Course guide  
220113 - TECI - Structural Theory and Industrial Construction

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 737 - RMEE - Department of Strength of Materials and Structural Engineering.  
758 - EPC - Department of Project and Construction Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2022  ECTS Credits: 4.5  Languages: Catalan

LECTURER

Coordinating lecturer: XAVIER ROCA RAMON  
CARLOS ROMEA

Others: CARLES ROMEA  
JOSE MANUEL DÍAZ

PRIOR SKILLS

The "Theory of Structures" module presumes prior knowledge of the subject "Continuum mechanics and Strength and Materials", as well as elementary notions of matrix algebra.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:  
1. An understanding of, and skills for, the calculation and design of industrial structures

Transversal:  
2. 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

The course is organized as follows:

1. Classes with large groups. In these classes, the theoretical contents of the subject, as well as part of the practical contents, are developed. The expository strategy to be used in each lecture will be at the teacher’s discretion, and will depend upon the goals set out in the corresponding module. The first and second partial exams will also take place in these classes.

2. Classes with medium-sized/small groups. These classes will focus on the practical application of the concepts developed in the theoretical lectures. Practical problems will be solved by either the teacher or the students themselves as part of their self-learning process. If appropriate, supervised activities may also be carried out.

LEARNING OBJECTIVES OF THE SUBJECT

Provide students with the basic notions of both structural design and industrial construction.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>31,0</td>
<td>27.56</td>
</tr>
<tr>
<td>Hours small group</td>
<td>14,0</td>
<td>12.44</td>
</tr>
<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
</tbody>
</table>

Total learning time: 112.5 h

CONTENTS

Module 1. Introduction to structures

Description:
1.1. Concept of structure
1.2. Steps for structural analysis
1.3. Classification of structures
1.4. Solution methods in structural analysis
1.4.1. Force method
1.4.2. Displacement method
1.4.3. Comparison of force and displacement methods

Full-or-part-time: 7h
Theory classes: 2h
Laboratory classes: 1h
Self study : 4h

Module 2. Basic notions of the displacement method

Description:
2.1. Slope-deflection equations
2.2. Particularization to non-sway structures
2.3. Simplifications derived from symmetry conditions.
2.4. Sway structures

Full-or-part-time: 27h 30m
Theory classes: 6h 45m
Laboratory classes: 3h
Self study : 17h 45m

Description:
3.2. Matrix form of the slope-deflection equations: the stiffness matrix.
3.3. Transformation of coordinates
3.4. Structural equilibrium in matrix form.
3.5. Imposition of boundary conditions.
3.6. Pin-ended beams
3.7. Thermal effects.

Full-or-part-time: 21h 45m
Theory classes: 6h 45m
Laboratory classes: 3h
Self study: 12h

Module 4. Introduction to industrial construction

Description:
4.1 Construction Processes
4.2 Legal framework of construction processes

Full-or-part-time: 23h 30m
Theory classes: 6h 45m
Laboratory classes: 3h
Self study: 13h 45m

Module 5. Basics on building systems: functions and characteristics

Description:
5.1 Foundations and Structures
5.2 External closures: façades and roofs
5.3 Interior elements
5.4 Finishings

Full-or-part-time: 32h 45m
Theory classes: 8h 45m
Laboratory classes: 4h
Self study: 20h

GRADING SYSTEM

1st exam "Structural theory", weight 40%
Proposed activity "Structural theory", weight: 10%
2nd exam "Industrial construction", weight: 40%
Proposed activity "Industrial construction", weight: 10%

The bad results of the partial examination will be able to recover with another test to realise the day fixed by the final examination. This test can access all the students enrolled that they have asked it with a minimum of 72 hours before. The qualification of the test will be between 0 and 10, and will substitute to the initial qualification always it will be upper.
BIBLIOGRAPHY

Basic: