Universidad Zaragoza

Academic Year/course: 2024/25

30035 - Renewable Energies

Syllabus Information

Academic year: 2024/25
Subject: 30035 - Renewable Energies
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 436 - Bachelor's Degree in Industrial Engineering Technology
ECTS: 6.0
Year: 4
Semester: First semester
Subject type: Optional
Module:

1. General information

The fundamental objective is to understand the essential aspects and components that make up the installations for different types of Renewable Energy, selecting the most appropriate ones based on the needs. Specifically, this pertains to solar thermal, solar photovoltaic, wind, hydraulic, and biomass energy.

2. Learning results

- Understands a wide range of renewable energy production and distribution systems and their applications in the energy industry or as auxiliary parts of other industries.
- Identifies the relationships between the knowledge and skills acquired in various industrial technologies in previous courses and their application in the specific field of renewable energies.
- Applies techniques and methods from various disciplines for analyzing and designing renewable energy processes.
- Learns to analyze solar resources and properly size solar thermal and photovoltaic installations of various sizes.
- Understands the basic thermochemistry of biomass combustion.
- Learns to analyze wind resources and calculate production using wind generators.

3. Syllabus

1. Introduction
2. Photovoltaic Solar Energy:
- The solar resource
- Current situation
- Fundamentals
- Components of the park
- Sizing of off-grid and grid-connected systems
3. Wind Energy:
- The wind resource
- Current situation
- Fundamentals
- Components of wind turbines
- Obtainable energy
- Isolated parks, grid-connected parks, and offshore parks
4. Hydraulic Power Plants:
- Potential of hydraulic energy
- Current situation
- Types of plants
- Components
- Utilization assessment
5. Solar Thermal Energy:
- The solar resource
- Low-temperature solar collectors
- Solar thermal installations for heating and DHW (Domestic Hot Water)
- Solar thermal power plants
6. Biomass Energy:
- Resource assessment
- Pretreatments for dry biomass
- Thermochemical utilization
- Biofuel production
- Biogas production
- Special engines for biogas

4. Academic activities

A01. Lecture (content presented by faculty or external experts to all students in the course): 34.5 hours
A02. Problem-solving and case studies (practical exercises conducted with all students in the course): 18 hours
A03. Laboratory practice (practical exercises conducted in small groups of students in the course): 31.5 hours
A05. Application or practical research projects: 18.2 hours
A07. Independent study by the student: 52 hours
A08. Evaluation tests: 4 hours

5. Assessment system

Continuous Assessment (only during the course):
Two partial exams that exempt material, one in November and the other during the continuous assessment week. Each will account for 35% of the final grade. A minimum score of 5 must be obtained on each partial exam to exempt material.
Short quizzes via ADD at the end of each theory session (solar thermal energy and biomass).
Lab reports and supervised work: 30% of the final grade. The lab reports and work must be submitted by the specified deadlines.

Global Assessment (first and second sittings):
Written theoretical-practical exam: 70%
Practical exam: 30%

6. Sustainable Development Goals

7 - Affordable and Clean Energy
12 - Responsible Production and Consumption
13 - Climate Action