

28602 - Fundamentals of building materials

Información del Plan Docente

Academic Year	2017/18
Faculty / School	175 - Escuela Universitaria Politécnica de La Almunia
Degree	422 - Bachelor's Degree in Building Engineering
ECTS	6.0
Year	1
Semester	First semester
Subject Type	Basic Education
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The organization of teaching will be carried out using the following steps:

- **Theory Classes** : Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.

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- **Practical Classes** : The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.

- **Laboratory Workshop** : The lecture group is divided up into various groups, according to the number of registered students, but never with more than 16 students, in order to make up smaller sized groups.

- **Individual Tutorials** : Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

5.2.Learning tasks

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity	Weekly school hours
Lectures	2
Laboratory Workshop	2
Other Activities	6

5.3.Syllabus

THEORETICAL CONTENTS

Module	Contents
1. THE ATOM AND THE PERIODIC SYSTEM	<p>Topic 1.- The atom.</p> <p>Elemental particles. Atomic models. The Bohr atom. The quantum mechanical model. Atomic orbitals; quantum numbers. Principles for the electronic construction of atoms.</p>

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	<p>Topic 2.- General overview of the periodic table</p> <p>Description of the current periodic table: groups and periods. Study of the electron shell and the periodic system. Periodic properties.</p>
<p>2. THE CHEMICAL BOND</p>	<p>Topic 3 .- The ionic bond</p> <p>General characteristics of the ionic bond. Network energy. General properties of ionic compounds.</p> <p>Topic 4 .- The covalent bond</p> <p>Simplified model: the Lewis theory. Bond polarity and geometry. Valence bond theory. Orbital hybridization. Molecular orbital theory.</p> <p>Topic 5 .- The metallic bond</p> <p>General characteristics of metals. Theories of the metallic bond: the electron sea theory and valence bond theory. Alloys: classes.</p>
<p>3. BONDS BETWEEN MOLECULES</p>	<p>Topic 6 .- Intermolecular bonds</p> <p>Van der Waal forces. Hydrogen bonds.</p>
<p>4. AGGREGATION STATES</p>	<p>Topic 7 .- The gas state</p>

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	<p>General characteristics of gases. Laws that govern the gas state. Equations of state. Kinetic theory. Gas mixtures: Dalton's Law. Gas diffusion and effusion: Graham's Law. Real gases: The Van der Waal equation.</p> <p>Topic 8 .- The liquid state</p> <p>General characteristics of liquids. Vapour pressure. The effect of temperature on vapour pressure. Critical phenomena. Condensation of vapours and gases. Solidification.</p> <p>Topic 9 .- The solid state</p> <p>Characteristics of solids. Classes of crystal network. Classes of solids based on bonding type. The phase rule and the triple point.</p>
<p>5. INTRODUCTION TO THE STUDY OF SOLUTIONS</p>	<p>Topic 10 .- Introduction to the study of solutions</p> <p>Disperse systems. Types of solutions. Means of expressing concentration. Solid-in-liquid solutions. Liquid-in-liquid solutions. Gas-in-liquid solutions. Colligative properties of solutions. Colloidal solutions.</p>
<p>6. INTRODUCTION TO THE STUDY OF REACTIONS</p>	<p>Topic 11 .- Chemical reaction. Stoichiometry.</p> <p>Chemical Equations. The Limiting Reactant Concept and Percent Yields from Chemical Reactions.</p>

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<p>7. INTRODUCTION TO STUDY OF THE MATERIALS AND ENVIRONMENTAL IMPACT</p>	<p>Topic 12.- Introduction to Analytical Chemistry in Materials</p> <p>Gravimetric Methods. Volumetric Methods. Spectroscopic Methods and Others</p> <p>Topic 13.- Environmental Impact and Waste Management in Construction</p> <p>Introduction. Environmental Impact Assessments. Legislation.</p>
<p>8. INTRODUCTION TO THE GEOLOGY</p>	<p>Topic 14.- Introduction to the Geology. Rocks.</p> <p>History. Plate tectonics. Structure and Composition of the Earth. Geological Processes. Rocks and Minerals Clasification of Rocks.</p>

PRACTICAL CONTENTS

Each student will undertake a total of six practicals during the academic year during the period assigned for them. In order to pass the subject, students must attend these practicals and submit a report once they have been completed.

