

**1. General information****Course:** PRINCIPLES OF BUILDING MATERIALS**Type:** BASIC**Degree:** 315 - UNDERGRADUATE DEGREE IN BUILDING ENGINEERING**Center:** 308 - SCHOOL POLYTECHNIC OF CUENCA**Year:** 1**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 59305**ECTS credits:** 6**Academic year:** 2022-23**Group(s):** 30**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** DAVID SANZ MARTINEZ - Group(s): 30

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**2. Pre-Requisites**

Prerequisites not required. However, given the time that is available for a development of the subject at a level that implies use of it by the future Building Engineer, cannot be based on a total ignorance of Chemistry and Geology, also taking into account, that the basic knowledge of both subjects is taught during several years of pre-university education. In this sense, participation in the initiation course (Zero-Course\_earlier sept) is recommended; the knowledge will be checked with an initial level test.

**3. Justification in the curriculum, relation to other subjects and to the profession**

The incorporation of Chemistry and Geology, as essential materials in the training of technicians in construction and building has been a logical process, growing and irreversible. Like other subjects that did not figure in the old educational plans of the technical schools, these subjects have been incorporated into the nucleus of the engineers' training. They come to fill a void that the business community demanded due to the increasing technification of their teams, in which there are usually no technicians trained to understand professional advisors of geology and / or chemistry.

It is, for them, evident that both the construction materials and the very deep excavations of the current and future buildings represent a worrying facet in the construction. The profession has accepted this demand in the new restructuring of the studies.

**4. Degree competences achieved in this course****Course competences**

Code	Description
E04	Knowledge of the chemical characteristics of the materials used in constructions, their manufacturing processes, the methodology of the tests to determine their characteristics, their geological origin, environmental impact, recycling and waste management.
G01	Ability for analysis and synthesis
G02	Organization and planning ability
G04	Problem resolution
G06	Critical thinking
G08	Teamwork in an interdisciplinary environment
G12	Autonomous learning
G21	Command of Information and Communication Technologies (ICT)
G22	Correct oral and written communication

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

To become familiar with the work in the laboratory leading to the identification and analysis of the materials or their components. To do this, the methodology of the tests for determining the characteristics of construction materials must be known.

To relate the chemical concepts with the minerals, rocks and materials of artificial origin of more frequent use, as well as to know the ores of the metals and other industrial materials

Acquire the foundations of anti-seismic regulations, key in the construction; and be able to read a geological map, its report and interpret a general geological cut.

You will know the reactivity of construction materials against different external agents and their relationship with potential pathological processes.

Know the relationship between the origin and application of the materials, and the scientific and technical nomenclature for their action in a multidisciplinary team; and, secondarily, to obtain initial training for a later specialization.

As a working tool, the specialized contents of the computer network will be used.

To systematize the processes, minerals and rocks corresponding to its genesis, and not by an arbitrary commercial gazetteer.

Application of chemical and geological knowledge in the environmental impact as well as in the recycling of construction materials, supporting the management and treatment of waste from construction activities.

## 6. Units / Contents

### Unit 1: Overview of construction materials.

**Unit 1.1** Introduction. Overview of existing resources.

### Unit 2: Fundamentals of chemistry.

**Unit 2.1** Basic concepts of chemistry: Atomic structure and chemical bonding. Elements and substances..

**Unit 2.2** States of matter aggregation. Solutions, colloids and suspensions.

**Unit 2.2** Water. Physical and chemical properties.

**Unit 2.3** Chemical reactions - stoichiometry - properties: acid-base, oxidation-reduction and precipitation reactions.

**Unit 2.4** Practice 1.- Laboratory practices and tests. Learning and use of material, acid-base, gravimetric and redox evaluations.

### Unit 3: Fundamentals of geology

**Unit 3.1** The mineral as structure and composition: crystalline matter, chemical classification and physical properties of minerals.

**Unit 3.2** Practice 2.- Identifying minerals of interest for the building-construction.

**Unit 3.3** Genetic classification of rocks and the petrological cycle: igneous, sedimentary and metamorphic rocks: their applications and properties.

**Unit 3.4** Practice 3.- Identifying types of rocks of interest for the building-construction.

**Unit 3.5** Geological mapping

**Unit 3.6** Practice 4.- Understanding & Interpreting a Geologic Map

**Unit 3.7** Geological risks in construction. Exogenous and endogenous risks. Fundamentals of seismology.

### Unit 4: Processing of construction materials. Basic properties and environment.

**Unit 4.1** Natural stones. Physical, chemical and mechanical properties.

**Unit 4.2** Practice 5.- Determination of physical and mechanical properties of stone materials.

**Unit 4.3** Materials and environment. Waste management and environmental implications.

## 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E04 G01 G06 G08 G21	1.4	35	N		Presentation in the classroom of the concepts and general principles of the geological and chemical sciences, using the participatory master lesson method.
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E04 G01 G02 G04	0.2	5	N		Exercises solving in a participatory way in the classroom.
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E04 G02 G06 G21	0.5	12.5	Y	Y	Realization of laboratory practices. Realization, delivery and exhibition of laboratory report.
Other off-site activity [OFF-SITE]	Problem solving and exercises	E04 G01 G02 G04	1	25	N		Self-solving exercises.
Group tutoring sessions [ON-SITE]	Group Work	E04 G01 G02 G04 G06 G08 G12 G21 G22	0.06	1.5	N		Group or individual tutorials.
Study and Exam Preparation [OFF-SITE]	Self-study	E04 G01 G02 G04 G06 G08 G12 G21 G22	2.6	65	N		Self-study
Mid-term test [ON-SITE]	Assessment tests	E04 G01 G02 G04 G06 G08 G12 G21 G22	0.16	4	Y	N	Realization of assessment tests and problems of the basic conceptual aspects of each of the main topics. To be able to make mediation with the evaluation of other activities, it is necessary to have a minimum score of 4 out of 10. The fraudulent realization of the tests will suppose a grade of 0 points (art. 9 REE).
Final test [ON-SITE]	Assessment tests	E04 G01 G02 G04 G06 G08 G12 G21 G22	0.08	2	Y	Y	
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>				
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

