26440 - Industrial Rocks and Minerals

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	5.0
Year	4
Semester	First semester
Subject Type	Optional
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 course is part of the module " Applied Geology " and is especially recommended for those Students interested in pursuing industrial applications of rocks and minerals.

To take this course basic knowledge of mineralogy and petrology / petrography are needed.

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The main objective of the course is that students acquire a strong background related to the rocks and industrial minerals that allow them to solve problems both scientific and applied to different industrial sectors where these raw materials are used.

In this course, concepts related to the rocks and industrial minerals related to identification, characterization and applications will be discussed. The contents are divided into two modules. Module 1 is dedicated to the study of industrial minerals used as raw materials in several industrial processes. Module 2 is dedicated to the study of industrial rocks used in construction related activities.

5.2.Learning tasks

1. Participatory Lectures (25 hours): focused on understanding and assimilation of the main foundations about industrial minerals and rocks.

2. Laboratory practices (15 hours): identification and characterization of industrial minerals and rocks.

3. Practice with computer support (4 hours)

4. Field trip (6 hours)

5.3.Syllabus

The THEORETICAL PROGRAM is divided into two modules:

I. INDUSTRIAL MINERALS (12.5 hours)

I.1. Refractories and Insulation: Bauxite, Al-Nesosilicates, Magnesite and Asbestos

I.2. Abrasives: Diamond, Corundum, Silica and Garnet.

I.3. Chemical industries: Sulphates, Carbonates, Halite, Borates, Silica sands, Feldspars and Fluorspar

I.4. Fertilizers: Nitrates, Phosphates, Potassium Salts

I.5. Filters: Zeolites and Diatomite

I.6. Non ceramic Clays: Bentonite, Sepiolite, Palygorskite, Talc andKaolinite

I.7. Electronic and Optical materials: Muscovite, Quartz, Beryl and Gold.

II: INDUSTRIAL ROCKS (12.5 hours)

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II.1. Introduction and European regulations of the sector.

II.2. Physical properties of rocks. porous system. mechanical, thermal and aesthetic properties.

II.3. Durability and quality of building rocks.

II.4. Aggregates. Types and properties.

II.5. Cement, lime and gypsum.

II.6. Rocks for the ceramic industry.

The PRACTICAL PROGRAM is divided into two modules

I. INDUSTRIAL MINERALS (9.5 hours)

I.1:Laboratory practices (5.5 hours): Identification of industrial minerals by " *visu* " and XRD and completion of a report which will detail the methodology used, the results obtained and possible applications of the samples studied.

I.2 Computer practices(4 hours) **:** planning and dimensioning of geological deposits using specific software.

II. INDUSTRIAL ROCKS (9.5 hours)

Hidric Laboratory test in constructive rocks

Intrinsic characterization of the rock. Correlation between the texture of the rock and its technological properties. Characterization tests, behavior and quality of the rocks. Correlation between technical petrographic and laboratory tests. It is assessed by means of a placement report on the methodology used and results obtained are detailed.

FIELD TRIPS (6 hours): Two field trips will be done. The first one, we will visiting an industrial minerals deposits and the processing plant. The second one we will visiting a quarry of ornamental rocks and the processing plant

5.4.Course planning and calendar

The lectures take place in classrooms and times indicated on the website of the Faculty of Sciences.

The practical sessions are conducted in the laboratories of Crystallography and Mineralogy Area and Petrology and

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Geochemistry Area of the Earth Sciences Department.

5.5.Bibliography and recommended resources

BB	Bustillo Revuelta, Manuel. Rocas industriales : tipología, aplicaciones en la construcción y empresas del sector / Manuel Bustillo Revuelta, José Pedro Calvo Sorando, Luis Fueyo Casado Madrid : Rocas y Minerales, D.L. 2001
BB	Carretero León, María Isabel. Mineralogía aplicada : salud y medio ambiente / María Isabel Carretero León, Manuel Pozo Rodríguez Madrid [etc.] : Thomson-Paraninfo, D.L. 2007
BB	Chang, L. L. Y.. Industrial mineralogy : materials, processes and uses / Luke L. Y. Chang, Bs., Ph. D. New Jersey : Prentice Hall , cop. 2002.
BB	Industrial minerals and rocks : commodities, markets, and users / edited by Jessica Elzea Kogel... [et al.] . - 7th ed. New York : Society for Mining, Metallurgy, and Exploration, cop. 2006
BB	Jornadas de caracterización y restauración de materiales pétreos en arquitectura, escultura y restauración (1 : . I Jornadas de Caracterización y Restauración de Materiales Pétreos en Arquitectura, Escultura y Restauración : Zaragoza, Junio 2001 / autores, Alonso Rodríguez, Fco. Javier... [et al.] ; editor-coordinador, Josep Gisbert Aguilar . [Zaragoza : Universidad de Zaragoza, Departamento de Geología], 2001
BB	Manning, D.A.C.. Introduction to industrial minerals / D.A.C. Manning. . - 1st ed. London [etc.] : Chapman & Hall, 1995.
BB	Manual de rocas ornamentales : prospección, explotación, elaboración y colocación / [editor López Jimeno, Carlos ; autores Benito Soria, Ana... (et al.)] . - [2a ed.] Madrid : E.T.S. de Ingenieros de Minas de Madrid : LOEMCO [etc.], 1996
BB	Mineralogía aplicada / editor, Emilio Galán Huertos ; Manuel Regueiro González-Barros... [et al.] Madrid : Síntesis, D.L. 2003
BB	Montoto San Miguel, Modesto. La petrofísica, una nueva disciplina en las Ciencias de la Tierra : lección inaugural del curso 1987-88 / Modesto Montoto San Miguel Oviedo : Universidad de Oviedo, 1987
BB	Pensabene, Patrizio. Marmi antichi II.

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BB

Cave e tecnica di lavorazione provenienze e distribuzione. Ed L'Erma di Bretschneider, 1988
Schön, J.H.. Physical properties of rocks : fundamentals and principles of petrophysics / by J.H. Schön . - 2nd ed. [s. l.] : Pergamon, 1998

LISTADO DE URLs:

AENOR. Ensayos tecnológicos - [http://www.aenor.es]
Código Técnico de la Edificación - [http://www.fomento.gob.es/MFOM/LANG_CASTELLANO/DIRECCIONES_GENE
El recorrido de los minerales en Aragón. Gobierno de Aragón - [http://benasque.aragob.es:443/MINERALES/index.html]
Eventos sobre rocas - [http://geology.com/news/category/rocks.shtml]
IGME. Panorama Minero - [http://www.igme.es/internet/PanoramaMinero/PMLin.htm]
MINCRYST: Crystallographic and Crystallochemical Database for Minerals and their Structural Analogues - [http://database.iem.ac.ru/mincryst/]
Mineralogy Database - [http://www.webmineral.com/]
UNED. Crista-Mine - [http://www.uned.es/cristamine/]