

## Course guides

### 250106 - GEOLOGIA - Geology

**Last modified:** 01/10/2021

**Unit in charge:** Barcelona School of Civil Engineering  
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering.

**Degree:** BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2010). (Compulsory subject).  
BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2017). (Compulsory subject).

**Academic year:** 2021    **ECTS Credits:** 6.0    **Languages:** Catalan, Spanish

#### LECTURER

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**Coordinating lecturer:** JOSE MOYA SANCHEZ

**Others:** JOSE MOYA SANCHEZ

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

3059. Basic knowledge of geology and terrain morphology and the ability to apply it to engineering problems. Climatology.

**Transversal:**

591. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.

597. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

600. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

#### TEACHING METHODOLOGY

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The course consists of 2 hours per week of classroom sessions in large groups (theory and workshops) and 2 hours of practice weekly, half of them in small groups and the other half in the large-sized groups.

In the theory sessions, especially in the workshops, exercises, questionnaires and problems, raised previously, are discussed and assessed in the classroom.

The practical sessions consist of: a) laboratory activities in small groups for rock description and identification; and b) exercises on geological maps (large groups). All the practices are assessed in the classroom.

Additionally, a 5 hours trip for the reconnaissance of geological structures and soils in the field is carried out.

Teaching materials for the activities are provided by means the virtual campus ATENEA: contents of theory and practices, programming of the activities and directed learning.

## LEARNING OBJECTIVES OF THE SUBJECT

Students will acquire a basic understanding of geology, morphology and climatology and learn how these disciplines apply to engineering problems.

On completion of the course, students will have acquired the ability to:

1. Identify specific types of rock and infer their basic mechanical and hydraulic properties;
2. Identify terrain structures and infer some of the basic structural, mechanical and hydrological properties of rocks;
3. Interpret geological maps and construct geological cross-sections using cartographic information and the results of reconnaissance surveys.

Mineralogy and its role in the composition of rocks; Types of naturally occurring rocks: igneous, sedimentary and metamorphic; Structural geology, including faults and joints and basic concepts of plate tectonics; Basic seismology; Geomorphology, in particular its bearing on engineering

4. Teamwork.

## STUDY LOAD

Type	Hours	Percentage
Self study	84,0	56.00
Hours medium group	15,0	10.00
Hours small group	15,0	10.00
Guided activities	6,0	4.00
Hours large group	30,0	20.00

**Total learning time:** 150 h

## CONTENTS

### Introduction

#### Description:

Definition of geology. Basic types of geological processes and products. Interest of geology in civil engineering. Concepts of mineral, rock, superficial formations and soils. Genesis and classification of rocks. Internal and external geodynamics geodynamics: processes and outcomes. Results of external geodynamics. General macroscopic properties of rocks

**Full-or-part-time:** 2h 24m

Theory classes: 1h

Self study : 1h 24m

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## GEOLOGICAL MATERIALS

### Description:

The crystalline material. Macroscopic physical properties of minerals. Classification of minerals. Petrogenetic minerals. Silicates. Carbonates. Evaporite minerals. Petrogenetic interest Minerals

Concept of magma. Reservoirs of igneous rocks. Textures. Mineralogy. Classification. Origin and rise of magmas. Distribution in the lithosphere.

General characteristics and classification. Silicic clastic rocks: texture, composition, classification and formation mechanism.

Carbonate sedimentary rocks: mineralogy and classification, texture, origin of the sediment dolomitization. Evaporitic

sedimentary rocks: Mineralogy, texture, classification and formation mechanism. Site of the sedimentary rocks. Definition of sedimentary formation.

Concepts of metamorphism and metasomatism. Metamorphic processes (crystallisation and development of foliation). Factors metamorphism. Regional and local metamorphism metamorphism. Microstructure of metamorphic rocks. Classification of metamorphic rocks. Common metamorphic rocks

Identify sedimentary, igneous and metamorphic rocks which are common in nature

Description of mechanic behavior of rocks in front of the effort. Mechanic strength of rocks.

