

**COMILLAS**

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

**GUÍA DOCENTE
2026 - 2027****FICHA TÉCNICA DE LA ASIGNATURA**

Datos de la asignatura	
Nombre completo	Regulación y Nuevos Modelos de Negocio
Código	DIE-MII-615
Impartido en	Máster Universitario en Ingeniería Industrial + Máster in Smart Grids [Segundo Curso]
Créditos	7,5 ECTS
Carácter	Optativa
Departamento / Área	Departamento de Ingeniería Eléctrica
Responsable	Carlos Batlle, Pablo Rodilla
Horario	Lunes 15:00 - 17:00, viernes 15:00 - 18:00
Horario de tutorías	Solicitar tutorías a los profesores

Datos del profesorado	
Profesor	
Nombre	Carlos Batlle López
Departamento / Área	Departamento de Ingeniería Eléctrica
Correo electrónico	Carlos.Batlle@comillas.edu
Profesor	
Nombre	Pablo Rodilla Rodríguez
Departamento / Área	Instituto de Investigación Tecnológica (IIT)
Despacho	Santa Cruz de Marcenado 26
Correo electrónico	Pablo.Rodilla@comillas.edu
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura
Aportación al perfil profesional de la titulación
El curso presenta una perspectiva interdisciplinar profunda del sector eléctrico. La regulación proporciona el nexo entre los enfoques de la ingeniería, económicos, legales y ambientales. Los mercados eléctricos, la regulación de incentivos de las redes, la fiabilidad del servicio, las fuentes de energía renovables, las cuestiones actuales relacionadas con las redes, la competencia en mercados minoristas, el diseño de tarifas, la generación distribuida, los mercados multinacionales de electricidad, el impacto ambiental, el futuro de los servicios públicos y las cuestiones estratégicas de sostenibilidad, que serán abordadas tanto desde un punto de vista tradicional como de mercados competitivos. El curso proporcionará la base económica y jurídica para evaluar críticamente los instrumentos reguladores que se aplican en todo el mundo a las actividades que se gestionan como monopolios regulados o en condiciones de mercado. La mayoría de estos enfoques regulatorios también son aplicables en otros sectores industriales. El conocimiento adquirido en el curso proporcionará la comprensión



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integral de los sistemas de energía eléctrica que serán necesarios para el desarrollo de investigación en este campo, así como para desarrollar futuras actividades profesionales en el sector energético, ya sea en la industria, el gobierno o la consultoría.

El método de enseñanza se centra en facilitar el aprendizaje del conocimiento y aumentar el pensamiento crítico del estudiante sobre la teoría de la regulación del sector eléctrico.

The course presents an in-depth interdisciplinary perspective of the electric power sector, with regulation providing the link among the engineering, economic, legal and environmental viewpoints.

Electricity markets, incentive regulation of networks, reliability of service, renewable energy sources, contemporary network issues, retail competition, tariff design, distributed generation, multinational electricity markets, environmental impacts, future of utilities and strategic sustainability issues will be addressed under both traditional and competitive regulatory frameworks.

The course will make available the economic and legal basis to critically evaluate the regulatory instruments that are used worldwide for electricity supply activities that are performed as regulated monopolies or under competitive conditions. Most of these regulatory approaches are also of application in other industrial sectors.

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.

The key objective is to provide the student with a solid grasp of the fundamentals of energy regulation. The main learning outcomes are:

- Fundamentals of energy system economics, introduction to different regulatory models and the restructuring process of the power sector
- Approaches to the regulation of transmission and distribution networks as natural monopolies and principles for the allocation of regulated costs
- Market design of competitive electricity wholesale markets and its complements, being ancillary services and possibly capacity mechanisms
- Regulatory and technological challenges for the widespread inception of retail markets

Prerrequisitos

No hay prerrequisitos específicos para esta materia.

Competencias - Objetivos

Competencias

GENERALES

CG03 .

Saber evaluar y seleccionar la teoría científica adecuada y la metodología precisa de sus campos de estudio para formular juicios a partir de información incompleta o limitada incluyendo, cuando sea preciso y pertinente, una reflexión sobre la responsabilidad social o ética ligada a la solución que se proponga en cada caso.



ESPECÍFICAS

CE05 .	Comprender la función reguladora y los instrumentos disponibles para regular monopolios y para promover la defensa de la competencia.
CE06 .	Conocer los principios económicos de los mercados y de los distintos enfoques para la regulación de los monopolios y oligopolios, y los aspectos diferenciales del sector eléctrico.

Resultados de Aprendizaje

RA1.	Evaluar y seleccionar el enfoque más adecuado para regular los negocios del sector eléctrico, considerando sus implicaciones sociales y económicas.
RA2.	Comprender la función reguladora y los principios económicos subyacentes a los diferentes esquemas reguladores y los instrumentos para regular las actividades monopolísticas y competitivas.
RA3.	Comprender los aspectos diferenciales de la industria de la energía eléctrica
RA4.	Conocer el esquema regulatorio más adecuado para cada una de las actividades del sector eléctrico, teniendo en cuenta las particularidades de cada sistema.
RA5.	Ser capaz de debatir y analizar adecuadamente el diseño regulatorio en el contexto de ejemplos de casos reales.

