



Teaching Guide				
Identifying Data			2020/21	
Subject (*)	General Chemistry 3		Code	610G01009
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	Basic training	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
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Lecturers	Alonso Rodriguez, Elia Carlosena Zubieta, Alatzne Castro Romero, Jesús Manuel Fernandez Solis, Jose Maria González Rodríguez, María Victoria Gonzalez Soto, Elena		E-mail	elia.alonso@udc.es alatzne.carlosena@udc.es jesus.castro.romero@udc.es jose.maria.fsolis@udc.es victoria.gonzalez.rodriquez@udc.es elena.gsoto@udc.es
Web				
General description	The subject "Chemistry 3" belongs to chemistry module, the first year of the Degree in Chemistry. It examines the most important aspects of chemical equilibria in solution, which are the basis of many chemical processes of inorganic, organic, analytical and physical chemistry.			

<b>Contingency plan</b>	<p>1. Modifications to the contents</p> <p>No changes will be made.</p> <p>2. Methodologies</p> <p>*Teaching methodologies that are maintained:</p> <p>All methodologies are maintained and if the health situation requires it, they will be adapted to the non-presential mode through the Moodle and Teams virtual classroom.</p> <p>In case part of the students cannot connect and follow the classes in real time, asynchronous means will be used (e-mail, recordings of the exhibition sessions, more personalized tutorials...).</p> <p>*Teaching methodologies that are modified:</p> <p>No modifications.</p> <p>3. Mechanisms for personalized attention to students</p> <ul style="list-style-type: none"> <li>- Email: Daily. Used to make queries, request virtual meetings to resolve doubts, etc.</li> <li>- Moodle: Daily. According to the needs of the lighting. They have "thematic forums" of the matter, to formulate the necessary consultations and put in common.</li> <li>- Teams: master sessions (in large groups) and seminars and practices (in small groups) to advance the theoretical and applied content of the subject, in the time slot assigned in the coordinated calendar of the title.</li> </ul> <p>4. Modifications in the evaluation</p> <p>No changes are made.</p> <p>Evaluation observations:</p> <p>All evaluable activities will be carried out through the most appropriate telematic means in each case (Teams, Moodle, etc.).</p> <p>Students who cannot follow synchronous activities online will be evaluated by equivalent activities carried out asynchronously.</p> <p>5. Modifications to the bibliography or webgraphy</p> <p>No changes will be made. All working materials are already available in the way accessible through the Moodle.</p>
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<b>Study programme competences</b>	
<b>Code</b>	<b>Study programme competences</b>
A1	Ability to use chemistry terminology, nomenclature, conventions and units
A4	Knowledge of main types of chemical reaction and characteristics of each
A5	Understanding of principles of thermodynamics and its applications in chemistry
A6	Knowledge of chemical elements and their compounds, synthesis, structure, properties and reactivity
A7	Knowledge and application of analytical methods
A12	Ability to relate macroscopic properties of matter to its microscopic structure
A16	Ability to source, assess and apply technical bibliographical information and data relating to chemistry
A17	Ability to work safely in a chemistry laboratory (handling of materials, disposal of waste)
A19	Ability to follow standard procedures and handle scientific equipment
A20	Ability to interpret data resulting from laboratory observation and measurement
A21	Understanding of qualitative and quantitative aspects of chemical problems
A23	Critical standards of excellence in experimental technique and analysis
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)
C3	Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life

Learning outcomes			
Learning outcomes	Study programme competences		
Knowledge of the nomenclature, structure and reactivity of organic functional groups. Knowledge of chemical equilibrium, entropy, free energy, acid-base, complexation equilibrium, solubility equilibrium, balance and electrochemical redox.	A1	B2	C1
	A4	B3	C3
	A5		
	A6		
	A7		
	A12		
	A21		
	A25		
Resolution and exposure problems of the chemistry of organic functional groups, the chemical equilibrium and types of chemical reactions (acid-base complex formation, solubility and redox).		B2	C1
		B3	C3
Skill in the literature search of real applications and research related to the contents of the subject. Have sufficient knowledge and experimental skills to use correctly and safely the products and the usual stuff in a lab. Interpret results obtained in the laboratory.	A7	B3	C1
	A12	B4	C3
	A16	B5	
	A17		
	A19		
	A20		
	A23		

