Universidad Zaragoza

Academic Year: 2025/26

60825 - New technologies in machines and vehicles

Teaching Plan Information

Academic year: 2025/26
Subject: 60825 - New technologies in machines and vehicles
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 532 - Master's in Industrial Engineering
ECTS: 6.0
Year: 2
Semester: First semester
Subject type: Optional
Module:

1. General information

The general objectives of this subject are for the student to acquire the ability to design and calculate subsets belonging to machinery and automotive engineering, which require advanced knowledge. It also aims to help the student become familiar with frames, security systems, machine fairings, vehicle bodies, bumpers, dashboards or headlights made of metals, composites or plastics. It covers both the technical requirements and their feasibility methods.
It is necessary to highlight the multidisciplinary nature of the topics under study and that acquiring this knowledge will allow the student to relate them appropriately.

2. Learning results

• To acquire analytical skills to determine the mechanical behaviour of machines and vehicles.
•To acquire practical skills for the application of experimental methodologies in the design and calculation of machines and vehicles.
•To analyse the structural behaviour of machines and vehicles and their components: introduction, methodologies and structural resolution tools.
•To apply the finite element method (FEM) to the virtual resolution of structural problems. Simulation programs (SolidWorks and/or Abaqus), application examples.
•To apply the finite element method (FEM) to the virtual resolution of problems related to the processing of plastic materials by injection and its influence on the resolution of structural problems. Simulation programs (Cadmould 3D-F) and (Cadmould Expert-Warp and/or Mekanic). Application examples.
•To apply design methodology based on the combination of simulation techniques and test execution. General aspects, result analysis, model validation.
•To design, calculate and optimise machine and vehicle components.
•To propose and solve specific cases through the application of tools based on the FEM.

3. Syllabus

- Types of vehicle bodies
- Design criteria for static, dynamic loads and collisions
- Weight optimization and solutions based on high resistance steels, aluminium and composites
- Typologies of functional subsystems
- Structural and functional criteria for the use of light materials such as thermoplastics
- Mould design criteria and feasibility of processes such as injection
- New advanced application technologies in plastic injection

4. Academic activities

Master classes: sessions with the teacher in which the subject syllabus will be explained: 30 hours
Problems: 15 hours
Laboratory practices: 15 hours
Completion of work: 27 hours
Study of the subject; class preparation; practical activities: 60 hours
Assessment tests: 3 hours

This subject is English Language Friendly (ELF) in at least one group. The study and class material is available in English and the teachers will attend office hours and prepare and evaluate students in English if they don't speak Spanish.

5. Assessment system

The subject will be assessment by the continuous assessment system by means of the following activities:

- Partial test (50%): written tests, individually done by the students throughout the teaching period of the subject. The result of these tests will give the student the possibility to eliminate the corresponding topics of the final test for the two official calls of the final exam.
- Laboratory practices (15%): Individual completion of a practice questionnaire related to the topics of the practice sessions.
- Supervised Work (35%): supervised work consisting of the resolution of different practical cases throughout the semester.

Following the regulations of the University of Zaragoza, a global assessment test will also be scheduled in each call, to be held on the date set by the centre, for those students who do not opt for this continuous assessment system. The test will consist of an assessment exam of theoretical practical contents that will constitute 100% of the final grade.

6. Sustainable Development Goals

3 - Good Health and Well-being
9 - Industry, Innovation and Infrastructure
12 - Responsible Consumption and Production