



Course guide

3200372 - ELP2 - Power Electronics II

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Lamich Arocas, Manuel

Others: Suñe Socias, Victor Manuel

PRIOR SKILLS

For a better understanding of the course it is advisable to have passed the course Electrònica de potència I

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. ELO: Knowledge of the foundations and applications of digital electronics and microprocessors
2. ELO: Applied knowledge of electrotechnics.
5. ELO: Capability for designing analog , digital and power electronic systems.

Transversal:

3. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
4. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

TEACHING METHODOLOGY

Pending.

LEARNING OBJECTIVES OF THE SUBJECT

To understand the types and basic structures of static DC/DC converters and be able to analyze how they work
To learn how to select the components of a static DC/DC converter.
To understand the various fields of application of static DC/DC converters.



STUDY LOAD

Type	Hours	Percentage
Hours large group	22,5	20.00
Hours small group	22,5	20.00
Self study	67,5	60.00

Total learning time: 112.5 h

CONTENTS

TOPIC 1: BASIC TOPOLOGIES IN STEADY-STATE

Description:

- 1.1. DC-DC converters.
- 1.2. DC-DC converter buck.
- 1.3. DC-DC converter boost.
- 1.4. DC-DC converter inverting buck-boost.

Specific objectives:

Understanding of the basic topologies and ability to analyze their functioning and to select their components

Full-or-part-time: 48h 45m

Theory classes: 8h 26m

Laboratory classes: 15h

Self study : 25h 19m

TOPIC 2: DC-DC CONVERTERS WITH GALVANIC ISOLATION IN STEADY-STATE

Description:

- 2.1. DC-DC converter flyback

Specific objectives:

Understanding of the flyback DC-DC converter and ability to analyze their functioning and to select their components

Full-or-part-time: 11h 15m

Theory classes: 2h 49m

Self study : 8h 26m



TOPIC 3: SMALL-SIGNAL MODELS

Description:

- 3.1. Obtaining small-signal models
- 3.2. Small-signal model of the buck converter
- 3.3. Small-signal model of the boost converter
- 3.4. Small-signal model of the inverting buck-boost converter
- 3.5. Small-signal model of the flyback converter

Specific objectives:

Usefulness of small-signal models. Methods to develop small-signal models. Knowledge and understanding of small-signal models for the buck, boost, inverting buck-boost, and flyback DC-DC converters

Full-or-part-time: 22h 29m

Theory classes: 5h 37m

Self study : 16h 52m

TOPIC 4: CONTROL OF DC-DC CONVERTERS

Description:

- 3.1. Introduction
- 3.2. Voltage mode control: Analysis and design

Specific objectives:

To know some of the control techniques currently employed. To be able to analyze and to design voltage-mode control blocks. Voltage-mode control for the DC-DC converters buck, boost, flyback

Full-or-part-time: 30h 01m

Theory classes: 5h 38m

Laboratory classes: 7h 30m

Self study : 16h 53m

GRADING SYSTEM

Pending

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.

If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

BIBLIOGRAPHY

Basic:

- Hart, Daniel W. Electrónica de potencia. Madrid: Prentice Hall, 2001. ISBN 8420531790.
- Mohan, Ned. Power electronics : converters, applications, and design. 3rd ed. New York: John Wiley and Sons, 2003. ISBN 0471226939.
- Rashid, M.H.; Navarro, R.; El Filali, B. Electrónica de potencia [on line]. 4a ed. Mèxic DF: Pearson, 2015 [Consultation: 17/03/2023]. Available on : https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6191. ISBN 9786073233255.