

30715 - Structures 1

Syllabus Information

Academic year: 2024/25

Subject: 30715 - Structures 1

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 470 - Bachelor's Degree in Architecture Studies

ECTS: 6.0

Year: 2

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The objective of the subject is that the student: a) acquires the ability to design and dimension structural elements for the most common typologies; b) learns the fundamental concepts of mechanics of continuous media for the most common typologies and the hypotheses and resistance formulations of materials for their application to design and calculation of structures and elements; and c) knows how to obtain and interpret the results of stress-stresses and deformations-displacements that guarantee the safety of the structure, taking into account the following criteria.

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, the learning activities planned in this subject will contribute to the achievement of targets 9.4 and 9.5 of Goal 9, and target 8.2 of Goal 8.

2. Learning results

- To know the basic laws governing the Mechanics of Continuous Media and, more specifically, the Theory of Elasticity.
- To understand the deformation mechanisms of a solid as a continuous medium.
- To know and understand the theories and hypotheses of Strength of Materials applied to bar type elements.
- To know how to distinguish the different structural typologies and the way in which they resist the stresses to which they are subjected and how to dimension them.
- Understand and know how to apply different methods of calculation and analysis of member structures.
- Know how to design a bar structure, as part of the architectural project, with choice of structural system, geometry, material, connections and support conditions.
- Ability to perform serviceability and strength design of bar structures.

3. Syllabus

1. Introduction to Structures.
2. Theory of Elasticity.
3. Behavior of structural materials.
4. Strength and Shape. Cables and membranes. Arches, vaults and domes. Lattices.
5. Structural strength analysis.
6. Bars to Axil.
7. Bending bars.
8. Torsion bars.
9. Stability of compressed bars. Buckling.

4. Academic activities

- **Participative theory classes (T1)** (30 hours). They present the theoretical concepts of the subject, illustrated with the following examples that help to understand them and in which the student is challenged to participate by reasoning about the theoretical concepts learned.
- **Problem classes (T2)** (15 hours). The contents of the theoretical classes are applied to the resolution of problems carefully selected to cover all the most relevant aspects and concepts.
- **Computer practices (T3)** (15 hours). They are organized so that the student becomes familiar with the different structural typologies and learns how to use basic calculation and computational numerical simulation tools. The objective is to ensure that the student is able to interpret the results obtained and question their validity.
- **Teaching assignments.** Evaluable tasks are proposed throughout the subject.
- **Personal study and work (T7)** (87 hours).
- **Tutoring.** Schedule of personalized attention to the student in order to review and discuss the materials and topics

presented in the classes.

- **Evaluation tests (T8)** (3 hours).

5. Assessment system

Continuous assessment

In order to pass the subject through continuous assessment, different evaluable activities must be carried out throughout the semester.

1) Course activities (20% of the final grade)

Activities and questions will be proposed through the Digital Teaching Ring. There will be an evaluable test on calculation and representation of stress laws in isostatic structures.

2) Practices (15% of the final grade)

There will be 5 practice sessions in small groups of students. Their assessment may be based on questionnaires or forms to be filled in by the students during the practice.

3) Exam (65% of the final grade)

On the date of the official exam of the first call, an exam will be held that will evaluate the complete content of the subject. A minimum grade of 4.5 out of 10 will be required in this exam in order to average with the rest grades obtained in the other activities.

Global Assessment

Students who do not pass the continuous assessment or do not wish to do it, may pass the course through the global assessment. In the second call it is mandatory to take the global assessment. Its characteristics are:

1) Exam (85% of the final grade)

On the date of the official exam of the first call, an exam will be held that will evaluate the complete content of the subject. A minimum score of 5 out of 10 will be required for this exam.

2) Practical exam (15% of the final grade)

If the student has satisfactorily completed the practices in the regulated sessions, they may be exempted from taking the practice exam in the global evaluation test, maintaining in such case the grade corresponding to the continuous assessment.

The final grade of the subject for either of the two modalities is obtained by adding the grades of each of the parts according to the indicated weighting. There are parts that require passing a minimum grade in order to average with the rest of activities. In order to pass the subject, the final grade obtained must be equal to or higher than 5 points out of 10.

6. Sustainable Development Goals

8 - Decent Work and Economic Growth

9 - Industry, Innovation and Infrastructure

12 - Responsible Production and Consumption