

Course guide

310705 - 310705 - Fundamentals of Materials, Chemistry and Geology

Last modified: 21/09/2023

Unit in charge: Barcelona School of Building Construction
Teaching unit: 753 - TA - Department of Architectural Technology.

Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019).
(Compulsory subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Lacasta Palacio, Ana Maria

Others: Ramirez Casas, Judith
Haurie Ibarra, Laia
Navarro Ezquerro, Maria Antonia
Corominas González, Andreu

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. FB-4 Knowledge of the chemical features of the materials used in construction, its fabrication processes, the methodology of the trials for determining its features, its geologic origin, the environmental impact, the recycling and the residues management.
2. FE-4 Knowledge of the materials and traditional or prefabricated construction systems used in construction, their varieties and physical and mechanical features which define them.

Transversal:

3. 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.

TEACHING METHODOLOGY

The directed self-learning hours consist on the one hand in teaching theoretical classes (big group) where the professor does a brief explanation to introduce the general learning objectives related with the basic concepts of the subjects. Subsequently and by means of practical exercises the professor tries to encourage and involve the students so that they take part actively in their learning. It is used support material in detailed educational plan format, by ATENEA. Learning objectives by contents, concepts, examples, evaluation activities and directed learning schedule and bibliography. On the other hand, the directed learning hours also consist on teaching problem classes (medium group) where normally the work is done in groups of 3 to 4 members, by means of the resolution of exercises and numerical problems related with the specific learning objectives of each content of the subject.

During the activities fulfilment it is pretended to incorporate some generic competences, like teamwork or effective oral communication. For that there will be developed cooperative learning techniques at class. The lab practices allow to develop basic skills of instruments kind, as well as introduce the students to the scientific method implementation in the resolution of lab problems. Generally after each session out of class tasks are proposed, the students must work individually or in group these tasks, which are the basis of the directed activities.

There also have to be considered the rest of the autonomous self-learning hours like the ones dedicated to the guided readings, the resolution of the proposed problems and the self-learning questionnaires of the different contents by virtual campus ATENEA.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the student:

- should have had acquired knowledge about the fundamentals of chemistry and geology necessary to understand the basic properties of materials
- should be able to describe the characteristics and properties of the different materials
- should to be able to describe and classify rocks and soils.

STUDY LOAD

Type	Hours	Percentage
Hours large group	15,0	20.00
Hours medium group	4,5	6.00
Self study	45,0	60.00
Hours small group	10,5	14.00

Total learning time: 75 h

CONTENTS

C1: Introduction and materials properties

Description:

The content studied in this term is the following:
 Introduction to the materials used in building construction.
 Fundamentals of chemistry and geology.
 Characteristics and physical and chemical properties of the materials.

Related activities:

A1 Laboratory experience and questionnaire on the topic of densities and porosities.
 A2 Practical class about phisico chemical properties of materials

Full-or-part-time: 35h

Theory classes: 7h
 Practical classes: 4h
 Laboratory classes: 3h
 Self study : 21h

C2: Rocks

Description:

Content in this term:

Definition, origin and different types of rock and their properties. Specific characteristics of rocks related to their application.

Common rocks used in the territory.

Related activities:

Activity 3. Rocks recognition

Full-or-part-time: 15h

Theory classes: 3h

Practical classes: 1h

Laboratory classes: 2h

Self study : 9h

C3: Soils

Description:

Content in this term:

Definition of the different types of soils, classification and identification. Analysis of their properties and characteristics from the tests and their results. Geotechnical studies: How they are interpreted (according CTE).

Regulations of reference.

Related activities:

A4 Approach and interpretation of a geotechnical study

A5 Practical exercise on soils classification

Full-or-part-time: 25h

Theory classes: 5h

Practical classes: 2h 30m

Laboratory classes: 2h 30m

Self study : 15h

ACTIVITIES

A1 Laboratory experience and questionnaire on the topic of densities and porosities.

Description:

An experience will be done in class on the determination of the apparent and real densities of a material. Subsequently, the student will answer a questionnaire.

Related competencies :

FB-04. FB-4 Knowledge of the chemical features of the materials used in construction, its fabrication processes, the methodology of the trials for determining its features, its geologic origin, the environmental impact, the recycling and the residues management.

Full-or-part-time: 1h

Laboratory classes: 1h

A2 Practical class about phisco chemical properties of materials

Description:

A practical laboratory session will be held where several of the physical and chemical properties studied in class will be analysed.

Material:

The equipment of the teaching laboratory of EPSEB materials will be used.

Delivery:

Students will be required to submit a report of results.

Related competencies :

FB-04. FB-4 Knowledge of the chemical features of the materials used in construction, its fabrication processes, the methodology of the trials for determining its features, its geologic origin, the environmental impact, the recycling and the residues management.

06 URI N1. 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.

Full-or-part-time: 4h

Laboratory classes: 2h

Self study: 2h

A3 Rocks recognition

Description:

This activity consists on the elaboration of a project proposed after the experience in the Laboratory.

Knowing the characteristics of the rocks and given a purpose of use in a building, determine the possible rocks to use, reasoning the selection criteria. The practice takes place in the Materials Laboratory.

Related competencies :

FB-04. FB-4 Knowledge of the chemical features of the materials used in construction, its fabrication processes, the methodology of the trials for determining its features, its geologic origin, the environmental impact, the recycling and the residues management.

06 URI N1. 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.

Full-or-part-time: 4h

Laboratory classes: 2h

Self study: 2h

A4 Approach and interpretation of a geotechnical study

Description:

The class will be divided in two groups, respecting the students groups. The first group has to approach a geotechnical study with some data, and the other group has to interpret some geotechnical study. The results will be exposed in class.

Related competencies :

06 URI N1. 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.

Full-or-part-time: 5h

Practical classes: 1h

Self study: 4h

A5 Practical exercise on soils classification

Description:

From a sample of soil, the students will complete the classification at the laboratory. Later they will analyse the data of accord with the procedure of Casagrande. The practice will be done in a group.

Material:

Each group must bring a soil sample.

Delivery:

The week following the practice, the students will have to hand in the results of the classification.

Related competencies :

FE-04. FE-4 Knowledge of the materials and traditional or prefabricated construction systems used in construction, their varieties and physical and mechanical features which define them.

FB-04. FB-4 Knowledge of the chemical features of the materials used in construction, its fabrication processes, the methodology of the trials for determining its features, its geologic origin, the environmental impact, the recycling and the residues management.

Full-or-part-time: 2h

Laboratory classes: 2h

GRADING SYSTEM

The final mark is the addition of these partial marks:

$$N_{\text{final}} = 35\% P1 + 10\% L1 + 5\%L2 + 5\%L3 + 10\% QA + 35\% EF$$

N_{final}: Final mark.

P1: Mark of the first exam.

L1: Mark of practice 1

L2: Mark of practice 2

L3: Mark of practice 3

QA: Activities mark (including all the practical work, and questionnaires done during the course).

EF: Mark of final exam

The re-evaluation test will consist of a single test that will include all the contents of the course.

BIBLIOGRAPHY

Basic:

- García Boada, J. ... [et al.]. Características mecánicas de los suelos. Barcelona: Col·legi d'Aparelladors i Arquitectes Tècnics de Catalunya, 1977.
- Arredondo y Verdú, Francisco. Estudio de materiales. Madrid: Instituto Eduardo Torroja de la Construcción y del Cemento, 1983.
- Fernández Olmo, E. Terrenos y ensayos. Madrid: Universidad Politécnica de Madrid, 1986. ISBN 9788460046264.
- Addleson, Lyall. Materiales para la construcción. Barcelona [etc.]: Reverté, 1983. ISBN 84-291-2005X.

RESOURCES

Audiovisual material:

- CES EduPack 2010: Standard & sustainability. Cambridge: Granta Design, 2010. http://cataleg.upc.edu/record=b4906900~S1*cat

Other resources:

Teaching material in Atenea