



Universitat de Lleida

DEGREE CURRICULUM

POWER ELECTRONICS

Academic year 2015-16

Subject's general information

Subject name	Power Electronics
Code	102122
Semester	2º Q
Typology	Obligatòria
ECTS credits	6
Theoretical credits	3
Practical credits	3
Office and hour of attention	Tuesday 19:00 - 21:00 h / Office 2.18, 2.19 entry
Department	Informàtica i Enginyeria Industrial
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	Idioma Percentatge d'ús Català 20.0 Castellà 80.0
Degree	Degree in Automation and Industrial Electronic Engineering
Distribution of credits	Juan Antonio Garriga Castillo 6
Office and hour of attention	Tuesday 19:00 - 21:00 h / Office 2.18, 2.19 entry
E-mail addresses	garriga@diei.udl.cat

Juan Antonio Garriga Castillo

Subject's extra information

Power Electronics requires other skills acquired in areas such as subjects of Electrical Technology, Circuit Theory and Fundamentals of Electronic Engineering. Computer skills are interesting and practical use of advanced applications in personal computers since it offers good support for mathematical analysis and systems simulation

Power Electronics is a course of six mandatory ECTS credits, taught in the second quarter of the third course of Engineering Degree in Industrial Electronics and Automation. This course introduces students to the analysis and design of power electronic systems for industrial applications with emphasis on semiconductors power most used, switched power converters (ac / dc, dc / dc, dc / ac, ac / c) in its various topologies and feeding different loads, as well as provide a comprehensive overview of the many fields of application of this discipline.

Learning objectives

goals

Gain perspective of power electronics. Gain perspective of various types of power semiconductor devices and their switching characteristics. Learning the lessons of power converters.

Use basic circuit analysis techniques to analyze the performance of power electronic circuits. Graphical and analytical understanding of the functioning of electronic power circuits.

Competences

Degree-specific competences

- Applied knowledge of high-power electronics.

Goals

- - Acquire a perspective on power electronics. - Gain perspective of different types of power semiconductor devices and their switching characteristics. - Types of power converters
- Knowledge of the principles and applications of analogical electronics.
- Knowledge of the principles and applications of digital electronics and microprocessors.
- Applied knowledge of electronic instrumentation.

Degree-transversal competences

- Ability to resolve problems and elaborate and defend arguments inside their field of study.

Goals

- - Use the basic techniques of circuit analysis to analyze the performance of power electronics circuits. Understand graphically and analytical performance of power electronic circuits.
- Ability to analyse and synthesize.

Subject contents

1. Introduction to Power Electronics

2. Power Semiconductors

- 2.1. Diode.
- 2.2. Thyristor.
- 2.3. GTO
- 2.4. TRIAC
- 2.5. Bipolar Transistor
- 2.6. MOSFET
- 2.7. IGBT

3. Converters

- 3.1. Conversion of alternating current-direct current (AC / DC)
- 3.2. Conversion of alternating current-alternating current (AC / AC)
- 3.3. Conversion of direct current-direct current (DC / DC)
- 3.4. Conversion of direct current-alternating current (DC / AC)

4. Applications of Power Electronics

Methodology

The theoretical contents of the subject treated is explained later problems will be solved and all the practical and theoretical issues worked on the topic will be analyzed.

It will proceed to make practices on foreground.

Finally an examination will take place on the scheduled dates.

In this period the knowledge and skills acquired in the subject are measured.

Development plan

During the first weeks of the course theory classes and problems develop first topic, and then (about the 3rd week) practice sessions were initiated in the laboratory for the issue developed.

This development plan will be conducted throughout the course, so, in the laboratory practices will be performed once acquired knowledge to carry them out.

The corresponding practical reports will be delivered as the same day deadline set for the completion of the partial examination, must contain the theoretical results, simulated and those obtained in the laboratory, practices made to date.

Evaluation

To pass the course requires passing practices.

Theory (Examinations) 60%, the minimum score on each test to make half will be 4 out of 10. Minimum mark of theory to pass the course in May.

Practices (Assistance + Reporting) 30%, reports should contain the relevant practice analysis, simulation and the empirical data.

Non-contact work (collection of solved problems) 10%

INSTRUCTIONS FOR THE CORRECT DEVELOPMENT REVIEW

Present the DNI / Passport in the test.

Always follow the instructions of the teacher in the allocation of seats to fill.

Leave necessarily always visible on the table ID / Passport, writing utensils and possible materials authorized for testing.

Leave folders, bags and / or backpacks where the professor noted.

Mobile phones or any telecommunications device must be disconnected and stored in bags or backpacks. The use of these devices and some other unauthorized material is strictly forbidden. If it detects that a student has activated, it will be expelled from the examination with the consequences arising.

You can not answer pencil, nor red or green ink.

While performing tests all students must have the pinna (ear) discovered for verification that they are not using hearing aids not allowed. During the exam students must always have both hands visible.

Correction and absolute silence during the examination.

The teacher may expel any student test violates these standards, with the consequences arising.

GENERAL CRITERIA FOR THE CORRECTION OF TESTS

If you consider a section divided in approach ("We ..." "You ask ..."), development ("The application of Theorem with this hypothesis allows ...") and resolution ("In the expression of the theorem is replaced ... and simplifying get ... ") until the result, to gain score paragraph must be presented in an orderly and intelligible development.

One result is rejected if the source, that is to present a coherent development with the statement (no need to make an explicit approach, or copy or recreate the statement) is not indicated.

For maximum score is required, where applicable:

Getting the correct numerical result with SI units (International System).

Presenting graphic indicating the scales with correct units.

Present schemes, block diagrams, etc. unambiguously.

Pulchritude, conciseness, accuracy and clarity of presentation will be highly valued.

It is heavily penalized so could nullify the score in a section:

The dimensional and conceptual errors in reasoning.

The results without units or SI units are not.

The numerical errors that lead to reasonable results only slightly penalized.

Other numerical errors can become considered misconceptions.

In chained questions are not heavily penalized errors arising from the above results, provided that taking these as data does not represent a conceptual error and the results derived are reasonable.

Bibliography

Título: ELECTRÓNICA DE POTENCIA: CIRCUITOS, DISPOSITIVOS Y APLICACIONES.

Autor/es: Muhammad H. Rashid;

Editorial: : PEARSON / PRENTICE HALL

Título: FUNDAMENTALS OF POWER ELECTRONICS

Autor/es: Erickson, Robert W. ; Maksimovic, Dragan ;

Editorial: Springer

Título: Power Electronics: Converters, Applications and Design

Autor/es: N. Mohan, T. M. Undeland y W. P. Robbins

Editorial: John Wiley and Sons

Título: ELECTRÓNICA DE POTENCIA

Autor/es: Hart, Daniel ;

Editorial: PEARSON

Título: ELECTRÓNICA DE POTENCIA. Principios fundamentales y Estructuras Básicas

Autor/es: Eduard Ballester, Robert Piqué ;

Editorial: MARCOMBO UNIVERSITARIA

Título: ELECTRÓNICA DE POTENCIA. COMPONENTES, TOPOLOGÍAS Y EQUIPOS

Autor/es: Martínez García, Salvador ; Gualda Gil, Juan Andrés;

Editorial: THOMSON PARANINFO,S.A.

Título: PROBLEMAS DE ELECTRÓNICA DE POTENCIA

Autor/es: Andres Barrado, Antonio Lázaro ;

Editorial: : PRENTICE HALL