

COURSE NAME

Name: **MATERIALS CHARACTERIZATION**

Code: 101192

Curriculum: **DEGREE IN ENERGY ENGINEERING AND MINERAL RESOURCES**

Year: 2

Name of the module to which it belongs: COMMON MODULE FOR THE MINING BRANCH

Subject: MATERIALS CHARACTERIZATION

Nature: OBRIGATORY Duration: FIRST SEMESTER

ECTS Credits: 6

Classroom hours: 60

Face-to-face classroom percentage: 40%

Non-contact hours: 90

FACULTY DETAILS

Name: FERNÁNDEZ RODRÍGUEZ, JOSÉ MARÍA (Coordinator)

Department: INORGANIC CHEMISTRY AND CHEMICAL ENGINEERING

Area: QUÍMICA INORGÁNICA

Location of the office: Inorganic Chemistry Laboratory Office

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Name: CANTADOR FERNÁNDEZ, DAVID

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SKILLS

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|------|---|
| CB1 | Have and understand specific knowledge of the field of study of mining engineering. |
| CB2 | Have and understand current and cutting-edge knowledge of the field of mining engineering. |
| CB3 | Be able to apply the knowledge acquired in professional contexts and to elaborate and defend arguments in the field of knowledge of mining engineering. |
| CU2 | Know and refine the user level of ITs. |
| CEC2 | Theoretical and practical knowledge of the chemical, physical, mechanical and technological properties of the materials most used in construction |
| CEC3 | Ability to know, understand and use the principles and technologies of materials. |

OBJECTIVES

This course is part of the "Science and Technology of Materials" subject and of the common module of the Civil Branch. Its objective is to offer students a scientific point of view of the structure and properties of the most commonly used materials in Civil Engineering. This way, they can gain the necessary knowledge of their structure, texture, chemical composition, as well as of the reactions that can occur depending on factors such as temperature or pressure, etc.

CONTENTS:

1. Theoretical contents

- Lesson 1. Structure of crystalline solids.
- Lesson 2. Crystalline imperfections. Point defects.
- Lesson 3. Phase diagrams. Gibbs phase rule.
- Lesson 4. Kinetics of processes in solids.
- Lesson 5. Glasses.

- Lesson 6. Cements.
- Lesson 7. Hydration of Portland cement.
- Lesson 8. Types of Portland cements.
- Lesson 9. Pozzolanas and pozzolanic cements.
- Lesson 10. Corrosion.
- Lesson 11. Engineering Alloys.
- Lesson 12. Ceramic materials.
- Lesson 13. Polymeric materials.
- Lesson 14. Composite materials.

2. Practical contents.

- Exercise 1. Identification of crystalline phases by X-ray diffraction. X-ray program.
- Exercise 2. Identification of crystalline phases by X-ray diffraction. Example of phase identification.
- Exercise 3. Identification of crystalline phases by X-ray diffraction. Determination of mixtures.
- Exercise 4. Chloride and sulfate content in soil and water.
- Exercise 5. Ammonium content in water
- Exercise 6. Calculations in phase diagrams.
- Exercise 7. Calculations in phase diagrams. Problem solving.
- Exercise 8. Company visit.
- Exercise 9. Company visit.