INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Steel and Composite Structures			Field of study	Solid Mechanics and Structures		
Master in	Construction Engineering			School	School of Technology and Management		
Academic Year	2023/2024	Year of study	1	Level	2-1	ECTS credits	6.0
Type	Semestral	Semester	1	Code	5024-419-1101-00-23		

Workload (hours)	162	Contact hours	T -	TP 60	PL -	TC -	S -	E -	OT -	O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Pedro Nuno Gonçalves Nogueiro

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
Understand the global behaviour of the steel structures. Analisys and design of the steel structures.

Prerequisites

Before the course unit the learner is expected to be able to:
To find the internal stresses of the structures. Actions Quantification and their combinations.

Course contents

General concepts. Analisys of the steel structures. Design of the members of the steel structures. Steel connections. Design of composite beams.

Course contents (extended version)

1. Chap. 1 General concepts
   - Contents and objectives, Regulamentation, Mechanical caracterization of the materials.
2. Chap. 2 Analysis of the steel structures
   - Global analysis of the steel structure. First order vs second order. Imperfections.
3. Chap. 3 Design of members of the steel structures
   - Tension. Bending moment. Plasticity. Buckling. Lateral torsional buckling. Bending and axial force.
4. Chap. 4 Connections
   - Welded connections. Bolted connections. Semi-rigid connections.

Recommended reading

1. Manual de Dimensionamento de Estruturas Metálicas. Rui A. D. Simões. CMM - Associação Portuguesa de Construção Metálica e Mista.
2. Manual de Dimensionamento de Estruturas Metálicas: Métodos Avançados. Luís Simões da Silva; Helena Gervásio. CMM - Associação Portuguesa de Construção Metálica e Mista.
3. Eurocode 1: Actions on Structures – Part 1-1: General Actions – Densities, Selft-weight, Imposed Loads for Buildings, European Committee for Standardization, Brussels.
4. Eurocode 3: Design of Steel Structures, Part 1-1: General Rules for Buildings, EN-1993-1-1, European Committee for Standardization, Brussels.
5. Eurocode 3: Design of Steel Structures, Part 1-8: Design of Joints, EN-1993-1-8, European Committee for Standardization, Brussels.

Teaching and learning methods

The unit will be taught using a combination of theorectical and practical lectures, self guided learning. Practical exercices will be done in bases of the recommended literature. At the same time it will be followed the design of one steel struture.

Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
  - Practical Work - 60%
  - Final Written Exam - 40%

Language of instruction

Portuguese

Electronic validation

Pedro Nuno Gonçalves Nogueiro	Debora Rodrigues de Sousa Macanjo Ferreira	Manuel Teixeira Brás César	José Carlos Rufino Amaro
03-10-2023	04-10-2023	04-10-2023	10-10-2023