GUÍA DOCENTE
2021 - 2022

FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Optativa Complementaria. Sustainable Transportation
Código	DIM-OPT-622
Impartido en	Máster Universitario en Ingeniería Industrial [Segundo Curso] Máster Universitario en Ingeniería Industrial y Máster Universitario en Administración de Empresas [Segundo Curso]
Nivel	Postgrado Oficial Master
Cuatrimestre	Semestral
Créditos	3,0 ECTS
Carácter	Optativa
Departamento / Área	Departamento de Ingeniería Mecánica

Datos del profesorado	
Profesor	
Nombre	Juan Norverto Moriñigo
Departamento / Área	Departamento de Ingeniería Mecánica
Correo electrónico	jnorvert@icai.comillas.edu

DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

This subject has been designed to complete the student knowledge about the issues about transportation, focusing on sustainability point of view, inside the Industrial engineer profile, going deep with the concepts already studied in other subjects in previous terms belonging to Energy Engineering.

At the end of the season, the students will be able apply sustainability indicators to transportation systems, impact of transportation on environment and feasibility of transportation projects for cities. Also power train technologies and passengers and goods transportation alternatives.

This subject will explore both theory and praxis, so numerical models will be used to solve the basic equations of the engineering transportation.

Prerequisitos

There are not any pre requirement needed to study the subject. However basic Energy Engineering knowledge will be a good asset.

Competencias - Objetivos

Competencias

CG1. To have appropriate knowledge about the scientific and technological aspects of: mathematical, analytical and numerical methods in engineering, electrical engineering, power engineering, chemical engineering, mechanical engineering, continuum mechanics, industrial electronics, automation, manufacturing, materials, quantitative methods management, industrial computing, planning, infrastructure, and so on.

CB2. Knowing how to apply and integrate their knowledge, understanding these, its scientific basis and troubleshooting capabilities in new and imprecisely defined environments, including multidisciplinary contexts both researchers and highly skilled professionals.

Resultados de Aprendizaje

At the end of the course students should be able to:

LO1. To know about sustainability. How to measure and improve projects.

LO2. To know about impact of transportation on environment.

LO3. To know about powertrain technologies.

LO4. To know about passenger and goods transportation alternatives.

LO5. To know about sustainable transportation projects for cities.

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

SUSTAINABILITY

Unit 1. INTRODUCTION TO SUSTAINABILITY TRANSPORTATION

1.1 Definitions. Functions and Factors. Social Impact.

1.2 Transportation models and classification: Road, train, vessels, airplanes.

1.3 History.

1.4 Transportation Engineering.

Unit 2. SUSTAINABLE DEVELOPMENT

2.1 What is sustainability?. Processes and indicators.

2.2 Lyfe cycle analysis: from well to wheel.

Unit 3: THE CO2 PROBLEM

3.1 The greenhouse effect.

3.2 Engine combustion with conventional fuels.

3.3 Basic equations.

Unit 4: SUSTAINABLE DRIVING

4.1 Driver's role.

4.2 Technology role.

TECHNOLOGY

Unit 5: NON-CONVENTIONAL FUELS AS AN ALTERNATIVE

5.1 Bio-fuels.

5.2 LPG.

5.3 CNG.

5.4 Hydrogen.

Unit 6: NON-CONVENTIONAL VEHICLES

6.1 Hybrid.

6.2 Electric.

POLICIES

Unit 7: SPECIFIC TRANSPORTATION PROGRAMS

7.1 PMUS (In City).

7.2 PPT (To working place)

7.3 Car Pooling.

7.4 Car Sharing.

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

Metodología Presencial: Actividades

- **Lectures.** The teacher will explain basic concepts for every theme showing the more important aspects. Special attention to be paid with equations and how to use. Examples will be presented, discussed and solved to complete the understanding. **(20 hours)**. CG1

- **In-class case discussion and problem solving.** Students will discuss the cases and problems proposed by the teacher. Cases will be open challenges that can be analyzed and solved by the use of the concepts already presented in class. **(6 hours)**. CB2

- **Team Work presentations**. The teacher will ask for team works of any proposed matter. Students will have to look for additional documentation to what was shown in class. Students must justify their conclusions and add value with their engineering mind. These works will be public presented in class. **(2 hours). CB2**

- **Assessment.** A written and individual exam will be done in the last session of the course. **(2 hours).** CB2

Metodología No presencial: Actividades

- **Self-learning on the concepts presented in class**. Material to be used are slides, multimedia files, personal and teacher notes, recommended books and magazines. **(20 hours). CG1**
- **Cases study.** To be revised and updated with the rest of information given in the subject. **(12 hours).** CB2
- **Team Works.** Preparation and presentation of team Works. Students must find the information sources to create outstanding works. **(14 hours).** CB2
- **Exam preparation.** Students will prepare the final exam based on the provided material and the adquired knowledge. **(14 hours).** CB2

RESUMEN HORAS DE TRABAJO DEL ALUMNO

STUDENT SCHEDULE SUMMARY (HOURS)			
LIVE			
Lectures	**Case discussion**	**Presentations**	**Assessment**
20	6	2	2
DISTANCE			
Self-study on theory	**Self-work on cases**	**Team work preparation**	**Exam preparation**
20	12	14	14
		ECTS:	**3 (90 hours)**

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Assessment activities	Criteria	Weight
Realización de exámenes: • End of term exam	• Concepts understanding. • Use of concepts to solve real cases. • Problem solving solution analysis and results interpretation. • Presentation and written communication.	**50%**

Contonuous assessment: • Homeworks and case solving	• Concepts understanding. • Use of concepts to solve real cases.	**20%**
• Team works	• Technical writing. • Oral presentations	**30%**

Calificaciones

Scoring

The score for the **ordinary summon** will be obtained by:

- 50% comes from the end of term exam.
- 50% comes from continuous evaluation.

Extraordinary summon

- 20% from the score obtained in continuous evaluation.
- 80% from the extraordinary summon exam.

Attendance: The absence of more than 15% of the total amount of classes can entail to fail the ordinary summon.

PLAN DE TRABAJO Y CRONOGRAMA

Actividades	Fecha de realización	Fecha de entrega
Self-learning of concepts presented in class	After lesson	
Problem solving	After lesson	
Team work preparation	Weeks 4 to 12	M1: week 7; M2: week 11; M3: week 14
End of term exam preparation	Weeks 13, 14 and 15	
Team work presentation	Week 14	

End of term exam	Last session (week 15)	

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

- Available slides at Moodle.

Bibliografía Complementaria

- Collections of articles on the subjects: sustainable transportation and sustainability indexes.
- White Book of 2015 transportation (EU).
- Green Book 2012 transportation (EPA).