

## 28625 - Buildings: Maintenance and Rehabilitation

### Syllabus Information

---

**Academic Year:** 2020/21

**Subject:** 28625 - Buildings: Maintenance and Rehabilitation

**Faculty / School:** 175 - Escuela Universitaria Politécnica de La Almunia

**Degree:** 422 - Bachelor's Degree in Building Engineering

**ECTS:** 6.0

**Year:** 3

**Semester:** Second semester

**Subject Type:** Compulsory

**Module:** ---

## 1.General information

### 1.1.Aims of the course

The subject and its expected results respond to the following approaches and objectives:

To know the different existing pathologies in the construction event.

Begin with the terminology and vocabulary appropriate to the student, so that they can express themselves with technical and scientific rigor.

To accustom the student to reasoning, so that he/she understands why a constructive element presents an injury, reasoning and understanding by the same, in a deductive manner, the reason for the observed deficiencies.

To provoke the capacity of deduction and analysis so that, from the observed deficiencies, he/she deduces the concrete cause or causes that have provoked them.

Encourage the student's ability to observe, to provoke their ability to see, distinguishing the materials and construction techniques used.

To provoke in the student the capacity to give adequate solutions in the presence of injuries in the buildings.

### 1.2.Context and importance of this course in the degree

The subject of Building Maintenance and Restoration is part of the Degree in Technical Architecture taught by EUPLA, and is part of the group of subjects that make up the module called Specific Training. This is a second year course located in the fourth semester and is compulsory (OB), with a teaching load of 6 ECTS credits.

This subject has an important impact on the acquisition of the skills of the degree, since it is the only compulsory subject in which the student acquires knowledge regarding intervention techniques in the rehabilitation and recovery of buildings.

By "Babé". Maintenance is nothing more than the work that must be carried out in a cyclical manner for the attention of the equipment and the component elements of the constructions in order to correct their deficiencies, and to efficiently maintain the services they provide with special emphasis on those parts that due to their continuous use or their location are more exposed to deterioration.

The need for the course within the curriculum of this degree is more than justified due to the attributions of the Technical Architects in the drafting of Building Rehabilitation Projects and in the Direction of Execution of the works, within the limits marked by respect for the architectural and structural configuration.

### 1.3.Recommendations to take this course

Given that the subject of Maintenance and Rehabilitation of Buildings requires a comprehensive analysis of the building's construction systems, it is considered necessary that the student has previously acquired knowledge in the subjects of:

- Building Materials I, II and III
- Structures I, II and III
- Building I, II and III
- Facilities I and II.

Therefore, it is considered advisable that the student has studied the previous subjects.

## 2.Learning goals

### 2.1.Competences

By passing the course, the student will be more competent to have.

- Capacity of organization and planning. Problem solving skills. Decision-making capacity
- Ability to define the function of each of the construction elements in relation to the requirements placed on it. Ability to communicate orally and in writing in the native language
- Ability to analyse and synthesise Information management skills
- Critical thinking skills
- Ability to work in an interdisciplinary team
- Improvisation and adaptation skills to face new situations Leadership skills
- Positive social attitude towards social and technological innovations
- Reasoning, discussion and presentation of own ideas
- Communication skills through word and image
- Information search, analysis and selection skills
- Possibility of applying their knowledge to their work or vocation in a professional way and possessing the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study.
- Ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues.
- Knowledge of traditional or prefabricated materials and construction systems used in building, their varieties and the physical and mechanical characteristics that define them.
- Ability to identify the elements and construction systems, to define their function and compatibility and their implementation in the construction process. To propose and solve constructive details.
- Ability to rule on the causes and manifestations of building injuries, propose solutions to prevent or remedy the pathologies, and analyze the life cycle of the elements and construction systems.
- Ability to intervene in the rehabilitation of buildings and in the restoration and conservation of the built heritage

### 2.2.Learning goals

The student, in order to pass this course, must demonstrate understanding of the following concepts:

- The meaning of the terms and vocabulary related to Rehabilitation and Pathology, achieving an introduction to the learning process of the course
- The knowledge of the construction systems of old buildings, which will provide the student with clear criteria on how to work with the building, helping him/her to know the causes of the injury.
- Differentiation of the types of works.
- Identification of the components of the construction elements. To define the types of existing maintenance.
- Calculation of the costs of Maintenance and Rehabilitation of the buildings.
- Ability to define the function of each of the construction elements in relation to the requirements that are demanded.
- Knowledge of the intervention techniques to be applied according to the construction system.
- Detail construction solutions based on previous conditions imposed by the existing elements in the building. - Analysis and correct application of the different constructive solutions for repairing injuries based on the previous conditions.
- Ability to discern the etiology of the lesion based on existing symptoms
- Ability to act in a reasoned and reasonable manner, making sound decisions and taking responsibility for them
- Ability to make pathological reports of construction injuries

- Application of the necessary methodology of the previous studies whatever the intervention to be carried out in the building.
- Reasoning capacity for situations that arise prior to and during the application of building intervention techniques.

### 2.3.Importance of learning goals

Through the achievement of the pertinent learning results, the necessary capacity is obtained for the understanding of the pathological processes in the buildings, deducing the origin of the problem from the study and analysis of the observed symptomatology, an essential question for the accomplishment of the proposal of suitable intervention, giving rise to the recovery of the element or constructive system and according to its extension, of the building. Through the knowledge acquired, training is acquired for the drafting of Technical Building Inspections.

The correct and timely implementation of measures and works in the various stages of a building's life has a considerable influence on the costs of a building.

## 3.Assessment (1st and 2nd call)

### 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

Calendar of classroom sessions and presentation of work

The following table shows the indicative schedule that includes the development of the activities presented above, which may vary depending on the development of the teaching activity.

The dates of the final exams will be those officially published on

<http://www.eupla.es/secretaria/academica/examenes.html>.

The written assessment tests will relate to the following subjects:

- **Test 1:** subjects 1, 2, 3, 4, 5, 6 and 7
- **Test 2:** subjects 8, 9, 10, 11 and 12 The contents on which the work will be developed appear in this teaching guide, being delivered in the week following the completion of the subject to which the work corresponds, specifying the dates in the course of the subject.

Contents

Contents of the subjects that are indispensable for obtaining the learning results

The guidelines followed to elaborate the contents were the following:

- The contents proposed in the verification report were respected.
- An agenda was developed whose chapters generally correspond to the titles of the specified program. When this was not done, it was because of its extension and/or correlation it was included in another one.
- A bibliography of recognized technical solvency, classic and current editions was selected.
- The best topics in the bibliography were selected and turned into a unique text, with its own design and format, and innovative didactic resources. The professor has not pretended to be unpublished in its elaboration, it has been based on texts of recognized prestige, only the objectives, organization and presentation of the material and writing of some sections of the topics are original.
- The main characteristics of the text's form can be summarized in having twelve themes, coinciding with the contents, developed in a complete way, avoiding summaries.

The course program is structured around two complementary content components:

- Theoretical.
- Practical work

Theoretical contents

The visualization, by means of presentations through the projection of photographs of pathologies in buildings or construction systems of constructions and their treatment and repair, supposes for the students, the opportunity to be able to visualize real cases happened. Due to the specialization of the subject matter, it is often difficult to find rehabilitation works nearby that provide in the specific case of the topics that are developed during the course.

Each subject exposed in the previous section, has associated practical works on it, where the student will be able to apply the acquired knowledge carrying out the resolution of practical assumptions. These

Practices will be raised either in class or through the Moodle platform.

Practical contents

Material resources

In order to achieve the learning results, the following activities will be developed:

- **Generic presential activities:**
  - **Theoretical classes:** The theoretical concepts of the subject will be explained and reasoned.
  - **Practical classes:** They will be materialized through visualizations of projections in PPT of real cases of rectification and repair of injuries as a complement to the theoretical concepts studied. When security and availability allow, works in process of rehabilitation will be visited.
- **Generic non-presential activities:**
  - Study and assimilation of the theory presented in the master classes.
  - Understanding and assimilation of pathologies and injuries, visualized in the real cases seen in the practical classes
  - Preparation of seminars and tutorials, etc.
  - Preparation of the works of each one of the subjects of the course. This part is included in non-presential activities since the students must go to the area where the work is to be done in order to take the necessary data and observations.
  - Preparation for the written tests of continuous assessment and final examinations.
- **Autonomous tutored activities:**

Although they will be more of a face-to-face event, they will be focused mainly on seminars and tutorials under the supervision of the teacher, to supervise and support the progress of the work
- **Reinforcement activities:**

Of a markedly non-presential nature, through a virtual teaching portal (Moodle) various activities will be directed to reinforce the basic contents of the subject. These activities may be personalized or not, and their execution will be controlled through the portal.

Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)The weekly schedule for the course can be found at [www.eupla.unizar.es](http://www.eupla.unizar.es)

## 4.Methodology, learning tasks, syllabus and resources

### 4.1.Methodological overview

The learning process that has been designed for this subject is based on the following

Strong teacher/student interaction. This interaction is materialized through a division of work and responsibilities between students and teachers. However, it must be taken into account that to a certain extent students will be able to set their own learning pace according to their needs and availability, following the guidelines set by the teacher.

The subject of Maintenance and Rehabilitation of Buildings is conceived as a unique set of contents, but worked under three fundamental and complementary forms as they are: the theoretical concepts of each didactic unit, the visualization of problem solving and the accomplishment of practical works on the part of the student.

Teaching will be organized according to the following guidelines:

- **Theoretical classes:** Theoretical activities given in a fundamentally expository way by the teacher, in such a way that the theoretical supports of the subject are exposed, highlighting the fundamental, structuring them in topics and/or sections and relating them to each other.

