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

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>23.08</td>
</tr>
<tr>
<td>Guided activities</td>
<td>15,0</td>
<td>11.54</td>
</tr>
<tr>
<td>Self study</td>
<td>85,0</td>
<td>65.38</td>
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</tbody>
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Total learning time: 130 h
CONTENTS

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

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.

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

Basic: