

SUBJECT TEACHING GUIDE

1099 - Advances in Renewable Energies

Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering Research

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering Research			Type and Year	Optional. Year 2 Optional. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Research in Electrical and Energy Technology Module - Sustainable Design in Industrial Systems Electroenergetic Module Electromechanic / Mechatronics Module				
Course unit title and code	1099 - Advances in Renewable Energies				
Number of ECTS credits allocated	5	Term	Semester based (1)		
Web	https://aulavirtual.unican.es/				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA				
Name of lecturer	INMACULADA FERNANDEZ DIEGO				
E-mail	inmaculada.fernandez@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESOR (S3027)				
Other lecturers	DELFIN SILIO SALCINES				

3.1 LEARNING OUTCOMES

- This course has a theoretical and applied approach in the field of electro-energy technology. It is expected that the student will get knowledge of the techniques of power generation from renewable sources, and will be able to handle research material.

- It is expected that will participate actively in class and in the laboratories with development of critical thinking and efficiently using ICT.

4. OBJECTIVES

The course aims to review the different techniques of harvesting and conversion of renewable energy , showing the current level of development, analyzing the issues for the advancement of each of the sources, exposing the scientific and technological developments

6. SUBJECT PROGRAM

CONTENTS	
1	Block 1
1.1	Energy Scenario of R.E.S. in the EU.
1.2	Small hydro power.
1.3	Tides and waves energy, ocean thermal energy and salinity gradient power:
1.4	Geothermal energy.
2	Block 2
2.1	Wind energy: wind resource.
2.2	Wind energy: electric machines.
2.3	Solar thermal energy.
2.4	Photovoltaic energy.
2.5	Solar thermal-electric energy.
3	Block 3
3.1	Biofuels and biomass.
3.2	Waste energy.
3.3	Hydrogen energy.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Continuous assessment. The minimum attendance of 80% of the sessions (theory, classroom practice and laboratory practices) is required. In qualifying the following aspects are taken into account: the attitude demonstrated during development of the course.	Others	No	No	30,00
Course work and oral presentation.	Work	No	Yes	70,00
TOTAL				100,00
Observations				
The work must include: Introduction, Content, Conclusions, and References or Bibliography. The format must be: Arial letter 11, Single spacing, Margins (2.5 top, bottom, left and right), photos, diagrams, figures, ... all of them must have a reasonable size, and if they are not authored by the student, they must be conveniently referenced.				
This subject is taught in Spanish; but work and work presentation could be done in English.				
Observations for part-time students				
Partial time students should make a work (50 pg, 20-25 minutes of oral presentation). The work must include: Introduction, Content, Conclusions, and References or Bibliography. The format must be: Arial letter 11, Single spacing, Margins (2.5 top, bottom, left and right), photos, diagrams, figures, ... all of them must have a reasonable size, and if they are not authored by the student, they must be conveniently referenced. In the extraordinary evaluation the student would be evaluated in a exam.				
This subject is taught in Spanish; but work and work presentation could be done in English.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Energy and environment in the European Union. Tracking progress towards integration. Luxemburgo: OPOCE, 2006. ISBN: 92-9167-877-5

Solar engineering of thermal processes, John Duffie & William Beckman; Ed. John Wiley & Sons; 2006, ISBN 0-471-69867-9

Biofuels for a more sustainable future : life cycle sustainability assessment, multi-criteria decision making / edited by Jingzheng Ren, Antonio Scipioni, Alessandro Manzardo, Hanwei Liang, Elsevier, 2020, ISBN 978-0-12-815581-3.

Photovoltaic solar energy generation, Adolf Goetzberger, Volker Uwe Hoffmann, Berlin: Springer, 2005; ISBN 3-540-23676-7

Ocean wave energy conversión, Michael MacCormick; Mineola (New York): Dover, 2007, ISBN 978-0-486-46245-5

Aprovechamiento de los residuos forestales como uso energético, Borja Velázquez, Ed Universidad Politécnica de Valencia; 2006, ISBN:84-8363-049-4

Manual de biomasa y biocombustibles : uso y aprovechamiento energético, Adolfo Núñez Sarompas, Centro de Estudios Financieros,2021, ISBN 978-84-454-4121-3

Wind energy handbook, Tony Burton, Nick Jenkins, David Sharpe, Ervin Bossanyi, Ed: John Wiley & Sons, 2002. ISBN: 0-471-48997-2

Grid integration of wind energy conversion systems, Siegfried Heier, Ed: John Wiley & Sons, 2006. ISBN 978-0-470-86899

Handbook of energy efficiency and renewable energy, Frank Kreith, Yogi Goswami. Ed.: CRC Press, 2007. ISBN: 978-0-8493-1730-9

Fuel cell fundamentals / Ryan O'Hayre PhD., Suk-Won Cha PhD., Whitney Colella PhD., Fritz B. Prinz PhD, 2nd. ed., New York : Wiley, 2009.

Energy harvesting: solar, wind, and ocean energy conversion systems, Alireza Khaligh, Omer Onar.: Taylor & Francis, cop. 2010.

Biomass to renewable energy processes / edited by Jay Cheng, Taylor & Francis, cop. 2010

Power conversion of renewable energy systems / Ewald Fuchs, Mohammad Masoum. New York : Springer, cop. 2011

Centrales de Energías Renovables: Generación Eléctrica con Energías Renovables, José Antonio Carta González, Roque Calero Pérez, Antonio Colmenar Santos, Manuel Alonso Castro Gil, Ed.: Pearson Prentice Hall, 2009. ISBN: 978-84-362-5878-3

Wind Power Generation, Paul Breeze. Ed.: Elsevier, 2016. ISBN: 978-0-12-804038-6

<https://www.ren21.net/reports/global-status-report/>

Fundamentals of renewable energy processes, Aldo Vieira Da Rosa, Juan Carlos Ordóñez, 2022, ISBN: 9780128160374.

El papel del hidrógeno en la transición energética : del gas natural al hidrógeno verde, Angelo Gatti, Scienza Scripts, a trademark of Dodo Books Indian Ocean Ltd.,2022. ISBN 978-620-4-48419-8