

Course guide

820148 - EMO - Electric Mobility

Last modified: 23/05/2016

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

Degree: **Academic year:** 2015 **ECTS Credits:** 6.0
Languages: English

LECTURER

Coordinating lecturer: DANIEL MONTESINOS MIRACLE

Others: DANIEL MONTESINOS MIRACLE

PRIOR SKILLS

Knowledge on electrical circuits is highly recommended.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

7. Analyse and simulate specific energy systems.
8. Assess and compare the energy capacitance and potential of the energy resources available.
9. Design automatic control systems.
10. Determine the best way to store energy on a case-by-case basis.
11. Explain energy resources, their characteristics and where they come from.
12. Model and simulate systems.
13. Perform energy balances and detect losses based on the operating principles of generators and boilers and of energy transformation inside machines.
14. Understand and apply the theory of electrical circuits and machines.
15. Understand automatic regulation and control techniques and their application to industrial automation.
16. Understand the applications of power electronics.
17. Understand the applications of power electronics.

Transversal:

2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
3. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.
4. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world's situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.
5. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
6. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

Theory / Problems / Lab presential classes + non-presential exercises

LEARNING OBJECTIVES OF THE SUBJECT

Electrical aspects of electric mobility will be addressed, from technology description, modeling and on-board energy management system.

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Hours small group	15,0	10.00
Guided activities	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Electric mobility introduction

Full-or-part-time: 4h

Theory classes: 4h

Energy sources and storage systems

Full-or-part-time: 4h

Theory classes: 4h

Electric machines in electric mobility

Full-or-part-time: 12h

Theory classes: 6h

Practical classes: 6h

Power converters

Full-or-part-time: 6h

Theory classes: 4h

Practical classes: 2h

Applications

Full-or-part-time: 4h

Theory classes: 4h



Modeling

Full-or-part-time: 11h

Theory classes: 4h

Practical classes: 7h

Electric vehicles and the environment

Full-or-part-time: 4h

Theory classes: 4h

GRADING SYSTEM

Final exam 50 %

Non-presential activities 40 %

Lab practices 10 %

BIBLIOGRAPHY

Basic:

- Larminie, J.; Lowry, J. Electric vehicle technology explained [on line]. Chichester, West Sussex: J. Wiley, cop. 2003 Available on: <http://onlinelibrary.wiley.com/book/10.1002/0470090707>. ISBN 0470851635.
- Miller, J. M. Propulsion systems for hybrid vehicles. 2nd ed. The Institution of Engineering and Technology, 2010. ISBN 978-1-84919-147-0.
- Husain, I. Electric and hybrid vehicles : design fundamentals [on line]. 2nd ed. Boca Raton: CRC Press, cop. 2011 [Consultation: 07/03/2012]. Available on: <http://www.sciencedirect.com/science/book/9780444535658>. ISBN 9781439811757.
- Ehsani, M.; Gao, Y.; Emadi, A. Modern electric, hybrid electric, and fuel cell vehicles : fundamentals, theory and design. 2nd ed. Boca Raton: CRC Press, cop. 2010. ISBN 9781420053982.
- Guzzella, L.; Sciarretta, A. Vehicle propulsion systems : introduction to modeling and optimization. 3rd ed. Berlin: Springer, cop. 2013. ISBN 9783642359125.