Teaching Guide				
Identifying Data				2019/20
Subject (*)	Química		Code	770G02004
Study programme	Grao en Enxeñaría Eléctrica			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Alonso Rodriguez, Elia	E-mail	elia.alonso@udc.es	
Lecturers	Alonso Rodriguez, Elia González Rodríguez, María Victoria	E-mail	elia.alonso@udc.es victoria.gonzalez.rodriguez@udc.es	
Web				
General description	Introduction to the scientific foundations of chemistry in relation to their technological applications			

Study programme competences / results	
Code	Study programme competences / results
A8	Capacidade para comprender e aplicar os principios e coñecementos básicos da química xeral, química orgánica e inorgánica e as súas aplicacións na enxeñaría.
B1	Capacidade de resolver problemas con iniciativa, toma de decisións, creatividade e razoamento crítico.
B2	Capacidade de comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial.
B4	Capacidade de traballar e aprender de forma autónoma e con iniciativa.
B6	Capacidade de usar adecuadamente os recursos de información e aplicar as tecnoloxías da información e as comunicacións na enxeñaría.
B7	Capacidade para traballar de forma colaborativa e de motivar un grupo de traballo.
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			
Learning outcomes	Study programme competences / results		
Utilize the basic principles of general chemistry, organic chemistry and inorganic chemistry.	A8	B7	C3
Apply the basic laws governing reactions: thermodynamics, kinetics and equilibrium.	A8		C3
Solve problems and analyze results.	A8	B7	C3
Adequately apply theoretical concepts in the laboratory through the correct and safe use of basic material and equipment		B1 B4	
Use rigorous language in chemistry		B2	
Present and interpret data and results		B6 B7	

Contents	
Topic	Sub-topic
Unity 1. Chemistry basics	Includes topic 1

Topic 1. Basics of Chemistry.	- Stoichiometry. Theorical and Percentage Yields. Limiting Reactant. - Atoms. The Quantum Mechanical Model. - Periodic Table of the Elements. - Chemical Bond. Main types of chemical bonds: ionic, covalent, metallic. Intermolecular Forces.
Unity 2. Thermochemistry	Includes topic 2
Topic 2. Thermochemistry	- Heats of Chemistry Reaction - Enthalpy - Calorimetry - Introduction to thermodynamics
Unity 3. Rates of Reaction	Includes topic 3
Topic 3. Rates of Reaction	- Reaction Rates - Reaction Rates Equation - Dependence of Rate on Concentration - Activation energy - Catalysis - Mechanism
Unity 4. Chemical Equilibrium	Includes topic 4
Topic 4. Chemical Equilibrium	- Chemical Equilibrium. The Equilibrium Constant. - Gaseous Reactions. Le Chatelier's Principle - Acid-Base Equilibria
Unity 5. Electrochemistry	Includes topics 5, 6 and 7
Topic 5. Electrochemistry I	- Oxidation -Reduction Reactions. Balancing - Standard Electrode Potentials - Spontaneity from Electrode Potencials - Nernst Equation
Topic 6. Electrochemistry II	- Voltaic Cells. Batteries - Electrolysis. Stoichiometry of Electrolysis
Topic 7. Corrosion	- Concept - Corrosion process and influence factors - Methods to protect metals from corrosion - Atmospheric Corrosión - Marine Corrosion
Unity 6. Principles of Organic Chemistry	Includes topic 8
Topic 8. Organic Chemistrya	- Introduction to Organic Chemistry - Functional Groups - Nomenclature - Isomers - Main types of organic reactions
Unity 7. Organic and Inorganic Chemistry Applied to Engineering	Includes topics 9 and 10
Topic 9. Organic Chemistry Applied to Engineering	- Carbon - Oil - Gas - Biomass - Polymers
Topic 10. Inorganic Chemistry Applied to Engineering	- Metallurgy - Industrial Inorganic Compounds: Synthesis - Main Technologic Inorganic Materials: Semiconductors, Optic Fiber, Ceramic, Superconductors

Unity 8. Bases of Industrial Chemistry: Mass Balance	Includes topic 8
Topic 11. Introduction to Industrial Chemistry	- Engineering Process - Mass Balance
Unity 9. Principles of Instrumental Analysis	Includes topic 12
Topic 12. Introduction to Instrumental Techniques for Industrial Analysis	- Classification of Instrumental Techniques - Quality Parameters in the Analytical Laboratory - Calibraction - Significant Digits

