Course guide
230335 - ESF - Photovoltaic Solar Energy

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject).
BACHELOR'S DEGREE IN ELECTRONIC ENGINEERING AND TELECOMMUNICATION (Syllabus 2018). (Optional subject).

Academic year: 2023  ECTS Credits: 2.0  Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: Ortega Villasclaras, Pablo Rafael
Others: Biel Sole, Domingo

PRIOR SKILLS
Basic knowledge of electrical/Electronic circuit theory

TEACHING METHODOLOGY
Theory lectures

LEARNING OBJECTIVES OF THE SUBJECT
Show photovoltaic solar energy fundamentals and an introduction to the sizing of typical photovoltaic systems

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>20,0</td>
<td>40.00</td>
</tr>
<tr>
<td>Self study</td>
<td>30,0</td>
<td>60.00</td>
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</tbody>
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Total learning time: 50 h
CONTENTS

1. Photovoltaic solar energy fundamentals

Description:
1.1 Renewable and non-renewable energies. Energy and power units
1.2 Irradiance and irradiation. Solar radiation components: direct, diffuse and albedo components
1.3 Spectral irradiance. AM0 and AM1.5G solar spectra
1.4 Status and prospects of the photovoltaic solar energy
1.5 Apparent movement of the sun and sun-path charts
1.6 Irradiation on solar collectors. Fixed-tilt vs. tracking systems

Full-or-part-time: 12h
Theory classes: 6h
Self study: 6h

2. The solar cell

Description:
2.1 Working principles
2.2 The photocurrent and related parameters
2.3 Electrical parameters of the solar cell
2.4 Temperature and irradiance dependence. Concentration systems

Full-or-part-time: 12h
Theory classes: 6h
Self study: 6h

3. Photovoltaic modules and arrays

Description:
3.1 Introduction
3.2 Voltage, current and power scaling in photovoltaic modules and arrays
3.3 Temperature and irradiance dependence

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

4. Introduction to photovoltaic system sizing

Description:
4.1 Grid and Off-grid photovoltaic systems
4.2 Application exercise

Full-or-part-time: 14h
Theory classes: 6h
Self study: 8h

GRADING SYSTEM

Final Exam and/or homework/mini-projects along the course
BIBLIOGRAPHY

Basic: