UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2015/16
Subject (*)	Química 1		Code	610G01007
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	FB	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Química Fundamental			
Coordinador	Martinez Cebeira, Monstserrat	E-mail	monserrat.martinez.cebeira@udc.es	
Lecturers	García Romero, Marcos Daniel Martinez Cebeira, Monstserrat Riveiros Santiago, Ricardo	E-mail	marcos.garcia1@udc.es monserrat.martinez.cebeira@udc.es ricardo.riveiros@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		
Formular e nomear sustancias inorgánicas e orgánicas sinxelas.	A1	B2 B3 B4 B5	C1

Coñecer as principais partículas que forman a materia, dende o punto de vista do Químico (electróns e núcleos).	A3 A8 A25	B2 B3 B4 B5	C1
Coñecer a composición do núcleo atómico e as súas principais reaccións.	A1 A8 A14 A25	B2 B3 B4 B5	C1
Coñecer de forma crítica e comparada os principais modelos atómicos e o seu desenvolvemento histórico así como a súa aplicación ao estudo das propiedades periódicas.	A2 A8 A12 A14 A25	B2 B3 B4 B5	C1
Coñecer a táboa periódica dos elementos e as propiedades dos átomos segundo a súa posición na mesma.	A2 A6 A8 A12 A14 A25	B2 B3 B4 B5	C1
Coñecer os principais modelos de enlace e a súa aplicación aos diversos tipos de especies químicas.	A3 A6 A8 A12 A14 A25	B2 B3 B4 B5	C1
Aplicar o modelo de orbitais moleculares á descrición da estrutura electrónica dos principais tipos de especies	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
Guest lecture / keynote speech	A1 A2 A3 A6 A8 A12 A14 A25 B4 B5	28	53	81
Problem solving	A1 A2 A3 A6 A8 A12 B2 B3	9	23	32
Mixed objective/subjective test	A1 A2 A3 A6 A8 A12 A14 B2 B3 C1	3	9	12
Workshop	A1 A2 A3 A6 A8 A12 B2 B3	10	12	22
Objective test	A1 A2 A3 A6 A8 A12 A14 B2 B3 C1	1	0	1
Personalized attention		2	0	2
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description

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. So that students can make the most of the class, the corresponding issue must be first read followed by responses a test to based on this reading. The completion of these tests will be essential in order to be qualified in classes and workshops problems related contents.
Problem solving	Problem solvent 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. At the beginning of each session, students must submit the original work (it is recommended to keep a copy, since the original is not will be returned), which will be periodically reviewed by the professor, not only for assessment purposes, but also to provide adequate support to the study of matter.
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.
Workshop	The workshops are designed as a set of eminently practical activities, carried out both in large group and small group, in which the student must participate actively. Its main objective is to complete and deepen the most relevant aspects and / or difficult to understand. They also resolve doubts about any aspect related to problem solving class and workshops, etc
Objective test	Periodically, in classes, problem solving or workshops will conduct some short exercices both to assessing student achievement as the teacher's guidance on the issues learn in their class. Besides, this activity tends to encourage the student to perform continuously the effort required to study chemistry 1

Personalized attention	
Methodologies	**Description**
Problem solving Workshop	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 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.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
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 and problems, similar to solved during course. It will celebrate in the end of semester	50
Problem solving	A1 A2 A3 A6 A8 A12 B2 B3	Problem solving and the workshops together will a maximum of 25 points total. This activity will take into account student participation. Also could be evaluated the exercices that student delivered before class of problems, as well as some brief exercises that can be made in this class	25
Workshop	A1 A2 A3 A6 A8 A12 B2 B3	Problem solving and workshops, will evaluated with maximum of 25 points total. This activity will take into account the participation and level of knowledge shown by the students. I could also take account the exercices that students have to deliver before some of the workshops, as well as some brief exercises that students can be made in class	0
Objective test	A1 A2 A3 A6 A8 A12 A14 B2 B3 C1	Periodically will some exercices of multiple choice or short answer according to what indicated in the methodology section will be made	25

Assessment comments
The rating is the sum of the following contributions: - Mixed objective: up to 50 points - Objective tests: up to 25 points - problem solving and workshops: up to 25 points. Although responses to pre-test the theoretical sessions are not part of the assessment of the matter, they are considered an essential tool in the teaching methodology designed. Consequently, those students who do not meet any test, or do so in a grossly negligent manner, will not be evaluated in classes problem solving or related workshops. To pass the subject it will be necessary to get at least 50 points between the different assessment activities (mixed testing, objective testing, troubleshooting and workshops) and obtain a minimum score of 20 points (out of 50) 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. Students who do not participate in workshops and problem solvent will score zero points in this section on two occasions or oportunities. The student will have a rating of not submitted when making less than 25% of academic activities scheduled and is not presented at the mixed objective. Students to be evaluated in the so-called "second chance" can only obtain qualified with the maximun if the maximum number of these to the corresponding course was not fully covered in the "first chance." In the case of exceptional circumstances objectivables and properly justified, the professor may waive in whole or in part the student for the continuous process. People in this circumstance must pass a specific test that leaves no doubt on the achievement of the competences of the subject. As is referring to successive academic years, the process of teaching and learning, including assessment, refers to an academic year, and therefore would start with a new program, including all activities and evaluation for that course.

Sources of information	
Basic	- Petrucci, R. H.; Hartwood, W. S.; Herring, F. G. (2003). Química General, 8ª Ed.. Pearson Education, Madrid - Petrucci, R. H.; Herring, F. G.; Madura, J. D.; Bissonnette, C. (2011). Química General, 10 Ed.. Pearson Education, Madrid Ambas 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 Reverté

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Química 4/610G01010

Subjects that continue the syllabus
Química 2/610G01008
Química 3/610G01009
Other comments
To deal with warranty estudo of this course the student needs the knowledge of chemistry own the bachelor