Teaching Guide				
Identifying Data				2023/24
Subject (*)	General Chemistry 1		Code	610G01007
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Lopez Torres, Margarita	E-mail	margarita.lopez.torres@udc.es	
Lecturers	Lopez Torres, Margarita Vazquez Garcia, Digna	E-mail	margarita.lopez.torres@udc.es d.vazquezg@udc.es	
Web				
General description	The course "Chemistry" of the Degree in Chemistry is part of the 60 credits of the Training Module Basic Science. Its purpose is to provide the students skills and knowledge homogeneous on the basic principles of chemistry on which will be developed, through specific subjects, skills own title. "Chemistry 1" is the first of four subjetcs where, for reasons of educational planning, was divided matter "Chemistry" in the curriculum of the UDC. It introduced, at a basic level and merely qualitative structure of matter, atoms, elements and compounds, based on both the model of interactions between atomic nuclei and electrons as the interactions between atoms; raising the relationship between structure and properties, and the greater or lesser ability of models for justify.			

Study programme competences / results	
Code	Study programme competences / results
A1	Ability to use chemistry terminology, nomenclature, conventions and units
A2	Ability to describe and account for trends in properties of chemical elements throughout the periodic table
A3	Knowledge of characteristics of the different states of matter and theories used to describe them
A6	Knowledge of chemical elements and their compounds, synthesis, structure, properties and reactivity
A8	Knowledge of principles of quantum mechanics and atomic and molecular structure
A12	Ability to relate macroscopic properties of matter to its microscopic structure
A14	Ability to demonstrate knowledge and understanding of concepts, principles and theories in chemistry
A25	Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B4	Working independently on own initiative
B5	Teamwork and collaboration
C1	Ability to express oneself accurately in the official languages of Galicia (oral and in written)

Learning outcomes			
Learning outcomes	Study programme competences / results		
Formulate and name simple inorganic and organic substances.	A1	B2 B3 B4 B5	C1

To know the main particles that form the matter, from the point of view of the Chemist (electrons and nuclei) and the composition of the atomic nucleus and its main reactions	A3 A8 A25	B2 B3 B4 B5	C1
To know critically and comparative the main atomic models and their historical development as well as their application to the study of periodic properties.	A2 A6 A8 A14	B3	C1
Know the main link models and their application to various types of chemical species and compare them to the molecular orbital model.	A3 A6 A8 A12 A14 A25	B2 B3 B4 B5	C1
Know the periodic table of the elements and properties of the atoms according to their position in the same.	A2 A6 A8 A12 A14 A25	B2 B3 B4 B5	C1

Contents	
Topic	**Sub-topic**
1.- Introduction	Matter and chemistry. Models. The scientific-experimental method. Composition of matter. Properties of matter
2.- Formulation and nomenclature	Formulation. Nomenclature
3.- The structure of matter and particle models	Matter as set nucleus and electrons. Rutherford atomic model. Bohr atomic model for the hydrogen atom. Limitations of the Bohr atomic model. Uncertainty Principle
4.- The wave mechanical model for the hydrogen atom	De Broglie's hypothesis. Stationary wave equation for Hydrogenoid System. Orbital functions. Orthonormality solutions to the equation and quantum numbers n, l ml. Electron energy Hydrogenoid System. Meaning of "Orbital Function". Comparison between models of Bohr and Schrödinger. The wave functions. Graphical representation of the orbitals
5.- The wave mechanical model for polielectronic atoms	The wave equation for an atom with more electrons. Orbital model approach. Determination of the effective nuclear charge. Slater rules. The energy of the orbitals of the electron atoms. The electron spin quantum number. The Pauli exclusion principle. Electronic configurations
6.- Periodic Table and periodic properties of the elements	Electronic configuration and periodic table. Periodicity of atomic properties
7.- Introduction to bonding models	The wave equation for polynuclear systems. Models bond between atoms. Link models adapted to the types of chemicals
8.- Lewis Theory	Structure and properties of molecular substances. Lewis model. Bond order and bond strength and longitude. Resonance. Molecules that do not meet the octet rule. Limitations of the theory of Lewis
9.- Valence-Shell Electron-Pair Repulsion Theory	The theory of pair repulsion electron valence shell. Application of the model. Application of the model species with more than one central atom
10.- Valence Bond Theory	VTE in diatomic molecules. The model of "Electronic Cement". The valence bond model. Orbital hybridization. Resonance. Polar covalent bonds. The polarity of the bond in the VTE. Polar covalent bond strength
11.- Intermolecular Forces	The absolute temperature scale. Solids, liquids and gases. Van der Waals force. Hydrogen bonds

