Universidad Zaragoza

**Year : 2019/20**

# 27205 - Geology

## Syllabus Information

**Academic Year:** 2019/20
**Subject:** 27205 - Geology
**Faculty / School:** 100 -

**Degree:** 452 - Degree in Chemistry

**ECTS:** 6.0
**Year:** 1
**Semester:** Second semester
**Subject Type:** Basic Education
**Module:**

# 1.General information

### 1.1.Aims of the course

### 1.2.Context and importance of this course in the degree

### 1.3.Recommendations to take this course

# 2.Learning goals

### 2.1.Competences

### 2.2.Learning goals

### 2.3.Importance of learning goals

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

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

# 4.Methodology, learning tasks, syllabus and resources

### 4.1.Methodological overview

This course is oriented to acquire the basic knowledge on geological materials (minerals, rocks, soils and fossil fuels), their principal features, and their industrial uses. A significant part of the course is focused on the structure, properties and study of the crystalline matter, as these topics are directly related to chemistry. In order to fulfill these objectives, lectures are designed to introduce to the student the basic theoretical concepts which, on the other hand, are applied in practice sessions. These practice sessions are devoted to a more detailed study of crystal symmetry, its description and representation and to the identification, classification and description of the properties of geological materials (minerals and rocks).

### 4.2.Learning tasks

This course is divided into four learning activities:

- Activity #1: Lectures, designed to introduce the basic concepts developed during the course (35 hours)
- Activity #2: Practicals on symmetry and geometrical crystallography, working on crystallographic models.(7 hours)
- Activity #3: Practicals on identification of minerals and rocks (10 hours).
- Activity #4: *Field work* (optional, 8 hours, one-day field trip)

### 4.3.Syllabus

The course will address the following topics:

*Part I. Crystalline matter and minerals*

- Topic 1. Introduction to Geology. The definition of mineral.
- Topic 2. The crystalline state and crystalline matter. Periodical lattices. The seven crystal systems. The five two-dimensional lattices. The Bravais lattices. Introduction to internal symmetry.
- Topic 3. Symmetry and rotation. Stereographic projection. Internal and external symmetry. Crystal forms. Crystal growth.
- Topic 4. Minerals. Structure and chemical composition. Classification and relevant groups.

*Part II. Rocks and other geological materials*

- Topic 5. Structure and composition of the Earth. Geological cycles. Rock-forming environments: sedimentary, igneous and metamorphic.
- Topic 6. Magmas and their crystallization. Plutonic rocks vs. volcanic rocks.
- Topic 7. Metamorphism and metamorphic factors. Metamorphic rocks.
- Topic 8. Sedimentary rocks and their formation. Siliciclastics, carbonate rocks and evaporites.
- Topic 9. Coals and oil. Components and evolution stages. Reservoir rocks and oil traps.
- Topic 10. Soils and soil components. Texture and structure. Introduction to soil chemistry. Soil degradation.

*Part III. Uses and applications of minerals and rocks*

- Topic 11. Minerals as commodities: industrial minerals, ores and gem minerals..
- Topic 12. Tectosilicates and phyllosilicates.
- Topic 13. Native elements, sulphides, oxides and hydroxides, sulphates, halides and carbonates.
- Topic 14. Nitrates, phosphates and borates.

***Practice sessions.***

Practicals are divided in laboratory classes (part I and part II) and field work.

- *Part I. Practicals on symmetry and geometrical crystallography.* These practical sessions are oriented to the identification of symmetry elements and symmetry classes of selected crystallographic models, learning to represent these elements in stereographic projection.
- *Part II. Practicals on identification of minerals and rocks.* These practical sessions are oriented to the identification of the relevant properties of selected mineral and rock hand specimens.
- *Field work.* One all-day field trip is scheduled in this course to study and explain several geological outcrops, where the identification of rocks and minerals can be contextualized. The maximum number of attendants to this activity is limited; places will be assigned according to the average grade obtained in the two assessment exercises developed prior to this activity (topics 1 to 4 and 5 to 10).

## 4.4.Course planning and calendar

Lectures, practical sessions and examination dates will follow the scheduling fixed by the Science Faculty, which is published in its website (https://ciencias.unizar.es/calendario-y-horarios). Practical sessions start three weeks after the beginning of the lectures and each students must attend one two-hour practical session per week.

## 4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=27205&year=2019