The content of the practical course is as follows:

<p>Practical 1</p>	<p>Standards in Chemical Laboratory</p> <p><i>Techniques, Equipment and Safety</i></p>

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Practical 2	<p>Solution Preparation</p> <p><i>Na₂CO₃ 0,1 M from Na₂CO₃ solid; CaCl₂ 0,1 M from CaCl₂ 2 M</i></p>
Practical 3	<p>Filtration</p> <p><i>Gravity Filtration and Vacuum Filtration</i></p>
Practical 4	<p>Volumetric Analysis</p> <p><i>Water hardness; carbonates and bicarbonates in water.</i></p>
Practical 5	<p>Distillation</p>

5.4.Course planning and calendar

SECTION	Topic	Nº hours
0 y 1	<p>Presentation.</p> <p>Atom (<i>Topic 1</i>) and the Periodic System (<i>Topic 2</i>)</p>	10
2 and 3	<p>The Chemical Bond (<i>Topics 3, 4, 5</i>) and Intermolecular Bonds(<i>Topic 6</i>)</p>	12
4	<p>Aggregation Sates (<i>Topics 7, 8, 9</i>)</p>	6

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5 and 6	Introduction to the study of solutions and reactions (Topics 10,11)	14
7 and 8	Introduction to Study of the Materials and Environmental Impact. Introduction to the Geology (Topics 12,13,14)	6
	Practical Course	6
	Exams	6
TOTAL		60

The dates of the final exams will be those that are officially published at <http://www.eupla.es/secretaria/academica/examenes.html>.

5.5.Bibliography and recommended resources

REFERENCES AND RESOURCES

Basic material prepared by the lecturer:

GONZÁLEZ PAÚLES, J. y BURBANO GARCÍA, G. Apuntes de Química para el Grado en Ingeniería Civil. *Ed. Eupla. 2011. ISBN 978 84 694 0618 2*

GONZÁLEZ PAÚLES, J. Química General. Apuntes del curso práctico. *Ed. Eupla.2010. ISBN 978-84-692-8044-7*

Power Point in Platform Moodle (<https://moodle2.unizar.es/>)

BIBLIOGRAPHY

- Gonzalez Paúles, J . Burbano García, G.. Apuntes de Química para el grado de ingeniería civil/Javier Gonzalez Paúles y Gloria Burbano García.. - 1ª Edición Eupla:La Almunia de doña godina(Zaragoza), 2011
- González Paúles, J.. Química General. Apuntes del curso práctico/ Javier González Paúles. - 1ª edición Eupla:La Almunia de doña godina(Zaragoza), 2010
- Química : un proyecto de la American Chemical Society / [versión española por Roberto Martínez-Alvárez, Mª

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- Josefa Rodríguez Yunta, Luis Sánchez Martín] Barcelona [etc.] : Reverté, D.L. 2005
- Química / Ronald J. Gillespie ... [et al.] ; versión española por Aurelio Beltrán Barcelona [etc.] : Reverté, D.L. 1990
 - Negro, José Luis. Iniciación al lenguaje químico inorgánico / José Luis Negro. Madrid: Alhambra, 1979
 - Nyman, C.J.. Problemas de química general y análisis cualitativo / C.J. Nyman y G.B. King ; traducción de A. López-Lago . - [1a ed. española] Madrid : AC, D.L.1978
 - Peterson, W.R. Formulación y nomenclatura química inorgánica/ W.R. Peterson. - 14 edición Barcelona: Edunsa, 1987
 - Sienko, Michell J.. Problemas de química / M.J. Sienko Barcelona [etc.] : Reverté, D.L.1987
 - Mahan, Bruce H.. Química : curso universitario / Bruce M. [sic] Mahan, Rollie J. Myers ; versión en español de María Isabel Pouchan...[et al.] . - 4a ed. Wilmington, Delaware [etc] : Addison-Wesley Iberoamericana, cop. 1990
 - Strahler, Arthur N.. Geología física / Arthur N. Strahler ; [traducido por Montserrat Domingo de Miró] Barcelona : Omega, D.L. 1992
 - Tarbuck, Edward J.. Ciencias de la tierra : una introducción a la geología física / Edward J. Tarbuck, Frederick K. Lutgens ; ilustrado por, Dennis Tasa; traducción AMR Traducciones científicas; revisión técnica y adaptación, Manuel Pozo Rodríguez, José Manuel González Casado . - 8ª ed. Madrid : Prentice Hall, D.L. 2005