

30154 - Metallic Structures

Syllabus Information

Academic year: 2024/25

Subject: 30154 - Metallic Structures

Faculty / School: 179 - Centro Universitario de la Defensa - Zaragoza

Degree: 563 - Bachelor's Degree in Industrial Organisational Engineering

ECTS: 6.0

Year: 4

Semester: First semester

Subject type: Optional

Module:

1. General information

The expected results are:

- To understand load transmission mechanisms in flat structures.
- To know the types of steels. Behavioural models.
- Design, calculation and testing of metallic structures according to Spanish regulations.
- Ability to analyse and assess the social and environmental impact of solutions acting with ethics, professional responsibility and social commitment professional responsibility and social commitment.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of the learning results of the subject provides capacity and knowledge, skills and competencies to contribute in a certain extent to their achievement

2. Learning results

1. Qualitatively define the resistance response mechanisms that occur in metallic structure elements.
2. Design and execute metallic structure structures according to Spanish regulations.
3. Describe in a basic way the behaviour of steel-framed structures.
4. Describe in general terms the characteristics of other types of special alloys and their applications.

3. Syllabus

The subject is included in the Structures and Materials specialty of IOI, together with "Steel Structures" and the "Structural Calculation" subjects. It's a fundamental subject in the in the training of Engineers Arm of the Earth Army. Previously, the student has studied the "strength of materials" subject, which lays the bases for understand the equations to define the behaviour of structures against external stresses. Also knowledge learned in the "General Construction Procedures" subject is used.

This subject contributes to the training in values of the Army Officers, providing knowledge about the behavior of structural steel that will allow you to find and evaluate solutions to real problems related to metal structures, mainly used for the execution of bridges and mobility support structures. This knowledge is necessary for Army Officers to carry out their mission, and thereby contribute to reliable and sustainable construction and infrastructure.

1. Main structural response mechanisms of metallic structures. Active section, active vector and active form. Design parameters
2. Construction process of metallic structures.
3. Calculation bases.
4. Structural safety.
5. Section resistance.
6. Resistance of the bars.
7. Unions.
8. Life cycle of structures

4. Academic activities

1. Participative theory classes. Presentation of the concepts and theoretical developments of the subject.

2. Problem-based learning.
3. Cooperative problem solving and flipped classroom.
4. Computer practices. Project-based learning: use of one of the most common structure calculation programs in the engineering field : CYPE structures.
5. Oral presentations: The student will make, among others, an oral presentation explaining the results of their final practice work.
6. Tutorials and Moodle platform: The student is helped to resolve any doubts that may arise during the learning process.

5. Assessment system

FIRST CALL

Continuous assessment: The students will be able to pass the total of the subject by the continuous assessment procedure. To do this, they must demonstrate that they have achieved the expected learning outcomes by passing the assessment instruments indicated below, which will be carried out throughout the semester:

- Two Midterm exams about theoretical and practical aspects, based on problem solving. Its weight in the final grade is 50%.
- Presentation in class of the analysis of an existing structure, in which the transmission mechanisms and load distribution are indicated. Its weight in the final grade is 10%.
- Coursework: in pairs, a metallic industrial warehouse will be designed. Its weight in the final grade is 10%.
- Course dissertation: in pairs, calculate the industrial warehouse designed above, with Cype Ingenieros program, according to the requirements of the Building Technical Code. Its weight in the final grade is 25%.
- Presentation and defense of the results of the practices in English and brief report of the work. its weight in the final grade is 5%.

The final continuous evaluation grade (100%) will be calculated according to the specific weight of each continuous evaluation test. The minimum mark of the evaluation of each of the midterm exam, works, presentations and practices must be 3.5 to mediate in the continuous evaluation. To pass the subject, the student must obtain a final grade greater than or equal to 5.

The evolution of the acquisition of knowledge throughout the course will be taken into consideration, as well as the active participation in class and the quality of the works.

The value of each section and the way to correct it will be indicated in each exam and work.

Final exam: The students who do not pass the subject by continuous assessment or who would like to improve their grades, will have the right to take the Final Exam set in the academic calendar, prevailing, in any case, the best of both grades. This global test will have a weight of 100% in the final grade. It will consist of the calculation of a column, a beam and a joint of a metallic structure. To pass the subject, the student's final grade must be equal to or greater than 5.

SECOND CALL:

Final Exam: The students who do not pass the subject in the first call may take the Final Exam set in the academic calendar for the second call. This Final Exam will consist of the calculation of a column, a beam and a joint of a metallic structure. To pass the subject, the student's final grade must be equal to or greater than 5.

Assessment instruments:	weighting	RA-1	RA-2	RA-3	RA-4
Exams	50%	x	x	x	x
Practices	35%		x		x
Presentations	15%	x		x	x

6. Sustainable Development Goals

- 7 - Affordable and Clean Energy
- 9 - Industry, Innovation and Infrastructure
- 11 - Sustainable Cities and Communities