UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2018/19
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	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Ruiz Bolaños, Isabel	E-mail	isabel.ruiz@udc.es	
Lecturers	Ligero Martínez - Risco, Pablo Martinez Cebeira, Montserrat Riveiros Santiago, Ricardo Romero Castro, Maria Jose Ruiz Bolaños, Isabel	E-mail	pablo.ligero@udc.es monserrat.martinez.cebeira@udc.es ricardo.riveiros@udc.es maria.jose.romero@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.			

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 thermochemical, kinetics of chemical reactions, chemical equilibrium, acid-base equilibrium and electrochemistry and its importance in biological medium.	A26	B1 B3 B4	
To have 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	
Be able to express properly the ideas that have been learnt			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. Kinetics and Catalysis	? Definition of kinetics and objectives ? Variables influencing the rate of chemical reactions ? Rate of reaction and and the rate law ? Effect of the temperatura on reaction rates. The Arrhenius equation ? Relationship between kinetic constants and equilibrium constants ? Theoretical models in chemical kinetics ? Mechanisms of reacton: elementary processes and in steps ? Catalysis
4. Chemical equilibrium	? Chemical equilibrium ? The equilibrium constant expression ? Relationship between kinetics and equilibrium ? Altering equilibrium conditions: Le Chatelier's principle ? Relationship between the equilibrium constant and Gibbs's free energy ? Standard state in Biochemistry ? Coupling reactions in biological systems
5. Acid-base equilibrium	? Acid and base definitions. The Brønsted-Lowry's theory ? Acid-base properties of water: concept of pH ? Strong and weak acids and bases. Ionization constants ? Solutions of salts: hydrolysis ? The common-ion effect ? Buffer solutions ? Acid-base titrations. Acid-base indicators ? pH control in biological systems

6. Electrochemistry	? Electrochemical processes and redox reactions ? Chemical energy and Electrochemistry. Electrochemical cells ? Standard electrode potentials ? Thermodynamics of electrochemical reactions ? Effect of the concentration on cell potential ? pH measurement ? Membrane potential ? Redox systems involving protons ? Redox indicators

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 content that is intended to cover, 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. This presentations, covering the basic content and additional material, 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 exercices, and the data tables, will be available in advance at the Moodle platform.
Laboratory practice	The students will performe seven lab practices related to the fundamental contents of the subject. The lab sessions will last two hours each. The scripts for the practices include the experimental procedure and some related questions. At the end of the sessions the students must submit an individual written report collecting the lab work, observations, results, and answers to proposed questions.
Supervised projects	In these sessions the understanding of the issues by the students will be assessed. Four sessions are scheduled in reduced groups. Students must prepare them, studying the relevant content of the issues. In each session the students first will have to do some exercises in groups of 2 or 3 people, which will be solved afterwards. In the last 30 minutes the students will answer a questionnaire individualy. Both exercises will be part of the evaluation.
Objective test	The degree of concepts assimilation and problem solving skills of the students will be assessed by mean a written exam.

Personalized attention	
Methodologies	Description

Supervised projects	In addition to the follow-up work in group tutoring sessions, there will be individual tutoring in the schedule set by the teachers. Students with appreciation a part-time academic and attendance waiver of exemption may complete the supervised projects in individual and/or group tutoring schedule to be agreed with the teachers.

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 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.	20
Objective test	A26 B1 B2 B3 B4 C1	The objective test consist of a number of practical or theoretical-practical exercises, similar to those made 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 is necessary to obtain a higher or equal to 5 points overall rating (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. In the first and second opportunities, students who failed the lab practices could undergo a specific test related to the lab practices. The qualification of this specific test will replace the grade obtained in lab practices. Students who haven't participated in the supervised works will receive a score of 0 in this section, both in January and July calls. Students passing the supervised works section will mantain the obtained rating in case of to attend to the second call. In the case of students with recognition of part-time dedication and academic assistance waiver, the qualification of the tutored work will be replaced by that obtained in the personal tutorials, with 20% of the overall grade in the first and the second opportunities. In the case of exceptional, objectified and appropriately justified circumstances, the professor may fully or partly exempt any student to perform continuous evaluation process. Students who are in this circumstance must pass a specific test that leaves no doubt about achieving das own powers gives material in the two opportunities. Students who attend fewer than 25% of planned academic activities (supervised work and practices), and do not assist to the objective test, will be qualified as "Not presented".

Sources of information	
Basic	- Petrucci, R.H.; Herring, F.G.; Madura, J.D.; Bissonnette, C. (2017). Química general: Principios y aplicaciones modernas (11ª Ed). Madrid: Pearson En xeral, calquera manual de Química Xeral actualizado é axeitado para o estudo da asignatura.Existen edicións anteriores do Petrucci (8ª Ed. QX240, 10 Ed. QX-243) e outros libros recomendados a disposición dos alumnos na biblioteca.

Complementary	- Chang, R.L.; Goldsby, K.A. (2013). Química (12ª Ed). México: McGraw-Hill - Atkins, P.; Jones, L. (2012). Principios de Química. Los caminos del descubrimiento (5ª Ed). Madrid: Ed. Médica Panamericana - Reboiras, M. D. (2007). Química, La ciencia básica. Madrid: Thomson - 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 - Reboiras, M. D. (2007). Problemas resueltos de: Química, la ciencia básica. Madrid: Thomson - Paterno Parsi, A.; Parsi, A.; Pintauer, T.; Gelmini, L.; Hilts, R. W. (2011). Complete Solutions Manual: General Chemistry, Principles and Modern Applications. Scarbough: Pearson Canada - Paterno Parsi, A.; Parsi, A.; Pintauer, T.; Gelmini, L.; Hilts, R. W. (2011). Selected Solutions Manual: General Chemistry, Principles and Modern Applications. Toronto: Pearson - López Cancio, J. A. (2010). Problemas de Química. Madrid: Prentice Hall

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, obtaining oxidation states of elements in chemical species, logarithms, exponents and differential and integral calculus.