Last update: 02-06-2015

820148 - EMO - Electric Mobility

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering

Teaching unit: 709 - EE - Department of Electrical Engineering

Academic year: 2015

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)

ECTS credits: 6 Teaching languages: English

Teaching staff

Coordinator: 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:

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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 mangement system.

Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	15h	10.00%
	Self study:	90h	60.00%

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Content

Electric mobility introduction	Learning time: 4h Theory classes: 4h
Energy sources and storage systems	Learning time: 4h Theory classes: 4h
Electric machines in electric mobility	Learning time: 12h Theory classes: 6h Practical classes: 6h
Power converters	Learning time: 6h Theory classes: 4h Practical classes: 2h
Applications	Learning time: 4h Theory classes: 4h
Modeling	Learning time: 11h Theory classes: 4h Practical classes: 7h
Electric vehicles and the environment	Learning time: 4h Theory classes: 4h

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Qualification 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. 2003Available 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.