

## Course guide

# 240206 - 240EN34 - Power Electronics and Electrical Machines Application in Electrical Mobility and Industrial Application

Last modified: 16/05/2023

**Unit in charge:** Barcelona School of Industrial Engineering  
**Teaching unit:** 709 - DEE - Department of Electrical Engineering.

**Degree:** MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Optional subject).  
MASTER'S DEGREE IN ELECTRIC POWER SYSTEMS AND DRIVES (Syllabus 2021). (Optional subject).  
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2022). (Optional subject).

**Academic year:** 2023    **ECTS Credits:** 5.0    **Languages:** English

## LECTURER

**Coordinating lecturer:** Montesinos Miracle, Daniel

**Others:** Heredero Peris, Daniel

## PRIOR SKILLS

Basic knowledge on electrotechnics, electronics, modelling and control

## REQUIREMENTS

None

## TEACHING METHODOLOGY

Masterclasses for main concepts, but combining theoretical concepts, exercises and problems.

## LEARNING OBJECTIVES OF THE SUBJECT

Understand the application of power electronics and electrical machines in mobility and industry  
-Sizing and selection of drives  
-Modelling and simulation of drives, traction systems and their control.

## STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	21.51
Hours small group	13,5	10.76
Self study	85,0	67.73

**Total learning time:** 125.5 h

## CONTENTS

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### Industry applications

**Description:**

In this module a brief introduction on industry applications is seen. The module is mainly focused on drives as the major industrial application of power electronics and drives.

- Introductions
- Servos and drives
- Kinematics and dynamics
- Sizing of drives
- Other industry applications: power supplies, LED lighting, Soldering, electrolytic and induction heating

**Related activities:**

Lab 1. Size a drive for a given application considering linear components

Final report. Size a drive for a given application considering non-linear components.

**Full-or-part-time:** 19h 30m

Theory classes: 7h 30m

Laboratory classes: 12h

### Mobility applications

**Description:**

In this module a brief introduction on mobility applications is seen. The module is mainly focused on analysing a powertrain and its control system.

- Introductions
- Motors and inverters
- Control systems
- Battery charging
- On-board power distribution
- Railway applications

**Related activities:**

Lab 2. Modelling and control of a vehicle and its powertrain

Final report. Modelling and control of PMSM

**Full-or-part-time:** 19h 30m

Theory classes: 7h 30m

Laboratory classes: 12h

## GRADING SYSTEM

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Final mark = 0,35 lab 1 + 0,35 lab 2 + 0,3 Final report

Those who will not pass the course or the lab report will be qualified with an NP

In case the reevaluation exam is necessary for you, the final mark will be reevaluation exam mark.

## EXAMINATION RULES.

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The final exam will be on the dates fixed by the school. The final exam and reevaluation exam consist of theoretical aspects, but also the aspects seen in the lab.



## BIBLIOGRAPHY

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### Basic:

- Ehsani, Mehrdad [et al.]. Modern electric, hybrid electric, and fuel cell vehicles : fundamentals, theory, and design. 3rd ed. Boca Raton: CRC Press, 2018. ISBN 9781498761772.