

**COURSE DATA****DATA SUBJECT****Code:** 36361**Name:** Chemistry**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2025-26**STUDY (S)**

Degree	Center	Acad. year	Period
1212 - Degree in Gastronomic Sciences	Facultat de Farmàcia i Ciències de L'alimentació	1	First quarter

**SUBJECT-MATTER**

Degree	Subject-matter	Character
1212 - Degree in Gastronomic Sciences	Chemistry	BASIC

**COORDINATION**

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**SUMMARY**

General Chemistry is a basic course taught during the first semester of first year Grade in Gastronomical Sciences. Current study plan (curriculum) includes 4,5 theoretical credits and 1,5 laboratory credits.

The theoretical part attempts to provide the student the concepts and bases of chemistry in general, with special emphasis to those concerning the chemical elements and their compounds, with an special focus in the components of foods. At the same time, it is our interest to highlight a scientific vision of reality, a fundamental aspect of university education. Students should achieve solid bases to enterpret and build the potential applications and uses of the chemical compounds that are components of foods, not only to undertake the study of other courses with chemical contents, but also in carrying out the different aspects of the professional activities specific to this Grade.

Concerning classroom lectures, they attempt that students consolidate and expand their knowledge on atomic structure, chemical bonding (both, in individual molecules and in solids), stoichiometric relationships, acid-base concepts, oxidation-reduction, and reactivity, as well as those principles determining kinetics and thermodynamic aspects of chemical transformations, applied at the chemical components of foods

With respect to laboratory work, students should achieve basic technical skills and be able to perform



experimental studies concerning some of the concepts covered in the theoretical lectures.

## PREVIOUS KNOWLEDGE

### RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

### OTHER REQUIREMENTS

Formulation and stoichiometry basic knowledge, as well as notions of connection and structure of matter.

## COMPETENCES / LEARNING OUTCOMES

### 1212 - Degree in Gastronomic Sciences

Adquirir la formación básica para formular hipótesis, recoger e interpretar la información para la resolución de problemas siguiendo el método científico y comprendiendo la importancia y las limitaciones del pensamiento científico.

Be able to distribute time appropriately for carrying out individual or group tasks.

Be able to engage in new fields of gastronomy in general through independent study.

Conocer los fundamentos químicos de aplicación en gastronomía.

Know the structure and properties of biological macromolecules and their relationship with the function that they perform.

Learn the fundamentals for using the scientific equipment directly related to professional activity.

Plan, order and channel activities in such a way that unforeseen events are avoided as much as possible, possible problems are foreseen and minimised, and solutions are anticipated.

Resolver tareas o realizar trabajos en el tiempo asignado para ello manteniendo la calidad del resultado.

Ser capaz de realizar las aproximaciones requeridas con el objeto de reducir un problema hasta un nivel manejable.

Ser capaz de trabajar en equipo y de organizar y planificar actividades, teniendo en cuenta, siempre, una perspectiva de género.

Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.



Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

## DESCRIPTION OF CONTENTS

### 1. CHEMISTRY IN THE KITCHEN: A HISTORICAL PERSPECTIVE

First cooking. Development of culinary gastronomy. Culinary science. Science and Cooking: a conversation. Scientists. Gastronomy. Chemistry and kitchen.

### 2. STRUCTURE OF MATTER

Inside the atom. The atomic nucleus. Isotopes. Quantum model for the atom. Schrödinger equation for the hydrogen atom. Electronic configurations. The periodic table of elements. Periodicity. Periodic properties.

### 3. CHEMICAL BONDING. MOLECULES AND INTERMOLECULAR FORCES

Introduction to the Chemical bonding. Chemical bonding and energetic stability. Ionic bonding. Covalent bonding. Metallic bonding. Characteristics of ionic, covalent and metallic compounds. Intermolecular forces. States of matter. Disperse systems: gels, emulsions and foams

### 4. WATER

Water in the kitchen. Structure of water. Properties of water. Water as solvent. Acidity and alkalinity. pH

### 5. FOOD MOLECULES (I)

Food chemistry: nutrition and biomolecules. Functional groups. Chemical structure of molecules and food: aminoacids and proteins. Denaturation of proteins

### 6. FOOD MOLECULES (II)

Food chemistry: carbohydrates and lipids



## 7. CHEMICAL CHANGES IN FOOD

Chemical reactions. Basic concepts: speed of reaction, speed equation and reaction order. Reaction mechanisms. Temperature effect on reaction speed. Activation energy. Catalysis. Redox reactions. Hydrolysis of sugars. Maillard reactions. Caramelization reactions. Browning reactions. Fat oxidation. Hydrogenation of fatty acids. Trans fats. Fruit ripening. Fermentation

## 8. ADDITIVES

Definition and classification of chemical additives. Preservatives. Substances responsible for smell and taste. Additives for colour modification. Additives for texture modification. Other types of additives.

## 9. LABORATORY SESSIONS

### BASIC LABORATORY MATERIALS AND PREPARATION OF SOLUTIONS

Use of laboratory equipment.

Basic operation of chemical reagents, waste and safety procedures

Preparation of solutions

### SEPARATION OF MIXTURES.

Basic laboratory techniques: mass and volumen measurements, filtration, separation, centrifugation, etc.

### ACID-BASE EQUILIBRIA. BUFFER SOLUTIONS.

pH determination of foods

Potentiometric titration of acetic acid.

Determination of acidity of commercial vinegar.

Determination of milk acidity.

Preparation of buffer solutions and testing its buffer capacity.

### REDOX REACTIONS.

electrochemical cell

Redox reactions in test tube

SO<sub>2</sub> determination

## WORKLOAD

### PRESENCIAL ACTIVITIES

Activity	Hours
Theory	45,00
Laboratory	15,00
<b>Total hours</b>	<b>60,00</b>

### NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	8,00



Independent study and work	21,00
Preparation of lessons	45,00
Preparation for assessment activities	10,00
Resolution of case studies	6,00
<b>Total hours</b>	<b>90,00</b>

## TEACHING METHODOLOGY

This course is structured in three types of activities: theory lectures, tutorials (recitations), seminars, and laboratory sessions.

Study of theory contents. Students should acquire the basic knowledge included in the syllabus by means of their individual study and assistance to the lectures. During such lectures, the professor will set and explain a global perspective of each subject, will emphasize the key concepts needed for its understanding, and will answer questions from the students. To help in their individual study and in depth preparation of each subject, students will be provided with basic and complementary bibliography, internet addresses and supporting computer equipment, as well as the instructions and advice for handling information sources. It is intended that the classes be dynamic so that debates or discussions of topics that may be of interest to the subject will begin.

## EVALUATION

In order to pass the subject it is necessary to obtain a grade of 5 points out of 10 in both the theoretical part (Theory) and the laboratory practices (Laboratory).

The grade in the laboratory section will include the score of some tests taken before each practice that will measure the degree of preparation of the practice, the work done in the laboratory (notebook and deliverable tasks), and the mark of the final exam of practices. All this will mean a 15% of the final grade of the subject, as long as a minimum value of 5 is reached.

Laboratory grade =  $[0.33 \times \text{practical preparation}] + [0.33 \times \text{laboratory work}] + [0.33 \times \text{final laboratory practical exam}]$ .

There will be a final exam of the course whose mark will be the grade of the Theory section.

The grade corresponding to the continuous evaluation section will include the score of deliverable tasks, questionnaires, participation in debates and forums, etc.

The final grade of the course will be composed by: the grade obtained in the Theory section (70%), the grade obtained in the Laboratory section (15%) and the grade of the continuous evaluation (15%).

Final grade =  $[0.70 \times \text{Theory}] + [0.15 \times \text{Laboratory}] + [0.15 \times \text{Continuous evaluation}]$ .



Finally, the realization of a work and the exposition of the same (optional work) will allow to increase the final grade up to an additional point to the final grade if **it reaches a minimum value of 4.5**.

## REFERENCES

- QUÍMICA GENERAL Enlace Químico y Estructura de la Materia. Petrucci R.H., Harwood, W.S. y Herring F.G. Prentice Hall. Octava edición, 2003.(Vol.I) -FOOD: THE CHEMISTRY OF ITS COMPONENTS. Coulter, T. P., Royal Society of Chemistry, Fourth Edition, London, 2002
- QUÍMICA GENERAL Reactividad química. Compuestos inorgánicos y orgánicos. Petrucci R.H., Harwood, W.S. y Herring F.G. Prentice Hall. Octava edición, 2003.(Vol.II) - LA COCINA Y LOS ALIMENTOS. McGee, H., Debate, Barcelona, 2007.