

## Course guide

### 310725 - 310725 - Building Pathology

Last modified: 31/01/2024

**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

#### LECTURER

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**Coordinating lecturer:** Bosch Prat, Mireia

**Others:** Rosell Amigó, Joan Ramon  
Bosch Prat, Mireia  
Olona Casas, Joan

#### PRIOR SKILLS

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Have completed:  
Introduction to construction  
Construction of structures  
Underground construction  
Workshops 1, Workshops 2, Workshops 3 and Workshops 4

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

1. FE-9 Ability to rule about the causes and symptoms of the damages in the buildings, propose solutions to prevent or repair the diseases, and analyse the useful life cycle of the constructive elements and systems.
2. FE-10 Aptitude to intervene in the refurbishment of buildings and the restoration and preservation of the built heritage.

**Transversal:**

3. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.
4. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
5. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.
6. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

#### TEACHING METHODOLOGY

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There will be combined the in-person, directed and autonomous methods. With the combination of the three methods the students will acquire the levels of knowledge, comprehension and application.

The directed learning hours consist on the one hand in teaching theoretical classes (big group) where the faculty does a brief exposition to introduce the general learning objectives related with the basic concepts of the subject. Subsequently and by practical exercises, the professor tries to motivate and involve the students so that they can participate actively in their own learning.

A site visit is planned for the four-month period, depending on the availability of rehabilitation works.

## LEARNING OBJECTIVES OF THE SUBJECT

Ability to develop constructive details in the existing buildings or historic and/or hereditary buildings.

Understand the pathological processes of the construction.

Identify the typology of damages and analyze the causes.

## STUDY LOAD

| Type               | Hours | Percentage |
|--------------------|-------|------------|
| Self study         | 45,0  | 60.00      |
| Hours medium group | 12,0  | 16.00      |
| Hours large group  | 18,0  | 24.00      |

**Total learning time:** 75 h

## CONTENTS

### Module I. Introduction to the methodology for the recognition of buildings

#### Description:

This first section of the subject is focused with the objective of providing an overview of the existing buildings and their state of conservation, establishing an action methodology to be able to carry out injury analysis techniques, building inspections and report writing, opinions and technical documents.

- Recognition methodology: prediagnosis-previous studies-diagnosis
- Of the inspection in the drafting of documents

#### Specific objectives:

This first section of the subject is focused with the objective of providing an overview of the existing buildings and their state of conservation, establishing an action methodology to be able to carry out injury analysis techniques, building inspections and report writing, opinions and technical documents.

- Recognition methodology: prediagnosis-previous studies-diagnosis
- Of the inspection in the drafting of documents

#### Related activities:

Activity Ex1. Exam correspond to the teaching given throughout Module I. The individual continuous assessment test will be carried out in the classroom during the large group sessions. It has a value of 10% with respect to the final grade of the subject Activity Coursework

#### Full-or-part-time: 4h

Theory classes: 3h

Practical classes: 1h

## Module II. Water behavior of buildings

### Description:

The starting point of this module is the set of construction techniques of the envelope. In this module, the physical-chemical behavior of materials will be analyzed in addition to their dysfunctions associated with the role of the building's skin, with special emphasis on filtration, capillarity, superficial and interstitial condensation.

- Presence of water, pathology and diagnosis
- Pathology of materials, mortars, stone and ceramics (1)

### Specific objectives:

Know and understand the physical-chemical behavior of the most common materials in traditional construction in the envelope. Locate the symptoms of the lesions and establish feasible hypotheses of pathological processes in the envelope of existing buildings.

### Related activities:

EX2 activity. Exam correspond to the teaching given throughout Module II. The individual continuous assessment test will be carried out in the classroom during the large group sessions. It has a value of 25% with respect to the final grade of the subject Activity Coursework

**Full-or-part-time:** 8h 20m

Theory classes: 4h 20m

Practical classes: 4h

## Module III. Mechanical-structural behavior

### Description:

This module will analyze the physical-chemical behavior of materials as well as the dysfunctions associated with their mechanical behavior.

- Pathology of materials, wood
- Pathology of materials, metals
- Pathology materials, concrete
- Construction systems, pathology and diagnosis in soils-foundations
- Construction systems, pathology and diagnosis in elements subjected to bending
- Construction systems, pathology and diagnosis in concrete structures
- Construction systems, pathology and diagnosis in arches and vaults

### Specific objectives:

Know and understand the physical-chemical behavior of the most common materials in traditional structures. Locate the symptoms of injuries and establish feasible hypotheses of pathological processes in existing building structures.

### Related activities:

Activity Ex3. Exam correspond to the teaching given throughout Module III. The individual continuous assessment test will be carried out in the classroom during the large group sessions. It has a value of 25% with respect to the final grade of the subject Activity Coursework

**Full-or-part-time:** 12h

Theory classes: 6h

Practical classes: 6h

#### Module IV. performance behavior

**Description:**

The performance requirements at the normative level designed for the new building exceed the demands that affect comfort and safety of the requirements established in traditional architecture. In this module criteria are established to diagnose and reconcile the benefits of traditional architecture versus current regulations.

- Energy pathology and diagnosis
- Pathology and acoustic diagnosis and protection against fire

**Specific objectives:**

Introductory assessment of the performance of existing buildings to improve energy efficiency, comfort and safety.

**Related activities:**

EX4 activity. Exam correspond to the teaching given throughout Module IV. The individual continuous assessment test will be carried out in the classroom during the large group sessions. It has a value of 10% with respect to the final grade of the subject Activity Course Work

**Full-or-part-time:** 4h

Theory classes: 3h

Practical classes: 1h

## ACTIVITIES

#### Ex1 Activity. Exam correspond to Module I

**Description:**

Exam corresponding to the teaching given throughout Module I.

The individual continuous assessment test will be carried out in the classroom during the large group sessions.

It has a value of 10% with respect to the final grade of the subject

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

Theory classes: 2h

#### EX2 activity. Exam correspond to Module II

**Description:**

Exam corresponding to the teaching given throughout Module II.

The individual continuous assessment test will be carried out in the classroom during the large group sessions.

It has a value of 30% with respect to the final grade of the subject

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

Theory classes: 2h

#### Ex3 activity. Exam correspond to Module III.

**Description:**

Exam corresponding to the teaching given at the end of Module III.

It Last until the end of the individual evaluation session continuous in the classroom during the sessions of the large group.

It has a value of 30% respect to the final grade of the subject

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

Theory classes: 2h



#### Ex4 activity. Exam correspond to Module IV.

**Description:**

Exam corresponding to the teaching given throughout Module IV.

The individual continuous assessment test will be carried out in the classroom during the large group sessions.

It has a value of 10% with respect to the final grade of the subject

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

Theory classes: 2h

#### Course work

**Description:**

It has a value of 20% with respect to the final grade of the subject

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

Theory classes: 2h

## GRADING SYSTEM

The subject will be evaluated through assignments and exams. As it is organized with 4 modules, a work and an exam per module is established. Below are the weights of the different activities with respect to the final grade:

Activity Ex1. Exam correspond to Module I (5%)

Activity TR1. Module I Work (5%)

EX2 activity. Exam corresponding to Module II (30%)

Activity TR2. Module II Work (10%)

Activity Ex3. Exam correspond to Module III (30%)

TR3 activity. Module III Work (10%)

EX4 activity. Exam correspond to Module IV (5%)

TR4 activity. Module IV Work (5%)

## EXAMINATION RULES.

All the work must be carried out, and delivered in a timely manner so that they can be evaluated.

You have to take all the exams to pass the subject.

No Re-evaluation exam.

## BIBLIOGRAPHY

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### Basic:

- Fernández Cánovas, M. Patología y terapéutica del hormigón armado. 3a ed. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos, 1994.
- Colegio Oficial de Arquitectos de Madrid. Comisión de Asuntos Tecnológicos. Curso de patología. Conservación y restauración de edificios. Madrid: COAM, 1995.
- Eichler, F. Patología de la construcción : detalles constructivos. Barcelona: Ed. Blume : Labor, 1973.
- Eldridge, H.J. Defectos comunes. Barcelona: Ed. Gustavo Gili, 1982.
- Curso de patología : conservación y restauración de edificios. Tomo 2. Madrid : Colegio Oficial de Arquitectos de Madrid. Comisión de Asuntos Tecnológicos, 1991. ISBN 84-7740-042-3.
- Vegas López-Manzanares, Fernando; Mileto, Camilla. Aprendiendo a restaurar : un manual de restauración de la arquitectura tradicional de la Comunidad Valenciana . Valencia : Generalitat Valenciana, Conselleria de Medi Ambient, Aigua, Urbanisme i Habitatge : COACV, Col·legi d'Arquitectes de la Comunitat Valenciana, DL 2011. ISBN 978-84-86828-93-6.
- Olona Casas, Joan; Bosch Prat, Mireia. Manual energètic de cobertes. CAATEEB, 2019. ISBN 978-84-15195-11-5.
- Curso de patología : conservación y restauración de edificios. Tomo 1. Madrid : Colegio Oficial de Arquitectos de Madrid. Comisión de Asuntos Tecnológicos, 1991. ISBN 84-7740-041-5.
- Curso de patología : conservación y restauración de edificios. Tomo 3. Madrid : Colegio Oficial de Arquitectos de Madrid. Comisión de Asuntos Tecnológicos, 1991. ISBN 84-7740-040-7.

### Complementary:

- Addleson, L. Fallos en los edificios. Barcelona: Ed. Blume, 1986.
- Lesiones en los edificios : síntomas, causas y reparación. Barcelona: CEAC, 1990.
- Mañà i Reixach, Fructuós. Patología de las cimentaciones. Barcelona: Ed. Blume, 1978.
- Caballero Zoreda, L. ... [et al.]. Curso de mecánica y tecnología de los edificios antiguos. Madrid: COAM, 1987.
- Aluminosi. Jornades de debat; Casado, Montserrat. Aluminosi : Jornades de debat : 10 i 11 de juny del 2010 . [Barcelona] : Unitat de Rehabilitació i Medi Ambient del CAATEEB , 2010. ISBN 9788487104855.

## RESOURCES

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### Other resources:

Audiovisual material  
Practical examples of real problems.  
Notes uploaded at the campus atenea