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>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>

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: