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

Última modificació: 02/04/2024

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

Titulació:
GRAU EN ENGINYERIA DE TECNOLOGIA I DISSENY TÈXTIL (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA ELÈCTRICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA ELECTRÒNICA INDUSTRIAL I AUTOMÀTICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA MECÀNICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA QUÍMICA (Pla 2009). (Assignatura optativa).
GRAU EN ENGINYERIA DE DISSENY INDUSTRIAL I DESENVOLUPAMENT DEL PRODUCTE (Pla 2010). (Assignatura optativa).
GRAU EN ENGINYERIA EN TECNOLOGIES AEROESPACIALS (Pla 2010). (Assignatura optativa).
GRAU EN ENGINYERIA EN TECNOLOGIES INDUSTRIALS (Pla 2010). (Assignatura optativa).
GRAU EN ENGINYERIA EN VEHICLES AEROESPACIALS (Pla 2010). (Assignatura optativa).

Curs: 2024 **Crèdits ECTS:** 3.0 **Idiomes:** Anglès

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

Tipus	Hores	Percentatge
Hores aprenentatge autònom	45,0	60.00
Hores grup gran	30,0	40.00

Dedicació total: 75 h

CONTINGUTS

Module 1: Introduction

Descripció:
- Brief history
- Overview
- Basic principles
- Elecromobility: 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.