



FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Optativa Complementaria. Sustainable Development
Código	DIM-OPT-611
Nivel	Postgrado Oficial Master
Cuatrimestre	Semestral
Créditos	6,0 ECTS
Carácter	Optativa
Departamento / Área	Departamento de Ingeniería Mecánica

Datos del profesorado	
Profesor	
Nombre	Raquel Chamochín Escribano
Departamento / Área	Departamento de Ingeniería Mecánica
Correo electrónico	rchamochin@icai.comillas.edu
Profesor	
Nombre	Catalina Hueso Kortekaas
Departamento / Área	Departamento de Ingeniería Mecánica
Correo electrónico	khueso@icai.comillas.edu
Profesor	
Nombre	Ramón Fisac García
Departamento / Área	Departamento de Ingeniería Mecánica
Correo electrónico	rfisac@icai.comillas.edu

DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura
Aportación al perfil profesional de la titulación
<p>In the professional profile of the Master's in Industrial Engineering, this subject aims to equip students with the knowledge and skills necessary to, firstly, understand the sustainable development agenda and the objectives that are set. Students will study the already available tools for achieving the sustainable development objectives, and finally will be able to know how to guide a company through the sustainable transition period.</p> <p>The main concepts that are developed in this subject are sustainability, the sustainable development agenda</p>



and objectives, and its tools in the energy level, in the resource level and in the environmental level. The subject is, therefore, divided into these three blocks and sets the basis for future subjects such as Energy Transition and Sustainable Transportation.

At the end, the student will be able to understand which elements of a corporation must be adapted for the sustainable transition and will evaluate the most efficient way to undertake the transformation.

Prerequisitos

There are no necessary prerequisites to overcome the subject. However, as the subject is inserted in environmental concepts it is convenient that the student has completed the subject Environmental Engineering or another similar subject.

Competencias - Objetivos

Competencias

CB2 - Let students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated by drawing up and defending arguments and solving problems within their area of study

CB4 - That students can transmit information, ideas, problems, and solutions to both specialized and non-specialized audiences.

CG04 - Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge and skills in the field of Industrial Engineering.

CG07 - Ability to analyze and assess the social and environmental impact of technical solutions.

Resultados de Aprendizaje

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

LO1. Know the objectives and the sustainable development agenda

LO2. Know the activities that have been carried out in the transition of the energy sector..

LO3. Know the concept of circular economy and how projects can be developed in this area.

LO4. Know the industrial developments of the circular economy and be able to evaluate them.

LO5. Know the environmental impact on a company and the economy.

LO6. Know the tools available to move a company towards the goals of sustainable development

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos



Unit 1: Sustainable Development, Climate change, emissions and energy.

- Climate Change: Causes and evidences
- Climate Change: Consequences
- GHGs emissions. Historical facts, accumulated and current values.
- Sustainable Development, CSR and 2030 Agenda
- World Climate Policies
- Carbon pricing. CO2 footprint.
- Forecast scenarios
- Spanish Policies

Unit 2: Circular Economy

- Concepts, implications and economic impact
- Secondary raw materials and dematerialization
- Eco-design and other trends
- Circular economy and consumption: transformation from consuming to services
- European and Spanish Circular Economy Strategy

Unit 3: Sustainable and environmental management of industry

- Sustainability in the business world: implications, actors and ecosystem of organizations
- The challenge of the economic assessment: Monetization of natural and social capital
- Social and environmental impact of companies
- Environmental management regulations, ISO 14000 series and others
- From classical economy to environmental and ecological economy: Concepts, utilities and interdependencies "economy vs. biosphere"
- Environmental economy practice
- Sustainable culture
- Sustainable finance: Concept, global trends, regulatory basis and agreements.

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

Metodología Presencial: Actividades

Lectures. The lecturer will explain basic concepts for every unit showing the more important aspects. Examples will be presented, discussed and solved to complete the understanding.

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.

