

# Course guide 240ICE21 - 240ICE21 - Concrete Structures

		Last modified: 13/06/2023		
Unit in charge:	Barcelona School of Industrial Engineering			
Teaching unit:	737 - RMEE - Department of Strength of Materials and Structural Engineering.			
Degree:	MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).			
Academic year: 2023	ECTS Credits: 4.5	Languages: Catalan		
LECTURER				
Coordinating lecturer:	Pons Poblet, Josep Maria			

Others: Laureà Miró Bretos

# **PRIOR SKILLS**

Proficiency in Mechanics of Continuous Mediums, Strength of Materials and Theory of Structures.

## REQUIREMENTS

Mechanics of Continuous Mediums, Strength of Materials and Theory of Structures.

# **DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES**

#### Specific:

CEECONS1. Design, calculate and build metallic structures, of reinforced concrete and other structural solutions; including the experimental measurement techniques.

CEECONS2. Apply the adequate knowledge for the design, construction and management of buildings and its surroundings, especially in the field of engineering.

CEECONS3. Apply the structural analysis and the modelling and numerical simulation of structures against static and dynamic stresses.

## **TEACHING METHODOLOGY**

Sessions in which the theoretical core of the course is combined with the lecturer's presentation, and practical cases are studied and discussed.

Laboratory practice: construction of a reinforced concrete resistant element, with subsequent failure test. Individual work carried out by the student.

Visit to a construction site.



# LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the student should have sufficient knowledge related to:

-Usual typologies for plain, reinforced and prestressed concrete elements.

- -The component materials and their properties: cements, granulates, water, additives, additions, passive and active reinforcements. -The construction works.
- -The bases of calculation and the application of the method of the limit states in the concrete structures.
- -The durability of the material.
- -The ultimate limit state of normal stresses.
- -The ultimate limit state of tangential stresses.
- -The ultimate limit state of instability.
- -Design and constructive arrangements of beams, columns, slabs.
- -Serviceability limit states: deformation, cracking, vibration.
- -The application of the method of connecting rods and tie rods for the design of elements classifiable as regions of discontinuity.

-Designing foundation and retaining elements: isolated, combined or spread footings; foundation slabs; pile caps and piles; retaining and basement walls; diaphragm walls; tanks.

-The use of prefabricated elements.

- -Designing concrete structural elements taking into account fire resistance requirements.
- -Knowledge of the environmental impact and sustainability strategies of concrete structures.

# **STUDY LOAD**

Туре	Hours	Percentage
Self study	72,0	64.00
Hours large group	27,0	24.00
Hours small group	13,5	12.00

Total learning time: 112.5 h

# **CONTENTS**

# Description:

Specific objectives:

**Related activities:** 

**Full-or-part-time:** 5h Theory classes: 2h Self study : 3h

#### **Description:**

**Specific objectives:** 

**Related activities:** 

**Full-or-part-time:** 7h 30m Theory classes: 3h Self study : 4h 30m



### **Description:**

Specific objectives:

**Full-or-part-time:** 5h Theory classes: 2h Self study : 3h

#### **Description:**

**Full-or-part-time:** 22h 30m Theory classes: 9h Self study : 13h 30m

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**Full-or-part-time:** 22h 30m Theory classes: 9h Self study : 13h 30m

### **Description:**

**Full-or-part-time:** 7h 30m Theory classes: 3h Self study : 4h 30m

# **Description:**

**Full-or-part-time:** 10h Theory classes: 4h Self study : 6h

#### **Description:**

**Full-or-part-time:** 12h 30m Theory classes: 5h Self study : 7h 30m



## **Description:**

**Full-or-part-time:** 10h Theory classes: 4h Self study : 6h

#### **Description:**

Full-or-part-time: 2h 30m Theory classes: 1h Self study : 1h 30m

## **Description:**

Full-or-part-time: 2h 30m Theory classes: 1h Self study : 1h 30m

## title english

**Description:** content english

Full-or-part-time: 1h Theory classes: 1h

### **GRADING SYSTEM**

June exam. Final exam: 30% (the subject of the midterm is not evaluated). Partial exam: 20%. Practices: 10%. Projects: 35%. Site visit: 5%.

Final grade= 0,3·Final exam + 0,2·Partial exam + 0,35·Projects + 0,1·Practices + 0,05·Worksite visit.

Re-evaluation Final exam: 55% (the material of the whole course is evaluated).

Final grade= 0,55·Final exam + 0,35· Projects + 0,1·Practices

# **EXAMINATION RULES.**

The rules will be indicated before the tests are carried out.



# **BIBLIOGRAPHY**

#### **Basic:**

- Jiménez Montoya, P. Hormigón armado [on line]. 15a ed. Barcelona: Gustavo Gili, 2009 [Consultation: 29/09/2022]. Available on: <a href="https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3209">https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3209</a> <a href="https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3209">https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3209</a> <a href="https://ebookcentral-proquest-com">https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3209</a> <a href="https://ebookcentral-proquest-com">https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3209</a> <a href="https://ebookcentral-proquest-com">https://ebookcentral-proquest-com</a>. <a href="https://ebookcentral-produest-com">https://ebookcentral-produest-com</a>. <a href="https://ebookcentral-produest-com">https://ebookcentral-produest-com</a>. <a href="https://ebookcentral-produest-com">https://ebookcentral-produest-com</a>. <a href="https://ebookcentral

- Calavera Ruiz, José. 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 8488764057.

# RESOURCES

# Hyperlink:

- Normativa Estructures de Formigó. EN 1992-1-1:2004. https://portal-aenormas-aenor-com.recursos.biblioteca.upc.edu/aenor/Suscripciones/Personal/pagina\_per\_sus.asp