Teaching Guide					
Identifying Data					2014/15
Subject (*)	Química			Code	610G02001
Study programme	Grao en Bioloxía				
Descriptors					
Cycle	Period		Year	Type	Credits
Graduate	1st four-month period		First	FB	6
Language	SpanishGalician				
Prerequisites					
Department	Química Física e Enxeñaría Química 1Química Fundamental				
Coordinador	Riveiros Santiago, Ricardo		E-mail	ricardo.riveiros@udc.es	
Lecturers	Avecilla Porto, Fernando Francisco Ligero Martínez - Risco, Pablo Martinez Cebeira, Monstserrat Penedo Blanco, Francisco Jose Riveiros Santiago, Ricardo Ruiz Bolaños, Isabel Sanchez Andujar, Manuel Vega Martin, Alberto de		E-mail	fernando.avecilla@udc.es pablo.ligero@udc.es monserrat.martinez.cebeira@udc.es francisco.penedo.blanco@udc.es ricardo.riveiros@udc.es isabel.ruiz@udc.es m.andujar@udc.es alberto.de.vega@udc.es	
Web					
General description	A Química no Grao en Bioloxía, é unha materia de formación básica con contidos centrados nalgúns dos conceptos fundamentais da Química Xeral. Estes coñecementos e competencias establecerán os cimentos imprescindibles para que o alumnado poida abordar o estudo das distintas ramas da Bioloxía nas que intervén o fenómeno químico, e nomeadamente da Bioquímica.				

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.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.

Learning outcomes			
Subject competencies (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	C1 C3
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	C1 C3

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	C1 C3

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	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	1	0	1
Guest lecture / keynote speech	13	26	39
Seminar	10	30	40
Laboratory practice	15	12	27
Supervised projects	8	28	36
Objective test	3	3	6
Personalized attention	1	0	1
(*)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 sessions 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 resolution in the classroom. The proposed exercice documents, and the needed data tables, will be available in advance at the Moodle platform.
Laboratory practice	The students will complete 7 practices related to the fundamental contents of the subject. The lab sessions will last two hours each. The scripts for the practices include previous work (recommended and / or questions reads) that the students must submit in writing to the head teacher at the beginning of the corresponding lab session. After the session they must submit a written individual dissertation, collecting the laboratory work, observations, results, and answers to proposed questions.
Supervised projects	The main goal of these sessions is evaluate the understanding of the subject by the students. Four tutoring sessions are scheduled in small groups. Students must first prepare each tutoring, studying relevant content and working out a questionnaire that will be given in advance. In the tutorials the doubts arising in this previous work will be resolved, and a test will be conducted. Both the previous work and the session test will be collected by the teacher, as a part of the assesment.
Objective test	A written examination, where the degree of concepts assimilation and problem solving skills of the students will be assesed.

Personalized attention	
Methodologies	Description
Laboratory practice 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.

Assessment		
Methodologies	Description	Qualification

Laboratory practice	The qualification of the practices represents 20% of the overall score. The submitted report, the attitude and the work done in the laboratory will be assessed. To pass the subject is necessary to obtain a minimum score of 4 in this part. Competencies assessed: A26, A30, A31, B1, B2, B3, B4, C1, C3.	20
Supervised projects	The qualification of the supervised work represents 20% of the overall score. The proposed previous questionnaire, the work done within the tutoring, and the questions proposed at the end of it, will be assesed. Competencies assessed: A26, B1, B2, B3, B4, C1, C3.	20
Objective test	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. Competencies assessed: A26, B1, B2, B3, C1.	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. Students with a score greater than 4 on the laboratory practices in the 2013-14 course will have no obligation to carry them out again,and they will keep the grade obtained.However, these students may, if they wish, assist to the laboratory practices in order to be assessed again. For all other students, including those passing the lab practices in courses prior to 2013-14, the completion of the laboratory practices is mandatory. In the first and second call, students who failed the lab practices could undergo a specific test related to the labs. 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. Students who attend fewer than 25% of planned academic activities (supervised work and practices), nor carry out the objective test, will be qualified with the assessment label "Not presented".

Sources of information	
Basic	- Petrucci, R.H.; Herring, F.G.; Madura, J.D.; Bissonnette, C. (2011). Química general: Principios y aplicaciones modernas (10ª Ed). Madrid: Prentice Hall
Complementary	- 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 - Atkins, P.; Jones, L. (2012). Principios de Química. Los caminos del descubrimiento (5ª Ed). Madrid: Ed. Médica Panamericana - López Cancio, J. A. (2010). Problemas de Química. Madrid: Prentice Hall - Reboiras, M. D. (2007). Problemas resueltos de: Química, la ciencia básica. Madrid: Thomson - Chang, R.L. (2013). Química (11ª Ed). México: McGraw-Hill - Reboiras, M. D. (2007). Química, La ciencia básica. Madrid: Thomson - Masterton, W.L.; Hurley, C.N. (2003). Química. Principios y reacciones (4ª Ed). Madrid: Thomson - Paterno Parsi, A.; Parsi, A.; Pintauer, T.; Gelmini, L.; Hilts, R. W. (2011). Selected Solutions Manual: General Chemistry, Principles and Modern Applications. Toronto: Pearson

Recommendations
Subjects that it is recommended to have taken before
Bioquímica: Bioquímica I/610G02011 Bioquímica: Bioquímica II/610G02012
Subjects that are recommended to be taken simultaneously
Matemáticas/610G02003
Subjects that continue the syllabus

Other comments
Coa fin de poder abordar con éxito a materia, é imprescindible que o estudiante posúa unha serie de coñecementos previos de química e matemáticas, de acordo co nivel esixido en secundaria e bacharelato, como son: Nomenclatura e formulación química, axuste de reaccións químicas, cálculos estequiométricos elementais, identificación do carácter ácido-base de compostos comúns, obtención de estados de oxidación dos elementos nas especies químicas, manexo de logaritmos, exponenciais, derivadas e integrais simples.