

## SUBJECT TEACHING GUIDE

### G875 - Electrical Drives

### Degree in Electrical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA			
Degree	Degree in Electrical Engineering	Type and Year	Compulsory. Year 4
Faculty	School of Industrial Engineering and Telecommunications		
Discipline	Subject Area: Machines and Electrical Switches Module: Electrical Technology		
Course unit title and code	G875 - Electrical Drives		
Number of ECTS credits allocated	6	Term	Semester based (1)
Web	<a href="https://aulavirtual.unican.es/">https://aulavirtual.unican.es/</a>		
Language of instruction	English	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA
Name of lecturer	MARIO MAÑANA CANTELI
E-mail	mario.manana@unican.es
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO PROFESOR (S2055)
Other lecturers	ALBERTO LASO PEREZ RAQUEL MARTINEZ TORRE

### 3.1 LEARNING OUTCOMES

- The student will be able to analyze and/or design an electric drive taking into account not only technical and economical aspects but also the application and the standards.

- .

**4. OBJECTIVES**

The main aim of this subject is providing the students with the basic principles of electrical drives. The students will gain the skills needed in order to select, analyze and design adjustable speed drives (ASD). The subject focuses on practical implementation of several types of ASD taking into account the standards, the available commercial-degree technology and the final application. The topics covered by the subjects are defined in the context of the sustainability objectives defined by the 2030 Agenda for Sustainable Development of United Nations and the SDGs, especially with regard to SDG 7.

**6. COURSE ORGANIZATION**

**CONTENTS**

1	Introduction to Electrical Drives: History. Definition of and Electrical-Motor Drive. State of the Art. Typical Applications. The Multi-Disciplinary Nature of Drive Systems.
2	Electronic Power Converter for Electrical Drives: Introduction. Power Semiconductor Devices. Overview of Power Processing Units. Converters for DC Motor Drives. Converters for AC Motor Drives.
3	DC-Motor Drives: Introduction. Operating Principles of DC Machines. Equivalent Models of DC-Motor Drives. Operating Modes in DC-Motor Drives. Feedback Controllers for Motor Drives.
4	AC-Motor Drives: Introduction. Space-Vector Representation. Permanent-Magnet Synchronous AC Drives. Induction Motor-Drives. Steady-State Operation. Speed and Torque Control of AC-Motor Drives.
5	Reluctance Drives: Introduction. Stepper-Motor Drives. Switched-Reluctance Motor Drives.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Virtual Evaluation. Activities using on-line tools.	Activity evaluation with Virtual Media	No	No	20,00
Evaluation Part I. Written exams during the class period.	Written exam	No	Yes	40,00
Evaluation Part II. Written exams during the class period.	Written exam	No	Yes	40,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>In general, the rules governing the evaluation system module will be in accordance with the current legislation in the University of Cantabria.</p> <p>The evaluation system will have as main benchmark the continuous assessment . It will be performed through activities planned throughout during the semester .</p> <p>Continuous assessment may be supplemented by a final test to be held at the end of the semester. In any case, the percentages corresponding to the continuous assessment and the final grade test shall comply with the following restrictions:</p> <ul style="list-style-type: none"> <li>• Continuous assessment: 75% of the final score.</li> <li>• On-line assessment: 15% of the final score.</li> <li>• Final project: 10% of the final score.</li> </ul> <p>Students who refuse to do the continuous evaluation or fail the final exam will be required to re-sit the exam period at the end of each semester.</p> <p>For reference, the ongoing evaluation activities will be:</p> <ul style="list-style-type: none"> <li>• Laboratory.</li> <li>• Oral presentations.</li> <li>• Individual or group work.</li> <li>• Written tests.</li> <li>• Online tests.</li> </ul> <p>All the evaluation can be carried out in both face to face or online mode.</p> <p>The remote evaluation of the works, practical laboratory exercises and written exams is foreseen, in the case of a new health alert by COVID-19 making it impossible to carry out the evaluation in a face to face way.</p>				
<b>Observations for part-time students</b>				
The evaluation of partial-time students will be performed with the same criteria that the full-time students.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
<b>BASIC</b>
Mohan, N.; Electric Machines and Drives. A First Course. Wiley.
Hart, D.; Power Electronics. McGraw-Hill Science.