



Teaching Guide

| Teaching Guide | | | | |
|---------------------|---|--------|--------------------|-----------|
| Identifying Data | | | | 2016/17 |
| Subject (*) | Chemistry | | Code | 730G05004 |
| Study programme | Grao en Enxeñaría Naval e Oceánica | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Graduate | 1st four-month period | First | FB | 6 |
| Language | Spanish | | | |
| Teaching method | Face-to-face | | | |
| Prerequisites | | | | |
| Department | Química Analítica | | | |
| Coordinador | Gonzalez Soto, Elena | E-mail | elena.gsoto@udc.es | |
| Lecturers | Gonzalez Soto, Elena | E-mail | elena.gsoto@udc.es | |
| Web | | | | |
| General description | This subject pretends to form the students in fundamental chemical concepts that will allow them comprise and resolve problems that will present them in their professional life and is basic to other subjects of the career. It contributes knowledges for the understanding of technological applications. | | | |

Study programme competences

| Code | Study programme competences |
|------|---|
| A4 | Have a capacity so that it understands and applies the beginnings of basic knowledge of the general chemist, organic and inorganic chemistry and its applications in the engineering |
| B1 | That the students proved to have and to understand knowledge in an area of study what part of the base of the secondary education, and itself tends to find to a level that, although it leans in advanced text books, it includes also some aspects that knowledge implicates proceeding from the vanguard of its field of study |
| B2 | That the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to prove itself by the elaboration and defense of arguments and the resolution of problems in its area of study |
| B3 | That the students have the ability to bring together and to interpret relevant data (normally in its area of study) to emit judgments that include a reflection on relevant subjects of social, scientific or ethical kind |
| B4 | That the students can transmit information, ideas, problems and solutions to a public as much specialized as not specialized |
| B5 | That the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy |
| B6 | Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas. |
| C2 | Coming across for the exercise of a, cultivated open citizenship, awkward, democratic and supportive criticism, capable of analyzing the reality, diagnosing problems, formulating and implanting solutions based on the knowledge and orientated to the common good. |
| C3 | Understanding the importance of the enterprising culture and knowing the means within reach of the enterprising people. |
| C5 | Assuming the importance of the learning as professional and as citizen throughout the life. |
| C6 | Recognizing the importance that has the research, the innovation and the technological development in the socioeconomic and cultural advance of the society. |

Learning outcomes

| Learning outcomes | Study programme competences | | |
|---|-----------------------------|----|--|
| Have a capacity so that it understands and applies the beginnings of basic knowledge of the general chemist, organic and inorganic chemistry and its applications in the engineering | A4 | | |
| That the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to prove itself by the elaboration and defense of arguments and the resolution of problems in its area of study | | B2 | |
| That the students have the ability to bring together and to interpret relevant data (normally in its area of study) to emit judgments that include a reflection on relevant subjects of social, scientific or ethical kind | | B3 | |
| That the students can transmit information, ideas, problems and solutions to a public as much specialized as not specialized | | B4 | |
| That the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy | | B5 | |



| | | | |
|---|--|----|----|
| Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas. | | B6 | |
| Que os estudantes demostran posuír e comprender coñecementos nunha área de estudo que parte da base da educación secundaria xeral e adoita encontrarse a un nivel que, aínda que se apoia en libros de texto avanzados, inclúe tamén algúns aspectos que implican coñecementos procedentes da vangarda do seu campo de estudo | | B1 | |
| Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común | | | C2 |
| Asumir como profesionais e cidadáns a importancia da aprendizaxe ao longo da vida | | | C5 |
| Valorar a importancia da investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade | | | C6 |
| Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras | | | C3 |

