Universidad Zaragoza

Academic Year/course: 2023/24

29721 - Fundamentals of electronics

Syllabus Information

Academic year: 2023/24
Subject: 29721 - Fundamentals of electronics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 330 - Complementos de formación Máster/Doctorado
434 - Bachelor's Degree in Mechanical Engineering
ECTS: 6.0
Year: 434 - Bachelor's Degree in Mechanical Engineering: 3
330 - Complementos de formación Máster/Doctorado:

Semester: Second semester
Subject type: Compulsory
Module:

1. General information

1. General Information

The general objective of this subject is to provide students with basic knowledge of analog, digital, and power electronics, and to introduce them to terminology and common concepts to facilitate interdisciplinary work with this branch of engineering, as well as to enable them to analyze simple electronic circuits and to evaluate wider electronic systems.

Sustainable Development Goals

3- Health and wellness: electronics in health and wellness support systems.

4- Quality education.

6 - Clean water and sanitation: instrumentation for water quality measurement

7 - Affordable and non-polluting energy: energy efficiency of electronic systems.

9- The interdisciplinary nature of engineering improves industrial infrastructures.

12- Responsible production and consumption: implicit in the user-oriented design exercises.

2. Learning results

Expected results for the student:

1. Identify the applications and functions of electronics in engineering
2. Recognize basic electronic components and devices used for various electronic functions
3. Know how to use the basic techniques of analog, digital and power electronic circuit analysis
4. Have the ability to design analog, digital and power electronic circuits at the block level
5. Handle the instruments used in a basic electronics laboratory and use electronic simulation tools

Specific competencies:
C22: Knowledge of the fundamentals of electronics.
Generic competencies:
C4: Ability to solve problems and make decisions with initiative, creativity and critical thinking.
C5: Ability to communicate and transmit knowledge, skills and abilities in Spanish.
C6: Ability to use engineering techniques, skills and tools necessary for engineering practice.

3. Syllabus

- Introduction. Functions of electronics in mechanical engineering. Introduction to basic devices and their models in circuit analysis.
- Sensing and conditioning: Sensors and instrumentation and analog electronics for sensing, and conditioning. Stages with operational amplifier.
- Electronics in power systems. Power transformation circuits and equipment. Batteries. Diodes and transistors. Integrated regulators.
- Power electronics in load control. Circuit stages for motor and load commutation control inDigital electronics and microcontrollers in control and visualization systems. Information processing, analysis and design of specific functions. DC and polarization of devices in conduction.

4. Academic activities

Lectures: to explain components, concepts, systems and procedures. 30 hours

Exercises: to apply the above concepts. 15 hours

Laboratory practices: to learn assembly skills and the use of laboratory instruments, and to verify the operation of circuits seen in class. Signal conditioning circuits, microcontroller, power regulation to motor and power supply. 15 hours

Evaluable activities: practical activities involving the use of concepts and circuits, circuit simulators and microcontroller programming. 15 hours

Study and personal work. 72 hours

Tutorials: at the student's request.

Assessment tests. 3 hours

5. Assessment system

Continuous assessment:

It comprises three activities:

- laboratory practicals: compulsory (25%), minimum grade of 4 to average with the rest

- evaluable activities (AEs): voluntary (20% if higher than the exam)

- exam: compulsory (55% with AEs of higher grade to the exam, or 75% otherwise). The minimum grade for this part, required to pass the subject, will be 4 points.

Global assessment:

The student's global assessment will be carried out in the two official calls. The following testswill be held on both dates:

Theoretical-practical exam: CT grade from 0 to 10 points. It will account for 75% of the overall grade, and a minimum grade of 4 pointswill be required for this part.

Laboratory examination: CL rating from 0 to 10 points. It will account for 25% of the overall grade. It can be validated with the practice grade obtained during the term if it is higher than 4 points.

The subject is passed with an overall grade of 5 out of 10.