

25222 - Clean technologies. Renewable energies

Información del Plan Docente

Academic Year	2017/18
Faculty / School	201 - Escuela Politécnica Superior
Degree	277 - Degree in Environmental Sciences
ECTS	6.0
Year	3
Semester	First Four-month period
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process is based on:

1) The participatory lecture technique (PLT) will be applied during the course of the theoretical sessions. Students will be encouraged to actively participate in the lectures by asking/answering questions and/or solve short exercises.

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- 2) Group work and collaborative learning will be used during the course of the practical sessions, which will be focused on solving a series of problems and case studies.
- 3) The technical visits will provide students with demonstrable knowledge on the topics covered during the course.
- 4) A collaborative project integrating concepts and techniques will be performed by the students (in groups of 3 members).

5.2.Learning tasks

- Theoretical sessions in the classroom (26 h).
- Practical sessions in the computer classroom (20 h).
- Technical visits (2 visits).
- Cooperative learning: during the practical sessions (in class) and the collaborative project (out of class).
- Autonomous learning (out of class): students will be encouraged to resolve several exercises and questionnaires related to the subjects covered in the classroom. They will post the solution on the Moodle site and interact with each other.
- Individual or small-group tutoring, which can be face-to-face (in the desk of lecturers) or virtual (using the Moodle platform).

5.3.Syllabus

Theoretical sessions

1. Introduction: basic concepts on energy.
2. Solar photovoltaic energy: semiconductors, photovoltaic panels, accumulation subsystems, regulation and power adaptation, dimensioning of photovoltaic systems.
3. Solar Thermal Energy: uses of solar thermal energy, cylinder parabolic collectors, characteristic parameters, solar power tower.
4. Wind power: wind resources, power produced by a wind-driven generator, wind machines, components of a wind-driven generator, uses and environmental impact.
5. Fundamentals of heat transfer and heat exchangers.
6. Energy and climate change.
7. Generating energy from fossil resources. Carbon combustion (effectiveness and environmental aspects), types of combustors, contaminant emissions control, clean coal technology.
8. Generating energy from biomass: concept of biomass and classification, thermal conversion of biomass (pyrolysis, combustion and gasification), alcoholic fermentation (obtaining bioethanol), producing biodiesel, anaerobic digestion, social and environmental aspects associated with the use of biomass energy.

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Practical sessions (resolution of 10 problems/case studies related to the subjects above).

5.4.Course planning and calendar

Schedule

Week	Theoretical sessions	Practical sessions	Visits
1	2 h		
2	2 h	Cooperative project (2 h)	
3	2 h	Session 1 (2 h)	
4	2 h	Session 2 (2 h) just for groups 1 & 3	
5	4 h	Session 2 (2 h) just for group 2	
6	2 h	Session 3 (2 h)	
7		Session 4 (2 h)	
8	2 h	Session 5 (2 h)	
9	2 h	Session 6 (2 h)	
10	2 h	Session 7 (2 h)	
11	2 h	Session 8 (2 h)	Visit (6 h)
12			
13	2 h	Session 9 (2 h)	
14	2 h	Session 10 (2 h)	



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Christmas holidays			
15		Oral presentation of the cooperative projects (2 h)	

Workload

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Activity	Classroom hours	Factor	Out of class hours
Theoretical sessions	26	1,5	39
Practical sessions	20	1,5	30
Collaborative work	4	-	25
Technical visits	6	-	-
Total	56		94
Total Workload	150 h		

5.5. Bibliography and recommended resources

- BB** engel, Yunus A.. Termodinámica / Yunus A. Çengel, Michael A. Boles ; revisión técnica, Sofía Faddeeva Sknarin. 6ª ed. Mexico [etc.] : McGraw-Hill Interamericana, cop. 2009
- BB** González Velasco, Jaime. Energías renovables / Jaime González Velasco . Barcelona [etc.] : Reverté, D.L. 2009
- BC** Cengel, Yunus A.. Transferencia de calor y masa : un enfoque práctico / Yunus A. Cengel ; revisor técnico Sofía Faddeeva . 3ª ed. México D. F. : McGraw-Hill Interamericana, cop. 2007
- BC** Quaschnig, Volker. Understanding Renewable Energy Systems / Volker

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BC

Quaschnig . 1st. ed. repr. London :
Earthscan, 2005 (reimp. 2010)
Twidell, John. Renewable energy
resources / John Twidell and Tony Weir .
2nd ed. reimp. London ; New York : Taylor
& Francis, 2006 (reimp. 2009)

LISTADO DE URLs:

Centro Nacional de Energías Renovables
[<http://www.cener.com/es/index.asp>]
European Commission-Energy
[http://ec.europa.eu/energy/index_en.htm]
Instituto para la Diversificación y Ahorro de
la Energía, IDAE
[<http://www.idae.es/>]
National Renewable Energy Laboratory,
NREL
[<http://www.nrel.gov/>]
Plan de Energías Renovables 2005-2012.
Ministerio de Industria, Turismo y
Comercio
[<http://www.minetur.gob.es/energia/desarrollo/EnergiaRenovable/Plan/Documentos>]
Portal de las Energías
Renovables, CIEMAT
[<http://www.ciemat.es/>]

The updated recommended bibliography can be consulted in:
<http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=2178>