Course guide
250700 - 250700 - Fundamentals of Structural Design

Last modified: 22/05/2025

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 2015). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Spanish, English

LECTURER

Coordinating lecturer: JESÚS MIGUEL BAIRÁN GARCÍA - NOEMÍ DUARTE GÓMEZ

Others: ITSASO ARRAYAGO LUQUIN, JESÚS MIGUEL BAIRÁN GARCÍA, ROLANDO ANTONIO CHACÓN FLORES, NOEMÍ DUARTE GÓMEZ, ANTONIO RICARDO MARI BERNAT, JUAN MURCIA DELSO, DAVID VERGES COLL

TEACHING METHODOLOGY

The course consists of 2,3 hours per week of classroom activity (large size group) and 0,3 hours weekly with half the students (medium size group).

The 2,3 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 0,3 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

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.

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

Subject to initiate the student in the design and calculation of concrete and steel according to European standards

Initial knowledge of the process of design of concrete and steel structures according to European Standards

Introduction of structural safety concepts and tools for their calculation. Limit states . Actions and combinations. Behavior of structural materials. Structural analysis of prestressing : prestress loads and forces, calculation of prestressing losses. Structural Concrete: service and ultimate limit states. Steel structures: bolted joints , welded joints , section class concept , and service limit states last

STUDY LOAD

Type	Hours	Percentage
Self study	96,0	64.00
Hours large group	54,0	36.00

Total learning time: 150 h

CONTENTS

Basis of design

Description:
Basis of design
Basis of design

Full-or-part-time: 24h
Theory classes: 8h
Practical classes: 2h
Self study : 14h

Prestressed concrete

Description:
Prestressed concrete
Prestressed concrete

Full-or-part-time: 28h 47m
Theory classes: 10h
Practical classes: 2h
Self study : 16h 47m

Reinforced concrete

Description:
Reinforced concrete
Reinforced concrete

Full-or-part-time: 33h 36m
Theory classes: 12h
Practical classes: 2h
Self study : 19h 36m

Steel structures

Description:
Steel Structures
Steel structures

Full-or-part-time: 33h 36m
Theory classes: 12h
Practical classes: 2h
Self study : 19h 36m

Block exams

Full-or-part-time: 9h 36m
Laboratory classes: 4h
Self study : 5h 36m

GRADING SYSTEM

The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and/or classroom computers.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The teachings of the laboratory grade is the average in such activities.

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

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:
- EHE-08 : instrucción de Hormigón Estructural : con comentarios de los miembros de la Comisión Permanente del Hormigón [on line]. Madrid: Ministerio de Fomento, Centro de Publicaciones, 2011 [Consultation: 09/02/2021]. Available on: http://www.ponderosa.es/docs/Norma-EHE-08.pdf.
- Comité Europeen de Normalisation. Eurocode 2: Design of concrete structures: EN-1992. Comité Europeen de Normalisation, 2004.
- Jimenez Montoya, P.; García Meseguer, A.; Morán, F.; Arroyo, J.C. Hormigón armado [on line]. 15ª ed. basada en la EHE-2008. Barcelona: Gustavo Gili, 2009 [Consultation: 08/03/2021]. Available on: https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=3209549. ISBN 9788425223075.
- Marí, A.; Molins, C.; Bairán, J.M.; Oller, E. Formigó armat i pretensat: exercicis curts de bases de càlcul i estats límits, adaptat a la instrucció EHE-08 [on line]. 2a ed. Barcelona: Edicions UPC, 2009 [Consultation: 25/02/2021]. Available on: http://hdl.handle.net/2099.3/36837. ISBN 9788498803907.
- Calavera, J. Proyecto y cálculo de estructuras de hormigón: en masa, armado y pretensado, de acuerdo con la nueva instrucción EHE-08: de acuerdo con el EUROCÓDIGO EC-2. 2a ed. Madrid: Intemac, 2008. ISBN 9788488764058.
- Espanya. Comisión Permanente de Estructuras de Acero. EAE: instrucción de acero estructural: con comentarios de los miembros de la Comisión Permanente de Estructuras de Acero [on line]. Madrid: Ministerio de Fomento, Secretaría General Técnica, 2011 [Consultation: 08/02/2021]. Available on: https://www.mitma.es/recursos_mfom/1903100.pdf. ISBN 9788449809040.
- Simoes da Silva, L.; Simoes, R.; Gervasio, H. Eurocode 3: design of steel structures: Part 1-1: General rules and rules for buildings. Brussels: ECCS- European Convention for Constructional Steelwork, 2010. ISBN 978-92-9147-098-3.