Course guide
310725 - 310725 - Building Pathology

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: 2022  ECTS Credits: 3.0  Languages: Catalan

LECTURER
Coordinating lecturer: Bosch Prat, Mireia
Others: Bosch Prat, Mireia  Olona Casas, Joan

PRIOR SKILLS
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
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
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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>18,0</td>
<td>24.00</td>
</tr>
<tr>
<td>Self study</td>
<td>45,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>12,0</td>
<td>16.00</td>
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</tbody>
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**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 5% with respect to the final grade of the subject
Activity TR1. Work Module I. Writing specific work in groups of 2 people. It has a value of 5% with respect to the final grade of the subject

**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 TR2. Work Module II. Drafting of specific work in groups of 2 people. It has a value of 10% with respect to the final grade of the subject

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 TR1. Work Module III. Drafting of specific work in groups of 2 people. It has a value of 10% with respect to the final grade of the subject

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 5% with respect to the final grade of the subject.
TR4 activity. Work Module IV. Drafting of specific work in groups of 2 people. It has a value of 5% with respect to the final grade of the subject.

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 5% 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.
Tea in 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 5% with respect to the final grade of the subject

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

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**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%)

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**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.

**Re-evaluation**

The student who has failed the subject with a numerical mark between 3.5 and 4.9 will have the opportunity to do an unique reappraisal exam, which will include all the contents of the subject and will be done in a settled term. If the student passes the exam, his/her final mark of the subject will be 5.0.

The student can not do this reappraisal exam if:
- i) they have already passed the subject.
- ii) The student's final mark is less than 3.5 (including NP).
**BIBLIOGRAPHY**

**Basic:**

**Complementary:**

**RESOURCES**

**Other resources:**
Audiovisual material
Practical examples of real problems.
Notes uploaded at the campus atenea