66342 - Advanced solar energy

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	535 - Master's in Renewable Energies and Energy Efficiency
ECTS	5.0
Year	1
Semester	Second semester
Subject Type	Optional
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 methodology followed in this course is oriented towards achievement of the learning objectives. It combines theoretical and practical activities, autonomous work and active group work.

5.2.Learning tasks

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The course includes the following learning tasks:

- A01 Lectures (25 hours). Presentation of theoretical contents by a faculty or by external experts to all students enrolled in the course. Although it is not a mandatory activity, regular attendance is highly recommended.
- A02 Problem and case solving (13 hours). Solve practical problems and exercises with all the students. Although it is not a mandatory activity, regular attendance is highly recommended.
- A03 Laboratory sessions (12 hours). Students will work actively in groups to solve practical exercises.
- A06 Guided assignments (20 hours). Students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures.
- A07 Autonomous work (50 hours). Students are expected to spend about 50 hours to study theory, solve problems and prepare lab sessions
- A08 Assessment (5 hours).

The indicated hours are for guidance and will be adjusted depending on the academic calendar.
At the beginning of the course, lecturers will communicate the schedule of practice sessions, which will be set according to the syllabus and the availability of laboratories and computer rooms.

5.3.Syllabus

The course will address the following topics:

1. Dynamics simulation of low-temperature solar thermal systems.
2. Photovoltaic - thermal hybrid collectors. Operating principles and applications.
3. Generation of cold from solar energy. Physical fundamentals and current state of the technology.
4. Solar thermal concentrating systems: parabolic trough collectors, linear Fresnel collectors, solar tower, Stirling disks, solar ovens. Operating principles and applications.
5. Applications: electricity, steam process use, integrated solar combined cycles (ISCC), solar energy in the chemical industry, solar desalination, hydrogen production from solar energy ...
6. Case studies: simulation of solar systems in specific applications.

5.4.Course planning and calendar

Further information concerning the timetable, classroom, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the website of the course (https://moodle2.unizar.es/add/)

5.5.Bibliography and recommended resources

- Duffie, John A.. Solar engineering of thermal processes / John A. Duffie, William A. Beckman . - 2nd ed. New York [etc.] : John Wiley and Sons, 1991
- Goswami, D. Yogi. Principles of solar engineering / D. Yogi Goswami, Frank Kreith, Jan F. Kreider . - 2nd ed. Philadelphia [etc.] : Taylor & Francis, cop. 2000
- Ibañez, M. Tecnología solar / M. Ibañez, J.R. Rosell, J.L. Rosell Mundi-Prensa
- Energías renovables para el desarrollo / José Mª De Juana Sardón, coordinador, coordinador ; Adolfo de Francisco García ... [et al.] . - 1ª ed., 2ª reimp. Madrid : Thomson Paraninfo, imp. 2007
- Kalogirou, Soteris. Solar energy engineering [recurso electrónico] : processes and systems / Soteris A. Kalogirou . Burlington, MA : Elsevier/Academic Press, cop. 2009
- Romero-Álvarez, M., Zarza, E. Concentrating Solar Thermal Power. En: CRC Handbook of Energy efficiency and Renewable Energy/ Edited by Frank kreith and D. Goswami. Boca Raton [etc.] : CRC Press, cop. 2007