**THEORETICAL CLASSES MAY BE REPLACED BY A LEARNING TYPOLOGY THAT INVOLVES THE STUDENT READING THE TOPICS BEFOREHAND AND REPLACING THE MASTER CLASSES WITH GROUP TUTORIALS.**

- **Practical classes:** The teacher solves problems or case studies for illustrative purposes. This type of teaching complements the theory presented in the master classes with practical aspects. The teacher will present, through examples and real cases, the most common pathologies within the building process so that the student can visualize and better understand the causes that provoke them and their rehabilitation.
- **Seminars:** The total group of theory classes or practical classes may or may not be divided into smaller groups, as

appropriate.

They will be used to analyze cases, solve assumptions, solve problems, etc. Unlike what happens with practical classes, the teacher is not the protagonist, limiting himself or herself to listening, attending, orienting, clarifying, assessing and evaluating. The aim is to encourage student participation, as well as to try to facilitate the continuous evaluation of students and to know the learning performance.

- **Group tutorials:** Scheduled learning follow-up activities in which the teacher meets with a group of students to guide their autonomous learning tasks and tutoring of directed work or work that requires a very high degree of advice from the teacher.
- **Individual Tutorials:** These are those carried out through the personalised attention, on an individual basis, of the teacher in the department. They aim to help solve the doubts that students encounter, especially those who, for various reasons, cannot attend group tutorials or need more personalized attention.

These tutorials may be face-to-face or virtual.

?If classroom teaching were not possible due to health reasons, it would be carried out on?line?

## 4.2.Learning tasks

This course is organized as follows:

- **Theory sessions:** The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
- **Practice sessions:** Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- **Workshops:** This work is tutored by a teacher, in groups of no more than 20 students.
- **Autonomous work and study.**
  - Study and understanding of the theory taught in the lectures.
  - Understanding and assimilation of the problems and practical cases solved in the practical classes.
  - Preparation of seminars, solutions to proposed problems, etc.
  - Preparation of laboratory workshops, preparation of summaries and reports.
  - Preparation of the written tests for continuous assessment and final exams.
- **Individual tutorials.**

## 4.3.Syllabus

The program offered to the student to help him/her achieve the expected results includes the following activities.

They involve the active participation of the students, so that in order to achieve the learning results the following activities will be developed, without the intention of redounding to what has been previously exposed:

- Generic classroom activities:
  - **Theoretical classes:** The theoretical concepts of the subject will be explained.
  - **Practical classes:** They will be visualized through projections in PPT, cases of injuries in buildings or construction systems and their correction as a complement to the theoretical concepts studied. When safety and availability allow, visits to works in the process of rehabilitation will be made.
- Tutored independent activities Generic non-presential activities:
  - Study and assimilation of the theory exposed in the master classes.
  - Understanding and assimilation of pathology and injury resolution, visualized in the practical cases seen in the practical classes.
  - Preparation of seminars and tutorials.
  - Preparation of the works of each one of the subjects of the course. This part is included in non-presential activities since the students must go to the area where the work is to be done in order to take the necessary data and observations.
  - Preparation of written assessment tests
- **Autonomous tutored activities:** Although they will be more of a face-to-face event, they will be focused mainly on seminars and tutorials under the supervision of the teacher.

- **Reinforcement activities:** Of a markedly non-presential nature, through a virtual teaching portal (Moodle) various activities will be directed to reinforce the basic contents of the subject. These activities may be personalized or not, and their execution may be controlled through the same.

#### 4.4.Course planning and calendar

Proposed activities and key dates of the course.

All these programmed activities are understood to be specified for information purposes, depending on the actual dates of the school calendar.

Variations on the syllabus or the work planned may be due to the practical nature of the subject and the possibility of acting on a real case that enriches the student.

##### Presentation of the first practical work

##### Practical Work 1. Study of a building injury.

##### Presentation of the second practical work.

##### Practical Work 2. Proposed Examination Questions.

##### Presentation of the third practical work.

##### Practical Work 3. Integral rehabilitation of a building.

- **Theme I Introduction to Rehabilitation: 2 school days**
- **Theme II Symptoms of Pathologies, Fissures and Cracks: 3 school days**
- **Topic III 2 school days**
- **Theme IV Movements in foundations: 3 school days.**
- **Topic V Foundation Underpinnings: 2 school days**
- **Topic VI Pathologies in concrete structures. 2 school days**
- **Theme VII Intervention in reinforced concrete structures. 2 school days**

Examination of the first partial of the subject.

Delivery of the first practical work

- **Theme VIII Pathologies in wooden structures 2 teaching days**
- **Theme IX Injuries due to the presence of water in buildings: 3 teaching days**
- **Theme X Rooftop Pathology: 2 teaching days**
- **Theme XI Facade Pathology: 3 teaching days**
- **Theme XII Maintenance of the buildings 1 school day**

Delivery of the second practical work

Examination of the second part of the subject.

Delivery of the third practical work Final exam of the subject.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of EUPLA website and Moodle.

#### 4.5.Bibliography and recommended resources

The bibliography, is updated in the following link:

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28625>