

## **Engineering Geology**

**Contact Hours: 45h00 TP + 15h00 O**

**Scientific Area: Geotecnia**

### **Learning outcomes of the curricular unit:**

- *Highlight the influence of geology in civil engineering;*
- *Show the relevance of natural observation, representative of a Science such as Geology;*
- *Give the specific vocabulary to make understandable the communication between the Civil Engineer and the Geologist or Engineering Geologist;*
- *Provide knowledge for basic geologic information in a Civil Engineering perspective;*
- *Hand-sample identification of the main types of rocks.*
- *To interpret geological maps.*
- *Recognize general features of Portugal geology.*
- *Describe the main processes of geotechnical survey.*
- *Understand the basic characteristics of soils and the relevant classifications applicable.*
- *Identify the mechanisms involved in soil compaction.*
- *Describe rock alteration processes and soil formation.*

### **Syllabus:**

1. Geology and Civil Engineering: Importance of Geology in Civil Engineering. General Geology. Seismology.
2. Mineralogy and Petrology: Mineral and amorphous solids. Mineral classification and properties (macroscopic scale). What is a rock? Rock classification. Rock formation processes.
3. Structural geology: Stress and strain. Folds and fractures (faults and joints).
4. Geological mapping: Geologic maps interpretation: rules and cross sections.
5. Geology of Portugal: Fundamental units.
6. Ground investigation.
7. Rock alteration and soil formation: Weathering and Erosion. Mass movements: types and causes. Concept, genesis and types of soil.

### **Demonstration of the syllabus coherence with the curricular unit's learning objectives:**

Subjects and specific vocabulary studied during the semester are essential to make understandable the communication between the Civil Engineer and his team Geologist or Engineering Geologist when planning and executing a project. The student should be able to analyse the geologic information and understand how it can influence its construction. The main acquired skills to successfully conclude this unit are: analysis of geologic maps information, rock and soil in situ identification, recognition of geologic structures and the main geotechnical surveys needed in Engineering Geology.

### **Teaching methodologies (including evaluation):**

The nature of this unit entails the alternation between theoretical and practical classes. Theoretical classes use slideshow presentation software illustrating the subjects. Practical classes are different depending on the subjects: hand specimen's identification of minerals and rocks, geological maps interpretation, construction of geological cross sections.

Continuous assessment is shared by 2 Tests (2x40%) during the semester and a report of a workgroup with 2 students (20%).

Exam assessment: final grade is 100% exam (minimum grade: 9,5 out of 20) or 80% exam (minimum grade: 9 out of 20) and a report of a workgroup with 2 students (20%).

### **Demonstration of the coherence between the teaching methodologies and the learning outcomes:**

Teaching methodologies, with theoretical and practical classes, allow the student to apply knowledge using analytical methods when identifying hand sample of rocks and minerals, executing geologic cross sections, or recognizing soils for engineering purposes. In more theoretical subject's students are encouraged to search bibliographic information to strengthen his knowledge and get the required skills.