Course guide
340674 - SIGB - Battery Management Systems

Last modified: 17/05/2023

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Jaume Miret Tomàs

Others:

TEACHING METHODOLOGY

The teaching methodology is based on:
Theory classes consisting of theoretical explanations, description of examples and problem solving.
Practical simulation classes where students will have to solve a design problem individually or in groups.
Practical laboratory classes with a DSP-controlled battery charger.

LEARNING OBJECTIVES OF THE SUBJECT

werwer

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

1. Introduction

Description:
1.1 The Electric Vehicle (VE).
1.2 The challenge of using VE in electricity generation as we know it.
1.3 The Li-ion battery.

Full-or-part-time: 22h 50m
Theory classes: 9h
Practical classes: 3h
Self study : 10h 50m

2. Battery chargers for plug-in (VEE) and hybrid (VEH) VEs.

Description:
2.1 Load power and infrastructure levels, rules and standards
2.2 Unidirectional chargers.
2.3 Bidirectional chargers.
2.4 On-Board and Off-Board Chargers

Full-or-part-time: 20h 10m
Theory classes: 8h
Practical classes: 3h
Self study : 9h 10m

3. Integrated battery chargers

Description:
3.1Classifications of Integrated Battery Chargers
3.2 Nonisolated/Isolated Cases for Induction Motors
3.3 Nonisolated/Isolated Cases for Permanent Magnet Motors
3.4 Nonisolated/Isolated Cases for Reluctance Motors

Full-or-part-time: 20h 40m
Theory classes: 8h
Practical classes: 3h
Self study : 9h 40m

4. Contactless inductive charging

Description:
4.1 Conductive Charging
4.2 Inductive Charging
4.3 Resonant and Compensation Circuit Topologies

Full-or-part-time: 18h 20m
Theory classes: 7h
Practical classes: 3h
Self study : 8h 20m

5. Insulation and safety requirements for battery chargers

Description:
Isolation and safety requirements for EV chargers

Full-or-part-time: 14h
Theory classes: 5h
Practical classes: 3h
Self study : 6h

6. Charging strategies and effects on infrastructure equipment

Description:
6.1 Uncoordinated load
6.2 Coordinated loading
6.3 Fast charging, a big challenge for the current infrastructure / electricity generation.
6.4 Trends in the deployment of cargo infrastructure.

Full-or-part-time: 20h 40m
Theory classes: 8h
Practical classes: 3h
Self study : 9h 40m

GRADING SYSTEM

The training activities of knowledge acquisition and individual study of the student will be evaluated by means of two tests written with a total value of 30%.
Practical training activities related to individual or team practical work will be evaluated with 70%.
The internship part can be re-evaluated.

BIBLIOGRAPHY

Basic:
- Kassakian, John G.; Schlecht, Martin F.; Verghese, George C. Principles of power electronics. Reading: Addison-Wesley, 1991. ISBN 0201096897.
- Mohan, Ned; Undeland, Tore M.; Robbins, William P. Power electronics: converters, applications, and design. 3rd ed. New York [etc.]: John Willey & Sons, 2003. ISBN 0471226939.