

SUBJECT TEACHING GUIDE

G74 - Energy Sources

Double Degree in Physics and Mathematics Degree in Physics

Academic year 2022-2023

| 1. IDENTIFYING DATA | | | | | |
|----------------------------------|---|------------------|--------------------|------------------|--------------------------------------|
| Degree | Double Degree in Physics and Mathematics Degree in Physics | | | Type and Year | Optional. Year 5 Optional. Year 4 |
| Faculty | Faculty of Sciences | | | | |
| Discipline | Subject Area: Energy Sources Mention in Applied Physics | | | | |
| Course unit title and code | G74 - Energy Sources | | | | |
| Number of ECTS credits allocated | 6 | Term | Semester based (1) | | |
| Web | https://moodle.unican.es/ | | | | |
| Language of instruction | Spanish | English Friendly | Yes | Mode of delivery | Face-to-face |

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|------------------|---|--|--|--|--|
| Department | DPTO. CIENCIA E INGENIERIA DEL TERRENO Y DE LOS MATERIALES | | | | |
| Name of lecturer | ANTONIO RODRIGUEZ YUNTA | | | | |
| E-mail | antonio.rodriguez@unican.es | | | | |
| Office | E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 1. DESPACHO PROFESORES (1060) | | | | |
| Other lecturers | FERNANDO RODRIGUEZ GONZALEZ | | | | |

| 3.1 LEARNING OUTCOMES |
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| - To know the concepts, principles and terminology related to the use of energy in today's society |
| - To know the traditional and renewable energy sources, and in particular the physical phenomena and technical devices that allow these energy sources to be used. |
| - To know the possible sources of energy in the future and its physical foundations . |
| - To use databases related to energy resources. |
| - To understand the use of energy sources and their relationship with social progress. |
| - To know the environmental impact caused by the use of different energy sources. |
| - To know the energy policies and future plans in Europe and Spain. |

4. OBJECTIVES

The student knows how to combine the different types of energy sources to meet human needs , being aware of the existence of multiple solutions

The student knows how to value the different aspects that characterize energy efficiency.

Situate the student into the current state of R & D on some topics related to energy.

The student is aware of the physical nonsense that would imply a constant and indefinite growth in the use of energy on a finite planet.

| 6. COURSE ORGANIZATION | |
|------------------------|---|
| CONTENTS | |
| 1 | PHYSICS AND ENERGY - History of energy consumption - The energy in classical mechanics - Thermodynamics - The energy in quantum and relativistic theories |
| 2 | USES OF ENERGY 2.1 Electric power generation and distribution. - Alternators and motors - Electric network - Illumination 2.2 Thermal engines - Internal combustion engines and turbines - Heat pumps 2.3 Energy storage - Batteries - Hydrogen and others |
| 3 | ENERGY SOURCES 3.1 Fossil fuels. - Coal. - Oil and Natural gas - Alternative fuels 3.2 Energy from the earth, wind and water. - Hydropower - Wind. - Marine Energies - Geothermal 3.3 Solar energy. - Thermal and Concentrated solar power - Photovoltaic 3.4 Nuclear energy - Fission and Nuclear Reactors - Fuel cycle - Fusion - ITER |
| 4 | DIFFICULTIES AND EXTERNALITIES - Contamination - Weather - Efficiency, savings, economy and cost - New materials |

7. ASSESSMENT METHODS AND CRITERIA

| Description | Type | Final Eval. | Reassessn | % |
|---|--------------|-------------|-----------|---------------|
| Written essay with oral presentation | Work | No | Yes | 35,00 |
| Written essay with oral presentation | Work | No | Yes | 25,00 |
| Written essay with oral presentation | Work | No | Yes | 40,00 |
| Extraordinary evaluation in July | Written exam | Yes | No | 0,00 |
| TOTAL | | | | 100,00 |
| Observations | | | | |
| <p>1) The students who do not pass the continuous evaluation, could do a more global work, proposed by the teacher, whose deadline for delivery will coincide with the last day of the February examination period set by the University</p> <p>2) Written memories will have the maximum length that the teacher marks in each case, never exceeding 10 DIN A4 sheets. Its content will be presented publicly on the designated date, with the duration indicated and ending with a maximum of 10 minutes of questions.</p> <p>3) If the work was done as a group, all students in the group should participate in the exhibition and answer questions about any part of the work. The grades will always be individual and it could increase up to 20% on the average grade of the work, or decrease in the same amount, depending on the individual contribution and the previous participation, active or not, of the students in the classroom</p> | | | | |
| Observations for part-time students | | | | |
| For part-time students, as far as possible and in agreement with the teacher, we will try to facilitate the follow-up of the subject. | | | | |

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

John R. Fanchi: "Energy Technology and Directions for the Future" 2004, ISBN-10: 0122482913. ISBN-13:978-0122482915.