

Program	59EC – Communications Electronic Engineering B. Eng.
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Course number and name	
Number	595010042
Name	Photovoltaic Engineering
Semester	S6 [(February-June)]

Credits and contact hours	
ECTS Credits	4,5
Contact hours	45

Coordinator's name	Vázquez López, Manuel [manuel.vazquez@upm.es]
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Specific course information

Description of course content

This course is an introductory subject to Photovoltaic Solar Energy. In addition to the basic notions about the solar radiation, the photovoltaic effect and the photovoltaic module, it shows the most important applications of the photovoltaic systems such as autonomous photovoltaic systems and grid connected photovoltaic systems. The students will learn to perform basic sizing for both types of facilities. It also has a laboratory part that supports the student learning.

List of topics to be covered

1. Introduction
 - 1.1. Solar energy in the current energy scenario
 - 1.2. Regulations
2. The solar cell and the photovoltaic module
 - 2.1. The photovoltaic effect
 - 2.2. Solar cell characteristic curve
 - 2.3. The photovoltaic module
3. Solar radiation
 - 3.1. Solar energy and radiation
 - 3.2. Solar radiation on Earth
 - 3.3. Evaluation of solar radiation on the Earth's surface
 - 3.4. Comparison of solar energy received with energy consumption at different scales (housing, thermal power plant, Spain)
4. Grid connected photovoltaic system
 - 4.1. Description
 - 4.2. Elements of a grid connected photovoltaic system
 - 4.3. Sizing of the elements of a grid connected photovoltaic system
 - 4.4. Calculation of the working point depending on the operating conditions
5. Autonomous photovoltaic systems

- 5.1. Description
- 5.2. Elements of an autonomous photovoltaic system
- 5.3. Sizing of an autonomous photovoltaic system

Prerequisites or co-requisites

- None

Specific goals for the course

Specific outcomes of instruction

- RA483 – To size up a photovoltaic system connected to network and evaluate its production.
- RA482 – To understand the different functionalities of elements of a photovoltaic system connected to network.
- RA478 – To understand the characteristic curve of the cell and analyze the influence of the different parameters which affect the characteristic curve.
- RA484 – To learn about the regulations related to photovoltaic solar installations.
- RA477 – To understand the photovoltaic effect and apply the knowledge to the operation of a solar cell.
- RA476 – To understand the importance of solar PV in the current energy system.
- RA481 – To size up an autonomous photovoltaic system.
- RA479 – To understand and manage the data sheet of the handbook of a photovoltaic module.

Further reading and supplementary materials

- Ingeniería Fotovoltaica. E. Lorenzo. Ed. Progensa
- Module, multimeters, power supply and accessories.
- PC and SW tool for the measuring.
- Moodle.