

## SUBJECT TEACHING GUIDE

G1983 - Concrete Structures

Degree in Civil Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Civil Engineering			Type and Year	Compulsory. Year 4
Faculty	School of civil Engineering				
Discipline	ANALYSIS AND TECHNOLOGY OF STRUCTURES				
Course unit title and code	G1983 - Concrete Structures				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ESTRUCTURAL Y MECANICA				
Name of lecturer	CLAUDIO LOPEZ CASTILLO				
E-mail	claudio.lopez@unican.es				
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 2. DESPACHO (2041)				
Other lecturers	ARTURO JOSE SANTAMARIA SALLAN				

3.1 LEARNING OUTCOMES
- It includes the mechanical and rheological behavior of concrete and steel reinforcement materials, both in isolation and as part of the structural parts.
- Applies safety criteria to reinforced concrete structures.
- Identifies and evaluates the actions to be considered in the project of reinforced concrete structures.
- Analyze, check and size reinforced concrete structural elements in situations of exhaustion.
- Analyze, check and size reinforced concrete structural elements in service situations.

#### 4. OBJECTIVES

1. The student will be able to establish and/or interpret safety criteria and procedures in concrete structures.
2. The student will be aware of the various properties of the component materials of reinforced concrete.
3. The student will be aware of the problem of durability in concrete structures as well as the resolution of associated problems.
4. The student will be able to establish and use the methodologies for analysis and verification of concrete structures.
5. The student will be aware of the aspects that govern the control of the project, materials and the execution of concrete structures.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	<ol style="list-style-type: none"> <li>1. Introduction to the subject.</li> <li>2. Historical notes on concrete.</li> <li>3. Joint behavior of steel and concrete that has enabled its success as a composite material.</li> </ol>
2	<ol style="list-style-type: none"> <li>1. Loads.</li> <li>2. Characteristics of concrete and steel materials</li> </ol>
3	<ol style="list-style-type: none"> <li>1. Structural analysis. Methods.</li> <li>2. Data necessary for linear, plastic or non-linear modelling. Materials and geometry.</li> <li>3. Shrinkage and creep.</li> </ol>
4	<ol style="list-style-type: none"> <li>1. Durability in concrete. Deterioration of the concrete mass. Steel corrosion.</li> <li>2. Identification of the factors of aggressiveness on the concrete.</li> <li>3. Protective measures.</li> <li>4. Maintenance of concrete structures.</li> </ol>
5	<ol style="list-style-type: none"> <li>1. Limit states, concept and method.</li> <li>2. Serviceability limit states. Deformations and cracking.</li> <li>3. Ultimate limit states. Axil, bending, shear, shear and torsion.</li> </ol>
6	<ol style="list-style-type: none"> <li>1. Strut and tie calculation</li> <li>2. Typical application cases. The node, concentrated load, dimension changes in beams and columns.</li> </ol>
7	<ol style="list-style-type: none"> <li>1. Typical structural elements. The beam, the pillar, the slab, the foundation elements.</li> <li>2. Organization and exploded view of the rebar in the structural elements.</li> <li>3. The execution. Problems associated with each element.</li> </ol>
8	<ol style="list-style-type: none"> <li>1. Basic principles of control</li> <li>2. Procedure control versus product control.</li> <li>3. Project control.</li> </ol>
9	<ol style="list-style-type: none"> <li>1. Control of reception of materials.</li> <li>2. Product conformity control</li> <li>3. Execution control</li> <li>4. Maintenance. Maintenance manual</li> <li>5. Introduction to prestressed concrete</li> </ol>

### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Partial exam 1	Written exam	No	No	15,00
Partial exam 2	Written exam	No	No	15,00
Final exam 1	Written exam	No	Yes	40,00
Respond to the tasks raised during the course	Work	No	Yes	30,00
TOTAL				100,00
Observations				
Observations for part-time students				
Part-time students will only do the final exam, which will be awarded a percentage of 100% of their evaluation.				

### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

#### BASIC

Eurocódigo 2, Estructuras de Hormigón  
Código Estructural 2021