Team Work presentations. The students, split in small teams, will expose in class a work about topics related with the subject. The topics will be able proposed by the lecturer or by the students with the



approval by the former.

Assessment. At the end of the course an individual written exam will be performed

Metodología No presencial: Actividades

Self-learning on the concepts presented in class. The student must make a personal work back to the lectures to understand and internalize the knowledge provided in the subject. It will be used for that the material presented on slides and notes (additional texts) on the subject

Cases study. The student will analyze the resolution of the problems in class conducted primarily by the lecturer, and then turn to face the problems proposed (no solved) in class.

Team Works. Once the topic has been assigned the students, divided in small teams, will perform the information searching and the developing of the work and the presentation..

Exams preparation. Students will prepare the exam based on the supplied material and the acquired knowledge.

RESUMEN HORAS DE TRABAJO DEL ALUMNO

STUDENT SCHEDULE SUMMARY (Hours)			
LIVE			
Lectures	Team Work	Case Discussion	Assesment
40	10	8	2
DISTANCE			
Self-Learning	Case study	Team Work	Exam preparation
40	30	30	20
ECTS: 6 (180 hours)			

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

EXAM PERFORMING	
ACTIVITY	CRITERIA
<ul style="list-style-type: none"> End of term exam (50%) 	<ul style="list-style-type: none"> Concepts understanding Use of concepts to solve real cases Presentation and written communication
CONTINUOUS ASSESMENT	
ACTIVITY	CRITERIA
<ol style="list-style-type: none"> Periodical assignments (15%) Team work (35%) 	<ul style="list-style-type: none"> Informarion searching Knowledge application to critical assessing technical information Oral and written expression



Calificaciones

ORDINARY SUMMON

The final score of the subject will be calculated as:

- **50% comes from the End of term exam score (E)**
- **50% comes from Continuous assesment (C)**

a) The score in the End of term exam (E) needs to be 4.0 or higher in order to proceed with the final score calculation.

b) The score in the Contonuous assesment (C) needs to be 5.0 or higher in order to proceed with the final score calculation.

c) End of term exam will consist of theoretical-practical questions.

d) Continuous assesment consists on:

- Periodical Assignments (P) about Unit 1. The score will be calculated as the main average of all the assignments.
- Team work presentation (T) about Units 2 and 3. Students will present their work at the end of the term. The professor who teaches Unit 2 will grade its corresponding part (U2) and the professor who teaches Unit 3 will grade its corresponding part (U3)

e) Continuous assesment grading (50%of the final score) is ponderated as: $15\%P + 10\%U2 + 25\%U3$

If the student reaches $E \geq 4.0$ and $C \geq 5.0$, then its final score will be calculated as:

$$\text{SCORE} = 50\%E + 15\%P + 10\%U2 + 25\%U3$$

If the student reaches $E < 4.0$ and/or $C < 5.0$, its final score will be the minimum between E and C.

EXTRAORDINARY SUMMON

The student will only need to retake the part that has caused its failure. Other scores will be manteined from the ORDINARY SUMMON.

Final score will be calculatad as: $\text{SCORE} = 50\%E + 15\%P + 10\%U2 + 25\%U3$

PLAN DE TRABAJO Y CRONOGRAMA

Fecha de



Actividades	Fecha de realización	Fecha de entrega
Self-learning of concepts presented in class (slides and additional text if any)	After session	
Periodical assignments	After assignment	
Team working performance	Until the end of each unit	
End of term exam preparation	At least weeks 13,14 and 15	
End of term exam	Ordinary summon period	

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

- WMO Statement on the State of the Global Climate in 2019. World Meteorological Organization. WMO-No. 1248
- AR5 Synthesis Report: Climate Change 2014. IPCC. 2014
- SP 1.5 Global Warming of 1.5 °C. IPCC. 2019
- Walter R. Stahel (2019) The circular economy. A user's guide. Routledge, London/New York