## 8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Practicum and practical activities reports assessment	50.00%	50.00%	Delivery and defense of a practice report according to established guidelines. Work will not be picked up if it does not meet these characteristics. For this, attendance at two tutorials (on the dates specified) of the group on the work will be mandatory. Quality of work and presentation will be valued. To be able to make media with the evaluation of other activities (assessment tests) it is necessary to have a minimum score of 4.5 out of 10.
Test	50.00%	50.00%	Assesment tests of the basic conceptual aspects of each of the main topics (topic 2, 3 and 4). To be able to make mediation with the evaluation of other activities (memory defense

			practices) it is necessary to have a minimum score of 4.5 out of 10 in each of the tests.
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

It is necessary to obtain a grade greater than or equal to 4 points in each of the written tests and practice report to be able to average with the rest of the evaluation activities. The average of all the evaluation activities must be equal to or greater than 5 points to pass the subject.

##### Non-continuous evaluation:

Practices¿Report will be delivered and a final theoretical-practical test will be carried out of all the contents, competences, learning results and objectives of the subject. To pass the subject it is necessary to have a minimum grade of 4 to make an average. The average of all the evaluation activities must be equal to or greater than 5 points to pass the subject.

#### Specifications for the resit/retake exam:

A final test will be established for those students who have not met all or any of the evaluation criteria of the final exam, being able to recover the evaluation activities established as mandatory during the course.

#### Specifications for the second resit / retake exam:

The final exam will be a global test of the whole subject.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Unit 1 (de 4): Overview of construction materials.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Mid-term test [PRESENCIAL][Assessment tests]	.25
Final test [PRESENCIAL][Assessment tests]	.25
Teaching period: 1st week	
Unit 2 (de 4): Fundamentals of chemistry.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	13
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	10
Group tutoring sessions [PRESENCIAL][Group Work]	.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	22
Mid-term test [PRESENCIAL][Assessment tests]	1.25
Final test [PRESENCIAL][Assessment tests]	.75
Teaching period: Weeks 1 to 5	
Unit 3 (de 4): Fundamentals of geology	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	12
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	6.5
Group tutoring sessions [PRESENCIAL][Group Work]	.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	22
Mid-term test [PRESENCIAL][Assessment tests]	1.25
Final test [PRESENCIAL][Assessment tests]	.75
Teaching period: Weeks 6 to 11	
Unit 4 (de 4): Processing of construction materials. Basic properties and environment.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	8
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	15
Group tutoring sessions [PRESENCIAL][Group Work]	.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	21
Mid-term test [PRESENCIAL][Assessment tests]	1.25
Final test [PRESENCIAL][Assessment tests]	.25
Teaching period: Weeks 11 to 15	
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	35
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	5
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	25
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	12.5
Mid-term test [PRESENCIAL][Assessment tests]	4
Group tutoring sessions [PRESENCIAL][Group Work]	1.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	65
Final test [PRESENCIAL][Assessment tests]	2

## 10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
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Arredondo y Verdú, Francisco	Generalidades sobre materiales de construcción	Sevicio de Publicaciones, E.T.S. Ingenieros de Cam		84-7493-135-5	1990	Básica
Bustillo Revuelta, Manuel	Materiales de construcción	Fueyo Editores		84-923128-8-2	2005	Basica
Chang, Raymond	Química / Raymond Chang, Williams College ; traducción, Marí	McGraw-Hill		970-10-3894-0	2005	Básica
Instituto Tecnológico Geominero de España	Granitos de España /	Ministerio de Industria y Energía, ITGE,		84-7840-054-0	199	Complementaria
Laffarga Osteret J, Olivares Santiago M.	Tecnología de la Arquitectura y de la Construcción: Materiales de Construcción.	Editan	Sevilla	84-87005-03-9	1995	Básica
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Tarbuck EJ, Lutgens FK	Ciencias de la Tierra	Prentice Hall		84-205-4400-0	2000	Básica
	Mármoles de España.	ITGE,		84-7840-063-X	1991	Complementaria
	Pizarras de España.	Instituto Tecnológico GeoMinero,		84-7840-099-0	1992	Complementaria
Edward Allen and Joseph Iano	Fundamentals of building construction : materials and methods	Hoboken, N.J. : John Wiley & Sons, cop.		978-0-470-07468-8	2009	Basic-English friendly
Bell, F. G.	Engineering geology	Elsevier, cop.	Amsterdam	978-0-7506-8077-6	2007	Basic-English friendly
Malone, Leo J.	Basic concepts of chemistry	John Wiley[and] sons, cop.	New York	0-471-8511-19-1	1989	Basic-English friendly