

<i>Course</i>	Master in Civil Constructions			<i>Academic year</i>	2021/2022		
<i>Subject</i>	Steel and composite structures			ECTS	6,0		
<i>Type of course</i>	Effective						
<i>Year</i>	1st	<i>Semester</i>	2nd	<i>Student Workload:</i>			
<i>Professor(s)</i>	PhD José Carlos Costa de Almeida			<i>Total</i>	168	<i>Contact</i>	52,5
<i>Area Coordinator</i>	PhD José Carlos Costa de Almeida						

Planned

1. LEARNING OBJECTIVES

Objectives:

- Deepen the knowledge, acquired in the first cycle, in the field of steel structures;
- Make the transition between the theoretical contents and professional activities in the design and implementation of steel and composite structures;
- Develop capacities at the level of understanding of the behavior of structures, in order to overcome the difficulties of the professional context;
- Acquire knowledge in order to increase capacity in the evaluation and decision making regarding the behavior of steel and composite structures;
- Study the problems regarding of the European standards.

Skills:

- Description and understanding of key concepts related to the behavior and design of elements;
- Identification of design methodologies in new European regulations;
- Calculation and developing of new solutions;
- Understand and develop the drawings for a project of a metal and composite structure.

2. PROGRAMME

1. General concepts;
2. Material properties according to Eurocode 3;
3. Cross-sections classification;
4. Stress Analysis;
5. Analysis and design elements with tensile and bending efforts;
6. Analysis and design of axially compressed elements;
7. Lateral buckling of elements;
8. Buckling by shear;

9. Analysis and design of elements with bending and compression efforts;
10. Analysis and design of steel and concrete structures according to Eurocode 4;
11. Analysis and design of connections.

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The syllabus set allows the student to develop skills in understanding of the behavior of either the metal structures, or of composite steel/concrete regarding the new European regulations. The various chapters presented allow the student to understanding the behavior and design of components subjected to different kinds of efforts, thereby enabling the realization and understand of projects, whether of steel or composite structures.

4. MAIN BIBLIOGRAPHY

- NP EN 1990 “Eurocódigo – Bases para projeto”, Instituto Português da Qualidade, 2009.
- NP EN 1991-1-1 “Eurocódigo 1 – Ações em estruturas – Parte 1-1: Ações gerais – Pesos volúmicos, pesos próprios, sobrecargas em edifícios”, Instituto Português da Qualidade, 2009.
- NP EN 1993-1-1 “Eurocódigo 3 – Projeto de estruturas de aço – Parte 1-1: Regras gerais e regras para edifícios”, Instituto Português da Qualidade, 2010.
- NP EN 1994-1-1 “Eurocódigo 4 – Dimensionamento de estruturas mistas aço-betão – Parte 1-1: Regras gerais e regras para edifícios”, Instituto Português da Qualidade, 2004.
- Simões R. “Manual de dimensionamento de estruturas metálicas, Eurocódigo 3: Projeto de Estruturas Metálicas, Parte 1-1: Regras gerais e regras para edifícios”, CMM – Associação Portuguesa de Construção Metálica e Mista, Coimbra, 2007, 224 p.
- Silva L.S. e Santiago A. “Manual de ligações metálicas”, CMM – Associação Portuguesa de Construção Metálica e Mista, 2003, Coimbra, 150 p.
- Calado L. e Santos J. “Estruturas mistas de aço e betão”, IST Press, Lisboa, 2010, 568 p.
- Bourrier P. e Brozzetti J. “Construction métallique et mixte acier-béton II – Vol. (2) conception et mise en oeuvre”, Ed. Eyrolles, Paris, França, 1996, 584 p.

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

The teaching methodology will focus on student learning. It will be taught all the concepts and techniques in a theoretical way, based on practical cases, which will permit to acquire necessary knowledge to practical application. The practical exercises aim for the application and developing the taught techniques. The exercises proposed will be targeted by resolution in practical lessons. Learning will be supplemented by study visits that will make the connection between the theoretical concepts and the reality of the workplace. The evaluation of this curricular unit will be continuous through a realization of final project. This assessment will be complemented, at the end of the semester with a written exam that covers the theoretical and practical aspects. The final is the result of the weighted sum of partial assessment. The weight of the assessment on the project is 50% and the remaining 50% are related to assessment by written examination.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

The teaching methodology adopted for this 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, apply, step by step, all concepts relating to the various involved phases.

7. ATTENDANCE

N/A

8. CONTACTS AND OFFICE HOURS

Contacts:

Office hours:

9. OTHERS

N/A

Date:

Area Coordinator

Professor