Course guides
250475 - ESTMIXCOMP - Mixed and Composite Structures

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: MASTER'S DEGREE IN STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2009). (Optional subject).
MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Optional subject).
MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Optional subject).
MASTER'S DEGREE IN STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2015). (Optional subject).

Academic year: 2020 ECTS Credits: 5.0 Languages: Catalan, Spanish, English

LECTURER
Coordinating lecturer: ENRIQUE MIRAMBELL ARRIZABALAGA
Others: ANTONIO RICARDO MARI BERNAT, ENRIQUE MIRAMBELL ARRIZABALAGA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
8162. Knowledge of all kinds of structures and materials and the ability to design, execute and maintain structures and buildings for civil works.
8228. Knowledge of and competence in the application of advanced structural design and calculations for structural analysis, based on knowledge and understanding of forces and their application to civil engineering structures. The ability to assess structural integrity.

Transversal:
8559. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding the mechanisms on which scientific research is based, as well as the mechanisms and instruments for transferring results among socio-economic agents involved in research, development and innovation processes.
8560. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.
8561. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

TEACHING METHODOLOGY

The course consists of 3 hours per week of classroom activity during 13 weeks.

In the theoretical lectures, the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.
LEARNING OBJECTIVES OF THE SUBJECT

Specialization subject in which knowledge on specific competences is intensified.

Knowledge and skills at specialization level that permit the development and application of techniques and methodologies at advanced level.

Contents of specialization at master level related to research or innovation in the field of engineering.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>19.5</td>
<td>15.59</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>9.8</td>
<td>7.83</td>
</tr>
<tr>
<td>Self study</td>
<td>80.0</td>
<td>63.95</td>
</tr>
<tr>
<td>Hours small group</td>
<td>9.8</td>
<td>7.83</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6.0</td>
<td>4.80</td>
</tr>
</tbody>
</table>

Total learning time: 125.1 h

CONTENTS

Overview

Description:

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study: 4h 11m

Structural behavior. Time dependent effects

Description:

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study: 4h 11m
The prestressed composite structures.

Description:
The prestressed composite structures: Prestressed pre-connection and post-connection. Instantaneous and delayed study. Efforts flush of localized nature.
Resolution of exercise for determining the ultimate moment of a section subjected to bending mixed positive and negative, considering linear elastic and plastic theory.

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study: 4h 11m

Ultimate limit states. Bending and shear

Description:

Exercise

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study: 4h 11m

Serviceability limit states. Deformability and cracking

Description:
Resolution of exercise of verification of the limit state of cracking in an intermediate support cross-section of a continuous composite beam.

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study: 4h 11m

Construction process

Description:
Resolution of an exercise related to the construction process of a steel-concrete composite structures.

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study: 4h 11m
Connection in composite structures

Description:

Full-or-part-time: 14h 23m
Theory classes: 3h
Practical classes: 3h
Self study : 8h 23m

Composite columns

Description:

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study : 4h 11m

Composite bridges

Description:

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study : 4h 11m

Composite slabs with profiled sheet

Description:

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study : 4h 11m
Composite structures with different types of concrete

Description:
Time dependent effects. Longitudinal shear force. Shear-friction model.
Exercise

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study: 4h 11m

Evaluation

Full-or-part-time: 7h 11m
Laboratory classes: 3h
Self study: 4h 11m

GRADING SYSTEM

The mark of the course is obtained from the continuous assessment.
It consists of five activities and a final exam.
The final mark (F) is obtained from the exam mark (E) and the activities directed (AD)

\[ F = 0.7E + 0.3AD \]
The maximum score assigned to each activity will be the same.

EXAMINATION RULES.

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.
BIBLIOGRAPHY

Basic: