SUBJECT TEACHING GUIDE

G1010 - Further Power Electronics

Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Industrial Electronic Engineering and Automatic Control Systems			Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Electronic Technology Optional Module				
Course unit title and code	G1010 - Further Power Electronics				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	English		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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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESORES (S3019)
Other lecturers	

3.1 LEARNING OUTCOMES
- Students are trained in design oriented analysis of transformers and isolated DC / DC converters
- Students complete the training on modeling techniques for power converters operating in discontinuous conduction mode
- The students receive training in analysis and design of magnetic components and the isolated DC to DC power converter circuits.
- The students acquire knowledge on the principle of operation analysis and properties of resonant converters

4. OBJECTIVES

Provide the student with up to date knowledge of the isolation techniques and isolated converter topologies
Extend the capabilities of modeling and control design for power converters
Provide an overview of modern rectifiers and the standard that limit the line power factor and line harmonic content
Equip the students with modeling and control design capabilities of single and three-phase grid connected converters

6. COURSE ORGANIZATION

CONTENTS	
1	Furthering on Converter Dynamics and Control - Input Filter Design - AC and DC Equivalent Circuit Modeling of the Discontinuous Conduction Mode - Current-mode Control
2	- Isolation Motivation - Filter inductor design constrains. Step by step design procedure. Multiple-winding magnetic design using the Kg method. Examples. Summary - Transformer design. Basic design constrains. Step by step design procedure using the Kgfe method. AC inductor design. Summary - Isolated DC - DC converter topologies Flyback Forward Push-Pull Half-Bridge Full-Bridge
3	Modern Rectifiers and Power System Harmonics - Power and Harmonic in Non-sinusoidal Systems - Line-Commutated Rectifiers - Pulse-width Modulated Rectifiers

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Work assignment, exercises and lab practices	Laboratory evaluation	No	Yes	40,00
Exam	Written exam	Yes	Yes	40,00
20% of the grading corresponds to test and assignments 40% of the grading corresponds to the lab development.	Others	No	No	20,00
TOTAL				100,00

Observations
Observations for part-time students
Since 60% of the grading corresponds to activities developed during the regular classes and lab sessions the assessment criteria for part time student is the same as for other students

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Christophe Basso Switch-Mode Power Supplies Spice Simulations and Practical Designs. Mc Graw Hill
R. W. Erickson, D. Maksimovic. Fundamentals of Power Electronics 2nd Edition
N. Mohan, T.M. Undeland, W.P. Robbins. Power Electronics: Converters, Applications and Design. John Wiley & Sons. 2003.
M. K. Kazimierczuk, D. Czarkowski, Resonant Power Converters 2nd Ed. New York: Wiley Interscience Publication, 2011.