



## Teaching Guide

Teaching Guide				
Identifying Data			2020/21	
Subject (*)	Chemistry		Code	610G02001
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	SpanishGalician			
Teaching method	Hybrid			
Prerequisites				
Department	Química			
Coordinador	Riveiros Santiago, Ricardo	E-mail	ricardo.riveiros@udc.es	
Lecturers	Castro García, Socorro Martínez Calvo, Miguel Pazos Chantrero, Elena Penedo Blanco, Francisco Jose Riveiros Santiago, Ricardo Rodríguez Rodríguez, Aurora Ruiz Bolaños, Isabel	E-mail	socorro.castro.garcia@udc.es miguel.martinez.calvo@udc.es elena.pazos@udc.es francisco.penedo.blanco@udc.es ricardo.riveiros@udc.es aurora.rodriguez@udc.es isabel.ruiz@udc.es	
Web				
General description	Chemistry in Biology degree is a subject of basic training with contents focusing on some of the fundamental concepts of General Chemistry. Such knowledge and skills will establish the essential background for the students, allowing them to take up the study of the different branches of biology where the chemical phenomenon is involved.			
Contingency plan	1. Modifications to the contents - No modifications will be made. 2. Methodologies *Teaching methodologies that are maintained  *Teaching methodologies that are modified - Keynote session. They will take place in person through teams at the time indicated in the official calendar. - Seminar. They will take place in person through teams at the time indicated in the official calendar. - Tutoed works. They will take place in person through teams at the time indicated in the official calendar. - Laboratory practices. They will be carried out in "online mode", that is, using the ICT tools available to the institution. - Objective Test. It will take place in person through teams and Moodle at the time indicated in the official calendar.  3. Mechanisms for personalized attention to students - Email: Daily. The professors of the subject will be available for inquiries, virtual meetings to resolve doubts and activities monitoring. - Teams: Daily. The professors of the subject will be available for inquiries, virtual meetings to resolve doubts and activities monitoring.  4. Modifications in the evaluation - In the event that the final objective test cannot be carried out in person in the classroom, it will be carried out through the Moodle and Teams platforms. *Evaluation observations:  5. Modifications to the bibliography or webgraphy - No modifications will be made. Students already have all the necessary information through Moodle and the faculty library.			



Study programme competences	
Code	Study programme competences
A26	Deseñar experimentos, obter información e interpretar os resultados.
A30	Manexar adecuadamente instrumentación científica.
A31	Desenvolverse con seguridade nun laboratorio.
B1	Aprender a aprender.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.

Learning outcomes			
Learning outcomes		Study programme competences	
To learn the most important parts of this discipline: Nomenclature, structure and reactivity of the major organic functional groups, and thermochemistry, kinetics of chemical reactions, chemical equilibrium, acid-base equilibrium and electrochemistry and its importance in a biological medium.		A26	B1 B3 B4
To acquire sufficient knowledge and experimental skills to use, properly and safely, the most common material and compounds in a chemical laboratory.		A26 A30 A31	B1 B3 B4
To be able to solve and explain problems related to the chemistry of functional groups, thermochemistry, kinetics of chemical reactions, chemical equilibrium, acid-base equilibrium and electrochemistry, and to interpret the results.		A26	B1 B2 B3 B4
To be able to adequately express the concepts and ideas learned.			C1

Contents	
Topic	Sub-topic
1. Organic Chemistry	? Introduction to Organic Chemistry ? Alkanes ? Alkenes and alkynes ? Aromatic hydrocarbons ? Alkyl halides ? Alcohols, fenols and ethers ? Aldehydes and ketones ? Carboxylic acids and their derivatives ? Amines and amides ? Stereochemistry
2. Thermochemistry	? Concepts and basic terms in Thermochemistry ? First law of Thermodynamics ? Heats of reaction. Enthalpy ? Thermochemical equations ? Calorimetry ? Standard enthalpy of formation: Hess's law ? Spontaneous change and Entropy ? Second law of Thermodynamics ? Criteria for spontaneous change. Gibbs's free energy



