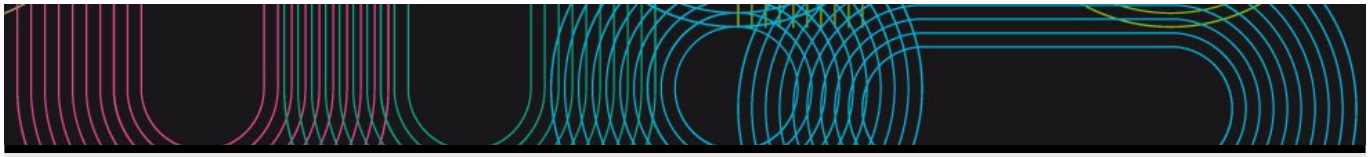

IDENTIFYING DATA				
Chemistry				
Subject	Chemistry			
Code	V09G311V01105			
Study programme	Degree in Mining and Energy Resources Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	1st	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Rodríguez Rodríguez, Ana María			
Lecturers	Canabal Abalo, Ana Deive Herva, Francisco Javier Rodríguez Rodríguez, Ana María			
E-mail	aroguez@uvigo.es			
Web				
General description	The matter provides to students of first course of engineering the bases of the Chemistry that will be useful in the development of his future profession			

Competencies	
Code	
A1	
A2	
A3	(*) Que os estudantes teñan a capacidade de reunir e interpretar datos relevantes (normalmente dentro da súa área de estudo) para emitir xuízos que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética.
A4	(*)Que os estudantes desenvolvesen aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores cun alto grao de autonomía.
A5	(*)Que os estudantes desenvolvesen aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores cun alto grao de autonomía.
B1	(*)Capacitación científico-técnica para o exercicio da profesión de Enxeñeiro Técnico de Minas e coñecemento das funcións de asesoría, análise, deseño, cálculo, proxecto, construción, mantemento, conservación e explotación.
B2	(*)Comprensión dos múltiples condicionamentos de carácter técnico e legal que se expoñen no desenvolvemento, no ámbito da enxeñería de minas, que teñan por obxecto, de acordo cos coñecementos adquiridos segundo o establecido no apartado 5 da orde CIN/306/2009, a prospección e investigación xeolóxica-mineira, as explotacións de todo tipo de recursos xeolóxicos, incluídas as augas subterráneas, as obras subterráneas, os almacenamentos subterráneos, as plantas de tratamento e beneficio, as plantas enerxéticas, as plantas mineralúrxicas e siderúrxicas, as plantas de materiais para a construción, as plantas de carboquímica, petroquímica e gas, as plantas de tratamentos de residuos e efluentes e as fábricas de explosivos e capacidade para empregar métodos contrastados e tecnoloxías acreditadas, coa finalidade de conseguir a maior eficacia dentro do respecto polo Medio Ambiente e a protección da seguridade e saúde dos traballadores e usuarios das mesmas.
C22	(*)Capacidade para comprender e aplicar os principios de coñecementos básicos da química xeral, química orgánica e inorgánica e as súas aplicacións na enxeñería.
D3	(*)Propoñer e desenvolver solucións prácticas, utilizando os coñecementos teóricos, a fenómenos e situacións-problema da realidade cotiá propios da enxeñería, desenvolvendo as estratexias adecuadas.
D4	(*)Favorecer o traballo cooperativo, as capacidades de comunicación, organización, planificación e aceptación de responsabilidades nun ambiente de traballo multilingüe e multidisciplinar, que favoreza a educación para a igualdade, para a paz e para o respecto dos dereitos fundamentais.
D5	(*)Coñecer as fontes necesarias para dispoñer dunha actualización permanente e continua de toda a información precisa para desenvolver o seu labor, accedendo a todas as ferramentas, actuais e futuras, de procura de información e adaptándose aos cambios tecnolóxicos e sociais

D10 (*)Tomar conciencia da necesidade dunha formación e mellora continua de calidade, desenvolvendo valores propios da dinámica do pensamento científico, mostrando unha actitude flexible, aberta e ética #ante opinións ou situacións diversas, en particular en materia de non discriminación por sexo, raza ou relixión, respecto aos dereitos fundamentais, accesibilidade, etc.

