

66331 - Hydrogen and Fuel cells

Información del Plan Docente

Academic Year	2018/19
Subject	66331 - Hydrogen and Fuel cells
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	535 - Master's in Renewable Energies and Energy Efficiency
ECTS	5.0
Year	1
Semester	Half-yearly
Subject Type	Optional
Module	---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions with exercises in the blackboard, practice sessions using specialized software to solve more complex problems and parametric studies, and group work in computer lab sessions to complete and submit tasks.

4.2.Learning tasks

The course includes the following learning tasks:

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- Lectures (40 hours): the professor explains the contents of the syllabus (see 5.3).
- Computer lab sessions (10 hours, presential): there are 5 computer sessions where a more complex case is presented and solved through the use of specialized software (EES). The concepts learned in lectures are completed and developed in these practice sessions. Additional work that must be done individually or in pairs (depending of the number of students) after the practice sessions and be submitted in the due date for assessment.
- Some shorts exercises must be done by the students as homework to have a feedback for both, students and professors on the level of comprehension of the concepts from time to time.

4.3.Syllabus

The course will address the following topics:

Section 1. Hydrogen

1.1 Properties of hydrogen

1.2 Hydrogen production processes: steam reforming and eletrolysis of water

1.3 Hydrogen production with renewable energies

1.4 Storage, transportation and distribution of hydrogen

Section 2. Fuel Cells

2.1 Basic structure of a fuel cell

2.2 Energy and mass balances. Polarization curve of a fuel cell

2.3 Auxiliary systems in a fuel cell stack

2.4 Low temperature fuel cells: PEMFC and DMFC

2.5 High temperature fuel cells: MCFC and SOFC

2.6 Other FC: AFC and PAFC

2.7 Fuel cell systems

4.4.Course planning and calendar

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

http://eina.unizar.es/intraneteina/index.php?r=calendarioExtN/index_oficial or <http://eupt.unizar.es/>.

4.5. Bibliography and recommended resources