3. Chemical equilibrium	<ul style="list-style-type: none"> <li>? Chemical equilibrium</li> <li>? The equilibrium constant expression</li> <li>? Relationship between kinetics and equilibrium</li> <li>? Altering equilibrium conditions: Le Chatelier's principle</li> <li>? Relationship between the equilibrium constant and Gibbs's free energy</li> <li>? Standard state in Biochemistry</li> <li>? Coupling reactions in biological systems</li> </ul>
4. Acid-base equilibrium	<ul style="list-style-type: none"> <li>? Acid and base definitions. The Brønsted-Lowry's theory</li> <li>? Acid-base properties of water: concept of pH</li> <li>? Strong and weak acids and bases. Ionization constants</li> <li>? Solutions of salts: hydrolysis</li> <li>? The common-ion effect</li> <li>? Buffer solutions</li> <li>? Acid-base titrations. Acid-base indicators</li> <li>? pH control in biological systems</li> </ul>
5. Electrochemistry	<ul style="list-style-type: none"> <li>? Electrochemical processes and redox reactions</li> <li>? Chemical energy and Electrochemistry. Electrochemical cells</li> <li>? Standard electrode potentials</li> <li>? Thermodynamics of electrochemical reactions</li> <li>? Effect of the concentration on cell potential</li> <li>? pH measurement</li> <li>? Membrane potential</li> <li>? Redox systems involving protons</li> <li>? Redox indicators</li> </ul>
6. Kinetics and Catalysis	<ul style="list-style-type: none"> <li>? Definition of kinetics and objectives</li> <li>? Variables influencing the rate of chemical reactions</li> <li>? Rate of reaction and the rate law</li> <li>? Effect of the temperature on reaction rates. The Arrhenius equation</li> <li>? Relationship between kinetic constants and equilibrium constants</li> <li>? Theoretical models in chemical kinetics</li> <li>? Mechanisms of reaction: elementary and in-steps processes</li> <li>? Catalysis</li> </ul>

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Introductory activities	B1	1	0	1
Guest lecture / keynote speech	B1 B3	13	26	39
Seminar	B1 B2 B3 B4	10	30	40
Laboratory practice	A26 A30 A31 B1 B2 B3 B4 C1	15	15	30
Supervised projects	A26 B1 B2 B3 B4	8	20	28
Objective test	A26 B1 B2 B3 B4 C1	3	9	12
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
Introductory activities	Initial session to introduce the subject, where students will be informed about the contents of the course, the teaching methodology -for large and small groups- and the assessment criteria.



Guest lecture / keynote speech	The theoretical content will be discussed at the keynote sessions, through multimedia presentations given by the teaching staff. Those presentations will take place simultaneously in the classroom and via teams. The presentations, covering the basic content, additional material and recorded videos of the sessions, will be available for the students at the Moodle platform.
Seminar	The seminars will address the analysis and resolution of some of the previously proposed exercises. In order to make the most of these sessions, it is very important that students work the exercises prior to their resolution in the classroom. The proposed exercises, and the data tables, will be available in advance at the Moodle platform.
Laboratory practice	Students will carry out 7 practices related to the theoretical contents that are addressed in the classroom. These practices will take place in the laboratory and / or virtually and will last 2 hours each. In each practice, the teaching staff will explain the most relevant theoretical aspects, and the students will have the work script to be carried out and the previous materials (readings, videos, etc.) that will be reviewed before starting the session. The script for each of the practices will include the experimental procedure and a final questionnaire. Each student will individually write a report/notebook of the practices, and in it they will describe the work done in the laboratory and virtually, the observations made, the results obtained and the answers to the questionnaire.
Supervised projects	The main target of these sessions is the follow-up of the comprehension of the subject by the students. For this purpose, 8 sessions of 1 hour of tutoring in small groups are scheduled. Students must prepare each tutorial in advance, studying the corresponding contents and solving the exercises of the previous bulletins that will be available at the Moodle platform. Students must upload the solutions to the proposed exercises to Moodle previously to the tutorials. In the tutorials the proposed exercises will be solved and discussed on the board, preferably by the students. Brief short tests by surprise and/or through the Moodle platform can be carried out during these tutorials and they will contribute to the final assessment.
Objective test	The degree of concepts assimilation and problem solving skills of the students will be assessed by means of a written exam.

## Personalized attention

Methodologies	Description
Supervised projects	<p>In addition to the follow-up work in group tutoring sessions, students can apply for individual tutoring, in the schedule set by the teachers, via Teams.</p> <p>In the specific case of part-time Students with exemption of attendance, seminars and supervised work will be led through individual and/or group tutoring schedule to be agreed with the teachers.</p>

## Assessment

Methodologies	Competencies	Description	Qualification
Laboratory practice	A26 A30 A31 B1 B2 B3 B4 C1	The score of the practices represents 20% of the overall score. The submitted report, the attitude and the work done in the lab and/or on line, will be assessed. To pass the subject is necessary to obtain a minimum score of 4 in this part.	20
Supervised projects	A26 B1 B2 B3 B4	The score of the supervised work represents 20% of the overall score. The individual work of the student with the previous questionnaires will be assessed as well as the active participation of the student in the tutorials, the attendance and the qualifications of the short tests in class and via Moodle.	20
Objective test	A26 B1 B2 B3 B4 C1	The objective test consists of a number of practical or theoretical-practical exercises, similar to those solved in seminars and tutorials. To pass the subject is necessary to obtain a minimum score of 4 in this part.	60

## Assessment comments



To pass the subject it is necessary to obtain an overall rating equal to 5 points or higher (out of 10) in one of the two calls (January and July). A score below 4 on the objective test or laboratory practices implies failing the subject.

