

Academic Year: ( 2019 / 2020 )

Review date: 30-05-2018

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: SORIA VERDUGO, ANTONIO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Thermodynamics.  
Heat Transfer  
Fluid Mechanics.

**OBJECTIVES**

Objectives

To introduce to the student in the social problems associated with the consumption of conventional energy sources

To provide the student with a specific knowledge about the capture, conversion, and use of renewable sources, considering energetic, economical and environmental aspects.

To evaluate the renewable technologies and the energy savings for the economy and the nature conservation.

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

- Understand the energy consumption of fossil origin and their associated environmental impact, as well as the basic concepts of these technologies.
- Evaluate conventional and renewable energy sources.
- Design renewable systems for the production of tap hot water, heating and refrigeration.
- Evaluate and design biomass systems.

**DESCRIPTION OF CONTENTS: PROGRAMME**

- 1.- Introduction to energy sources.
- 2.- Pollutant emissions associated to energy conversion.
- 3.- Wind Energy.
- 4.- Thermo solar energy (low temperature).
- 5.- Photovoltaic solar energy.
- 6.- Thermoelectric solar energy.
- 7.- Biomass energy.
- 8.- Other renewable energy (Mini-hydraulic, Geothermal, Wave energy).

**LEARNING ACTIVITIES AND METHODOLOGY**

The methodology will include:

1. Lectures where the main concepts are explained. Lecture notes and bibliography will be available for the students to facilitate learning.
2. Problems solving classes where the mathematical procedure to analyze renewable energy system will be established.
3. Problem solved by the student to consolidate the knowledge acquired in the classes.
4. Reports writing by the students concerning renewable energies.
5. Laboratory works based on informatic calculation; visits to experimental installations concerning renewable energies.

## ASSESSMENT SYSTEM

The evaluation will be based in the following criterias:

- Individual problems solving.
- Group reports.

A final test will be carried out to evaluate the global knowledge adquiered by the students.

<b>% end-of-term-examination:</b>	50
<b>% of continuous assessment (assigments, laboratory, practicals...):</b>	50

## BASIC BIBLIOGRAPHY

- A. Goetzberger and V.U. Hoffman Photovoltaic Solar Energy Generatio, Springer, 2015
- John A. Duffie and William A. Beckman Solar Engineering of Thermal Process, John Wiley & Sons, 1980 o posterior
- John A. Duffie and William A. Beckman Solar Engineering of Thermal Process, John Wiley & Sons, 1980 o posterior