COURSE DATA

DATA SUBJECT

Code: 34060
Name: General Chemistry
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Facultat de Farmàcia i Ciències de L'alimentació	1	First quarter
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Facultat de Farmàcia i Ciències de L'alimentació	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	Chemistry	BASIC
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	COMPULSORY

COORDINATION

MARTINEZ LILLO FRANCISCO JOSE

SUMMARY

General Chemistry is a basic course taught turing the first semestre of first year Grade in Pharmacy. In the current curriculum (study plan) the course consists of 4.5 theory credits and 1.5 laboratory credits.

The theoretical part seeks to provide the students with the basic and fundamental concepts of Chemistry in general, especially those concerning the chemical elements and their compounds, while showing at the same time the importance of the scientific knowledge (scientific perspective) of reality (of life), a fundamental aspect of the university education. The student must achieve solid bases to interpret and to build the potential applications and uses of the inorganic compounds, not only to undertake the study of other subjects, with significant chemical content, but also in the different areas of the performance of those professional activities related to its professional degree, in research, teaching, pharmacies and industry.

With respect to the theory lectures, the objective is that the students consolidate and extend their knowledge on atomic structure, chemical bonding (in discrete molecules as well as in the solid state), and chemical reactivity.

As for the laboratory sessions, the student must achieve the necessary skill in the basic laboratory techniques and perform experimental studies of some of the concepts covered during the theory 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

COMPETENCES / LEARNING OUTCOMES

1201 - Degree in Pharmacy

Act with autonomy in learning, making informed decisions in different contexts, issuing judgements based on experimentation and analysis, and transferring knowledge to new situations.

Apply such knowledge to the professional world, contributing to the development of human rights, democratic principles, principles of equality between women and men, solidarity, environmental protection and promotion of a culture of peace with a gender pe

Assign and determine the structure of the different types of inorganic compounds.

Collaborate effectively in work teams, assuming responsibilities and leadership roles and contributing to collective improvement and development.

Contribute to the design, development and implementation of solutions that respond to social demands, taking into account the Sustainable Development Goals as a reference.

Demonstrate critical and self-critical thinking in the field of the degree programme, considering aspects such as professional ethics, moral values and the social implications of the different activities carried out.

Develop skills to update knowledge and undertake further studies, including pharmaceutical specialisation, scientific research, technological development and teaching.

Explain phenomena and processes related to basic aspects of chemistry in an understandable manner.

Explain phenomena and processes related to inorganic chemistry in an understandable manner.

Gather and transmit information in English at a level of proficiency equivalent to B1 of the Council of Europe.

Know and understand, within the field of the degree programme, gender inequalities in society; integrate different needs and preferences based on sex and gender into the design of solutions and problem solving.

Know dissolution reactions, different states of matter and principles of thermodynamics and their application to pharmaceutical sciences.

Know how to communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Know how to interpret, evaluate and communicate relevant data in the different areas of pharmaceutical activity, using information and communication technologies.

Know how to solve simple quantitative problems related to chemical processes, both in terms of equilibrium and from a kinetic point of view.

Know the characteristic properties of elements and their compounds, and their application in the pharmaceutical field.

Module: Chemistry. Estimate the risks associated with the use of chemical substances and laboratory processes.

Name and formulate inorganic and organic chemical compounds.

Possess and understand knowledge in the different areas of study included in pharmacist training.

Propose creative and innovative solutions to complex situations or problems within the field of knowledge, to respond to diverse professional and social needs.

Search for and find knowledge related to the area, always applying critical and self-critical thinking.

Solve any basic problem relating to the determination of empirical and molecular formulas of compounds.

Transmit ideas, analyse problems and solve them with critical spirit, acquiring teamwork skills and assuming leadership when appropriate.

DESCRIPTION OF CONTENTS

1. ATOMIC STRUCTURE

Composition of the atoms. The Schrodinger equation for hydrogen. Atomic orbitals. Polyelectronic atoms. Electronic configuration. Periodic Table.

2. CHEMICAL BONDING

Basic Concepts of bonding and types of bonding. Electronegativity and bond polarity. Lewis structures. Resonance. Molecular shapes. VSEPR theory.

3. COVALENT BONDING

Molecular orbital diagrams. Homo- and heteronuclear diatomic molecules. Polyatomic molecules. Hybridization. Multiple Bonds.

4. INTERMOLECULAR FORCES

Van der Waals forces. The hydrogen bond.

5. SOLID STATE I

Metallic solids. Structures. Band theory: conductors, Semiconductors and insulators.

6. SOLID STATE II

Covalent network solids. Molecular solids.

7. SOLID STATE III

Ionic solids. Structure considerations. Bond energy in ionic solids: lattice energy and the born-haber cycle. Polarization of ions.

8. THE CHEMICAL REACTION

Principles on Chemicals reactivity. Free energy and Chemicals equilibrium. Enthalpy. Enthalpy of formation. Hess¿s law. Bond enthalpy. Entropy. Free energy and spontaneity. Equilibrium constant. Change of

equilibrium constant with temperature.