The completion of the labs is mandatory to pass the subject. When, after doing the practises the mark obtained is lower than 4, the teacher will return the practice report, indicating the sources of error, which must be corrected by the student and delivered for a new assesstment by the teacher. The qualification of this second review will be definitive, it will replace the mark obtained in the practices at the time to do the final assessment and it can be done both at the first and the second opportunities.

The attendance to the supervised work is mandatory to pass the subject. Students who attend less than 50% of those tutorials will obtain a qualification lower than 50% in this section for both assessment opportunities in January and July, regardless of their qualification obtained in the short tests during tutorials or via Moodle. In the second opportunity of July, in order to obtain the global qualification, the qualification obtained during the course in this section will be maintained.

In the specific case of students with recognition of part-time dedication and academic assistance waiver, the mark of the tutored work will be replaced by that obtained in the personal tutorials, counting as 20% of the overall grade in the first and the second opportunities. In case of exceptional, and appropriately justified circumstances, the teacher may fully or partly exempt any student to perform the continuous evaluation process. In such case the sutudents will undergo a specifically designed test, in any of the opportunities scheduled.

"Not attended" assessment mark will be applied when the students attend less than 25% of the planned academic activities (supervised work and practices), and do not assist to the objective test.

## Sources of information

<b>Basic</b>	<p>- Petrucci, R.H.; Herring, F.G.; Madura, J.D.; Bissonnette, C. (2017). Química general: Principios y aplicaciones modernas (11ª Ed). Madrid: Pearson</p> <p>En xeral, calquera manual de Química Xeral actualizado é axeitado para o estudo da asignatura. Existen edicións anteriores do Petrucci (8ª Ed. QX240, 10ª Ed. QX-243) e outros libros recomendados a disposición dos alumnos na biblioteca, incluíndo acceso electrónico e versión en inglés.</p>
<b>Complementary</b>	<p>- Chang, R.L.; Goldsby, K.A. (2017). Química (12ª Ed). México: McGraw-Hill</p> <p>- Atkins, P.; Jones, L. (2012). Principios de Química. Los caminos del descubrimiento (5ª Ed). Madrid: Ed. Médica Panamericana</p> <p>- Reboiras, M. D. (2007). Química, La ciencia básica. Madrid: Thomson</p> <p>- Brown, T.L.; LeMay Jr. H.E.; Bursten, B.E.; Murphy, C.J.; Woodward, P.M. (2014). Química. La ciencia central (12ª Ed). México: Pearson</p> <p>- Reboiras, M. D. (2007). Problemas resueltos de: Química, la ciencia básica. Madrid: Thomson</p> <p>- Paterno Parsi, A.; Parsi, A.; Pintauer, T.; Gelmini, L.; Hilts, R. W. (2011). Complete Solutions Manual: General Chemistry, Principles and Modern Applications. Scarborough: Pearson Canada</p> <p>- Paterno Parsi, A.; Parsi, A.; Pintauer, T.; Gelmini, L.; Hilts, R. W. (2011). Selected Solutions Manual: General Chemistry, Principles and Modern Applications. Toronto: Pearson</p> <p>- López Cancio, J. A. (2010). Problemas de Química. Madrid: Prentice Hall</p> <p>- Quiñoá, E. (2005). Nomenclatura y representación de los compuestos orgánicos. Una guía de estudio y autoevaluación. Madrid: McGraw-Hill</p> <p>&lt;br&gt;</p>

## Recommendations

### Subjects that it is recommended to have taken before

### Subjects that are recommended to be taken simultaneously

Mathematics/610G02003

### Subjects that continue the syllabus

Biochemistry I/610G02011

Biochemistry II/610G02012

### Other comments



In order to successfully study the subject, it is imperative that the student has a previous knowledge of chemistry and mathematics, according to the level in secondary and high school, such as: chemical nomenclature, balance of chemical reactions, stoichiometric calculations, identification of acid-base character of common compounds, oxidation states calculation of elements in chemical species, logarithms, exponential and basic differential and integral calculus.

(\*)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.