Universidad Zaragoza

Year : 2019/20

28838 - Structures: Design and Calculations

Syllabus Information

Academic Year: 2019/20
Subject: 28838 - Structures: Design and Calculations
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

1.1.Aims of the course

The main goals of the subject "Design and Calculation of structures" are that the students get the skills to choose a structural model appropriate to each real problem, and then, to carry out the structural analysis to get the stresses and displacements and finally, to validate an adequate structural element section (predominantly in steel).

1.2.Context and importance of this course in the degree

The subject "Design and Calculation of Structures" is an optional subject that is framed within the module of mechanics - design and calculation of the curriculum of the **BEng in Mechatronic Engineering**. It is a subject of 6 ECTS credits that it is taught in the second semester of the fourth year, or eighth semester of the race.

The subject is the continuation of the subject Strength of Materials, which gives the basics this new subject. From this point, in this subject the student is provided with the necessary technological tools for the design, calculation, analysis and size of the most frequent types of structures in industrial plants and facilities.

The student will end up knowing:

- Structuring calculation methods
- Advanced constructive solutions
- Industrial constructions

1.3.Recommendations to take this course

We recommend that the student that take this course will know how to:

- Solve reactions and forces on statically determinate structures.
- Determine displacements and angular rotation.
- Get normal and tangential stresses from forces.
- Calculate articulated structures.

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning process designed for this subject is based on the following:

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The current subject is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities

The organization of teaching will be carried out using the following steps:

- **Lectures**: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamentals, structuring them into topics and or sections, interrelating them.
- **Practice Sessions**: The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- **Individual Tutorials**: Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

4.2.Learning tasks

The program offered to the student to help them achieve their target results is made up of the following activities. Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

Face-to-face generic activities:

- **Lectures**: The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
- **Practical Classes**: Problems and practical cases are carried out, complementary to the theoretical concepts studied.

Generic non-class activities:

- Study and understanding of the theory taught in the lectures.
- Understanding and assimilation of the problems and practical cases solved in the practical classes.
- Preparation of seminars, solutions to proposed problems, etc.
- Preparation of the written tests for continuous assessment and final exams.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity / Weekly school hours

Lectures / 4

Other Activities / 6

4.3.Syllabus

The course will address the following topics:

1. Actions on buildings (CTE DB SE-AE)
2. Structural analysis: reticular structures
3. Structural analysis: articulated structures
4. Forces on structures (axial, bending, shear, normal and tangential stresses)
5. Steel Structural Design (CTE DB SE A)
6. Foundations
7. Introduction to matrix structural analysis and finite element analysis

4.4.Course planning and calendar

Calendar of meetings attend them and presentation of works

The dates of both final examinations will be the published ones of official form in http: // http://www.eupla.unizar.es/asuntos-academicos/examenes.

The dates of the partial tests will communicate at the beginning of the classes.

4.5.Bibliography and recommended resources

Presentaciones, ejercicios, apuntes,... en Moodle y la siguiente bibliografía:
http://biblos.unizar.es/br/br_citas.php?codigo=28838&year=2019