| Contents | |
|-----------------------------------|---|
| Topic | Sub-topic |
| 1. Fundamental Chemical Concepts. | <ul style="list-style-type: none">- Stoichiometry. Percent Yield of a Reaction. Limiting Reactant.- Atom. Quantum Theory.- Periodic table and Periodic Properties.- Chemical Bonding. Types of Bonding: Ionic, Covalent, Metallic. Intermolecular strengths. |
| 2. Thermochemistry. | <ul style="list-style-type: none">- Changes of Energy in the Chemical Reactions.- Enthalpy.- Calorimetry.- Introduction to the Thermodynamics. |
| 3. Chemical Kinetics. | <ul style="list-style-type: none">- The Rate of a Chemical Reaction.- Relation between the Concentration of Reagents and the Time.- Activation Energy.- Catalysis.- Reaction Mechanisms. |
| 4. Chemical Equilibrium. | <ul style="list-style-type: none">- Concept of Chemical Equilibrium. The Equilibrium Constant Expression.- Gases Equilibrium. Le Chatelier's Principle.- Acid-Base Equilibria. |
| 5. Electrochemistry I. | <ul style="list-style-type: none">- Redox Reactions. Balance of Redox Reactions.- Standard Electrode Potentials.- Spontaneity of the Redox Reactions.- Nernst Equation. |
| 6. Electrochemistry II. | <ul style="list-style-type: none">- Voltaic Cells. Batteries.- Electrolysis. Quantitative aspects of Electrolysis. |
| 7. Corrosion. | <ul style="list-style-type: none">- Concept.- Processes of Corrosion and Factors that Influence.- Methods of Protection against Corrosion.- Atmospheric Corrosion.- Marine Corrosion. |
| 8. Organic Chemistry. | <ul style="list-style-type: none">- Introduction to Organic Chemistry.- Functional Groups.- Nomenclature.- Isomery.- General Types of Organic Reactions. |



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| 9. Organic Chemistry Applied to the Engineering. | <ul style="list-style-type: none"> -The Combustion: <ul style="list-style-type: none"> Coal Oil Natural Gas Biomass - Polymers |
| 10. Inorganic Chemistry Applied to the Engineering. | <ul style="list-style-type: none"> - Metallurgy. - Industrial Synthesis of Inorganic Compounds. - Inorganic Materials of Technological Interest: Semiconductors, Optical Fibres, Ceramic Materials, Superconductors. |
| 11. Characterisation of Dangerous Chemical Products. | <ul style="list-style-type: none"> - Chemical Contaminants in the Sea. - Toxicity of the Chemical Compounds. |
| LABORATORY PRACTICE | <ul style="list-style-type: none"> - Heat of Reaction. - Kinetics of the Chemical Reactions. - Determination of the Content of Copper in an Alloy. - Electrodeposition. - Redox Reactions. - Polymers. |

| Planning | | | | |
|---|----------------------------------|----------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies | Ordinary class hours | Student's personal work hours | Total hours |
| Objective test | A4 B1 B2 B5 B6 | 4 | 12 | 16 |
| Guest lecture / keynote speech | A4 B2 B5 B6 C3 C5 | 25 | 32.5 | 57.5 |
| Problem solving | A4 B1 B2 B3 B4 B5 B6 | 15 | 30 | 45 |
| Supervised projects | A4 B1 B2 B3 B4 B5 B6 C2 C3 C6 | 3 | 6 | 9 |
| Laboratory practice | A4 B1 B2 B3 B4 B5 B6 C6 | 10 | 10 | 20 |
| Personalized attention | | 2.5 | 0 | 2.5 |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. | | | | |

| Methodologies | |
|--------------------------------|--|
| Methodologies | Description |
| Objective test | Written proof used for the evaluation of the learning of the student. |
| Guest lecture / keynote speech | The student assimilates the subject and takes aim. It poses doubts and questions. |
| Problem solving | Presentation and resolution of the problems bulletin. The student works individually or in group, poses doubts and questions. |
| Supervised projects | Realisation of directed studies. Presentation and correction. |
| Laboratory practice | Comprehensive reading of the practice. The student carries out the experimental work. He poses and resolves the numerical calculations associated as well as the questions that poses him . He examines and values the final result. |

