

Academic Year: ( 2020 / 2021 )

Review date: 01-09-2020

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: USAOLA GARCIA, JULIO

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Principles of economics: markets and financial failures  
Transmission and distribution of energy

## OBJECTIVES

Basic knowledge of optimal pricing based on the cost structure of companies and demand.  
Ability to assess when competitive markets can function without intervention and when the public sector must intervene.  
Analysis of the economic and social profitability of energy investment projects.

## DESCRIPTION OF CONTENTS: PROGRAMME

The energy system in the world and in Spain  
Optimal prices and market failures  
Fossil fuels. Uses and reserves.  
Fossil fuel markets: coal, oil and natural gas. General features  
Externalities of energy. Pollution and climate change. Fossil fuel subsidies  
Decarbonisation plans. Emission markets.  
Electric system. Characteristics. Optimization of costs in the electrical system.  
Electric generation planning  
Principles of electricity markets. Organized markets and price formation.  
Restrictions and zonal prices. Auxiliary services.  
Regulated activities: transport and distribution networks.  
Retail market - tariffs  
LCOE and cost of energy  
Return on energy investments and cost-benefit analysis

## LEARNING ACTIVITIES AND METHODOLOGY

Learning activities:  
Theoretical practical classes  
Computer classroom practices  
Tutoring on request  
Individual or group work of the student  
Methodology:  
Presentations by the teacher with computer and audiovisual media support, in which the main concepts of the subject are developed and the bibliography is provided to complement the learning of the students.  
Resolution of practical cases, problems, etc. raised by the teacher individually or in groups.  
Exhibition and discussion in class, under the teacher's moderation of topics related to the content of the subject, as well as practical cases.  
Preparation of works and reports individually or in groups.

## ASSESSMENT SYSTEM

1. Final exam (40% of the final grade)
2. Mid-term exam (20% of the final grade).
3. Projects and activities proposed in class (40% of the final grade).

It is necessary to obtain a minimum grade of 4 out of 10 in the weighted average mark resulting from sections 1 and 2 to pass the course.

Attendance at practical activities (face-to-face or distance) is compulsory to pass the subject in ordinary

call.

In the extraordinary call the evaluation conditions are the same.

<b>% end-of-term-examination:</b>	40
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	60

#### BASIC BIBLIOGRAPHY

- Bhattacharyya, S.C Energy Economics: Concepts, Issues, Markets , and Governance, Springer Verlag, London , 2019
- D. S. Kirschen and G. Strbac Fundamentals of power system economics, Wiley, 2019
- I. Pérez-Arriaga, Ed. Regulation of the power sector, Springer, 2013
- Peter Zweifel Aaron Praktiknjo Georg Erdmann Energy Economics, Springer, 2017