12.- Covalent Solids	Covalent solids. Some solid covalent structures
13.- Structure and bonding in metals	Metals: Property characteristics. Structure of Metals. Electronic Cement. The metallic bond: electron sea model
14.- Structure and bonding in salts	Definition and properties of salts. Structure salts. Ionic radii. A "Rule radios". Ionic bonding model. Calculation of the laticce energy. Covalent character of the bond in the salts. Electron density maps. Polarizing power and polarizability of the ions. Fajans rules. Consequences of participation in the covalent bond
15.- Molecular Orbital Theory	Limitations of VTE. Again the wave equation for polynuclear systems. OM diagram H2 species. OM diagram of He2 + and He2 species. Binding order in the TOM. OM of other diatomic molecules. The "orbital investment." OM for the molecule BeH2, an example of polyatomic molecule. Molecular orbitals of polar species. Delocalized systems. Treatment of the electronic structure of metals by TOM: Bands model. The pattern of bands applied to covalent solids. Treating the salts by MOM
16.- The atomic nucleus	The atomic nucleus. Protons and neutrons. Radioactive decay reactions. Beta-particle emission. + Beta particle emission. Electron capture. Emission of alpha particles. Gagma emission radiation. Half-life. Nuclear fission. Nucleosynthesis. Nuclear energy. The Re

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Workbook	A1 A2 A3 A6 A8 A12 A14 A25 B4	0	15	15
Guest lecture / keynote speech	A1 A2 A3 A6 A8 A12 A14 A25 B4 B5	32	36	68
Problem solving	A1 A2 A3 A6 A8 A12 A14 B2 B3 C1	10	23	33
Mixed objective/subjective test	A1 A2 A3 A6 A8 A12 A14 B2 B3 C1	3	11	14
Completion exercises	A1 A2 A3 A6 A8 A12 A14 B3 B4	0	2	2
Workshop	A1 A2 A3 A6 A8 A12 B2 B3 B5 C1	6	12	18
Personalized attention		0	0	0
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Workbook	So that students can make the most of the guest lecture, the corresponding issue must be first read followed by responses a test to based on this reading after the guest lecture.
Guest lecture / keynote speech	In the classes will review the contents of the relevant issues, indicating their most important aspects, particularly those fundamental or more difficult to understand concepts to students.
Problem solving	Problem solving will be dedicated to solving problems and questions raised in advance of the student so that it can work on them before the corresponding session. Uploading the answers to the questions to "Campus Virtual" will be essential to be evaluated in the problem solving classes. Periodically, short tests will be carried out, both for the evaluation of the students and for the teacher's guidance on the problems caused by the subject. Tangentially, these tests encourage the student to continuously make the effort required to study the subject.

Mixed objective/subjective test	The test be held on the date set in the timetable agreed by the Faculty Board. It aims to contribute to the assessment of the level of skills acquired by students in the whole course.
Completion exercises	Probas que constan dun enunciado que teñen que completarse nun ou máis puntos cunha frase específica, palabra ou cifra, co obxetivo de repasar os contidos teóricos vistos na materia.
Workshop	The workshops are designed as a set of eminently practical activities in which the student must participate actively. Its main objective is to complete and deepen the most relevant aspects and / or difficult to understand. Each workshop is associated with carrying out a previous work and uploading the work to "Campus Virtual" will be essential to be evaluated in the workshops. At the end of the workshop, using applications available on the Internet, a multiple-choice test will be carried out to assess the degree of assimilation of the student of the topics covered.

Personalized attention	
Methodologies	**Description**
	The teaching methodology proposed is based on the student's work, which becomes the main protagonist of the teaching-learning process. For the student to obtain optimal performance of their effort it is that there is a continuous interaction and closer student-teacher, so that the latter can lead the first in this process capital. This interaction will especially in workshops and problem solving sessions. Through student-faculty interaction, as well as the different evaluation activities will be determined to what extent the students reached the competency targets set in each unit, and determine students who need personalized attention through individualized tutoring. Therefore, periodically or teachers may call students to tutoring, to be held in the most convenient times for each student, with the intention of receiving the necessary guidance. Regardless of the tutorials proposed by the teacher, the student may attend tutoring at his own request, as often as desired, and the time that is most suitable. According to the ""norma que regula o réxime de dedicación ao estudo dos estudantes de grao na UDC" (Art.3.b e 4.5) and ""normas de avaliación, revisión e reclamación das cualificacións dos estudos de grao e mestrado universitario? (Art. 3 e 8b), students with recognition of part-time dedication and assistance exemption should be able to participate in a training methodology and associated teaching activities that would allow the achievement of the training objectives. Therefore, in the subject General Chemistry 1 (Química 1), the percentage of exemption would be preset in a first interview with the students, taking into account once known their personal situations. At this point, students can participate in a personalized tutorial system for guidance and evaluation, with at least five individualized sessions, which will serve for the orientation of students in their autonomous work as well as for monitoring their progression during the course and evaluating the degree of competence development reached. Regarding this last point, the tutorials will serve to carry out those activities included in the Problem Solving methodology and which correspond to a 20% of the final grade for the course.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Workshop	A1 A2 A3 A6 A8 A12 B2 B3 B5 C1	Uploading to "Campus Virtual" the previous work will be essential to be evaluated in the corresponding workshop. In this activity, the active participation and the level of knowledge demonstrated by the students in the multiple-choice test that will be carried out at the end of each workshop will be taken into account.	10
Mixed objective/subjective test	A1 A2 A3 A6 A8 A12 A14 B2 B3 C1	It will consist of questions to develop both as test questions, formulation and problems, similar to solved during course. It will celebrate in the end of semester	60

Problem solving	A1 A2 A3 A6 A8 A12 A14 B2 B3 C1	Uploading to "Campus Virtual" the answers of the Problem Sheet will be essential to be evaluated in the corresponding class of problems. Short tests will be carried out periodically, as mentioned in the methodology section. This activity will also take into account the active student participation. and the level of knowledge demonstrated by the students will be evaluated, both when solving the exercises and in the debate with their classmates	20
Workbook	A1 A2 A3 A6 A8 A12 A14 A25 B4	What is learned in the reading will be evaluated through a test that will be carried out in Moodle after having read the recommended readings aand going to the guest class.	5
Completion exercises	A1 A2 A3 A6 A8 A12 A14 B3 B4	Tests carried out on the Virtual Campus throughout the course, which consist of a statement that must be completed at one or more points with a specific phrase, word or number, where some of the theoretical content seen in the subject is evaluated.	5

Assessment comments

To pass the subject, it will be necessary to get at least 50 points among the different assessment activities (mixed test, objective tests, workbook, problem solving, completition exercises and workshops), as well as obtain a minimum score of five (out of ten) in the mixed test . If is not possible to achieve the minimum score in the mixed test, although the average be greater than or equal to 50 points (out of 100) will be listed as not passing matter (4.5).

Since the rating is based on the model of continuous assessment, specifically assess student progression throughout the semester could be added maximum of 1 point to the final grade.

In the event that the mark of the mixed test is higher than the one obtained as the sum of the qualifications of the different assessable activities, the mark of the mixed test will be considered the final mark of the subject.

To obtain a rating of not submitted the students, students may not have participated in more than 25% of problem solving classes and workshops, or perform the mixed test.Students to be evaluated in the so-called "second chance" Will repeat the mixed test and the final grade is calculated according to the established percentages and the previously established restrictions.Students assessed in the second opportunity can only be granted with a"Matrícula de Honra" (the highest grade awarded to outstanding students) only if the maximum number of these distinctions according to the regulations were not awarded to students passing the course in the first opportunity.Those students having a part-time dedication to the course, and thus waiverof assistance to the on-site academic activities according to the regulations of UDC, the grade obtained in the activities associated with the personalized tutoring system will correspond to the evaluation of the problem solving methodology, that is to say, 20% of the final grade. The remaining 80% of said final grade will be determined through the results obtained by the student in the mixed test. Plagiarism in any test or activity will be sanctioned according to university regulations.

Sources of information

Basic	- Petrucci, R. H.; Herring, F. G.; Madura, J. D.; Bissonnette, C (2017). Química General, 11 Ed.. Madrid, Pearson Education - Petrucci, R. H.; Herring, F. G.; Madura, J. D.; Bissonnette, C. (2011). Química General, 10 Ed.. Madrid, Pearson Education - Petrucci, R. H.; Hartwood, W. S.; Herring, F. G. (2003). Química General, 8ª Ed. . Madrid, Pearson Education As tres referencias corresponden a distintas edicións do mesmo texto, e pódense usar indistintamente.
Complementary	- J. Casabó i Gispert (1996). Estructura Atómica y Enlace Químico.. Barcelona, Editorial Reverte - Emilio Quiñoá Cabana; Ricardo Riguera Vega; José Manuel Vila Abad. (2005). Nomenclatura y formulación de los compuestos orgánicos una guía de estudio y autoevaluación. Madrid, McGraw-Hill - Emilio Quiñoá Cabana; Ricardo Riguera Vega; José Manuel Vila Abad. (2006). Nomenclatura y formulación de los compuestos inorgánicos una guía de estudio y autoevaluación. Madrid, McGrawHill

Recommendations

Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Chemistry Laboratory 1/610G01010
Subjects that continue the syllabus
General Chemistry 2/610G01008 General Chemistry 3/610G01009
Other comments
To deal with warranty estudo of this course the student needs the knowledge of chemistry own the bachelor.Green Campus Faculty of Sciences Program: To contribute to achieving a sustainable environment and comply with point 6 of the "Environmental Declaration of the Faculty of Sciences (2020)", the documentary works carried out in this subject: A. They will be requested mainly in virtual format and computer support. B. If done on paper: - Plastics will not be used.   - Double-sided prints will be made.   - Recycled paper will be used.   - Drafts will be avoided.