

Course Unit Description - (VELEC)

(Electrical Vehicles)

(Mestrado em Engenharia Electrotécnica - Sistemas Eléctricos de Energia)

Academic year: 2009/2010

Subject group: Sistemas de Energia

	Semestral	Optional		
Mode of study	Diurno	Hours/Week	T-Teórica	2
Year	1 ^o		PL-Prática-Laboratorial	2
Semester	2 ^o		OT-Orientação Tutorial	2
ECTS	7.5			

Objectives

General Objectives:

The student should:

- Have its own opinion about the CO2 emissions problem and particularly about the transport sector responsibility.
- Know the main alternatives to the actual vehicles.
- Know and choose the main components of an electric vehicle traction system

Specific Objectives:

The student should:

- Participate in the mentality changing relative to the actual transportation systems.
- Be capable of design an electric vehicle traction system.

Course Contents

1. The Transportation sector context
 - 1.4. Oil consumption and production evolution
 - 1.5. The transportation contribution for CO2 emissions
 - 1.6. The emission evolution associated to transports
2. Some History
 - 2.4. Electric Vehicle History
 - 2.5. Hybrid Electric Vehicle History
3. Electric vehicle Project requirements
 - 3.4. Equation of movement
 - 3.5. Resistive Forces
 - 3.6. Vehicle Performance
 - 3.7. Energy Consumption
4. Electric Vehicles
 - 4.4. Main Parts
 - 4.5. Project Requirements
 - 4.6. Electric Motors and their Control
 - 4.7. Torque transmission
 - 4.8. Batteries
 - 4.9. Fuel Cell
 - 4.10. Study Cases
5. Hybrid Vehicles
 - 5.4. Architectures
 - 5.5. Project Requirements
 - 5.6. Serie and Parallel configurations
 - 5.7. Study Cases

Recommended reading

- Sandeep Dhameja, Electric Vehicle Battery Systems, 2002.
- K. T. Chau, Modern Electric Vehicle Technology, 2001.
- Mehrdad Ehsani, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles, 2004.
- Lino Guzzella and Antonio Sciarretta, Vehicle Propulsion Systems - Introduction to Modeling and Optimization (Springer, 2007).

Teaching Methods

Case presentation and solving

Discussion

Autonomous Work Development

Development of laboratory projects

Several activities, such as: reading, analysis and commentary of references concerning the course contents; presentation of cases and computer application participation in talks and demonstration sessions.

Assessment methods

The final classification of the discipline depends of two components. One component (NFREQ) results from the classification of one practical Work. The work in group and are compulsory for all students. The minimum classification for the work is 9.

The second component (PE) consist of an exam. The minimum classification for the exam is 9,5.

The final classification can be calculated using the following formula.

Final Classification= $0,4 * PE + 0,6 * NFREQ$

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