

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

Code	33988
Name	Food Analysis
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

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

Subject-matter

Degree	Subject-matter	Character
1103 - Degree in Food Science and Technology	13 - Food analysis	Obligatory

Coordination

Name	Department
GARCIA LLATAS, GUADALUPE	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

Subjects of the Basic Module, essentially, biology, chemistry (general, organic and analytical), biochemistry and statistics. It is advisable to have done other courses such as Food Science (Bromatology) and Food Chemistry.

OUTCOMES

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

- 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. Analysis of other food components 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 chromatography.
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.

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.

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
TOTAL	147,00	

TEACHING METHODOLOGY

Theoretical classes: explanatory sessions and/or demonstration of contents, with a total of 38 hours/term. Classes are taught using audio-visual technical equipment and materials available on the online platform beforehand. At the end of each item, ICT tools might be used by the teacher in order to reinforce the most relevant aspects. Additionally, throughout the semester, students will be provided of activities and resources in order to facilitate the study of the subject available in open-access educative platforms.



Seminars: students gain insight through interaction and activities. The coordinated seminars will take place 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.

Practical lessons (laboratory): there will be four hands-on lab sessions, i.e. three of four hours and one of three hours. Practice exercises will be done in pairs.

At the beginning of each lab session, students should complete individually a test through a Moodle questionnaire and deliver a scheme of the experimental procedure related to the assays to be performed during the session. At the end of the lab sessions, students must fill in, in pairs, the report available on the online platform, and it must be delivered daily through this platform.

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.

Continuous assessment activities: continuous assessment activities will be distributed throughout the semester. The topics of these activities raised by the teachers will be part of the contents theoretical and practical of the subject. If necessary, students could be provided with the basic bibliography and resources to work on the knowledge they are intended to acquire.

Individual or group work and study: individual and in-group learning capacity will be developed.

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 acquisition of knowledge, competence and skills will be assessed continuously throughout the semester.

Measurable parameters considered are:

- Written test** which will assess the degree of general knowledge of theoretical and practical concepts and procedures presented for each item.
- Completion of questionnaires** (continuous assessment activities, lab sessions and tutorials) and elaboration of seminars.
- The activities of laboratory sessions, tutorials and seminars are of mandatory attendance, and, therefore, **are not recoverable**.



The assessment will be performed as follows:

1. Acquisition of theoretical/practical concepts and way of their expression through written tests (70%). The exam matters will include the topics covered in the theoretical and practical sessions and continuous assessment activities. There will be a written test by call (2 h length) with questions of open-ended and short answers, or of alternative response (true-false) with reasoning; in the case of including multiple choice questions, wrong answers will be penalized; this test will also include numerical resolution of practical cases and short answers from the laboratory sessions (fundamentals, purpose of used reagents, etc.). The correction in the expression of concepts (including spelling) and the terminology used will be taken into account for the mark. **Students must reach 5 out of 10** to be added up with the rest of marks obtained and thus pass the subject.

2. Student's attitude and participation in the lab sessions as well as previous preparation of practical classes (8%).

Student attitude will be assessed through the completion of Moodle questionnaires and the deliver of the experimental procedure schemes at the beginning of each lab session and the result report at the end of each session.

Assessment criteria:

- Attitude and participation during the lab sessions: Aspects like previous preparation of practical classes, active intervention in issues raised in the laboratory, the cooperative attitude, teamwork and the care and management of material will be considered.
- Application of acquired knowledge to resolve proposed questions and/or problems raised.

Attendance of the lab sessions and the daily delivery of the experimental procedure schemes and the result reports are compulsory to pass the subject.

3. Tutorials (5%): the solution of questions proposed through the online platform for each session will be assessed and they will have to be delivered by means of it. The evaluation will be carried out through a Moodle questionnaire (0.25 points/tutorial session) composed by test questions.

Attendance of tutorials is compulsory in order to pass the subject.

4. Seminars (10%): written work, presentation, defense and proposed activities. In the assessment of seminars it will be taken into account the work in writing, presentation, defense and proposed activities, according to the guidelines available at the web page of the Degree.



Attendance of seminars is compulsory in order to pass the subject.

5. Continuous assessment activities (10%): the realization of the tasks proposed in each of the continuous assessment activities related to the contents of the subject will be assessed. The evaluation will be done through a Moodle questionnaire and by means of the delivery of proposed tasks.

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.

(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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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.

Adrian, J., Potus, J., Poiffait, A., Dauvillier, P. Análisis nutricional de los alimentos. Ed Acribia. Zaragoza. 2003.

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

Additional

- Adrian, J., Potus, J., Poiffait, A., Dauvillier, P. Análisis nutricional de los alimentos. Ed Acribia. Zaragoza. 2003.
- 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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- 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)

