



FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Sustainable Engineering Principles
Código	DIM-SAP-246
Créditos	4,5 ECTS
Carácter	Optativa (Grado)
Departamento / Área	Departamento de Ingeniería Mecánica

Datos del profesorado	
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura
Aportación al perfil profesional de la titulación
<p>This course is an introduction to the sustainable development applied to environmental technology and renewable energies. It includes an overview of environmental issues such as air pollution, greenhouse gases, carbon footprint and water pollution. We will study water purification (WPP) and the wastewater treatment plants (WWTP). Finally, we will learn the basic principles of renewable energies systems. During the course, tools such as mass and energy balances, life cycle assessment and environmental management systems will be used.</p>



Prerrequisitos

Having passed a first year of Bachelor degree in Engineering

Competencias - Objetivos

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

1. Introduction and basic concepts. Ecology. Ecotoxicity. Industrial ecology. Definitions of sustainability. The challenges of sustainability. Limits to growth. Overconsumption.
2. Measurement of sustainability. Interpretations of sustainability. Is sustainability possible? Indicators of sustainability. Examples of commonly used indicators. Ecological footprint. Instruments for sustainability. General criteria. Sustainability rules and policies. Corporate sustainability. Evaluation of social capital.
3. Mass and energy balances. Environmental impact assessment /Strategic Environmental Assessment. Life Cycle Analysis. Cost-benefit analysis.
4. Environmental technology. Air: parts of the atmosphere, pollution measure and control, greenhouse gases, carbon footprint, carbon capture and storage. Climate change. Health risks
5. Environmental technology. Water: hydrology and hydrogeology, quality, purification (WPP) and wastewater treatment plants (WWTP).
6. Environmental technology. Soil: Soil features and pollution. Natural resources management. Solid waste management.
7. Renewable energy: Energy resources. Hydraulic. Solar thermal and photovoltaic. Wind. Biomass. Geothermal energy. Energy from municipal solid waste. Biofuels. Other renewable energies. Storage. Energy efficiency.

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

Field trips and outdoor classes:
There will be five to six 3-hour sessions.
FT1. Waste water treatment plant
FT2. Environmental education center



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GUÍA DOCENTE

2024 - 2025

FT3. National Park Sierra de Guadarrama

OC1. Air pollution

OC2. Water treatment

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

The following conditions must be accomplished to pass the course:

A minimum overall grade of at least 5 over 10.

A minimum grade in the final exam of 4 over 10.

The overall grade is obtained as follows:

Field trip reports(10-20%)

Student's presentations/essay (30-40%)

Intermediate assignment (10-20%)

Final assignment (30-40%)

The extraordinary exam accounts for 80-90% (with 10-20% being the average of continuous evaluation)

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

Boyle, G. (2012). Renewable Energy: Power for a Sustainable Future. 3rd Edition.

Oxford University Press.

Davis, M. L., & Masten, S. J. (2004). Principles of environmental engineering and science. McGraw-Hill.

Henry, J. G., & Heinke, G. W. (1996). Environmental science and engineering. 2nd Edition. Prentice Hall.

Mulder, K. (ed) (2006). Sustainable development for engineers. Greenleaf Publishing.

Rogers, P.P., K.F. Jalal, J.A. Boyd (2007). Introduction to sustainable development. Earthscan Publications.

Wengenmayr, R. & Bührke, T. (Eds.) (2012). Renewable Energy: Sustainable Energy Concepts for the Energy Change. 2nd Edition. Wiley.