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A8	21	29.4	50.4
Problem solving	B1 B7	20	38	58
Laboratory practice	A8 B4 B6 B7 C3	5	10	15
Supervised projects	B7 B2 C3	3	6	9
Objective test	A8 B1	4	12	16
Personalized attention		1.6	0	1.6
(*)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	Participants take notes and make questions
Problem solving	Participants apply rules, write mathematical relationships and analyze results
Laboratory practice	Participants perform an experiment following a written procedure and write a report
Supervised projects	Participants summarize and discuss information
Objective test	Participants answer questions and problems

Personalized attention	
Methodologies	Description
Supervised projects	Reviewing the development of intermediate and final stages of supervised projects Resolving specific issues Students being recognized officially as partial-time and entitled not to attend the lectures will be attended in a tutorships regime (set hour with teacher in advance).

Assessment			
Methodologies	Competencies / Results	Description	**Qualification**
Problem solving	B1 B7	Resolution of exercises and ability to explain them in the classroom	10
Laboratory practice	A8 B4 B6 B7 C3	Carry out the laboratory practices and reports and ability to work collaboratively	10
Supervised projects	B7 B2 C3	Elaboration of supervised projects and presentation in the classroom. Performing an activity and objective test.	10

Objective test	A8 B1	A first test (theory and problems) will be carried out about half of the semester. The subject taught until then will be evaluated. At the end of course, a partial second test (theory and problems) will be performed for students who have passed the first test. Simultaneously a global test (theory and problems) will be performed for students who have not approved the first test. Each test consists of two independent parts, being necessary to obtain a minimum score on each part to compensate: - Theory, maximum score 4 points, minimum score 1.5 points to compensate. - Problems, maximum score 3 points, 1 point minimum to compensate score.	70

Assessment comments
A minimum of 75% of the laboratory practical classes have to be carried out by each student to be evaluated. A minimum mark of 3 points is requested in the test to take into account the other marks. For students being recognized officially as partial-time and entitled not to attend the lectures, the final exam represent 80% of the final grade and supervised projects 20%. For 2010 Plan students, who explicitly renounce continous assesment will be evaluated by the grade obtained in the final exam (100%)

Sources of information	
Basic	- CHANG (2002). Química . Interamericana. Mc Graw - Hill. 7ª Edición - http://eup.cdf.udc.es (). . - McMurry, Fay (2009). Química General . Prentice Hall - PÉREZ IGLESIAS, J. y SECO LAGO, H.M. (2006). Experimentos de química. Aplicaciones a la vida cotidiana . Badajoz. Editorial Filarias - VINAGRE F., VAZQUEZ DE MIGUEL L.M. (1996). Fundamentos y problemas de química . Alianza, 4ª Ed. - Petrucci, Ralph H. (2011). Química general: principios y aplicaciones modernas. Prentice Hall
Complementary	- WILLIS (1995). Resolución de Problemas de Química General . Reverté - José Vale Parapar y col. (2004). Problemas resueltos de Química para Ingeniería . Thomson - KOTZ, TREICHEL, HARMAN (2003). Química y reactividad química . Thomson Ed. 5º Ed. - PAZ, M.; CASTRO, F. y MIRO, J. (1995). Química . Madrid.Ed.UNED - PETERSON (2012). Fundamentos de nomenclatura química . Reverte - Skoog, Douglas A (2007). Principios de análisis instrumental . Santa Fe : Cengage Learning

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Environmental Engineering/770G01014
Other comments

Recommendations Sustainability Environment, Person and Gender Equality:1.
The delivery of the works (supervised work) that
are carried out in this matter will be done in the following way:
1.1. It will be delivered in virtual format and / or computer support
1.2. In the case of having to print something on paper, it will be made
on recycled and double-sided paper. Drafts will not be printed, only the
final version.2. It must make a sustainable use of resources and
the prevention of negative impacts on the natural environment. It will
be encouraged that the materials that are discarded in the matter
(papers, plastics) are thrown in the respective containers enabled in
the streets for such purpose.3. It will try to convey to students
the importance of ethical principles related to the values ??of
sustainability so that they apply not only in the classroom, but in
personal and professional behaviors.4. The gender perspective
must be incorporated in this subject, so the works delivered by the
students and the material prepared by the teacher must use non-sexist
language.5. It will facilitate the full integration of students
who for physical, sensory, psychic or sociocultural reasons, experience
difficulties to an adequate, equal and profitable access to university
life.