310151 - Diagnosis for Rehabilitation

Coordinating unit: 310 - EPSEB - Barcelona School of Building Construction
Teaching unit: 753 - TA - Department of Architectural Technology
748 - FIS - Department of Physics

Academic year: 2017

Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2015). (Teaching unit Optional)
BACHELOR'S DEGREE IN BUILDING CONSTRUCTION SCIENCE AND TECHNOLOGY (Syllabus 2009). (Teaching unit Optional)

ECTS credits: 3

Teaching languages: English

Teaching staff

Coordinator: JUAN RAMON ROSELL AMIGO

Others: MONTSERRAT BOSCH GONZALEZ - MARIA ANTONIA NAVARRO EZQUERRA

Opening hours

Timetable: Generally agreed.

Degree competences to which the subject contributes

Specific:
1. FB-1 Aptitude to use the applied knowledges related with the numerical and infinitesimal calculus, linear algebra, analytic and differential geometry, and the probabilistic and statistical analysis techniques and methods.
2. FB-2 Applied knowledge of the general mechanics principles, the statics of structural systems, the mass geometry, the principles and methods of analysis of the elasticity of solids.
3. 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.
4. 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.
5. 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.
6. FE-10 Aptitude to intervene in the refurbishment of buildings and the restoration and preservation of the built heritage.

Transversal:
7. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
8. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
9. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
10. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.
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Teaching methodology

This subject will promote the work in groups aimed to the learning oriented to the resolution of problems (PBL). The in-person classes will be distributed as:
- Theoretical classes, in big group, where the professor will explain the contents of the subject and will present practical cases to motivate the students.
- Lab classes with a total of 3 practices.
The in-person classes will be complemented with the different directed activities.

Learning objectives of the subject

The subject pretends that the student assimilates the knowledge related with the pathological processes and the methodologies of diagnosis typical of each material and constructive system. At the end of the course the students should be able to:
. Determine, explain and define correctly the pathological processes in construction.
. Identify the symptoms.
. Use the appropriate methodologies of diagnosis.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 75h</th>
<th>Hours large group: 12h</th>
<th>16.00%</th>
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<td>Hours medium group: 9h</td>
<td>12.00%</td>
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<tr>
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<td>Hours small group: 9h</td>
<td>12.00%</td>
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<td></td>
<td>Guided activities: 0h</td>
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<td>Self study: 45h</td>
<td>60.00%</td>
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The in-person classes will be distributed as:
- Theoretical classes, in big group, where the professor will explain the contents of the subject and will present practical cases to motivate the students.
- Lab classes with a total of 3 practices.
The in-person classes will be complemented with the different directed activities.
**Content**

| C1 Introduction. General concepts and definitions. | Learning time: 3h  
Theory classes: 2h  
Self study: 1h |
|---|---|
| **Description:**  
In this content the students work:  
The introduction of the subject with the will of set general and specific concepts, as well as the appropriate nomenclature. | |

| C2 Characteristics of materials and water. | Learning time: 6h  
Theory classes: 2h  
Self study: 4h |
|---|---|
| **Description:**  
In this content the students work:  
Interpretation of the materials (and the construction materials) from the scientific foundation: incorporation of the knowledge in physics, chemistry, geology, heat transfer, hygrometry, deformation under loads, etc.  
The water as direct agent and the water as mobilising conductor of substances. Correlation with the porous network.  
**Related activities:**  
See explanation of the directed activity 1. | |

| C3 Tools of support to the diagnosis. | Learning time: 4h  
Theory classes: 1h  
Laboratory classes: 1h  
Self study: 2h |
|---|---|
| **Description:**  
In this content the students work:  
The measurement and trial tools are presented, the various tools to use for valuing quantitatively and qualitatively various parameters. With special emphasis in the applicability and the type of result and its interpretation.  
**Related activities:**  
See the explanation of the directed activity 1. | |
### C4 Diagnosis of pathological processes.

**Learning time:** 47h  
- Theory classes: 14h  
- Laboratory classes: 2h  
- Self study: 31h

**Description:**  
In this content the students work:  

**Related activities:**  
See the explanation of the directed activity 1.

### C5 Energetic evaluation of buildings

**Learning time:** 8h  
- Theory classes: 3h  
- Self study: 5h

**Description:**  
In this content the students work:  
The basic concepts of the energy consumption associated to the use and the construction typology. There will be given the basic tools for evaluating the current condition of the buildings as well as making intervention proposals.

**Related activities:**  
See the explanation of the directed activity 1.

### C6 The documents

**Learning time:** 3h  
- Theory classes: 1h  
- Self study: 2h

**Description:**  
In this content the students work:  
The different documents which it is possible to set a diagnosis work.

**Related activities:**  
See the explanation of the directed activity 1.
## Planning of activities

| **A1 STUDY OF DIAGNOSIS. (ALL OF THE CONTENTS)** | **Hours:** 2h  
Guided activities: 2h |
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<td><strong>Description:</strong></td>
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Realisation of a course exercise. The students, in groups of 3 members, will develop the diagnosis of a real building.  
The building must be chosen, proposed by the faculty or the students (with the approval of the professor).  
Depending on the features of the chosen building there will be defined the necessary contents of the work to develop. |
| **Support materials:** |  
Projects of diagnosis, available in the library, done by former students as TFC.  
Contents and material provided during the theory sessions.  
The material and equipment necessary for the realisation of the measurements which can be done at the lab or with the instruments "in situ".  
Complementary and specific bibliography. |
| **Descriptions of the assignments due and their relation to the assessment:** |  
The student or the small group (depending on the case) will deliver an only document. This document, with the following of the study process, will be the reason of the evaluation. It represents the 50% of the final mark of the subject. |
| **Specific objectives:** |  
At the end of the work the student must be able to face, with determination, a professional task of making and writing of a diagnosis. |

| **A2 FINAL EXAM** | **Hours:** 2h  
Theory classes: 2h |
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Individual exam at class with a part of the minimum theoretical essential concepts of the subject (90 to 120 minutes). |
| **Support materials:** |  
Exam wordings, calculator for the realisation of the exam. |
| **Descriptions of the assignments due and their relation to the assessment:** |  
Resolution of the exam. It represents the 50% of the final mark of the subject. |
| **Specific objectives:** |  
At the end of the exam, the students should be able to:  
. Determine, explain and define correctly the processes of variation of the construction materials, apply methodologies of diagnosis and rule from the observed symptoms and the obtained data. |
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**Qualification system**

The final mark is determined as the addition of these partial marks:

\[ N_{\text{final}} = 0.5 \cdot N_{\text{pf}} + 0.5 \cdot N_{\text{ac}} \]

- \( N_{\text{final}} \): Final mark.
- \( N_{\text{pf}} \): Mark of the final exam.
- \( N_{\text{ac}} \): Mark of the continuous evaluation.

From this expression:

The final exam consist on one part with questions about concepts associated to the learning objectives of the subject. The students have 2 hours for doing it.

The continous evaluation consist on doing different activities, individually and in groups, with summative and educational nature. The activities will be done during the course (in and out of class).

**Regulations for carrying out activities**

If some of the continous evaluation activities is not done, it will be considered as non-marked.

**Bibliography**

**Basic:**


**Complementary:**