Learning outcomes

Expected results from this subject	Training and Learning Results			
To understand the basic concepts of Chemistry	A1 A2 A3 A4 A5	B2	C22	D3 D4 D5 D10
To understand how the scientific knowledge interacts with technolgy in accordance with the society characteristics and needs at any moment	A1 A2 A3 A4 A5	B1 B2		D5
To know how to evaluate the information coming from different sources in order to make the own opinion that will ultimately allow the student to critically respond about technological problems related to Chemistry	A1 A2 A3 A4	B1 B2	C22	D3 D4 D5 D10

Contents

Topic	
Subject 1. Atomic structure, chemical lbonds and states of aggegation	1. Atomic number, atomic mass, isotopes. Electronic configuration. Principle of Exclusion of Pauli, Principle of Aufbau, Rule of Hund, periodic Table of the elements 2. Inter and intramolecular bonds 3. States of aggregation
Subject 2. Chemical and thermodynamic equilibrium in the engineering	1. Chemical equilibrium 2. Enthalpy, entropy and free energy 3. Equilibrium constant 4. Le Chatelier principe
Subject 3. Acid-base equilibrium in the engineering	1. Definition of acid and base. Theory of Brönsted and Lowry 2. Strength of acids and bases. Concept of pH 3. Buffer solutions 4 Hydrolysis.
Subject 4. Solubility equilibrium in the engineering	1. Solubility and solubility product 2. Factors affecting solubility. Fractional Precipitation 3. Sparingly soluble salts 4. Influence of pH in the solubility equilibrium
Subject 5. Electrochemical processes	1. Concepts of oxidation 2. Electrochemical cells: basic concepts and redox potential. 3. Nernst equation
Subject 6. Kinetical chemistry in the engineering	1. Reaction rate and kinetic constat 2. Determination of the Rate Equation: Initial rate method. Integrated Rate Laws 3. Factors affecting the reaction rate. Catalysts.
Subject 7. Industrial processes of organic chemistry	1. Petrochemical. Foundations of a refinery 2. Biofuels

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	25	40	65
Problem solving	20	52.5	72.5
Laboratory practical	5	5	10
Objective questions exam	1	0	1
Problem and/or exercise solving	1	0	1
Self-assessment	0.5	0	0.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description

Lecturing	Presentation of the most relevant concepts of the subject from the point of view of the engineering by the lecturer
Problem solving	A series of problems will be proposed to the students, some of them will be solved during the classroom hours and the other should be carried out autonomously
Laboratory practical	Laboratory practises will be performed by the students to reinforce in an empirical manner the main concepts tackled during the masterclasses

Personalized assistance

Methodologies	Description
Lecturing	Any doubt can be solved, individually or in groups, during tutorship. Likewise, the students also will be able to do queries through telematic means (email, videoconference, forums of FAITIC, ...) after a previous request to the lecturer
Problem solving	Any doubt can be solved, individually or in groups, during tutorship. Likewise, the students also will be able to do queries through telematic means (email, videoconference, forums of FAITIC, ...) after a previous request to the lecturer
Laboratory practical	Any doubt can be solved, individually or in groups, during tutorship. Likewise, the students also will be able to do queries through telematic means (email, videoconference, forums of FAITIC, ...) after a previous request to the lecturer

Assessment

	Description	Qualification	Training and Learning Results		
Laboratory practical	The students will deliver the answers to the questions posed in each practice. The students will have to be able to organise, schedule and develop work in team, accepting the own responsibilities of the multilingual and multidisciplinary work	10	A3	B1 B2	
Objective questions exam	It will make a global proof of short answers for the evaluation of the competitions purchased in the matter	30	A1 A2	B1	
Problem and/or exercise solving	It poses to the students a series of problems where will apply the theoretical concepts treaties during the development of the subject	35	A4 A5		D5
Self-assessment	When finalising each subject or block of subjects the professor will make proofs written where the students will be able to analyse the degree of achievement of the partial aims	25	A5		D5

Other comments on the Evaluation

All the proposed evaluation methodologies should reach a minimum of 50% of the mark to pass the subject. The participation of the student in any of the evaluation proofs will involve the condition of presented and consequently, a qualification will be given.