Workshop 1: discussion of the questionnaires on geological materials

Workshop 2: on the solution and discussion 1st part theory exam

### Specific objectives:

Identify rocks which are common in nature

### Full-or-part-time: 60h

Theory classes: 11h

Practical classes: 3h

Laboratory classes: 11h

Self study : 35h

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### Geological structure and tectonics

**Description:**

Summaries of the primary structures of the rocks. Determination of the orientation of geological maps

The age of the Earth. Relative dating of rocks and structures. Reconstruction of geological history. The scale of geological time.

Diachrony of lithological formations.

Large continental morphotectonic units. General structure of mountain ranges and their geographical distribution. Transform faults. Continental rift zones. Salt diapirs. Regional Examples

Morphology of the ocean basins. Continental drift. Distribution of earthquakes and active volcanoes. The seafloor and the formation of ocean basins. Subduction zones. Lithospheric plates and plate tectonics. Orogeny and formation of mountain ranges.

Workshop 3: discussion of questionnaires on geological structures and tectonics

Geological maps

**Full-or-part-time:** 40h 48m

Theory classes: 6h

Practical classes: 11h

Self study : 23h 48m

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### Field trip

**Description:**

field trip

**Full-or-part-time:** 14h 23m

Laboratory classes: 6h

Self study : 8h 23m

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Laboratory classes: 6h

Self study : 8h 23m

## GEOMORPHOLOGY

### Description:

Basic geomorphological processes and actors. Products external geodynamics. Water in the ground. Weathering: processes of weathering, weathering resistance, material products of weathering, influence the climate. Degree of weathering and mechanical loss of strength of rocks

Slopes, valleys and interfluve. The hydrological cycle of the slopes. Surface runoff and water erosion on hillsides. Slope movements: definition, requirements for training and classification.

Fluvial erosion and sedimentation. Factors controlling the work of rivers. Qualitative approach to the dynamics of erosion - sedimentation river. Morphology river: channel morphology, morphology of river valleys and alluvial fans.

Concept of coastal zone. Coastal processes. Coastal morphology and coastal environments: coastal erosional and depositional coasts. Submerged and emerged coastal shores. Temporal and spatial scale morphodynamic processes Litor

Item 15: Hydrogeology of rocks and soils

Workshop 4: discussion of the questionnaires on geomorphology

Workshop 5: on the solution and discussion of the 2nd theory and geological maps exams

**Full-or-part-time:** 26h 24m

Theory classes: 6h

Practical classes: 2h

Laboratory classes: 3h

Self study : 15h 24m

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## GRADING SYSTEM

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The grade consists of the following components (the percentages indicate the weight in the mark of the subject):

- 1) Continuous assessment in the classroom (32%): in theory classes and workshops (18%), in petrology practices (7%), in geological maps practices (7%).
- 2) Four exams (68%) grouped into two parts: a) a first part consisting of a theory exam (21%) and a practical exam of petrology (13%), b) a second part consisting of a theory exam (21%) and a geological map exam (13%).

Students will obtain a "no show" mark in the subject in the following cases: 1) unjustified absence to two practices, evaluable classroom activities or deliverables on the designated dates, 2) any exam.

The assessment method for the English group will be identical to that of the other groups.

## EXAMINATION RULES.

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Qualification criteria and admission to reevaluation. Students not passing the regular evaluation will have the option to perform a reevaluation exam in the period set in the academic calendar provided they have completed and delivered all the results of the practices, workshops and theoretical exercises carried out in classroom and the four regular exams. The maximum mark for the reevaluation exam will be five (5.0). The non-attendance of a student summoned to the reevaluation exam, celebrated in the fixed date, cannot give rise to the realization of another exam with a later date. Students who have passed the regular assessment cannot take the reevaluation test.

An extraordinary evaluation exam will be carried out for those students who, due to proven major reasons, have not been able to carry out any of the evaluation exam. This extraordinary exam must be authorized by the head of studies, at the request of the teacher responsible for the subject, and will be carried out coinciding with the reevaluation exam.

## BIBLIOGRAPHY

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- Bastida, F. Geología: una visión moderna de las ciencias de la tierra. Gijón: Trea, 2005. ISBN 8497042026.

### Complementary:

- Anguita Virella; F.; Moreno Serrano, F. Procesos geológicos externos y geología ambiental. Madrid: Rueda, 1993. ISBN 8472070700.
- Gutiérrez Elorza, M. Geomorfología. Madrid: Prentice Hall, 2008. ISBN 978-84-8322-389-5.
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