Course guide
2500021 - GECESTRUCT - Structures

Last modified: 21/11/2022

Unit in charge:       Barcelona School of Civil Engineering
Teaching unit:        751 - DECA - Department of Civil and Environmental Engineering.
Degree:               BACHELOR’S DEGREE IN CIVIL ENGINEERING (Syllabus 2020). (Compulsory subject).
Academic year:        2022
ECTS Credits:        6.0
Languages:           Spanish, English

LECTURER

Coordinating lecturer: LUIS MIGUEL CERVERA RUIZ, RICCARDO ROSSI BERNECOLI
Others:               LUIS MIGUEL CERVERA RUIZ, ALEJANDRO CORNEJO VELÁZQUEZ, MOHAMMAD REZA HASHEMI, IVÁN RIVET FERNÁNDEZ, RICCARDO ROSSI BERNECOLI, RUBÉN ZORRILLA MARTÍNEZ

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
14401. Ability to analyze and understand how the characteristics of structures influence their behavior. Ability to apply knowledge about the resistant operation of structures to size them according to existing regulations and using analytical and numerical calculation methods. (Common module to the Civil branch)

General:
14380. Scientific-technical training for the exercise of the profession of Technical Engineer of Public Works and knowledge of the functions of advice, analysis, design, calculation, project, construction, maintenance, conservation and exploitation.

TEACHING METHODOLOGY

The course consists of 4 hours a week of classes during the 15 weeks of the semester. The approximate distribution of the 60 contact hours is:
15 hours of lectures devoted to the exposition of the concepts and basic materials for the course.
15 hours of practical sessions devoted to the presentation of examples and exercises and problems.
24 hours laboratory and directed activities devoted to practical exercises to consolidate the objectives of general and specific learning of the subject.
6 hours devoted to psychological testing.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.
LEARNING OBJECTIVES OF THE SUBJECT


1. Ability to understand and apply the fundamentals of structural analysis and to understand energy theorems and their utility.
2. Ability to apply equilibrium and compatibility methods to structural analysis.
3. Ability to perform analysis and calculation of structures through the using computer software.


STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

**Fundamentals of Structural Analysis**

**Description:**

Fundamentals of Structural Analysis. Problems
Fundamentals of Structural Analysis. Laboratory

**Full-or-part-time:** 33h 36m
- Theory classes: 2h
- Practical classes: 2h
- Laboratory classes: 10h
- Self study : 19h 36m
Stresses and Movements

Description:
Differential equation of the deflection of a beam line. Navier formulas for planar structures. Elastic equations.
Efforts and movements. Problems
Efforts and movements. Laboratory

Full-or-part-time: 14h 23m
Theory classes: 2h
Practical classes: 2h
Laboratory classes: 2h
Self study : 8h 23m

Work and Energy

Description:

Work and Energy. Problems
Work and Energy

Full-or-part-time: 33h 36m
Theory classes: 4h
Practical classes: 4h
Laboratory classes: 6h
Self study : 19h 36m

Compatibility Method

Description:

Compatibility method. Problems
Compatibility method. Laboratory

Full-or-part-time: 9h 36m
Theory classes: 1h
Practical classes: 1h
Laboratory classes: 2h
Self study : 5h 36m
Equilibrium Method

Description:
- Bases of the method. Continuous beams: equation of the three rotations, support settlements, elastic supports.
- Frames: intrasional and trasional frames
- Balance Method. Problems
- Balance Method. Laboratory

Full-or-part-time: 33h 36m
- Theory classes: 4h
- Practical classes: 4h
- Laboratory classes: 6h
- Self study: 19h 36m

Stiffness method

Description:

Full-or-part-time: 19h 12m
- Theory classes: 2h
- Practical classes: 2h
- Laboratory classes: 4h
- Self study: 11h 12m

GRADING SYSTEM

The final grade is the weighted average of the one obtained in the periodic evaluation exercises (AV), the exercises carried out in the practical classes and directed activities (AD) and in the final work of the subject (AT).

The periodic evaluation (A) is obtained as: \( AV = 0.4 \times A1 + 0.6 \times A2 \), being A1 and A2 the two periodic evaluations.

The final grade for the subject will be:

\[
Subject \ grade = 0.4 \times (AV \ grade) + 0.4 \times (AD \ grade) + 0.4 \times (AT \ grade)
\]

if each of the AV, AD and AT grades has obtained a grade equal to or greater than 4.0. Otherwise, the mark of the subject will be:

\[
Mark \ of \ the \ subject = \frac{1.2}{[0.4/\text{Note AV} + 0.4/\text{Note AD} + 0.4/\text{Note AT}]}
\]

To pass, the mark of the course must be equal to or greater than 5.0.

Criteria for qualification and admission to re-evaluation: Students suspended in the ordinary evaluation who have regularly taken the evaluation tests of the failed subject will have the option to take a re-evaluation test in the period established in the academic calendar. The students who have already passed it or the students qualified as not presented will not be able to present themselves to the re-evaluation test of a subject. The maximum grade in the case of taking the reevaluation exam will be five (5.0). The non-attendance of a student summoned to the re-evaluation test, held within the established period, may not give rise to another test with a later date. Extraordinary evaluations will be carried out for those students who, due to proven force majeure, have not been able to carry out any of the continuous assessment tests. These tests must be authorized by the corresponding head of studies, at the request of the professor responsible for the subject, and will be carried out within the corresponding academic period.
EXAMINATION RULES.

If you do not perform any activities of continuous assessment or final work subject in the scheduled period, it is considered zero punctuation.

BIBLIOGRAPHY

Basic:

Complementary: