



FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
NombreCompleto	Energy Economics: Primary Sources, Electric Power Systems and Market
Código	DOI-OPT-424
Título	Grado en Ingeniería Electromecánica
Impartido en	Grado en Ingeniería Electromecánica [Cuarto Curso] Grado en Ingeniería Telemática [Cuarto Curso]
Nivel	Intercambio
Cuatrimestre	Semestral
Créditos	3,0
Carácter	Optativa (Grado)
Departamento / Área	Departamento de Ingeniería Eléctrica Grado en Ingeniería Telemática
Responsable	Carlos Batlle López and Pablo Rodilla Rodríguez
Horario de tutorías	Contact with Professor

Datos del profesorado	
Profesor	
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura
Aportación al perfil profesional de la titulación
<p>The course presents an interdisciplinary perspective of the energy sector, with a special focus on the electric power sector, linking the engineering, economic, legal and environmental viewpoints. The course reviews the whole electricity supply value chain, from the analysis of the key primary energy sources</p>



(hydrocarbons, nuclear and renewable ones) to the description of the main electricity activities (generation, transmission, distribution and retail) and the different regimes in which they operate (regulated monopolies or under competitive conditions), with a special focus on the review of the fundamentals needed to approach the market designs currently implemented worldwide.

The knowledge acquired in the course will provide the comprehensive understanding of electric power systems that will be needed for research in this field, as well as for future professional activities in the energy sector, whether in industry, government or consulting.

Prerrequisitos

There are not specific prerequisites in this course.

Competencias - Objetivos

Competencias

CG3. Knowledge of basic and technological subjects, which enables students to learn new methods and theories, and gives them versatility to adapt to new environment
CG4. Ability to solve problems with initiative, decision, creativity, and critical reasoning; and to communicate and transfer knowledges, abilities and skills in the field of Engineering.

CG5. Knowledges to perform measurements, calculations, valuations, studies, reports, work plans and similar tasks

CG7. Ability to analyze and assess the social and environmental impact of technical solutions.

CG9. Ability for organization and planning in firms and other institutions.

CG10. Ability to work in a multilingual, multidisciplinary environment.

RI10. Knowledge of basic and technological subjects, environmental and sustainability technologies.

Resultados de Aprendizaje

RA1. Be aware of the social, political and economic implications of energy.

RA2. Quantify the orders of magnitude of the different energy vectors.

RA3. Understand the role of primary energy sources and the basic economic principles underlying the energy business.

RA4. Understand the role of markets as tools to help agents pricing and trading the different sources.

RA5. Understand the differential aspects of the electric power business.

RA6. Know the key factors that condition the electricity business and the main techniques to manage them.

BLOQUES TEMÁTICOS Y CONTENIDOS



Contenidos – Bloques Temáticos

Introduction

Introduction to Energy Economics Sources, units, sector structure and perspectives

MODULE 2

Review of the primary energy sources

Review of the primary energy sources (exploitation, transport, markets)

MODULE 3

Energy commodities markets

Spot and futures/forward markets

MODULE 4

Financial fundamentals of the energy sector

Project financing.

Portfolio theory.

MODULE 5

Electric power systems

System balance: Demand and Generation

Networks: Transmission & distribution

MODULE 6

Electric power markets

From monopolies to markets

Operation

Investment

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

Metodología Presencial: Actividades

Breaking news discussion: Brief discussion on the key energy and especially electric power systems news appearing in the media.



(5 hours)

Lectures: The teaching method is structured around a series of modules built first on the basic energy economics principles and then on the different electric power system activities. The lectures are structured as follows (23 hours):

- The theoretical basis are presented and discussed.
- Case studies: The presentations will include the analysis of different case studies. These cases will be geared at allowing the student understanding how the theoretical concepts apply in real electricity systems.

Office hours: the instructors are available for the students to support the students learning process.

Metodología No presencial: Actividades

Personal work of the student:

- As the course progresses, the students need to keep themselves updated on the news related to the course as they appear in the media. The students are weekly asked to share with their colleagues the pieces of news they find of interested. The instructors choose the most relevant ones, which are briefly discussed at the beginning of the class. (10 hours)

- Study of the course contents (40 hours).

Term task. The students have also to complete an individual term task. The students are assigned one particular hot topic related to the issues discussed throughout the course, for which they have to develop a critical analysis. (6 hours).

RESUMEN HORAS DE TRABAJO DEL ALUMNO

SUMMARY OF WORKING HOURS OF THE STUDENT

CLASSROOM HOURS

News discussion: 5 hours

Lectures: 23 hours

Exams: 2 hours

NON-CLASSROOM HOURS

Personal work of the student: 40 hours

Term task: 6 hours

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN



Evaluation activities

Grading criteria

Mid-term exam (after half of the material has been covered) - Weight 30%

Exams are a combination of short questions and a multi-option test.

- Understanding of the theoretical concepts
- Application of concepts to the solution of practical problems

Final term (chapters 4 to 6) - Weight 40%

- Understanding of the theoretical concepts
- Application of concepts to the solution of practical problems

Participation in the class - Weight 10%

- Contribution to the class discussions

Term paper- - Weight 20%

The term paper will be evaluated according to the quality of the document itself, the clarity and comprehensiveness of the description. The soundness of the references used are also pondered.

Calificaciones

Regular asesment period

- Theory accounts for 70%: mid-term exam (30%) + final exam (40%).
- Participation in the class grade accounts for 10%.
- Term paper accounts for 20%.

In order to pass the course, the averaged mark of the exams must be greater or equal to 4.5 out of 10 points and the mark of the final project must be at least 5 out of 10 points. Otherwise, the final grade will be the lower of the two.

Retakes

The student has two periods of final evaluation during one academic year. The first one will be carried out at the end of course (end of the semester). In case that this was not passed obtaining 5 or more points, the student has another opportunity of final evaluation at the end of the academic year. The dates of evaluation periods will be announced in the web page.

The new grade will be obtained as follows:

- 70% New exam covering the whole course.
- 10% Participation in class
- 20% Term task (the student can resubmit to improve the first grade received).



The mark of the retake final exam must be greater or equal to 4.5 out of 10 points and the mark of the final project must be at least 5 out of 10 points. Otherwise, the final grade will be the lower of the two.

PLAN DE TRABAJO Y CRONOGRAMA

Actividades	Fecha de realización	Fecha de entrega
See the work plan at the end of document		

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

Material provided in class (presentations)

J. Barquín. Economía, energía y sociedad. Universidad Pontificia Comillas. 2004.

Bibliografía Complementaria

- D.G. Luenberger. Investment science. Oxford University Press 1998.
- I.J. Pérez-Arriaga. Regulation of the Power Sector. Springer-Verlag, 2013.

WORK PLAN AND SCHEDULE¹

Session		In-class activities
#	hours	Lectures
1	2	Introduction to Energy Economics
2	2	Sources, units, sector structure and perspectives
3	2	Review of the primary energy sources I
4	2	Review of the primary energy sources II
5	2	Spot and futures/forward markets I
6	2	Spot and futures/forward markets II
7	2	Project financing
8	2	Portfolio theory
9.1	1	Mid-term exam
9.2	1	Demand
10	2	Generation
11	2	Networks
12	2	Regulatory models
13	2	Short-term markets operation
14	2	Investment management
15	2	Final exam

¹ This schedule is tentative and may vary to accommodate the rhythm of the class.