

28838 - Structures Analysis and Design

Syllabus Information

Academic year: 2023/24

Subject: 28838 - Structures Analysis and Design

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia

Degree: 424 - Bachelor's Degree in Mechatronic Engineering

ECTS: 6.0

Year: 4

Semester: Second semester

Subject type: Optional

Module:

1. General information

The subject of ***Design and Calculation of Structures*** is an elective subject within the mechanics module of the degree. It is the natural continuation of the subject "Strength of Materials", in which the conceptual bases on which it is based have been established. Based on their knowledge, this subject provides the student with the necessary technological tools for the design, calculation and analysis of the most common types of structures in industrial plants and facilities, focusing especially on the steel structure.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (<https://www.un.org/sustainabledevelopment/es/>), specifically with Goals 4 and 9, in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement

2. Learning results

- To master the constructive layout of the different systems that make up an industrial structure.
- To know and apply the fundamentals of the Theory of Structural Safety based on the current regulations and instructions in force.
- Master and apply different methods of calculation and analysis of articulated structures.
- Master and apply different methods of calculation and analysis of rigid node structures.
- Master and solve problems of global stability of structures.
- To master and apply the general regulations on structures and building as contained in the Technical Building Code or other relevant regulations or instructions.
- To carry out a dimensioning of the most common metallic structural typologies in industrial construction.

3. Syllabus

Theoretical Contents

1. Actions and Structural Safety Theory
2. Calculation of flat lattice structures
3. Calculation of flat articulated structures
4. Introduction to matrix calculus
5. Introduction to the finite element method
6. Dimensioning of structural elements and steel connections. CTE DB SE-A / Eurocodes / Others Regulations
7. Introduction to foundation design

Practical Contents

Throughout the subject, a practical case of design, calculation and sizing of an industrial building in steel structure will be developed.

In addition, practical calculation cases will be carried out using several commonly used computer calculation tools, so that the student becomes familiar with different tools and work methodologies.

4. Academic activities

- Participative lectures.
- Practical classes with problem solving and case studies.
- Laboratory and structural and/or related software practices.
- Visits to construction sites and facilities of interest for the subject.

- Lectures, seminars and technical conferences.
- Evaluation Tests.

This should include:

- Study and personal work.
- Tutorials and generic non face-to-face activities.

5. Assessment system

There are two assessment systems: continuous and global assessment.

Continuous assessment

It will consist of:

- Design and calculation practice of an industrial building: Throughout the subject the student will develop a particular case of design and calculation of industrial construction in which they will write in a report all the development from the genesis to the dimensioning of the structure, according to the content of the syllabus taught in the classes. There will be two deliveries of the practice. This practical work will have a weight of 50% of the grade.
- Theoretical-practical exam, whose weight on the grade is 50%

Those students whose average grade of the practical work and the assessment -practical exam is at least 5 points will pass the subject in continuous assessment the theoretical-practical exam is at least 5 points.

It is an indispensable condition to pass the subject in continuous assessment, to attend 80% of the face-to-face activities: classes, technical visits, practices, etc.

Global Assessment

The student who does not pass the continuous assessment system or does not wish to do so, will opt for a global assessment, as described below.

- Theoretical-practical content exam (100% of the final grade). In this exam, theoretical and practical questions will be formulated and several problems of similar difficulty to those done in class will be done. The subject will be passed by obtaining >50% of the grade.