

60838 - Resonant electronic converters

Syllabus Information

Academic year: 2023/24

Subject: 60838 - Resonant electronic converters

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 objective of the subject is to provide knowledge to specify, analyse and design high-efficiency power processing electronic systems based on the use of resonant techniques, considering advanced modes of operation and control. It also aims to help the student to identify some industrial, domestic, communications and medical applications of these systems, delving into the design of some of them.

<https://www.un.org/sustainabledevelopment/es/> These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific targets, so that the acquisition of the learning results of the subject provides training and competence to the student to contribute to some extent to their achievement:

- Goal 7: Ensure Access to Affordable, Secure, Sustainable and Modern Energy for All. Objectives 7.2 and 7.3.
- Goal 8: Promote Inclusive and Sustainable Economic Growth, Employment and Decent Work for All Objectives 8.2 and 8.4.
- Goal 9: Industry, Innovation and Infrastructure. Objective 9.5. Enhance scientific research and improve the technological capabilities of industrial sectors in all countries, in particular developing countries, among others, by fostering innovation and significantly increasing, by 2030, the number of R&D personnel per million population and public and private sector expenditures on research and development.

2. Learning results

Upon completion of this subject, the student will be able to:

- Identify and distinguish the different types of high efficiency advanced electronic power processing systems that use resonant techniques, as well as their modes of operation and control.
- Analyse and design resonant power stages based on common topologies (full bridge, half-bridge, and single-switch topologies).
- Conduct computer simulations and experimental laboratory measurements, as aid to the analysis and design of these types of systems.
- Know some industrial, domestic, communication, and medical applications of these systems and delve into the design of some of them.

3. Syllabus

1. Introduction and applications.
2. Resonant circuits.
3. Resonant stages, full bridge and half-bridge.
4. Resonant stages of a switch.
5. Modelling of resonant stages.

4. Academic activities

1. Master Class (approximately 20 hours)
2. Problem solving and case studies (approximately 10 hours)
3. Laboratory practice (approximately 9 hours)
4. Special practices (approximately 6 hours)
5. Teaching assignments (approximately 42 hours)
6. Study (approximately 60 hours)

7. Assessment tests (approximately 3 hours)

5. Assessment system

In order to pass the subject, the student must demonstrate they has acquired the foreseen learning results by the following assessment activities:

Theoretical work and oral presentation:

The work and oral presentation of a topic related to the subject will be evaluated.

This activity will be graded from 0 to 3 points (C1) and will represent 30% of the student's grade in the subject.

Assessment of laboratory practices and associated work:

The work done in relation to the practices will be evaluated, as well as its previous preparation and development.

This activity will be graded from 0 to 7 points (C2) and will represent 70% of the student's grade in the subject.

The **total grade for the subject** (out of 10 points) will be $C1 + C2$, provided that C1 is higher than or equal to 1 and C2 is higher than or equal to 3. Otherwise, the grade for the subject will be the minimum between $C1 + C2$ and 4. The course is passed with a total grade higher than or equal to 5 points out of 10.

Global test:

For those students who prefer it, there will be a global test consisting of a theoretical-practical exam.