

25222 - Clean technologies. Renewable energies

Información del Plan Docente

Academic Year	2018/19
Subject	25222 - Clean technologies. Renewable energies
Faculty / School	201 - Escuela Politécnica Superior
Degree	277 - Degree in Environmental Sciences 571 - Degree in Environmental Sciences
ECTS	6.0
Year	3
Semester	Four-month period
Subject Type	Compulsory
Module	---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, fieldwork, cooperative learning, tutorials and autonomous work and study.

4.2.Learning tasks

This course is organized as follows:

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- **Lectures** (26 hours). These sessions will be participative and students will be encouraged to participate actively asking and answering questions and solving short exercises.
- **Practice sessions** in the computer classroom (20 hours). Group work and collaborative learning will be focused on solving a series of problems and case studies.
- **Fieldwork** (2 trips). They will provide students with demonstrable knowledge on the topics covered during the course.
- **Cooperative learning**: during the practical sessions (in class) and the collaborative project in groups of 3 members (out of class).
- **Autonomous work and study**: 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.
- **Tutorials**. Individual or small-group, which can be face-to-face or virtual (using the Moodle platform).

4.3.Syllabus

This course will address the following topics:

Lectures

- Topic 1. Introduction: basic concepts on energy.
- Topic 2. Solar photovoltaic energy: semiconductors, photovoltaic panels, accumulation subsystems, regulation and power adaptation, dimensioning of photovoltaic systems.
- Topic 3. Solar Thermal Energy: uses of solar thermal energy, cylinder parabolic collectors, characteristic parameters, solar power tower.
- Topic 4. Wind power: wind resources, power produced by a wind-driven generator, wind machines, components of a wind-driven generator, uses and environmental impact.
- Topic 5. Fundamentals of heat transfer and heat exchangers.
- Topic 6. Energy and climate change.
- Topic 7. Generating energy from fossil resources. Carbon combustion (effectiveness and environmental aspects), types of combustors, contaminant emissions control, clean coal technology.
- Topic 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.

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

4.4.Course planning and calendar

Schedule

Week	Lectures	Practice sessions	Trips
1	2 h		
2	2 h	Cooperative project (2 h)	
3	2 h	Session 1 (2 h)	
4	2 h	Session 2 (2 h)	

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5	4 h	Session 3 (2 h)	
6	2 h	Session 4 (2 h)	
7	2 h	Session 5 (2 h)	
8	2 h		
9	2 h	Session 6 (2 h)	
10	2 h	Session 7 (2 h)	
11			Trip (6 h)
12	2 h	Session 8 (2 h)	
13	2 h	Session 9 (2 h)	
14	2 h	Session 10 (2 h)	
15		Oral presentation of the cooperative projects (2 h)	

25222 - Clean technologies. Renewable energies**Workload**

Activity	Classroom hours	Factor	Out of class hours
Lectures	26	1,5	39
Practice sessions	20	1,5	30
Collaborative work	4	-	22
Fieldwork	6	-	-
Evaluation	3		
Total	59		91
Total Workload	150 h		

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Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website and Moodle.

4.5. Bibliography and recommended resources

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|-----------|---|
| BB | engel, Yunus A.. Termodinámica / Yunus A. Çengel, Michael C. Boles ; revisión técnica, Sofía Faddeeva Sknarin. 6ª ed. México : McGraw-Hill Interamericana, cop. 2009 [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. México D. F. : McGraw-Hill Interamericana, cop. 2007 |
| BC | Quaschnig, Volker. Understanding Renewable Energy Systems / Volker Quaschnig . 1st. ed. repr. London : Earthscan, 2006 (reimp. 2010) |
| BC | Twidell, John. Renewable energy resources / John Twidell ; Tony Weir . 2nd ed. reimpr. London ; New York : Taylor & Francis, 2006 (reimp. 2009) |

Links:

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/>]
Portal de las Energías Renovables, CIEMAT
[<http://www.ciemat.es/>]

The updated recommended bibliography can be consulted at:
<http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=10980>