

Course file

Study cycle	BACHELOR IN CIVIL ENGINEERING		
Course	STRUCTURAL CONCRETE II	Mandatory	<input checked="" type="checkbox"/>
		Optional	<input type="checkbox"/>
Course scientific area	CIVIL ENGINEERING	Category	E

Course category: B - Basic; C - Core Engineering; E - Specialization; P - Complementary.

Year: 3rd	Semester: 6th	ECTS: 4,5		Total: 108
Contact time	T: 22,5	TP: 22,5	PL:	S: OT:

T - Lectures; TP - Theory and practice; PL - Lab Work; S - Seminar; OT - Tutorial Guidance.

Course Director	Title	Position
António Carlos T. Sousa Gorgulho	Especialista	Professor Adjunto

Learning objectives (knowledge, skills and competences to be developed by students)

(max. 1000 characters)

Design and detailing of slabs; solid slabs supported on beams, stairs, flat slabs and precast slabs

Application of skills in design and detailing of slabs to retaining walls, swimming pools and reservoirs

Design and detailing of superficial foundations: footings and foundation beams

Basic principles of prestressed concrete in linear parts: completion of prestress, equivalent loads and safety verification

Syllabus

(max. 1000 characters)

I-REINFORCED CONCRETE

1.SLABS

1.1.Different types of slabs.

1.2. Slabs supported on beams

1.2.1. Slabs with bending in one direction

1.2.2. Stairs

1.2.3. Slabs with bending in two directions

1.3. Flat slabs

1.3.1. Equivalent frame analysis

1.3.2. Punching shear ultimate limit state

1.4. Precast slabs of pre-stressed beams and blocks

1.4.1. Ultimate limit state

1.4.2. Service limit states

2.SUPERFICIAL FOUNDATIONS

2.1. Verification of security in terms of tensions on the ground: isolated footings and interconnected by beams.

2.2. Reinforcement evaluation: Strut and tie method and corbel method.

II - INTRODUCTION TO PRESTRESSED CONCRETE

1.INTRODUCTION

2.PRESTRESSED TECHNIQUES AND SYSTEMS

3.PRE-STRESS EFFECTS ON BEAMS

4.DESIGN OF PRESTRESSED ISOSTATIC BEAMS

Demonstration of the consistency between the syllabus and the course objectives

(max. 1000 characters)

The competence to be acquired by students in the design and detailing of various types of slabs: solid slabs supported on beams, stairs, flat slabs, precast slabs and other reinforced concrete structures with similar behavior as retaining walls, pools and reservoirs is developed throughout the chapter 1 of the program where they study in detail these different types of slabs

Competence in the design and detailing of direct foundations :footings and foundation beams is developed in Chapter 2 where we study these foundation systems

The learning of basic concepts related to pre-stress in linear parts: completion of the prestressing system, equivalent loads and verification of safety is made in the last chapter where he makes the Introduction to

Prestressed Concrete

Teaching methodology (evaluation included)

(max. 1000 characters)

The subjects are presented to pupils in lessons and theoretical-practical sessions each type corresponding to roughly half of total contact hours. In the theoretical-practical sessions students perform, on an individual basis, with assistance from teachers, some exercises of design and detailing of slabs, stairs and footings.

They also display different types of problems trying that students develop the necessary skills in their resolution in individually or in groups study sessions, which are the main form of preparation for assessment.

Continuous assessment represents the completion of two tests predatory in terms of matter, carried out in the middle and end of the semester.

The nature of the tests is predominantly practical in pursuit of the objectives presented above.

These tests have a duration of three hours.

In seasons of normal and feature tests are performed also global tests with the duration of 3 h

Demonstration of the consistency between teaching methodology and the course learning objectives

(max. 3000 characters)

The capacity of students to develop skills within the project of different types of stairs and slabs of concrete and direct foundation systems, both in terms of design and verification of safety, both in terms of detail with representatives of reinforcing steel, is, as previously mentioned, the main objective of the course.

For the student to develop these skills are essential in addition to the theoretical sessions, the theoretical-practical sessions where students together with the teacher solve practical problems of design and detail of that kind of structures.

These and other problems are also discussed and clarified in the tutorial sessions also carried out.

The guarantee of achieving that goal by the student is assured by the accuracy and type of assessment where the students practiced skills can only be fully approved demonstrating that holds that power.

It should be noted that students have access to the Coursepage on the Internet at various study elements, which include problems solved tests and examinations of past semesters that constitute an essential part of student learning.

Main Bibliography

(max. 1000 characters)

- Hormigón Armado “ Montoya, Messeguer, Morán. Editorial Gustavo Gili (vol. 1, vol. 2)
- Construções de Concreto “Leonhardt” (vol. 3)
- Tablas para el cálculo de placas y vigas pared “R. Bares”. Editorial Gustavo Gili
- EN 1992-1-1 :Abr 2004 : Eurocódigo 2 – Projecto de Estruturas de Betão- Regras gerais e regras para edifícios,CEN, Bruxelas
- Notes for Structural Concrete II – A. Sousa Gorgulho (2007)