Universidad Zaragoza

Academic Year/course: 2023/24

29851 - Industrial Electronics

Syllabus Information

Academic year: 2023/24
Subject: 29851 - Industrial Electronics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS: 6.0
Year: 4
Semester: Second semester
Subject type: Optional
Module:

1. General information

The objective of the subject is to train students in the real-time control of power electronic systems associated with electric drives, a discipline commonly known as Mechatronics. For the successful design of this type of systems, the student must combine knowledge of electrical machine models, skills in the design of power electronic systems, knowledge of programmable systems, the ability to model mechatronicsystems and, additionally, master the peculiarities of real-time control.

The subject is articulated around a project (speed control of an electric car) to be carried out throughout the semester, so continued study and work, from the first day of the term, are essential for the success of the subject.

2. Learning results

In order to pass this subject, the students shall demonstrate they has acquired the following results:

- Specify the requirements of an Industrial Electronics application.
- Model and simulate mechatronic applications.
- Develop real-time control of mechatronic systems based on microcontrollers.

3. Syllabus

- Specifications and requirements in Industrial Electronics applications.
- Mechatronic systems: fundamentals, modeling and simulation.
- Modeling of permanent magnet machine.
- Vector control of permanent magnet machines.
- Power electronic systems for the control of electrical machines.
- Microcontroller programming of the real-time control of a permanent magnet machine.
- Simulation of electronic systems for real-time control of electric drives.
- Integration of power electronics systems, microcontrollers and drives.
- Control of energy exchange with the power grid.

4. Academic activities

This subject is articulated through the **Project Based Learning** method: from the beginning, the design and realization of the electric traction of a vehicle equipped with a permanent magnet synchronous motor will be proposed.

The teaching process will be developed in three areas:

- Theory and problem classes (42 hours): the teacher will present the project to be carried out and the specific milestones to be covered. Part of the directed work will be carried out. Students will present their proposals for development and solutions and there will be a discussion on their appropriateness.
- Laboratory practices (15 hours): students will experimentally validate the proposals developed.
- Personal study and work (93 hours): each student, either in a group or on their own, will work on the achievement of the required milestones.

5. Assessment system

According to permission granted by the Vice Rectorate for Academic Policy on January 13, 2022, the assessment in the first call will be carried out exclusively according to continuous assessment criteria, without any global assessment test . In the second call, the evaluation will be carried out following a global assessment test.

In order to pass the subject, a **minimum grade of 3.5 points out of 10** must be obtained **in each of the sections** of the

corresponding exam of the corresponding call.

First call. Only a continuous assessment system is established:

- Assignments and Evaluable Activities (30%). The student who, unjustifiably, does not present the deliverables in the dates established during the teaching period, will not be able to pass the assessment in the first call. The student who, without justification, does not attend more than 10% of the class sessions, will not be able to pass the assessment in the first call.
- Laboratory Practicals (50%) The student who, without justification, does not attend a session of laboratory will not be able to pass the assessment in the first call.
- Delivery of final work (20%). The student will deliver a summary document in which the work of design done throughout the term will be collected.

Second call for applications. The second round will consist of a global assessment test divided into the following sections:

- Test of Assignments and Evaluable Activities (30%).
- Laboratory Practice Test (50%).
- Delivery of final work (20%).