66429 - Advanced vehicle design

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	536 - Master's in Mechanical Engineering
ECTS	4.5
Year	1
Semester	Second semester
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It promotes student continuous work and focuses on practical aspects of calculation and optimization of advanced automotive systems. A wide range of teaching and learning tasks are implemented, such as:

Lectures with the whole clase group cover theoretical and descriptive aspects of the course contents as well as the design criteria, calculation procedures and examples of solved cases corresponding to different vehicle systems treated in

the course.

In practice sessions, vehicle bodies and its components are designed and optimized as well as thermal and hybrid engines of vehicles, through the handling of numerical and experimental techniques. Real design variables are handled.

The evaluation focuses on the practical aspects of design and calculation of the studied systems. The criteria used in the evaluation process are explained in the previous section of this course guide.

5.2.Learning tasks

The course includes the following learning tasks:

- **Lectures** A01 (10 hours) and **problem-solving and case studies** A02(12.5 hours). They are distributed along the 15 weeks of the semester. In them, the class group is given the description of the vehicle systems. It is also explained the design, calculation and applicable test procedures and some case studies.
- **Laboratory sessions** A03 (20 hours). They are taught in small groups, in the computer room or experimental laboratory. In them, students will develop skills in solving real problems and interpretation of results. Further information regarding laboratory sessions will be on the website (EINA and course website).
- **Special laboratory sessions** A04 (2.5 hours).
- **Assignments** A05 (35 hours).
- **Tutorials for assignment supervision** A06 (5 hours).
- **Study** A07 (55 hours).
- **Evaluation tests** A08 (2.5 hours).

5.3.Syllabus

The course will address the following topics:

Topic 1. Alternative Internal Combustion Engines

Topic 2. Electric and hybrid power plans

Topic 3. Design of vehicle bodies

5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

5.5.Bibliography and recommended resources

Basic Bibliography:

1. MUÑOZ, M.; MORENO, F. y MOREA, J. *Motores alternativos de combustión interna*. Prensas universitarias de Zaragoza. 1999.
2. HEYWOOD, J. *Internal combustion engine fundamentals.* McGraw-Hill. 1988.
3. CARRERAS, R.; A. COMAS; A. CALVO. *Motores de combustión interna. Fundamentos.* Servei de Publicacions. UPC. 1993.
4. PAYRI, F. y DESANTES, J.M. *Motores de combustión interna alternativos*. Editorial Reverté y UPV. 2011.
5. GIACOSA, D. *Motores endotérmicos.* Omega. 1988.

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6. STONE. R. *Introduction to internal combustion engines.* SAE. 1992.

Complementary bibliography:

1. TAYLOR, C. *The internal combustion engine in theory and practice.* The MIT Press. 1985.
2. LILLY, L. *Diesel engine reference book.* Butterworths, 1986.
3. FERGUSON, C. R. *Internal Combustion Engines*. John Wiley & Sons. 1985.
4. FERRARI, G. *Motori alternativi.* Dipartimento di Energetica. Politecnico di Milano.
5. GUIBET, J. *Carburants et moteurs.* Vol. 2. Éditions Technip. 1987.
6. SCHILLING. A. Los aceites para motores y la lubricación de los motores. Interciencia. 1965.
7. WATSON, N. y M. S. JANOTA. Turbocharging the internal combustion engine. The Macmillan Press. 1982.
8. HEISLER, H. Advanced engine technology. Edward Arnold. 1995.

Other bibliography:

1. "Electric and Hybrid Vehicles. Design Fundamentals". Iqbal Husain. CRC PRESS 2003.
2. "Propulsion Systems for Hybrid Vehicles". John M. Miller. THE INSTITUTION OF ENGINEERING AND TECHNOLOGY. 2004.
3. "Electric Vehicle technology Explained". James larminie / John Lowry. WILEY 2003.
4. "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles". Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay, Ali Emadi. CRC PRESS 2005.
5. "Spanish Capabilities in the Eco-electro Road Mobility Sector and the FP7 Green Cars Initiative". TECNOEBRO-CDTI-SERNAUTO 2009.