

Academic Year/course: 2022/23

## 66423 - Methods of analysis for structural mechanics

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 66423 - Methods of analysis for structural mechanics

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 536 - Master's in Mechanical Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** First semester

**Subject Type:** Compulsory

**Module:**

### 1. General information

### 2. Learning goals

### 3. Assessment (1st and 2nd call)

### 4. Methodology, learning tasks, syllabus and resources

#### 4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

**Lectures** A01 (15 hours) . The teacher explains the main contents of the course. This activity will take place in the classroom.

**Practice sessions** A02 (15 hours). These classes are also conducted in the same classroom lectures participatory. They consists on solving problems and cases related to the contents of Section I and Section II.

**Laboratory sessions** A03 (25 hours). Introduction to the use of techniques of experimental characterization of structures and introduction to handling structural calculation software.

**Special practice sessions** A04 (5 hours).

**Assignments** A05 (40 hours). These assignments can be done individually or in pairs. Students will study several real cases proposed by the teacher. They should analyze these cases and seek the necessary additional information for their full understanding. The students will prepare a report for each assignment and submit them to the teacher. They will be orally defended in front of the teachers and the rest of students.

- 1. Numerical-experimental activity correlation of a real case.

**Tutorials** A06 (5 hours). Students can attend office hours with the aim of reviewing and discussing the materials and topics presented in both the theory and practice sessions.

**Study** A07. (42 hours)

**Assessment** A08 (3 hours). Reports, presentations, assignments, and tests.

#### 4.2. Learning tasks

The course includes the following learning tasks:

- Using computational analysis techniques stress states mechanical components and structural elements.

- Computer simulation of the behavior of materials through the constitutive laws of materials.
- Experimental characterization of the mechanical properties of different materials by universal testing machines.
- Experimental techniques for measuring residual stress in pieces by extensometry.

### **4.3. Syllabus**

The course will address the following topics:

Section I: Experimental techniques.

1. Measurement of residual stresses in parts by extensometer.
2. Universal testing machines. Characterization of materials.
3. Experimental simulation of actual behavior of mechanical prototypes.

Section II: Computational methods.

1. Computational mesh processing tools.
2. Computational tools based on the finite element method.
3. Structural analysis computational tools in building.

### **4.4. Course planning and calendar**

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class.