Contents	
Topic	Sub-topic
Item 1. - Chemistry of organic functional groups.	Introduction to organic compounds and structures. Classification, nomenclature and properties of organic compounds as functional groups. Reactivity and main types of organic reactions. Stereoisomerism.
Item 2. - The chemical equilibrium.	General condition of equilibrium. Equilibrium constant. Homogeneous and heterogeneous equilibria. Relationship between kinetics and chemical equilibrium. The reaction quotient. Factors affecting chemical equilibrium. Le Chatelier's Principle. Equilibrium and Gibbs free energy.
Item 3. - Acid-base balance.	Acidity and basicity: definition of Arrhenius, Bronsted and Lewis. Autoionization of water. Concept of pH. Strength of acids and bases. Ionization constants. Polyprotic acids. Salt solutions: hydrolysis. Common ion effect. Buffer solutions. Acid-base indicators. Acid-base titration. Acid-base balance in nonaqueous medium. Pearson model.
Item 4. - Balancing complex formation.	General considerations. Types of ligands. Formation and dissociation constants. Acid-base reactions of complex ions. Kinetic aspects. Applications of Coordination Compounds.
Item 5. - Equilibrium solubility.	Salt solubility and solubility product. Precipitation reactions and reaction quotient. Fractional precipitation. Factors influencing the solubility of the salts is the common ion effect, effect saline, pH and complexation. Solubility and qualitative analysis.
Tema 6.- Equilibrium oxidation-reduction. Electrochemistry.	Basic concepts: redox reactions. Electrode potential and standard electrode potential. Equilibrium constants. Relationship between potential, Gibbs free energy and equilibrium constant. Variation of energy with concentration: Nernst equation. Mixed equilibria: influence of other equilibria. Electrochemical cells. Electrolysis.



## Planning

Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Guest lecture / keynote speech	A1 A4 A5 A6 A7 A12 A16 A21 A25 B2 B3 B4	24	48	72
Seminar	A1 A5 A6 A21 A25 B2 B3 B4 B5 C3	8	24.8	32.8
Laboratory practice	A7 A12 A16 A17 A19 A20 A23 B3 B4 B5 C1 C3	20	20	40
Objective test	A1 A4 A5 A6 A12 A20 A21 A25 B3 C1	1	0	1
Mixed objective/subjective test	A1 A4 A5 A6 A12 A20 A21 A25 B3 C1	2.2	0	2.2
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	The teacher will present the fundamental contents of each of the topics. For better learning, students will have to advance the development of these sessions teaching materials suitable for your personal preparation. All students can consult the teacher any aspect of the matter in the tutorial schedule established for this purpose. He taught in large group.
Seminar	Sessions devoted to the resolution of problems and issues with the active participation of students. He taught in small group.
Laboratory practice	In the laboratory sessions students will develop experimental examples of the theoretical exposed in the classroom. Will be essential to achieving the prelaboratorios before the relevant practice (but the student can not perform such practice) as well as keep up to date lab book, according to the instructions of the teacher. This will be carried out in small group. An initial meeting will be provided in large group students to explain the content and dynamics of practices.
Objective test	Periodically, in the guest lecture, in the seminars and/or in the Moodle virtual classroom, short tests will be carried out to evaluate the degree of acquisition of knowledge and skills by the students and to promote continuous assessment throughout the course.
Mixed objective/subjective test	The student will perform a joint test for verifying the degree of understanding and skills of the subject has gained. It will include questions and problems about the contents of the whole subject that will have to be solved in a reasoned way.

## Personalized attention

Methodologies	Description
Laboratory practice Seminar	Students will be invited to two 1-hour sessions of personalised attention to resolve any possible doubts and to provide guidance on the contents of the course.  Students may also request tutorials with the teaching staff, who will resolve any doubts they may have and guide them through the study of the subject.

