SUBJECT TEACHING GUIDE

M1653 - Renewable Energies

Master's Degree in mining engineering

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Master's Degree in mining engineering			Type and Year	Optional. Year 2
Faculty	School of Mines and Energy Engineering				
Discipline	BLOCK II, SPECIALTY ENERGY Optional Module				
Course unit title and code	M1653 - Renewable Energies				
Number of ECTS credits allocated	3	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA
Name of lecturer	CARMELA ORIA ALONSO
E-mail	carmela.oria@unican.es
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESORES (S3066)
Other lecturers	JAIME JAVIER GOMEZ-ACEBO ARA

3.1 LEARNING OUTCOMES
- To Expand the students' knowledge about renewable energies.

4. OBJECTIVES
Deepen theoretical principles and practical applications of various technologies to exploit renewable energy.

6. COURSE ORGANIZATION	
	CONTENTS
1	I. BIOMASS AND BIOFUELS 1. Introduction 2. Biofuels. Obtention, characterisation and use. Standards and regulations. 3. Methods for the transformation of the biomass into energy. Thermochemical conversion (combustion, pyrolysis and gasification). Biochemical conversion. 4. Use of biomass. Electrical use of biomass. Thermal uses of biomass. 5. Environmental impact. 6. Economical analysis.
2	II. FUEL CELLS 1. Introduction. 2. Different types of fuel cells. 3. Proton-exchange membrane fuel cell (PEMFCs). Functioning and components. 4. Solid oxide fuel cells. Functioning and components. 5. Hydrogen and fuel cells. 6. Applications of fuel cells.
3	III. SOLAR ENERGY 1. Medium and high temperature solar thermal energy 2. Hybridization of solar thermal power plants

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Continuous assessment	Work	No	No	30,00
Final exam	Written exam	Yes	Yes	70,00
TOTAL				100,00

Observations

1. CONTINUOUS ASSESSMENT

The students who actively participate in presential activities of the subject will be able to pass it through continuous assessment. The students must pass the continuous assessment obtaining an average grade of 5/10. The continuous assessment will consists in:

- Written exam: Theoretical-practical exam/s that will deal with the contents studied in the subject. These exams will have a weight of 70% in the final grade, and they will take place before the end of the semester. These exams can be reassessed in the ordinary and extraordinary sessions. To be able to compensate this part of the assessment, it is necessary to obtain a minimum grade of 4/10 in each of the exams.

- Assignment that will consist of a written project and an oral presentation (individual or in groups) with a weight of 70% in the final grade. The topic and date of the presentation will be proposed by the lecturer. In order to score in this section, attendance of at least 80% of the presential activities of the subject and active participation in them is mandatory. For positive assessment of students' assistance, the following aspects will be considered: attitude and participation in class (questions, answers, ...), resolution of exercises and delivery of tasks on time, etc.

2. FINAL ASSESSMENT

Students who have not followed the presential activities will have to pass the final assessment, which will cover all the lessons.

In the ordinary session, the exam will have a weight of 70% in the final grade.

In the extraordinary session, the exam will have a weigth of 100% in the final grade.

Observations for part-time students

Part-time students can be assessed through continuous assessment, in the same conditions as full-time students, or they can pass the subject through a final assessment (100%) in the ordinary or extraordinary sessions.

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.
- Sathyajith Mathew; Geeta Susan Philip, Editors. Advances in Wind Energy Conversion Technology. (2011). Springer.
- Aldo Vieira da Rosa. Renewable Energy Processes (2009). Elsevier.