9. ACID-BASE EQUILIBRIA

Acid-base reactions. Auto-ionization of water. The pH concept. Strength of acids and bases. Acid-base titrations. Buffer Solutions.

10. REDOX EQUILIBRIA

Oxidation states. Redox Potentials. Spontaneity of reactions. Nernst equation.

11. LABORATORY SESSIONS

USE OF LABORATORY EQUIPMENT. PREPARATION OF SOLUTIONS.

SEPARATION OF MIXTURES. REDOX EQUILIBRIA. BATTERIES.

ACID-BASE EQUILIBRIA. BUFFER SOLUTIONS.

SYNTHESIS OF SODIUM BICARBONATE.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	41,00
Seminar	2,00
Laboratory	15,00
Total hours	**60,00**

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
Total hours	**90,00**

TEACHING METHODOLOGY

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

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 an overview of each subject, emphasizing those 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.

Laboratory work. Laboratory sessions are structured around four main components. In the first place, students must undertake a preparatory work before going to the laboratory, consisting in an effort to understand the laboratory guide provided for each experiment, review of the theoretical concepts involved, answering a set of previous questions, and preparing an outline of work process. At the beginning of each laboratory session, the students will be asked to answer a set of questions to evaluate the preparation of the work to be performed. The student should go to each session with a laboratory notebook in which to register the previous work done, as well as all the observations and relevant facts taking place during the each experiment and the results of all the measurements performed. The student should analyze the observed facts and will answer some post-laboratory questions. By the end of the course all students will take a written exam on some questions directly related with the carried-out experiments.

Tutorials. Tutorials are meant to solve any doubt raised during theory lectures and to orient students about the most effective study methodology to improve their learning performance. In addition, during the tutorials the students will be provided with a list of questions to be solved at home, either individually or in group.

Seminars. Practical seminars and workshops are programmed during the course on monographic specific aspects of the course in order to help in their learning.

Attendance to seminars and tutorials are mandatory to at least an 80% of them. Unjustified absence to any of the laboratory sessions will prevent passing the course.

Continuous assessment activities, which in this subject are known to be laboratory practices, tutorials and seminars, are MANDATORY ATTENDANCE and, therefore, NON-RECOVERABLE, in accordance with the

provisions of article 6.5 of the Assessment and Qualification Regulations of the UV for Bachelor's and Master's degrees. In the event that, for justified reasons, you cannot attend any of these activities, must be communicated well in advance. In this way, the person in charge of the subject can assign the student a session in another group.

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

EVALUATION

Learning evaluation of students will take into account all aspects exposed in the methodology section of this teaching guide and will be carried out by the professor in a continuous way.

First Examination Sitting.

Student will be taking a final written exam that will represent a 75% of the final grade obtained in the course. It will consist of conceptual or reasoning questions to evaluate student's understanding of the fundamentals concepts. The exam may include a topic to be developed to evaluate the synthesis and descriptive ability.

The score obtained in the laboratory work, with mandatory attendance to all sessions, will represent 15% of the final grade. The evaluation of the laboratory work will take into account all components described in the methodology section, according to the following criteria:

Previous work to each session: 45%

Laboratory notebook: 10%

Final exam: 45%

A 10% of the final grade will come from all the activities carried out during the learning process: attendance to tutorials and seminars, sound participation in the discussions raised, preparation and presentation of the

proposed activities, adequate progress in the usage of chemical language, raising doubts, and the capacity for team work.

In order to pass the course, a minimum score of 5 over 10 will be required in both, the final exam and in the laboratory work, separately.

Second Examination Sitting.

The same criteria will be applied for the second exam sitting.

Note.

In case of failing the subject in the two calls of the course (January and June), the grade obtained in the laboratory work (15%) will not be maintained and, therefore, the laboratory work must be repeated. This measure will affect new students enrolled from the academic year 22-23.

Students who do not pass the subject in the two calls of the course will not keep the grade obtained in the tutorials section and seminars (10% of the total) for subsequent courses.

REFERENCES

• QUÍMICA GENERAL Enlace Químico y Estructura de la Materia. Petrucci R.H., Harwood, W.S. y Herring F.G. Prentice Hall. Octava edición, (Vol.I) 2003.

• QUÍMICA. La Ciencia Central. Brown T.L., Lemay H.E., Bursten B. E. y Murphy C. J. Editorial Pearson. Décimoprimera edición. 2009.

• QUÍMICA. Chang R. Ediciones McGraw-Hill. Décima edición, 2010.

• QUÍMICA GENERAL Reactividad química. Compuestos inorgánicos y orgánicos. Petrucci R.H., Harwood, W.S. y Herring F.G. Prentice Hall. Octava edición, (Vol.II) 2003.

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• FUNDAMENTOS DE ENLACE Y ESTRUCTURA DE LA MATERIA. E. Colacio Rodríguez. Base Universitaria, Anaya, 2004.