## Assessment

Methodologies	Competencies	Description	Qualification
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Laboratory practice	A7 A12 A16 A17 A19 A20 A23 B3 B4 B5 C1 C3	It will assess the performance of the prelaboratorios, abilities and skills of students in the experimental work, their ability to interpret the results, etc.	20
Seminar	A1 A5 A6 A21 A25 B2 B3 B4 B5 C3	It will be valued the resolution of questions and/or problems, compliance dates for delivery or revision and also the participation of the student through the raising of questions, before or after the development of the seminars.	5
Mixed objective/subjective test	A1 A4 A5 A6 A12 A20 A21 A25 B3 C1	It has two parts. In one of them will be evaluated the student's ability to express, summarize and develop theoretical aspects of the subject and, in the other, the resolution of problems and numerical exercises.	60
Objective test	A1 A4 A5 A6 A12 A20 A21 A25 B3 C1	Periodically, short tests will be carried out in which students must answer questions or solve problems in a reasoned manner that allows them to evaluate their degree of understanding of the most important aspects of the subject.	15

#### Assessment comments

-To pass the subject you must:

- 1) Perform the laboratory practices.
- 2) Obtain a higher or equal to 5 points rating (out of 10) in the laboratory practices and in each part of the mixed test. If the total sum value was equal to or greater than 5 (out of 10) but this threshold mark was not met, the final mark will be 4.5 (fail).

-In the first and second time, students who do practices and obtain less than 5, have the opportunity to, in addition to the mixed test, perform a specific test related to the labs. The score of this test espeeccífica replaced the grade obtained in practice for the overall rating.

-Students who do not participate in the seminars activities and do not realize the objective tests will score 0 in these sections (5% and 15%, respectively, of the overall grade). In the second opportunity, these grades will be maintained for the overall rating.-

The student will obtain the qualification of No Presented when the

student does not assist to the laboratory practice and neither attend to

the mixed test. As regards the successive academic years, the teaching-learning process, including continuous assessment, refers to an academic course and, therefore, would comezar a new course, including all activities and procedures the Assessment that is scheduled for that course. - Second Opportunity: The mixed test's mark obtained in the second opportunity will replace the first one's. The students tested on the second occasion shall be eligible for honors if the maximum number of these to the corresponding course not covered in full at the first opportunity.

Students with recognition of dedication and part-time academic exemption waiver assistance:

Conducting laboratory practices are mandatory and it will be provided within the flexibility to allow coordinating schedules and material and human resources. They shall be deemed exempt from the keynote sessions while assistance will be provided to the greatest number of seminars. If they can not attend the seminars will make a mentored work.

#### Sources of information

<b>Basic</b>	<p>- Petrucci, R.H.; Herring, F.G.; Madura, J.D.; Bissonnette, C. (2011). Química General: principios y aplicaciones modernas. 10ª Ed., Prentice Hall, Madrid.</p> <p>-Tamén existen edicións anteriores do libro de texto recomendado Petrucci. Por exemplo na biblioteca dispónse de exemplares da 8ª Ed., con referencia: QX-240.</p>
<b>Complementary</b>	<p>- Reboiras, M.D. (2007). Problemas resueltos de Química. Madrid, Thomson Paraninfo, S.A.</p> <p>- Chang, R. L. (2013). Química. 11ª Ed., México: Mc Graw Hill.</p> <p>- Reboiras, M.D. (2006 ). Química. La ciencia básica . Madrid, Thomson Paraninfo, S.A.</p> <p>- Atkins, P.; Jones, L. (2012). Principios de Química. Los caminos del descubrimiento. 5ª Ed., Madrid: Ed. Médica Panamericana.</p> <p>- ( ). .</p> <p>En xeral calquera libro de texto de química xeral serve como guía de estudo para a materia.</p>

#### Recommendations



Subjects that it is recommended to have taken before
General Chemistry 1/610G01007 Chemistry Laboratory 1/610G01010
Subjects that are recommended to be taken simultaneously
General Chemistry 2/610G01008
Subjects that continue the syllabus
Analytical Chemistry 1/610G01011 Physical Chemistry 1/610G01016 Inorganic Chemistry 1/610G01021 Organic Chemistry 1/610G01026 Chemistry Laboratory 2/610G01032
Other comments
To successfully overcome the matter, it is imperative that students have a number of prior knowledge of chemistry and mathematics, according to the level required in middle and high school, including: nomenclature and chemical formula, set of chemical reactions , stoichiometric calculations, acid-base character identification of common compounds, obtaining oxidation states of the elements in the chemical species, management of logarithms, exponents, etc..

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.