as in the proposals of topics for the coordinated seminars. This is intended to provide students with knowledge, skills and motivation to understand and address these SDGs, while promoting reflection and criticism

## EVALUATION

- Learning assessment of knowledge, skills and abilities will take the form of final written exam.
- Measurable parameters considered are:
  - Written test which will assess the degree of general knowledge of theoretical concepts and procedures presented for each topic
  - Implementation of individual memories and/or collective exercises related to various activities in the classroom and laboratory, which will assess the acquisition of competencies (skills and attitudes).
- The assessment will be performed as follows:





**1. Acquisition of theoretical / practical concepts and their expression through written tests (75%).**

The exam material includes the topics presented in the theoretical classes, tutorials and practices. There will be a written test by call (2 hours long) with open and short answer questions, or alternative answer (true / false) with reasoning; in the case of including test-type questions, incorrect answers will be penalized; it will also include numerical resolution of case studies and short questions from laboratory sessions (including: fundamentals, purposes of the reagents used, etc.). Correction in the expression of concepts (including spelling) and terminology used will be taken into account. **It is necessary to reach 37.5%** (grade of 3.75 out of 7.5 points) to add the score of sections 2, 3 and 4 of the evaluation.

**•Report from the lab sessions (10%). Attendance to the lab sessions is compulsory to pass the course.**

- Assessment criteria:
- In the reports it will be assessed: Presentation (wording and use of appropriate language), bibliographic sources used and interpretation and analysis of the data obtained.

- **Tutorials:** The answer to questions raised by the professor will be assessed. The contribution of tutorials to the final mark will be **5%**.

**1. Seminars:** written work, presentation, defense and proposed activities (**10%**). In the assessment of seminars it will be taken into account the work in writing, presentation, defense and proposed activities, the level of understanding of the contents as well as the skills for its presentation and discussion, aspects agreed for coordinated seminars (which will be published in the virtual platform). **Attendance to seminars is compulsory the first year in order to pass the subject.**

**Notes:**

- (i) **Attendance to laboratory sessions and seminars is compulsory to pass the course.**
- (ii) **Students who in the first call did not pass the written test, the marks corresponding to seminars, tutorials and lab sessions will be maintained until the second call of the same year.**
- (iii) **Students who are repeating the subject, marks from seminars will be maintained. Marks corresponding to the lab sessions will be maintained for the following two years after their performing. After this period, lab sessions will have to be repeated.**



(iv) Although, numerically the sum of the marks corresponding to seminars, tutorials and lab sessions will achieve 50%, the subject will not be considered as passed if the mark corresponding to the written theoretical/practical test has not achieved the established minimum (37.5%).

(v) In the case of a student who passes tutorials, seminars and lab sessions, but not assisted to the written theoretical/practical test, the mark obtained will be “not presented”

## REFERENCES

### Basic

- Nielsen, S.S.; Boff, J. M.; Bradley, R. L.; Bridges, A.R.; BeMiller, J.M.; 2008. Análisis de los alimentos. Ed. Acribia, Zaragoza.

Nollet, L.M.L., Handbook of food analysis. Ed. Marcel Dekker. 2004 (vols. 1, 2 y 3)

Association of Official Analytical Chemists (AOAC), Official Methods of Analysis of AOAC International, 17th ed., Vols. 1 y 2. Horwitz, W., Ed., 2002.

Codony, R., Boatella, J., Rafecas, M., Guardiola, F. Anàlisi daliments. Ed. Universitat de Barcelona. 2002.

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Matissek, R., Schnepel, F.M., Steiner, G. Análisis de los Alimentos: Fundamentos, métodos, aplicaciones. Ed. Acribia. 1999.

### Additional

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Picó Y. Chemical Analysis of Food: Techniques and Applications. Ed. Elsevier. 2012. Disponible en: <http://www.sciencedirect.com/science/book/9780123848628>

Lees, R. Análisis de los alimentos: Métodos analíticos y de control de calidad. Ed. Acribia. 1991.

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Guardiola F. Pràctiques danàlisi daliments. Ed. Universitat de Barcelona. 2007.(para la preparación de las prácticas).

Nielsen S.S. Food analysis laboratory manual. Ed. Springer. 2º ed. 2010. Disponible en: <http://link.springer.com/book/10.1007%2F978-1-4419-1463-7>



- Agencia Española de Consumo, Seguridad Alimentaria y Nutrición:  
<http://aesan.msssi.gob.es/AESAN/web/home.shtml>

Ministerio de Agricultura, Alimentación y Medio Ambiente: <http://www.magrama.gob.es/es/>  
<http://www.alimentacion.es/es/>

European Food Safety Authority: <http://www.efsa.europa.eu/>  
Institute for Reference Materials and Measurements: <https://ec.europa.eu/jrc/en/institutes/irmm>

Association of Official Analytical Chemists: <http://www.aoac.org/>

American Chemical Society: <http://www.acs.org/content/acs/en.html>

Revistas: Alimentaria (a través de los BBDD de la UV)

Revistas: Alimentación, equipos y tecnología (disponible en la Biblioteca de la Facultad)

Revistas: Journal of food composition and analysis (a través de los BBDD de la UV)

Revistas: Food science and technology international (a través de los BBDD de la UV)

Revistas: Grasas y aceites (a través de los BBDD de la UV)