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

0.1. WHAT'S ECONOMIC REGULATION ABOUT?

- Case examples

0.2. THE REGULATORY FUNCTION

- Principles and institutions

1.1. HISTORY OF THE POWER SECTOR FROM THE EYES OF REGULATION

- From light-handed to not-so-light regulation
- Cost-of-service regulation vs incentive regulation
- Dawn of power systems opening: PURPA and competitive bidding
- Restructuring, liberalization, deregulation: Wholesale market competition

1.2. BASICS ON MICROECONOMICS OF THE ELECTRIC POWER SECTOR

1.2.1. Costs, bids and pricing

- Short-term economic dispatch
 - Thermal cost minimization
 - Closer to real supply function: Costs and opportunity costs



- Marginal costs and prices
- Short-term markets: Bidding and pricing (clearing)

1.2.2. Long-term contracting

- Hedging, instruments and short-term behavior

1.3. BASIC PRICING PRINCIPLES

- Overview
- Key elements
 - Long-Run Marginal Costs
 - Residual costs
 - Locational prices

2.1. BASICS ON WHOLESALE MARKET DESIGN

- Short-term markets: Efficiency enablers
- From central dispatch to wholesale power markets
- Reference models: US vs EU. Day-ahead market timeline

2.2. INTERPLAY BETWEEN TRANSMISSION AND WHOLESALE MARKETS

- LMPs versus redispatch
- Investment in transmission: the golden rule

2.3. DISTRIBUTION

- Remuneration and incentive mechanisms
- Output-based and performance incentives

2.4. PRICING ELECTRICITY GENERATION

- End-user tariff design: Principles and laws
- Electricity tariffs' elements
 - Cost components and building blocks
 - Network charges
 - Residual costs

2.5. ELECTRICITY RETAILING

- Anatomy. Activities and cost structure
- End-user energy price design: Default tariff design
- Just energy transition



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METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

Metodología Presencial: Actividades

BA02, CG01

Lectures and case example discussions

Description of the course contents and open discussion of concepts. The students have also to try to respond to the numerous questions posed by the instructors throughout the lecture.

BA02, CG01

Term task discussion

The individual tasks will be discussed with the instructors and class mates in groups of four or five people.

with no presentations (as the instructors have read already the papers, the session will consist of just discussion on the content of the term papers, which, admittedly, cover many topics so the discussion could be broad

BA02, CG01

Tutorial activities

Available according to the need of the student

Metodología No presencial: Actividades

BA02, CG01

Teaching resources require the active participation of the student. In addition, the classroom activity should be complemented by the individual student work performed out of class. Both aspects are taken into account in the evaluation method

BA02, CG01

Term task. Regulatory analysis of a current issue, proposed by the instructor. The student has to face her own research, in order to develop the ability to first investigate the current state of the regulation of a real case, and also to apply the critical skills acquired to build regulatory

recommendations (40 hours).

BA02, CG01

Personal work of the student. Study of the course contents.

The use of artificial intelligence tools is particularly recommended. The aim is for students to learn how to leverage the potential of these tools for learning and analytically developing their knowledge of regulatory economics

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Theory will account for 55%, of which:

- Exercises discussed in the class: 10%
- Mid-term exam: 20%
- Final exam: 25%



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Participation in class will account for 10%

Term paper will account for the remaining 25%

In order to pass the course, the mark of the final exam must be greater or equal to 4 out of 10 points and the laboratory mark must be at least 5 out of 10 points. Otherwise, the final grade will be the lower of the two marks.

RETAKE(S)

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 student can opt for taking a new test to upgrade their grade in the theoretical part or to resubmit the term task to improve the first grade received.

Calificaciones

Retake

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:

65% New exam covering the whole course.

5% Participation in class

30% 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 marks.



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PLAN DE TRABAJO Y CRONOGRAMA

Actividades	Fecha de realización	Fecha de entrega
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Session		In-class activities
#	hours	Lectures
		0.1. WHAT'S ECONOMIC REGULATION ABOUT?
1	2	Case examples
2	3	
		0.2. THE REGULATORY FUNCTION
3	2	Principles and institutions
		1.1. HISTORY OF THE POWER SECTOR FROM THE EYES OF REGULATION
4	3	- From light-handed to not-so-light regulation - Cost-of-service regulation vs incentive regulation - Dawn of power systems opening: PURPA and competitive bidding - Restructuring, liberalization, deregulation: Wholesale market competition
5	2	
6	3	
		1.2. MICROECONOMICS OF THE ELECTRIC POWER SECTOR
7	2	1. Costs, bids and pricing - Short-term economic dispatch - Thermal cost minimization - Closer to real supply function: Costs and opportunity costs - Marginal costs and prices - Short-term markets: Bidding and pricing (clearing) 1. Long-term contracting - Hedging, instruments and short-term behavior
8	3	
9	2	
10	3	
		1.3. PRICING PRINCIPLES
11	2	- Overview - Long-Run Marginal Costs - Residual costs - Locational prices
12	3	
13	2	
15	2	EXAM 1
		2.1. WHOLESALE MARKET DESIGN



14	3	Short-term markets: Efficiency enablers
16	3	From central dispatch to wholesale power markets
17	2	Reference models: US vs EU. Day-ahead market timeline
		2.2. INTERPLAY BETWEEN TRANSMISSION AND WHOLESALE MARKETS
18	3	- LMPs versus redispatch - Investment in transmission: the golden rule
19	2	
		2.3 DISTRIBUTION
20	3	- Remuneration and incentive mechanisms - Output-based and performance incentives
21	2	
		2.4. TARIFF DESIGN
22	2	- End-user tariff design: Principles and laws - Electricity tariffs' elements - Cost components and building blocks - Network charges - Residual costs
23	3	
24	2	
		2.4. ELECTRICITY RETAILING
25	2	- Anatomy. