Course guide
310613 - 310613 - Fundamentals of Civil Engineering

Unit in charge: Barcelona School of Building Construction
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.
Degree: BACHELOR’S DEGREE IN GEOPHYSICAL AND GEOMATICS ENGINEERING (Syllabus 2016).
(Compulsory subject).
Academic year: 2022 ECTS Credits: 4.5 Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: Josep A. Gili
Others: Rodrigo Miró Recasens

REQUIREMENTS
It is planned to make several field trips to visit some typical civil works, both in execution and in operation. We will also visit civil engineering laboratories. For this reason students must be covered by school insurance. This is automatic for students under the age of 28. Seniors must opt for the optional insurance offered at the time of registration, or prove equivalent or higher insurance to the center. Otherwise, they will not be able to make the visits, being severely limited their learning and the options to pass the subject.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES
Specific:
1. (ENG) Comprendre i analitzar els problemes de implantació en el terreny de les infraestructures, construccions i edificacions projectades des de l’enginyeria en topografia, analitzar els mateixos i procedir a la seva implantació.
2. (ENG) Planificació, projecte, direcció, execució i gestió de processos i productes d'aplicació a l'obra civil i l'edificació, dins l'àmbit geomàtic.
3. Knowledge about construction methods; analysis of structures; design, execution and control of infrastructures in the work with interdisciplinary teams, knowledge of hydraulics.
4. Knowledge about security, health and labour risks inside the scope of this engineering and its application and development.

Transversal:
5. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.
6. 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.

TEACHING METHODOLOGY
The classes will be eminently practical, both in the classroom and in the field (visits). The 3 hours per week in common (students-teachers) will be used for sharing previously prepared content (classroom) or for analysis of the works and organizations visited. After each activity there will be post-session tasks, to be done individually or in small groups.

The moodle teaching intranet (ATENEA) will be used as a repository of basic and complementary documentation for each activity, as well as for the delivery of the post-session deliverables.

All the activities will be assessed (marked), even the assistance (face-to-face or, when it is indicated, online) and the active participation of each individual in the common sessions.

During the semester we will incorporate some generic skills, such as teamwork, critical thinking, the search for new solutions, sustainability and social and environmental commitment.
LEARNING OBJECTIVES OF THE SUBJECT

At the end of the subject, the student must:

- Understand the main types of public works, their purpose, their parts and their basic nomenclature.
- Know the raw materials and machinery used in the construction of these civil engineering works.
- Identify differently the different actors involved in the public work (endusers, owners, builders, developers, administrations).
- Be able to distinguish the execution phases of a civil engineering project, from the initial idea to the exploitation and possible final deconstruction.
- Know how a work is designed and managed, especially in relation to the monitoring and control during execution.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>18,0</td>
<td>16.00</td>
</tr>
<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>27,0</td>
<td>24.00</td>
</tr>
</tbody>
</table>

Total learning time: 112.5 h

CONTENTS

- **Materials and elements necessary for a construction**

  **Description:**
  Presentation of the subject
  Make known the materials, from their properties, to how can they be improved, in their case, until the application in construction.
  Necessary auxiliar elements for the correct geometric definition and for its positioning.
  The grounds and rocks. The materials used in the construction. The auxiliar materials necessary for the application in construction.
  Projection of related videos and circle table.

  This content will be carried out in the first lective weeks.

  **Full-or-part-time:** 6h
  Theory classes: 3h
  Self study : 3h

- **The principles of geotecnichs. The foundations. Concrete structures.**

  **Description:**
  It will be treated the main knowledge about the the ground mechanics and study of the soil, necessaries for the definition of determined foundations that can transmit the charges of the structure. It will also be defined the different types of foundation, the elements that form a structure and its implantation in the space. It will be done special emphasis on the bridges.
  Projection of related videos and circle table.

  This content will be made in the fourth, fifth and sixth week.

  **Full-or-part-time:** 6h
  Theory classes: 3h
  Practical classes: 3h
- Constructive processes of linear works

**Description:**
It will be treated the different phases of the construction in linear works, with emphasis in roads, railways and tunnels. It will be studied the adequate machinery in each case and how it is done the tracking, the topographic and geodesic control. Projection of related videos and the circle table.

**Full-or-part-time:** 6h  
Laboratory classes: 3h  
Self study: 3h

- Constructive processes of maritime works

**Description:**
It will be treated maritime and portuary works with a big surface and that also have specific conditions that affect the machinery to use and the constructive processes. It will be talked about ground consolidation, maritime machinery and phases in the construction. In each phase it will be talked about monitoring and topographic and geodesic control. Projection of related videos and circle table.

