Guia docent
205217 - EEAS - Electromobilitat i Sistemes d'Aeronaus Elèctriques

Unitat responsable: Escola Superior d'Enginyeries Industrial, Aeroespacial i Audiovisual de Terrassa
Unitat que imparteix: 709 - DEE - Departament d'Enginyeria Elèctrica.

Última modificació: 22/04/2022

PREMIS

PROFESSORAT

Professorat responsable: Jordi-Roger Riba

Altres:

METODOLOGIES DOCENTS

The course is developed through lectures including theoretical sessions imparted with the aid of powerpoint presentations and more applicative and more visual sessions with videos, stellar catalogues and simulations.

OBJECTIUS D'APRENENTATGE DE L'ASSIGNATURA

The main objective of the course is to introduce students into theoretical and practical aspects of electromobility, with special emphasis on more electrical aircrafts. Students after this course should be able to identify and understand the different electrical and electronic systems used in electromobility applications such as hybrid and electrical vehicles and aircrafts. Additionally, some aspects related to energy storage systems, electrical machines technology, power converters, energy efficiency, power density, carbon footprint or life cycle assessment will also be considered. Capabilities to be acquired by the student: English language, team work, autonomous learning, solvent use of information resources.

HORES TOTALS DE DEDICACIÓ DE L'ESTUDIANTAT

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Dedicació total: 75 h
## Module 1: Introduction

**Descripció:**
- Brief history
- Overview
- Basic principles
- Electromobility: current status and future trends
- Trends of more electrical aircrafts

**Activitats vinculades:**
- Theoretical sessions
- Activities in class. Activity 1

**Dedicació:** 5h
- Grup gran/Teoria: 2h
- Aprenentatge autònom: 3h

## Module 2: Energy storage and power sources

**Descripció:**
- Batteries
- Fuel-cells
- Plug-in systems
- Lifetime costs

**Activitats vinculades:**
- Theoretical sessions
- Activities in class. Activity 2

**Dedicació:** 10h
- Grup gran/Teoria: 4h
- Aprenentatge autònom: 6h

## Module 3: Brushless electric motors and generators

**Descripció:**
- Generator and motor principles
- AC generators for aircrafts
- Three-phase generation and distribution in aircrafts
- Brushless AC motors

**Activitats vinculades:**
- Theoretical sessions
- Practical sessions: Simulations
- Activities in class. Activity 3

**Dedicació:** 22h 30m
- Grup gran/Teoria: 9h
- Aprenentatge autònom: 13h 30m
Module 4: Power conversion and electronic DC/DC regulation

Descripció:
- Transformers
- Transformer-rectifier units (TRU)
- Inverters
- DC-DC power converters
- Filters
- Auxiliary power unit (APU)
- Emergency power
- Distribution of power supplies

Activitats vinculades:
- Theoretical sessions
- Practical sessions: Simulations
- Activities in class. Activity 4

Dedicació: 22h 30m
Grup gran/Teoria: 9h
Aprenentatge autònom: 13h 30m

Module 5: The more electrical aircraft: next generation aircraft power

Descripció:
- Full view of the electrical and electronic system of MEA
- Towards high-voltage systems
- Operating environment
- Wiring, insulation materials, and circuit protection

Activitats vinculades:
- Theoretical sessions
- Activities in class. Activity 5

Dedicació: 10h
Grup gran/Teoria: 4h
Aprenentatge autònom: 6h

Module 6: Environment aspects and life cycle assessment (LCA)

Descripció:
- Principles of LCA
- Application to all electric and hybrid vehicles
- Application to aircraft systems

Activitats vinculades:
- Theoretical sessions
- Activities in class. Activity 6

Dedicació: 5h
Grup gran/Teoria: 2h
Aprenentatge autònom: 3h
SISTEMA DE QUALIFICACIÓ

The qualification of the subject is divided in two parts:
Guided project: 40%
Written mid-term exam: 30%
Written final exam: 30%
The guided project will be handed over at the end of the subject.
All modules will be covered between the written mid-term and final exams. They will be done at mid-term and the end of the subject, respectively.

Final_Mark = 0.3·Exam_Mid-Term_Grade + 0.3·Exam_Final_Grade + 0.4·Guided_Project_Grade

Any student who cannot attend any of the written exams or that wants to improve the grade obtained, will have the re-conduction possibility. It is an additional global written exam that will take place the dated fixed in the final exams calendar. The grade obtained in this exam will replace that of the previous exams only in case it is higher.