Universidad Zaragoza

Academic Year/course: 2023/24

29633 - Renewable Energy: Electricity-Producing Installations

Syllabus Information

Academic year: 2023/24
Subject: 29633 - Renewable Energy: Electricity-Producing Installations
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 430 - Bachelor's Degree in Electrical Engineering
ECTS: 6.0
Year: 4
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The objective of the subejct is to develop the student's skills that will allow them to calculate and design installations of electrical production using renewable energies, its evacuation, in case of being connected to the grid, and its storage system, in case of being isolated from it.

These approaches and goals are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda 2030 (Goal 7-Guarantee access to affordable, secure, sustainable and modern energy for all and Goal 9- Industry, innovation and infrastructure).

The student needs to have a series of previous knowledge for a correct learning of the subject, such as the following Electrical Circuits, Electrical Machines, Power Electronics, Control Engineering, Electrical Installations of Low, Medium and High Voltage.

2. Learning results

In order to pass this subject, the student must demonstrate that they have acquired the basic knowledge and the necessary tools to be able to address the design and analysis of the various electrical energy production systems in the professional field, as a Graduate in Electrical Engineering. In particular, shall demonstrate that it has acquired the following results:

- Know the various energy systems that can be used to obtain electrical energy.
- Understand the processes of electricity generation from renewable energy sources and its connection to the grid.
- Know how to select and dimension the set of elements that make up the power generation system.
- Know how to evaluate wind and solar resources.
- Distinguish between the various technologies for stand-alone and grid-connected systems.
- Have the ability to distinguish the design and grid connection constraints of renewable sources.
- Know how to select and dimension the various auxiliary systems that are part of the electricity production with renewable energies
- Know how to design electrical energy evacuation and storage systems.
- Be aware of the existence of specific regulations associated with renewable energies.

3. Syllabus

The contents to be developed are the following:

- Introduction to electricity generation by means of renewable energies
- Photovoltaic solar energy electricity production facilities
- Electricity production facilities using wind energy
- Other electricity production facilities using renewable sources
- Storage and evacuation of electrical energy from renewable sources

4. Academic activities

The teaching process will be developed in three main levels: theory classes, problems and laboratory, with increasing level of student participation. In the theory classes, the electricity generation systems with renewable energies will be presented , paying attention to the principles of operation of their different components, their operation and control, illustrating with several examples of electricity production facilities. In the problem classes, problems will be developed and practical applications. External practices will be developed visiting solar power plants and wind farms, and laboratory practices in small groups, where the student will put into practice the knowledge acquired.

The program offered to the student to help him/her achieve the expected outcomes comprises the following activities:

Lectures and problems (45 hours).

They constitute the central teaching nucleus. In them, the scientific body of the content of the program is developed, while the student is confronted with new knowledge. The technique followed in these classes is fundamentally expository.

Student participation will be encouraged through questions and comments.

As a complement to the content of the program, problem classes will be developed, since they are an effective complement to the theoretical classes, both for the understanding of the subject and for the student to develop real installations of generation that students will have to face in their professional life. The student will be encouraged to work previously on the exercises on the design of renewable energy installations.

Laboratory (15 hours).

These will serve to bring the student closer to reality, being able to observe how to obtain the results that have already been explained in the theoretical lessons. Some practices will be carried out in the laboratory, calculating, assembling, analyzing and checking the operation; others consist of external practices, visiting and analyzing the operation and interpreting renewable energy installations.

Assessment (3 hours).

In addition to the grading function, the evaluation is also a learning tool with which the learner checks the degree of understanding and assimilation achieved.

Tutoring.

Direct attention to the student, identification of learning problems, orientation in the subject and attention to exercises and assignments.

Supervised work (37 hours).

Throughoutthe term there will be several case studies and a tutored work related to the content of the subject . These case studies and assignments will be carried out in small groups and must be submitted before the deadline designated for each ofthem.

Individual study (50 hours).

The continuous work of the student will be encouraged through the homogeneous distribution throughout the semester of the various learning activities . This section also includes the preparation of laboratory practices and additional activities.

5. Assessment system

1. Assessment during the teaching period:

1.1. Laboratory Practices (10%).

The laboratory practices will be evaluated in the laboratory sessions themselves. The grade for each practical will be a function of the previous preparation of the practical, and the presentation of a final report, filling in the corresponding questionnaire.

The grade for this activity will be from 0 to 10 points and will represent 10% of the overall grade. A student who fails to attend a session at the scheduled time, unless there is a justified cause, will receive a grade of 0 for that session.

A minimum score of 5 out of 10 is required to pass the subject.

1.2. Tutored work (40%).

Throughoutthe term, several case studies will be presented and a course work related to the topics of the subject will be carried out. These activities will be done individually or in groups and must be delivered before the due date indicated in each of them.

The initial documentation required for the development of these case studies and the course work will be available at at http://moodle.unizar.es

2. Assessment on the dates scheduled by the center for the Official Calls:

2.1. Final Exam.

This exam will have a theoretical and a practical part with an estimated duration of three hours. There will be a written exam at every official call.

The grade for this activity will be from 0 to 10 points and will represent 50% of the student's overall grade.

To pass the subject it is necessary to obtain in the final exam a minimum score of 4 points out of 10, both in theory and problems.

2.2. Additional substitute assessment of laboratory practices (10%).

Those students who have not passed the practice during the teaching period may opt for an assessment of the practices by means of a practical examination. The grade for this activity will be from 0 to 10 points and will represent 10% of the student's overall grade.

To pass the subject it is necessary to obtain a minimum score of 4 points out of 10 in the final exam.

2.3. Additional substitute assessment of evaluable work and activities (40%).

Those students who have not passed the **work and evaluable activities** in the teaching period may opt for an evaluation of the same by means of a practical exam, which will also represent 40% of the overall grade.

The grade for this activity will be from 0 to 10 points. To pass the subject it is necessary to obtain a minimum score of 4 points out of 10 in the final exam.

Final grade

In order to pass the subject, it is necessary to obtain a final grade equal to or higher than five points. The final grade is composed of: Final Grade = 0.5*(Final exam)+0.1*(Laboratory practicals)+0.4*(Supervised work)