

SUBJECT TEACHING GUIDE

G605 - Renewable and Alternative Energies

Degree in Energy Resources Engineering

Academic year 2024-2025

1. IDENTIFYING DATA				
Degree	Degree in Energy Resources Engineering		Type and Year	Compulsory. Year 4
Faculty	School of Mines and Energy Engineering			
Discipline	Subject Area: Advanced Electrical Technology Module: Training in Energy Resources, Fuels and Explosives			
Course unit title and code	G605 - Renewable and Alternative Energies			
Number of ECTS credits allocated	6	Term	Semester based (1)	
Web	https://ocw.unican.es/course/view.php?id=249			
Language of instruction	English	Mode of delivery	Face-to-face	

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA		
Name of lecturer	PABLO BERNARDO CASTRO ALONSO		
E-mail	pablo.castro@unican.es		
Office	E.P. de Ingeniería de Minas y Energía. Planta: + 0. DESPACHO SUBDIRECCION 059 (059)		
Other lecturers			

3.1 LEARNING OUTCOMES
- Ability to cope with the present situation of the energy system and its possible evolution.
- Deeper knowledge of the concept of energy and its applications on renewable sources.
- To obtain the necessary skills to carry out engineering projects that use renewable energy sources.

4. OBJECTIVES

- To obtain a quantitative view of the use of different energy sources at national and international level.
- To learn about the different sources of renewable and alternative energy used today and others that can be used in the near future.
- To be familiar with national and international regulations governing the use of renewable energy.
- To design facilities to obtain work and energy using renewable sources.

6. SUBJECT PROGRAM

CONTENTS

1	Introduction to renewable energies.
2	Wind Energy: 1.1. Wind as a power generator. 1.2. Wind turbines: technical aspects. 1.3. Wind farms. 1.4. Legal aspects of wind energy.
3	Solar Energy: 2.1. Solar radiation. 2.2. Solar thermal collectors. 2.3. Solar thermal utilization. 2.4. Solar thermal power plants. 2.5. Solar panels. 2.6. Photovoltaic applications.
4	Ocean Energy: 3.1. Tidal power. 3.2. Wave power. 3.3. Ocean thermal energy.
5	Hydropower: 4.1. Hydropower facilities. 4.2. Hydropower resources management. 4.3. Types of turbines. 4.4. Study of suitable sites by topographic, hidrologic and economical aspects.
6	Geothermal Energy: 5.1. Geothermal resources. 5.2. Geothermal exploration methods. 5.3. Geothermal energy application. 5.4. District heating design.
7	Biomass and Biofuels: 6.1. General aspects. 6.2. Types of biomass. 6.3. Biofuels: Types and production. 6.4. Urban Solid Waste.
8	Energy of hydrogen: 7.1. General aspects. 7.2. Hydrogen production. 7.3. Storage and distribution. 7.4. Applications.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Laboratory report	Work	No	No	20,00
Classwork	Work	No	No	20,00
Mid-term exam	Written exam	Yes	Yes	30,00
Mid-term exam	Written exam	Yes	Yes	30,00
TOTAL				100,00
Observations				
To pass the subject through continuous assessment is necessary to achieve simultaneously :				
-To submit the laboratory report. -To attend to 80% of the class activities. -To obtain more than 30% of the maximum score in the mid-term exams. -To obtain a final average score of 50% or more of the maximum score.				
Observations for part-time students				
Part-time students must take an exam of all the contents of the subject in the February or September call.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Twidell, John; Weir, Tony. Renewable Energy Resources. (2006). Taylor & Francis.

Tushar K. Ghosh; Mark A. Prelas. Energy Resources and Systems. Volume 2: Renewable Resources. (2011). Springer.

Paul Breeze; Aldo Vieira et all. Renewable Energy Focus Handbook. (2009). Elsevier.

Martin Kaltschmitt; Wolfgang Streicher; Andreas Wiese. Editors. Renewable Energy, Technology, Economics and Environment. (2007). Springer.

M. Kanoglu; Y. Cengel; J. Cimbala. Fundamentals and applications of renewable energy. Mc Graw Hill (2020)