SUBJECT TEACHING GUIDE

G873 - Power Electronics

Degree in Electrical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Electrical Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Power Electronics Module: Electrical Technology				
Course unit title and code	G873 - Power Electronics				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA
Name of lecturer	FRANCISCO JAVIER AZCONDO SANCHEZ
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Other lecturers	FRANCISCO JAVIER DIAZ RODRIGUEZ

3.1 LEARNING OUTCOMES
- To know the different types of power semiconductor devices, its characteristics and application.
- To know the architectures of the four types of energy converters. Modes of operation. Principles of analysis and design. Applications.
- To know the application of active power devices in power distribution networks.
- To know the design of power systems based on renewable energies.

4. OBJECTIVES

To know the operation of power semiconductors as switches.
To know the basic architecture of the different types of converters and the use and integration of renewable energies in the network.

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction to Power Electronics V - I operation quadrants of switched mode power devices Static and dynamic electrical characteristics of: - Power diodes - Power MOSFETs - IGBTs - Thyristors
2	Switched mode power conversion Line frequency convertrs High frequency converters Average modeling. Steady state, dynamics and small-signal. Linear control
3	Grid-connected converters Devices to improve the grid quality Possible applications: FACTS devices. Parallel devices: SVC and STATCOM. Serial Devices: TCSC and SSSC. Series-Parallel Devices: DFC and UPFC.
4	Renewable energies application. Photovoltaic Solar Energy (PV). Architecture of a PV solar power system. Convertdiores in PV energy. Wind power. Architecture of a wind energy system.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Laboratory practices	Laboratory evaluation	Yes	Yes	30,00
Student participation in classes and competences acquisition troughout the course will be assessed through test and assignments. It will weight 70% of the final grade. Minimum grade is 4/10. Lab continuous assesment and results weight 30% of the final gra	Others	Yes	Yes	70,00
Final exam grade will replace the continuus assesmment (70% of the final grade) A final exam for the lab will be also available for students who had not reeach 5/10 during the course in this part	Written exam	Yes	No	0,00
TOTAL				100,00

Observations

Given the uncertain situation that the social distancing measures established by the health authorities do not allow the development of some teaching activity in the classroom for all enrolled students, a mixed teaching modality will be adopted that combines this classroom teaching with distance teaching. In the same way, tutoring may be replaced by remote tutoring using telematic means.

Observations for part-time students

The evaluation criteria for part-time students is the same as for full-time students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

"Fundamentals of Power Electronics" 3rd Edition, Erickson/Maksimovic. Springer Nature Switzerland AG 2020. ISBN 978-3-030-43879-1. https://doi.org/10.1007/978-3-030-43881-4

Ned Mohan, Tore M. Undeland, William P. Robbins. Power Electronics: Converters, Applications, and Design. John Wiley & Sons Inc. Nov. 2002. ISBN 978-0471226932