

Academic Year/course: 2022/23

## 26440 - Industrial Rocks and Minerals

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 26440 - Industrial Rocks and Minerals

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 296 - Degree in Geology

588 - Degree in Geology

**ECTS:** 5.0

**Year:** 4

**Semester:** First semester

**Subject Type:** Optional

**Module:**

## 1. General information

### 1.1. Aims of the course

SDG 9: Industry, Innovation and Infrastructure

SDG 12: Responsible Consumption and Production

## 2. Learning goals

## 3. Assessment (1st and 2nd call)

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, laboratory sessions, fieldwork and assessment tasks.

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.

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.

### 4.2. Learning tasks

This course is organized as follows:

- **Lectures** (2.3 ECTS): focused on understanding and assimilation of the main foundations about industrial minerals and rocks.
- **Laboratory practices** (1.7 ECTS): identification and characterization of industrial minerals and rocks.
- **Fieldwork** (1.0 ECTS)

Teaching and assessment activities will be carried out on site for as long and as much as possible. This scenario could change if safety regulations related to the covid19 crisis recommended online activities.

### 4.3. Syllabus

This course will address the following topics:

In this course, concepts related to rocks and industrial minerals related to identification, characterization and applications will be discussed.

#### Lectures

##### Section I. Industrial Minerals (11.5 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. Absortion, Filters and Cathalysys: Sepiolite and palygorskite, bentonite, zeolites and diatomites
- I.6. Electronic and Optical materials: muscovite, quartz, beryl and gold.

##### Section II: Industrial Rocks (11.5 hours)

- 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.

#### Practice sessions

##### Section I. Industrial Minerals (8.5 hours)

- 1. Laboratory practices: 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.

##### Section II. Industrial Rocks (8.5 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.

**Fieldwork** (10 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

### 4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website (<https://ciencias.unizar.es>; <https://cienciatierra.unizar.es>) and Moodle.

### 4.5. Bibliography and recommended resources

[http://biblos.unizar.es/br/br\\_citas.php?codigo=26440&year=2020](http://biblos.unizar.es/br/br_citas.php?codigo=26440&year=2020)