**Full-or-part-time:** 6h  
Theory classes: 3h  
Practical classes: 3h

- Introduction to hydraulic

**Description:**
It will be treated the basic concepts of piping and canal hydraulics, beginning by the geometric notions that will define the hydraulic section to the aspects of fluid dynamics like speed, the volume of water and flow.

It will be described the hydraulic infrastructures like pipes, canals and dams.

**Full-or-part-time:** 6h  
Theory classes: 3h  
Guided activities: 3h

**ACTIVITIES**

- VISIT to Civil Engineering Lab-1

**Description:**
A Civil Engineering Laboratory will be visited, a visit linked to the content covered in the joint sessions.

**Full-or-part-time:** 6h  
Practical classes: 3h  
Guided activities: 3h
- VISIT to Civil Engineering Lab-2

**Description:**
A Civil Engineering Laboratory will be visited, a visit linked to the content covered in the joint sessions.

**Full-or-part-time:** 6h  
Practical classes: 3h  
Guided activities: 3h

- VISIT TO A PUBLIC WORK-1

**Description:**
A work in execution linked to the contents explained and worked on will be visited.

**Specific objectives:**  
See in situ some of the contents explained in class.

**Full-or-part-time:** 6h  
Practical classes: 3h  
Guided activities: 3h

- VISIT TO A PUBLIC WORK-2

**Full-or-part-time:** 6h  
Practical classes: 3h  
Guided activities: 3h

- VISIT TO A PUBLIC WORK-3

**Full-or-part-time:** 6h  
Practical classes: 3h  
Guided activities: 3h

- VISIT TO A PUBLIC WORK-4

**Full-or-part-time:** 6h  
Practical classes: 3h  
Guided activities: 3h

- VISIT TO A PUBLIC WORK-5

**Full-or-part-time:** 6h  
Practical classes: 3h  
Guided activities: 3h
**- VISIT TO a public organism related to Civil Engineering-1**

**Description:**
An organization related to Civil Engineering will be visited, a visit linked to the content covered in the joint sessions.

**Full-or-part-time:** 6h
- Practical classes: 3h
- Guided activities: 3h

**- VISIT TO a public organism related to Civil Engineering-2**

**Full-or-part-time:** 6h
- Practical classes: 3h
- Guided activities: 3h

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**GRADING SYSTEM**

The subject is passed by learning and continuous assessment. All the activities directed by the subject are object of evaluation: before the classes and visits, they will have to be prepared (search and study of previous documentation); during classes and visits active participation by students will be valued; the works or product reports after the joint activity (directed, individual or small group activity) will be valued. In parallel to the joint sessions, he will be in charge of reading book chapters, watching videos, preparing "inter-pares" questionnaires, conducting questionnaires in ATENEA, study of basic vocabulary of Civil Engineering, visits to exhibitions / expos for free, etc. Logically, attendance at each activity is controlled, which is also involved in the note.

The calculation of the Final Grade is done by geometric means of all the evaluated items (activities, works, reports, questionnaires, interventions etc). The minimum grade (or in case of not having done the task) is 1 out of 10. It is possible that some activities receive a higher weight than others, by means of an exponent higher than the unit within the root of the geometric mean . The root ratio of the geometric mean will be, logically, the sum of all subradical exponents. This calculation is intended to encourage the regularity of the effort and participation of the student throughout the semester and all the activities carried out in the subject, from beginning to end.

It follows from the above that, if the course is developed 'normally', it is not necessary to take partial or final exams to pass the subject. Given the current pandemic circumstances, it cannot be ruled out (because it has already happened) that the planned 'normal' development will be affected by changes in online presence or by the impossibility of making visits to works that have been prepared. In this case, we would be forced to take a final exam, the grade of which would be combined with the grades of the 'normal' activities that could have been maintained; we will always try to give maximum weight to the grade of 'normal activities'.

Re-evaluation test: only students who have participated in a significant majority (> 80%) of directed activities of the subject, but who have not passed (Final Grade Suspended) will have the opportunity to apply to a re-evaluation test. This test will not necessarily be a written exam, but will try to assess a representative part of the main activities carried out during the semester, so it will combine online questionnaires with oral, written and / or practical part. The maximum grade for students who pass this re-assessment test will be 5.0

**EXAMINATION RULES.**

see "Assessment system"
BIBLIOGRAPHY

Basic:

RESOURCES

Audiovisual material:

Hyperlink: