 <p><b>IPG</b> Politécnico da Guarda Escola Superior de Tecnologia e Gestão</p>	<b>GUIA DE FUNCIONAMENTO DA UNIDADE CURRICULAR</b>	<b>MODELO PED.008.02</b>
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<i>Course</i>	<b>Master in Civil Constructions</b>			<i>Academic year</i>	2021/2022		
<i>Subject</i>	<b>Prestressed concrete</b>			ECTS	5,0		
<i>Type of course</i>	<b>Compulsory</b>						
<i>Year</i>	<b>1<sup>st</sup></b>	<i>Semester</i>	<b>1<sup>st</sup></b>	<i>Student Workload:</i>			
<i>Professor(s)</i>	<b>PhD José Carlos Costa de Almeida</b>			<i>Total</i>	140	<i>Contact</i>	52,5
<i>Area Coordinator</i>	<b>PhD José Carlos Costa de Almeida</b>						

### Planned

## 1. LEARNING OBJECTIVES

Deepen the knowledge in the field of reinforced concrete, completing the training received in the 1st cycle, especially in the field of prestressed concrete.  
 Analysis of specific needs of the application of prestressing. Develop the capacity at the level of understanding the behavior of reinforced concrete and prestressed structures in order to obviate the difficulty with new work situations.  
 Knowledge acquisition in order to increase capacity in the evaluation and decision making regarding the behavior of structures.


## 2. PROGRAMME

1. General concepts;
2. Material properties;
3. Section analysis;
4. Design of prestressed elements;
5. Design of isostatic beams;
6. Prestress losses;
  - 6.1. Immediate losses;
  - 6.2. Time dependent losses in prestress;
7. Ultimate limit state verifications;
8. Verification and design of the anchorage zones;
9. Prestress in statically indeterminate structures;
10. Design with strut and tie models.

## 3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The established syllabus allows students to develop skills in the understanding the behaviour of reinforced and prestressed concrete regarding the new European standards. The various chapters presented allow students to have the bases for design of prestressed concrete structures as well to understand the behavior of structures in the discontinuity regions, enabling the realization and understanding of projects of prestressed structures.

## 4. MAIN BIBLIOGRAPHY

	<b>GUIA DE FUNCIONAMENTO DA UNIDADE CURRICULAR</b>	<b>MODELO PED.008.02</b>
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Collins M.P. e Mitchell D. “Prestressed concrete structures” Prentice Hall, Englewood Cliffs, New Jersey, Estados Unidos da América, 1991, 766 p.

Leonhardt F. “Construções de concreto (Vol. 5) – concreto protendido” Interciência, Brasil, 1983, 316 p.

Nilson, Arthur H. “Design of prestressed concrete” John Wiley & Sons, New York, Estados Unidos da América, 1987, 608 p.

NP EN 1990 “Eurocódigo – Bases para projecto”, IPQ, 2009.

NP EN 1991-1-1 “Eurocódigo 1 – Acções em estruturas – Parte 1-1: Acções gerais – Pesos volúmicos, pesos próprios, sobrecargas em edifícios”, IPQ, 2009.

NP EN 1992-1-1 “Eurocódigo 2 – Projecto de estruturas em betão – Parte 1-2: Regras gerais e regras para edifícios”, IPQ, 2010.

RSA – Regulamento de Segurança e Acções para Estruturas de Edifícios e Pontes (Dec. Lei 235/83 de 31 de Maio). Biblioteca IPG – Cota: 69.07 REG.

REBAPE – Regulamento de Estruturas de Betão Armado e Pré-Esforçado (Dec. Lei 349-C/83 de 30 de Julho). Biblioteca IPG – Cota: 69.07 REG.

Walther R. e Miehlsbradt M. “Dimensionnement des structures en béton: bases et technologie” Traité de Génie Civil Vol (7), Presses Polytechniques et Universitaires Romandes, Lausanne, Suíça, 1990, 404 p.

## **5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)**

The teaching methodology will allow the student to be the center of learning. It will be taught all the concepts and techniques in a theoretical way, supported by case studies, which will acquire the knowledge necessary for their practical application. It will be offered practical work for students to apply and develop the taught techniques. The proposed work will be debated in the classes. The student's learning will be complemented with the support of school guidance and tutorial visit the works.

The evaluation of UC will be continuous through the practical work throughout the semester. This evaluation will be completed by the end of the semester with a written exam that covers the theoretical and practical aspects of the taught issues. The final grade results from the weighted sum of partial assessments. The weight of the assessment in relation to work is 30% and the remaining 70% related to assessment by written examination. To achieve approval in the course the student should have a rating not less than 8.0 values in the written examination.

## **6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES**

The teaching methodology adopted for the curricular unit, has a special focus on the concept of learning by doing. This methodology allows the student to practice the exercises and the preparation of a project, applying, step by step, all the concepts for the various involved phases of prestressed structures.

## **7. ATTENDANCE**

N/A

## **8. CONTACTS AND OFFICE HOURS**

Contacts:

Office hours:

## **9. OTHERS**

N/A

Date:

Signature:

Signature:

Area Coordinator

Professor Name