

**COURSE DATA****DATA SUBJECT****Code:** 33981**Name:** Chemical Analysis**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2025-26**STUDY (S)**

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

**SUBJECT-MATTER**

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

**COORDINATION**

BENEITO CAMBRA MIRIAM

**SUMMARY**

Chemical Analysis is a core course taught in the second year of Food Science and Technology Grade along the first four-month period. In the curriculum, it involves 6 ECTS credits.

The aim of the course is, essentially, student training to perform instrumental and chemical analysis, and the establishment of the necessary basis to understand the fundamentals of each step of the analytical procedure, in order to be able to apply it correctly.

The study of this subject is justified due to the necessary acquirement of theoretical and practical knowledge, relative to sampling, sample preparation, and the analytical possibilities of the classical and instrumental analytical techniques. Some concepts previously acquired on Mathematics, Physics and Chemistry, are used, since they constitute a base key to the normal development of the subject.

This subject will provide to the future Graduate in Food Science and Technology the necessary skills to achieve a complete education in order to face with success any analytical problem in his/her future job.

**PREVIOUS KNOWLEDGE**



## RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

## OTHER REQUIREMENTS

Students enrolling in this course are expected to know and use basic chemical concepts learnt before university access. Students should have had previous coursework in undergraduate Physics and Mathematics

## COMPETENCES / LEARNING OUTCOMES

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Capacidad para transmitir ideas, analizar problemas y resolverlos con espíritu crítico, adquiriendo habilidades de trabajo en equipo y asumiendo el liderazgo cuando sea apropiado.

Carry out health and hygiene analyses related to food.

Design, apply and evaluate reagents, methods and analytical techniques.

Saber interpretar, valorar y comunicar datos relevantes en las distintas vertientes de la actividad profesional, haciendo uso de las tecnologías de la información y la comunicación.

## DESCRIPTION OF CONTENTS

### 1. Introduction and Terminology

Concept. Types and levels of information. Steps of the analytical process. Classification of analytical techniques

### 2. Evaluation of analytical data

Types of errors in Chemical Analysis. Evaluation of analytical data. Presentation of results. Quality criteria for analytical methods.

### 3. CALIBRATION AND ANALYTICAL FIGURES OF MERIT

Linear calibration. Analytical figures of merit: sensitivity, detection and quantification limits, dynamic range. Standard addition method. Internal standard method.



## **4. SAMPLING, STORAGE AND PREPARATION OF MATERIALS**

Importance of the processes of sampling and treatment of materials. Sampling. Previous treatments of the sample. Dissolution of solid samples. Extraction techniques.

## **5. VOLUMETRIC ANALYSIS**

Introduction to volumetric methods. Acid-base titrations. Complexometric titrations. Precipitation titrations. Redox titration. Applications in food analysis.

## **6. GRAVIMETRIC ANALYSIS**

Fundamentals of gravimetric methods. Precipitation mechanisms. Basic operations of gravimetric analysis. Calculations. Applications in food analysis.

## **7. ELECTROCHEMICAL ANALYSIS**

Electrochemical cells. Electrode potentials. Potentiometry. Instrumentation. Analytical methodology. Analytical features and performance. Applications in food analysis

## **8. SPECTROSCOPIC METHODS OF ANALYSIS**

Molecular spectroscopic techniques. Atomic spectroscopic techniques. Fundamentals. Instrumentation. Analytical methodology. Analytical features and performance. Applications in food analysis.

## **9. CHROMATOGRAPHIC METHODS OF ANALYSIS**

Concept and classification of chromatographic techniques. Main parameters in chromatography. Gas chromatography. Liquid chromatography. Instrumentation. Analytical methodology. Applications in food analysis.

## **10. Laboratory**

1. Determination of the total acidity of a commercial vinegar
2. Determination of the total hardness of a water sample
3. Spectrophotometric determination of nitrite in water
4. Determination of additives in foods by liquid chromatography

**WORKLOAD****PRESENCIAL ACTIVITIES**

Activity	Hours
Tutorials	2,00
Theory	38,00
Seminar	2,00
Laboratory	15,00
<b>Total hours</b>	<b>57,00</b>

**NON PRESENCIAL ACTIVITIES**

Activity	Hours
Attendance at other activities	0,00
Individual or group project	14,00
Independent study and work	53,00
Preparation of lessons	13,00
Preparation for assessment activities	10,00
Resolution of case studies	0,00
<b>Total hours</b>	<b>90,00</b>

**TEACHING METHODOLOGY**

The subject is structured considering the following activities for its development: lectures, workshops, coordinated seminars, laboratory sessions and tutorials.

**Lectures.** Participatory lecture is used as didactic strategy. In the lectures, the instructor offers an overview of the topic, and proposes questions and small activities to be resolved in the classroom by the students.

**Workshops.** Throughout the course there are workshop sessions focused on various aspects of the subject. The teacher provides the necessary materials and proposes a series of activities.

**Coordinated seminars.** They will be conducted on topics provided by the teacher and must follow the guidelines on seminars available at the web page of the Faculty. The development of the seminar will be monitored through tutorials, to be agreed between the teacher and students. The seminars will be presented in writing and submitted by students. After the oral presentations other students will have a speaking time moderated by the teacher.

**Tutorial sessions.** In them, the teacher will give to the student advices on all the elements of the learning process, in terms of global strategies and specific issues. Also, students will present the results they have obtained on the additional problems and the questions set by the teacher, and will discuss them on the blackboard.

**Laboratory sessions.** The course is enhanced with practical lessons that develop in the laboratory where the student acquires the skills necessary to implement the knowledge developed. To support the teaching practice the student is supplied with a booklet with practical protocols to perform. The protocol includes



the theoretical, reagents, procedures and calculations involved.

During the classes, application examples of the subject contents in relation to the Sustainable Development Goals (SDG) will be indicated, as well as, in the topic proposals for coordinated seminars. Thereby, it is intended to provide students with knowledge, skills, and motivation to understand and address these SDGs.

## EVALUATION

The evaluation of students learning will take into account the different aspects outlined in the methodology section of this guide and will be performed by the teacher in a continuous way. For this purpose, the subject is structured in three parts: theoretical sessions, laboratory sessions and coordinated seminars.

The score or the **theoretical part**, which weighs 70% in the final mark, include the qualification of a written exam at the end of the first semester (weighs 75% in the theoretical part), and the score of the activities carried out in workshops and tutorials (25% of the theoretical part). Attendance to tutorials is mandatory, and not recoverable, for all enrolled students. The written exam will consist of conceptual questions and problems that allow the student to demonstrate his/her degree of assimilation of fundamental concepts. They may also include more general topics where the student will have to show his/her ability to synthesize and expose. The qualification obtained in the activities carried out in workshops and tutorials will not be preserved for following academic years.

To evaluate **laboratory sessions**, which attendance is compulsory and non-recoverable, the student will have to present a report gathering the analytical results of all practices. In addition, during the last laboratory session, there will be a written exam on issues discussed during the practices. Final laboratory practices mark will be composed by report of the practices (20%), written exam (30%) and laboratory work (taking also into account precision and accuracy of the results) (50%). The overall qualification will rate 20% of the final score of the subject. In the case of not passing the subject, the mark obtained in the laboratory part will be preserved during the TWO following academic years, as long as it is higher than 5 out 10.

Tutorials and laboratory practices are of mandatory attendance and, therefore, not recoverable, in accordance with the provisions of Article 6.5 of the Regulation of Evaluation and Qualification of the UV for Bachelor and Master degrees. If it is not possible to attend any of these activities for justified reasons, it must be communicated in advance. In this way, the person in charge of the subject may assign the student a session in another group.

The qualification obtained in the **coordinated seminar** will rate 10 % of the global qualification of the subject, according with the regulations of coordinated seminars on the degree program. In case of not passing the subject, the mark obtained in the laboratory part will be preserved for following academic years. Attendance to coordinated seminars is mandatory for first-time students.



To request advancement of call, the student should have completed the mandatory activities listed in this teaching guide.

### FIRST GENERAL EXAM OPPORTUNITY

The final course score is calculated averaging the specific scores in theory, laboratory sessions and coordinated seminar by the following expression:

$$\text{Final Rating} = \text{THEORY} \times 0.70 + \text{PRACTICAL} \times 0.20 + \text{SEMINAR} \times 0.10$$

This expression only applies in case of obtaining a minimum score of 4.5 out of 10 in each of the parts. likewise, inside the theory block it is also necessary to obtain a minimal note of 4.0 in the written exam to average with the note of the activities of workshops and tutorials. To pass the subject, the student must obtain a qualification of 5 out of 10. In the case of the final rating being smaller than 5.0 points, or not having obtained a minimum score of 4.5 to balance underscored parts (or 4.0 in the written theory exam), the subject will be considered failed.

### SECOND GENERAL EXAM OPPORTUNITY

In the second round of qualification, the same criteria used in the first round are applied. Students who did not pass the theory exam and/or the theory block in the first opportunity must take an exam of this part, keeping in the second opportunity, mark obtained in tutorials and workshops. Students who did not pass the practical block, must take the corresponding exam, maintaining in the second round, the mark obtained in laboratory work, since it implies a continuous evaluation process. Only in the case of the reports, a partial recovery will be allowed in those sections that correspond to results treatment and interpretation. In case of not passing the subject, if the mark obtained in the laboratory part, is not equal nor higher than 5 out 10, it will not be kept for subsequent courses.

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>

## REFERENCES

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