

29821 - Strength of Materials

Syllabus Information

Academic year: 2023/24

Subject: 29821 - Strength of Materials

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering

444 - Bachelor's Degree in Electronic and Automatic Engineering

ECTS: 6.0

Year: 3

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The objective of the subject is to enable the student to analyze and design the simplest and most common deformable solid to which many of the elements that make up structures, as well as countless machine elements, can be reduced: the bar element. Some concepts of plane and three-dimensional elasticity are also presented, allowing the study of more complex elements. The subject covers both the fundamentals of Strength of Materials and its more applied aspects and previous knowledge of mathematics and rigid solid mechanics is required.

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/>) and certain specific targets, such that the acquisition of the learning results of the subject will contribute to some extent to the achievement of targets 9.1 and 9.4 of Goal 9.

2. Learning results

In order to pass this subject, the following results must be achieved:

- To understand the concepts of stress and deformation, as well as to know how to relate them by means of the equations of behavior to solve simple three-dimensional elastic solids.
- Know how to calculate and represent stress diagrams in bars and simple structures.
- Know how to solve torsion problems in axes and simple three-dimensional structures.
- Know how to solve composite bending problems in beams and simple structures.
- To understand the concepts of plasticization depletion and rupture, and to be able to correctly apply the most common plasticization criteria.
- To understand the phenomenon of bar buckling and to know how to solve isolated bar buckling problems.
- To distinguish between isostatic and hyperstatic problems and to know different strategies for solving the latter.

3. Syllabus

The subject program includes different topics, covering concepts such as:

- Introduction to elasticity. Tensions and deformations.
- Introduction to strength of materials.
- Stress diagrams.
- Bars subjected to tensile-compression stresses.
- Bars subjected to bending and shear stresses.
- Bars subjected to torsional stresses.
- Analysis of isostatic and hyperstatic problems.
- Buckling.

4. Academic activities

The development of the subject comprises the following blocks:

- Theory classes (30 hours): The theoretical basis of Strength of Materials will be presented.
- Problem class (15 hours): Examples and practical cases of the concepts shown will be solved with the participation of the students.
- Laboratory practices (15 hours): They will be carried out in small groups, where the student will test and apply the knowledge acquired.
- Subject work (20 hours): It will show a global perspective of the subject.

- Personal study and work (65 hours).
- Assessment tests (5 hours)

5. Assessment system

Río Ebro Campus (Zaragoza).

Continuous assessment

- Course work (15% of the grade). Minimum grade of 4 out of 10): A mechanical structure or system will be designed, or a pre-existing one will be tested. The assessment will be based on the written report submitted.
- Partial assessment test (20% of the grade, minimum grade of 4.5 out of 10): Written test, carried out in the middle of subject, which includes the concepts exposed up to that moment.
- Practices (15% of the grade, minimum grade of 4 out of 10): Computer practice sessions with delivery of final report.
- Exam (50% of the grade, minimum grade of 4.5 out of 10): Final exam in which the complete content of the subject will be evaluated. It will consist of theoretical and practical exercises and problems.

Global assessment in the official calls:

- Exam (85% of the grade, minimum grade of 4.5 out of 10): Final exam in which the complete content of the subject will be evaluated. It will consist of theoretical and practical exercises and problems.
- Practical exam (15% of the grade, minimum grade of 4 out of 10): It will consist of different questions related with the practices carried out during the term. If the student has satisfactorily completed the practice throughout the subject, they will be exempted from taking this practical exam in the global assessment.

Teruel Campus.

Continuous assessment

- Subject work (15% of the grade): A mechanical structure or system will be designed, or a pre-existing one will be tested. The assessment will be based on the written report submitted.
- Partial assessment test (15% of the grade): Written test, carried out in the middle of the term, which includes the concepts exposed up to that moment.
- Practices (10% of the grade, minimum grade of 4 out of 10): Computer practice sessions with delivery of final report.
- Exam (60% of the grade, minimum grade of 4.5 out of 10): Final exam in which the complete content of the subject will be evaluated. It will consist of theoretical and practical exercises and problems.

Global assessment in the official calls:

- Exam (85% of the grade, minimum grade of 4.5 out of 10): Final exam in which the complete content of the subject will be evaluated. It will consist of theoretical and practical exercises and problems.
- Practical exam (15% of the grade, minimum grade of 4 out of 10): It will consist of different questions related with the practices carried out during the term. If the student has satisfactorily completed the practice throughout the subject, they will be exempted from taking this practical exam in the global assessment.