When the practices and self-assessment marks are over 5 points (out of 10), they will be kept for the second opportunity, and just a final exam with questions and problems must be carried out.

Those students that obtain the official resignation to the continuous evaluation will be evaluated through a final exam, to be held in the official date.

The student is expected to present an adequate ethical behavior. If an unethical behavior is detected (copying, plagiarism, unauthorized use of electronic devices, and others) it is considered that the student does not meet the requirements for passing the subject. In this case, the final grade in the current academic year will be FAIL (0.0 points).

The use of electronic devices during the assessment tests will be not permitted. Introducing an unauthorized electronic device into the examination room, will be considered as a FAIL (0.0 points) in the current academic year

Sources of information

Basic Bibliography

R.H. Petrucci y col., **Química General**, Prentice Hall, 2017

R. Chang, **Química**, McGraw Hill, 2013

M.R. Fernández y J.A. Fidalgo, **1000 Problemas de Química General**, Everest, 1997

Complementary Bibliography

L.S. Brown y T.A. Hollme, **Chemistry for engineering students**, Brooks Cole Cengage Learning, 2018

M.A. Ramos Carpio, **Refino de Petróleo, Gas Natural y Petroquímica**, UPM, 1997

Recommendations

Subjects that are recommended to be taken simultaneously

Mathematics: Calculus I/V09G291V01104

Contingency plan

Description

Considering the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University establishes an extraordinary planning that will be activated when the administrations and the institution determine it. It is based on safety, health and responsibility, and it guarantees teaching in an online or semi-presential modalities. These already planned measures will guarantee, at the required time, the development of teaching in a more agile and effective way, because they will be known in advance by students and teachers through the standardized tool for teaching guides DOCNET.

1. Semi-presential modality
Once the semi-presential teaching is required, it would mean a reduction of the capacity of the teaching spaces used in the face-to-face modality. Therefore, as the first measure of the centre, the capacity of the teaching spaces would be reformulated and informed to the teachers, in order to proceed to reorganize the formative activities for the rest of the semester. It should be noted that the reorganization will depend on the moment throughout the semester in which this semi-presential modality is activated. For the reorganization of the teaching activities, the following guidelines would be followed:

Through the FaiTIC platform, all the students will be informed about the new conditions under which the formative activities and assessment tests will be carried out at the end of the semester.

The tutorial sessions will be carried out by telematic means (email, videoconference, FAITIC forums, ...) with prior agreement.

Once some of the students have carried out experimental or computer laboratory practices in the face-to-face modality, if it is possible, the rest of the students will have the possibility to perform the same or equivalent activities in the same modality.

For the rest of the activities until the end of the semester, it should be done a proper identification of those formative activities which can be done under face-to-face modality and those which will be carried out remotely.

Regarding the potential tools to be applied for the formative activities during the online mode, CampusRemoto and the FaiTIC platform will be used.

2. Online modality
In the event that the non-face-to-face teaching modality is required (suspension of all face-to-face formative and assessment activities), the tools currently available at the University of Vigo, CampusRemoto and the FaiTIC platform will be used. The reorganization will depend on the moment throughout the semester in which this online modality is activated. In the reorganization of the teaching activities, the following guidelines would be followed:

2.1. Communication
Through the FaiTIC platform, all the students will be informed about the new conditions under which the formative activities and assessment tests will be carried out at the end of the semester.

2.2. Adaptation and / or modification of teaching methodologies
As the teaching methodologies have been conceived for the face-to-face teaching modality, the teaching methodologies that would be kept and those which would be modified or replaced in the online modality are indicated below.

The teaching methodologies that would be kept, since they can be used in face-to-face and online teaching mode
-Lecturing
-Problem solving
The teaching methodology that would be modified is laboratory practical that will be replaced by an explanatory video

2.3. Adaptation of tutorial sessions and personalized attention
The tutorial sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) with prior agreement.

2.4. Evaluation

No modifications are planned

2.5. Bibliography or additional material to facilitate self-learning
No applicable