

**POWER ELECTRONICS
2016-2017**

Bachelor Degree:	ELECTRICAL ENGINEERING	804G
Course title:	POWER ELECTRONICS	623
Year/Semester:	First Semester	ECTS Credits: 6,00

DEPARTMENT

ELECTRICAL ENGINEERING					
Address:	Luis de Ulloa, 20				
City:	Logroño	Province:	La Rioja	Postal code:	26004
Phone number:	941 299 477	Email address:			

ENGLISH-FRIENDLY FACULTY

Name:	Antonio Zorzano Martínez				
Phone number:	941 299 486	Email address:	Antonio.zorzano@unirioja.es		
Office:	318	Building:	Department Building		

CONTENTS

Unit 1: Introduction to Power Electronics: Electronic Switches, Functions and Applications

- 1.1. Fundamentals of Power Electronics
- 1.2. Typical Applications
- 1.3. Electrical and Electronics Components
- 1.4. Power Computations

Unit 2: AC-DC Converters (Rectifiers)

- 2.1. Half-Wave Rectifiers
 - 2.1.1. Uncontrolled Half-wave Rectifier
 - 2.1.2. Controlled Half-wave Rectifier
- 2.2. Full-Wave Rectifiers
 - 2.2.1. Uncontrolled Full-Wave Rectifiers
 - 2.2.2. Controlled Full-Wave Rectifiers
- 2.3. Three Phase Rectifiers
 - 2.3.1. Uncontrolled Three-Phase Rectifiers
 - 2.3.2. Controlled Three-Phase Rectifiers

Unit 3: DC-DC Converters

- 3.1. Switching converters without electrical isolation
 - 3.1.1. The Buck Converter
 - 3.1.2. The Boost Converter
 - 3.1.3. The Buck-Boost Converter.
- 3.2. Switching converters with electrical isolation
 - 3.1.1. The Flyback Converter
 - 3.1.2. The Forward Converter

Unit 4: DC-AC Converters (Inverters) and AC-AC Converters

- 4.1. DC-AC Converters
 - 4.1.1. Introduction
 - 4.1.2. Classical Topologies
 - 4.1.2.1. Half-Bridge Inverters
 - 4.1.2.2. Full-Bridge Inverters
 - 4.1.2.3. Three-Phase Inverters
 - 4.1.3. Pulse-Wide-Modulated Inverters
- 4.2. AC-AC Converters

4.2.1. The Single-Phase AC-AC converter with resistive load

4.2.2. The Single-Phase AC-AC converter with RL load

Unit 5: Complements of power electronics

5.1. Other type of converters

5.2. Power Devices

5.3. Control Circuits

5.4. Protection Circuits

Unit 6: Practical session

Application of Power Electronic Conversion using Semiconductor Devices. Rectified Circuits, DC-DC converters, Inverters and AC voltage Controllers will be analyzed and designed. Skill E7 (knowledge applied Power Electronics) will be developed in intensive way next to ability of using practical Knowledge, and critical ability and self-criticism and (G10) and team work.

REFERENCES

Title
"Power Electronics", Daniel W. Hart, ISBN-13: 978-0-07-338067-4, ISBN: 0-07-338067-9, Publisher: McGraw Hill, 2010, First edition
"Fundamental of Power Electronics", Robert W. Erickson, Dargan Macksimovic, Second edition, ISBN 0-7923-7270-0 Publisher: Kluwer Academic, 2001
Modern power Electronics and AC Drives, Bimal K. Bose, ISBN 10: 0130167436, ISBN 13: 9780130167439, Publisher: Prentice Hall, 2001

EVALUATION SYSTEM

Project worth 20% of the overall grade
Reporting practices worth 20% of the overall grade
Examination worth 60% of the overall grade