| Personalized attention | |
|------------------------|---|
| Methodologies | Description |
| Laboratory practice | Review of the development of the intermediate stages and final of the directed study. |
| Supervised projects | Resolution of punctual questions that prevent him to follow-up the subject. |



| Assessment | | | |
|---------------------|----------------------------------|---|---------------|
| Methodologies | Competencies | Description | Qualification |
| Laboratory practice | A4 B1 B2 B3 B4 B5 B6 C6 | Realisation of each one of the practices, delivery of the report, active participation in the same. Interest and attitude of the student. | 5 |
| Objective test | A4 B1 B2 B5 B6 | In the half of the 1st four-month period, we will realise an eliminatory first partial examination (theory and problems) corresponding to the matter given until this moment. At the end of the 1st four-month period, we will realise a second partial examination (theory and problems) for the students that have surpassed the first partial and a global examination of the subject(theory and problems) for the students that had not presented or had not approved the first partial examination. Each examination will consist of two independent parts, being necessary to obtain a minimum note in each one of them to compensate them: - theory, maximum punctuation 4 points, minimum punctuation to compensate 1,5 points. - Problems, maximum punctuation 3 points, minimum punctuation to compensate 1 point. | 70 |
| Problem solving | A4 B1 B2 B3 B4 B5 B6 | Resolution of the bulletins of exercises and active participation in the classroom. Interest and attitude of the student. | 15 |
| Supervised projects | A4 B1 B2 B3 B4 B5 B6 C2 C3 C6 | Realisation in groups and exhibition in the classroom of a directed activity. Realisation of an individual activity. Interest and attitude of the student. | 10 |

| Assessment comments |
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| <ul style="list-style-type: none"> - To be able to add the points of the different activities to the note of the examination, it will be necessary to reach in this a minimum of 3 points. - To be able to have the 1,5 points corresponding to the participation in problem solving classes, the students will have to resolve in the classroom two exercises of no correlated bulletins correspondig to the first partial of the subject and two exercises of no correlated bulletins corresponding to the second partial of the subject. - Those students that have realised and surpassed the laboratory practice of the subject in previous courses, will be able to decide if they do them again or not. In case of not repeating them, the qualification obtained will keep them. - The corresponding qualifications to participation in problem solving classes and in the realisation of supervised projects does not keep from a course to another one. |

| Sources of information | |
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| Basic | <ul style="list-style-type: none"> - Pérez Iglesias J. y Seco Lago H.M. (2006). Experimentos de Química: Aplicaciones a la Vida Cotidiana. Mc Graw-Hill Calamonte (Badajoz), Filarias - Vinagre F. y Vázquez de Miguel L.M. (1996). Fundamentos y Problemas de Química, 2ª edición. Alianza - http://eup.cdf.udc.es () . - Mc Murry, Fay (2009). Química General. Prentice Hall - Chang R. (2010). Química, 10ª edición. Mc Graw-Hill - Petrucci R.H. (2011). Química General: Principios y Aplicaciones Modernas. Prentice Hall |
| Complementary | <ul style="list-style-type: none"> - Peterson (1993). Formulación y Nomenclatura Química Inorgánica. EDUNSA - Vale Parapar, Fernández Pereira y otros (2004). Problemas Resueltos de Química para Ingeniería. Thomson - Paz M., Castro F. y Miró J. (1995). Química. UNED - Kotz, Treichel, Harman (2003). Química y Reactividad Química, 5ª edición. Thomson - Willis (1995). Resolución de Problemas de Química General. Reverté - Rosenberg J., Epstein L. y Krieger P. (2014). Química Schaum. McGraw Hill |

| Recommendations |
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| Subjects that it is recommended to have taken before |



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| Subjects that are recommended to be taken simultaneously |
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| Subjects that continue the syllabus |
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| Other comments |
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(*)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.