

Course guide

310716 - 310716 - Non-Stone Materials

Last modified: 03/10/2023

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:** 6.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: Haurie Ibarra, Laia

Others: Gomez Val, Ricardo Jose
Segués Aguasca, Edgar
Leiva Navarro, Juan
Pidemunt Moli, Antoni
Avellaneda Lopez, Alina
Ruiz Merida, Francisco

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.
3. FE-5 Ability to adapt the construction materials to the typology and use of the building, manage and run the receipt and quality control of the materials, its implementation in the construction, the control of execution of the construction units and the realization of trials and final tests.
4. FE-12 Knowledge of the evaluation of the environmental impact of the construction and demolition, the sustainability in the construction, and the procedures and techniques to evaluate the energetic efficiency of the buildings.

Transversal:

5. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world's situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.
6. 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.
7. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
8. 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.
9. 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

In this subject the individual work and teamwork will be promoted.

The in-person classes will be distributed in this way:

- Theoretical classes, where the professor will explain the contents of the subject and will present practical cases to motivate the students.
- Practical classes in the laboratory
- Guided activities.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, students should be able to:

- Describe the characteristics and properties of the different materials.
- Identify and use the current regulations of the building materials.
- Carry out a correct and backed up selection of the materials in the construction field.
- Apply the sustainable and environmental criteria related to the different life cycle phases.

STUDY LOAD

Type	Hours	Percentage
Hours small group	21,0	14.00
Self study	90,0	60.00
Hours large group	30,0	20.00
Hours medium group	9,0	6.00

Total learning time: 150 h

CONTENTS

C1 Ceramics

Description:

In this content the students work:

Raw materials and extraction processes of the ceramic products.
Features and physico-chemical and mechanical properties of the ceramics.
Regulations, trials and quality control of the ceramics used in building.
Ecological and environmental aspects of the ceramics.

Related activities:

Theoretical classes.
Laboratory.
Attendance to a lecture o technical visit.
Control test.

Full-or-part-time: 25h

Theory classes: 6h
Practical classes: 1h 30m
Guided activities: 2h 30m
Self study : 15h

C2 Glass

Description:

In this content the students work:

Raw materials and extraction processes of the different glasses.

Feature and physico-chemical and mechanical properties of the glass products.

Glass used in construction.

Regulations, trials and quality control of the glass used in building.

Ecological and environmental aspects of the glass products.

Related activities:

Theoretical classes.

Laboratory.

Attendance to a lecture o technical visit, viewing of related technical videos..

Control test.

Full-or-part-time: 25h

Theory classes: 6h

Practical classes: 1h 30m

Guided activities: 2h 30m

Self study : 15h

C3 Materials for waterproofing

Description:

C3.1: Bituminous

Description:

This content works on:

Composition, obtaining and properties of bituminous materials. Application of these materials as waterproofing systems in construction.

Regulations and environmental aspects related to bituminous materials.

C3.2: Polymer-based waterproofing systems

Description:

Polymer-based waterproofing systems such as butyl sheets or polyurethane membranes will be treated.

Related activities:

Theoretical class.

Control test.

Full-or-part-time: 25h

Theory classes: 6h

Practical classes: 1h 30m

Guided activities: 2h 30m

Self study : 15h

C4 Wood

Description:

In this content the students work:

Composition and properties of the wood: Macroscopic and microscopic structure of the wood.

Wood products in building.

Problems and lesions of the wood in building.

Regulations, trials and quality control of the wood.

Ecological and environmental aspects of the wood.

Related activities:

Theoretical class.

Attendance to a lecture or technical visit, viewing related technical videos.

Laboratory.

Control test.

Full-or-part-time: 25h

Theory classes: 6h

Practical classes: 1h 30m

Laboratory classes: 2h 30m

Self study : 15h

C5 Metals

Description:

In this content the students work:

Metallic bonding.

Features and physico-chemical and mechanical properties of the metals.

Production and configuration of the different products: metallurgy and iron and steel industry.

Corrosion and rusting.

Diagrams of phases and thermal transformations.

Metal products used in construction.

Regulations, trials and quality control of the metallic products used in building.

Ecological and environmental aspects of the metals.

Related activities:

Theoretical classes.

Attendance to a lecture or technical visit, viewing related technical videos..

Laboratory.

Control test.

Full-or-part-time: 25h

Theory classes: 6h

Practical classes: 1h 30m

Guided activities: 2h 30m

Self study : 15h

C6 Plastics, composites and paints

Description:

In this content the students work:

Definition of polymer and basic concepts related: monomer, polymerization, additives...

Classification of the different polymers: thermoplastic, thermostable, elastomer.

Features and implementations of the different plastic families.

Definition and basic components of a paint.

Implementation of the paints according to the composition.

Compound material concept: matrix and dispersed phase.

Implementation of the compound materials in building.

Ecological and environmental aspects.

Related activities:

Theoretical classes.

Attendance at a conference or technical visit, viewing of related technical videos

Laboratory practices.

Control test.

Full-or-part-time: 25h

Theory classes: 6h

Practical classes: 1h 30m

Guided activities: 2h 30m

Self study : 15h

ACTIVITIES

INFORMATIONAL SKILLS (CONTENT 1)

Description:

Session in charge of the EPSEB library staff. There will be shown the tools accessible to all the students for doing the research works.

Specific objectives:

At the end of the practice the student should be able to:

- . Search information of different aspects related with the materials.
- . Distinguish between reliable and non-reliable information sources.

Material:

Computer tools and computers of the EPSEB computer rooms.

Full-or-part-time: 4h

Practical classes: 2h

Self study: 2h

Laboratory (ceramics)

Description:

Experimental work that will be done in the materials laboratory of the EPSEB.

Specific objectives:

At the end of the activity, the student should be able to:

- . Analyze the material properties.
- . Connect the characterization trials with the material outputs.
- . Identify the most common defects of the ceramics.

Material:

Materials needed to perform the practical part in the laboratory.
Practice guide.

Delivery:

The students will deliver a report that will be evaluated.

Full-or-part-time: 4h

Laboratory classes: 2h

Self study: 2h

Lecture

Description:

Organization of talks by leading companies in the sector and/or highly regarded professionals in the aspects related with the subject topics.

Specific objectives:

At the end of the activity the student should be able to:

- . Understand the given information.

Material:

EPSEB events hall and multimedia equipment.

Delivery:

The lectures will be evaluated with the formulation of questions during the exams.

Full-or-part-time: 4h

Guided activities: 2h

Self study: 2h

Laboratory (glass)

Description:

Experimental work that will be done in the materials laboratory of the EPSEB.

Specific objectives:

At the end of the activity, the student should be able to:

- . Analyze the material properties.
- . Connect the characterization trials with the material outputs.
- . Identify the most common imperfections of the glass.

Material:

Materials needed to perform the practical part in the laboratory.
Practice guide.

Delivery:

The students will deliver a report that will be evaluated.

Full-or-part-time: 4h

Laboratory classes: 2h

Self study: 2h

Control tests (all topics)

Description:

Test performed at the end of each topic.

Specific objectives:

Track the student's learning.

Full-or-part-time: 16h

Theory classes: 3h

Practical classes: 3h

Self study: 10h

Partial test 1: Ceramic, glass, bituminous and waterproofing materials and paints.

Description:

Individual exam at class to evaluate the knowledge acquired until that moment by the students.

Specific objectives:

At the end of the test, the student should be able to:

- . Explain the properties of the studied materials and be able to choose the most suitable.
- . Understand the pathological processes of the materials and be able to prevent them.
- . To value the environmental and normative aspects related with the different materials.

Material:

Wordings.

Delivery:

Resolution of the exam.

Full-or-part-time: 2h

Theory classes: 2h

A11 WOOD LAB PRACTICE (CONTENT 5)

Description:

Experimental work that will be done in the materials laboratory of the EPSEB.

Specific objectives:

At the end of the activity, the student should be able to:

- . Analyze the material properties.
- . Connect the characterization trials with the material outputs.
- . Identify the most common imperfections of the wood.

Material:

Necessary materials for doing the practical phase in the lab.
Practice guide.

Delivery:

The students will deliver a report that will be evaluated.

Full-or-part-time: 4h

Laboratory classes: 2h

Self study: 2h

TECHNICAL VISIT

Description:

Technical visit to observe buildings containing the materials explained in class.

Specific objectives:

At the end of the activity, the student should be able to:

- . Understand the given information.

Delivery:

The content of the visits will be considered as part of the course and will be evaluated in the tests.

Full-or-part-time: 8h

Guided activities: 6h

Self study: 2h

Laboratory (metals)

Description:

Experimental work that will be done in the materials laboratory of the EPSEB.

Specific objectives:

At the end of the activity, the student should be able to:

- . Analyze the properties of the material.
- . Connect the characterization trials with the material outputs.
- . Identify the corrosion and rusting processes of the metals.

Material:

Necessary materials for doing the practical phase at lab.
Practices guide.

Delivery:

The students will deliver a report that will be evaluated.

Full-or-part-time: 4h

Laboratory classes: 3h

Self study: 1h

Parcial exam 2: wood, metals and other non-stone materials

Description:

Individual exam at class for evaluating the knowledge acquired until that moment by the students.

Specific objectives:

At the end of the practice, the student should be able to:

- . Explain the properties of the studied materials and be able to choose the most suitable.
- . Understand the pathological processes of the materials and be able to prevent them.
- . To value the environmental and normative aspects related with the different materials.

Material:

Wordings

Delivery:

Resolution of the exam

Full-or-part-time: 2h

Theory classes: 2h

GRADING SYSTEM

The final mark is obtained from:

$$N_{\text{final}} = 37,5\% N_{p1} + 37,5\% N_{p2} + 10\% PLCT + 15\% PL$$

N_{final}: Final mark of the subject.

N_{p1}: Mark of the 1st exam

N_{p2}: Mark of the 2nd exam

PCT: Tests performed at the end of each lesson

PL&C: Laboratory classes and other deliverables

This subject offers a reassessment exam for students who have failed the course with a grade of at least 3.5. The reassessment exam (re-evaluation) will include all the topics of the course. The final mark of the subject may be a maximum of 5 if the reassessment exam is approved. In the reassessment, only the grade of the re-evaluation exam will be taken into account.

BIBLIOGRAPHY

Basic:

- Alamán Simón, A. Materiales metálicos de construcción. 3a ed. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos, 2000.
- CES EduPack 2010. Standard & sustainability [support en CD-ROM]. Cambridge: Granta Design, 2010.
- Shackelford, James F; Güemes, Alfredo; Martín, Núria. Introducción a la ciencia de materiales para ingenieros [on line]. 7a ed. Madrid [etc.]: Pearson Educación, 2010 [Consultation: 03/07/2023]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1258. ISBN 9788483226599.
- Peraza Sánchez, Fernando. Guía de la madera. Madrid: AITIM, 2010-2014. ISBN 9788487381409.

Complementary:

- Código Técnico de la Edificación (CTE). 2a ed. Madrid: Ministerio de Vivienda: Boletín Oficial del Estado, 2008.
- Sánchez-Marín Pizarro, José M^a; Lasheras, J. M. Conocimiento de materiales. 5a ed. Sant Sebastià: Donostiarra, 1987. ISBN 8440066503.
- Callister, W. D. Introducción a la ciencia e ingeniería de los materiales [on line]. 2a ed. Barcelona: Limusa Wiley, 2009 [Consultation: 24/11/2021]. Available on: <https://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=2616389>.
- Tectónica. Madrid: ATC ediciones, 1996-.

RESOURCES

Other resources:

Wood notes. Published by the building materials section.

Paint notes. Published by the building materials section

Plastic notes. Published by the building materials section

Guide to Ceramic Tile. Guía de la baldosa cerámica (2006). Instituto Valenciano de Edificación. Valencia.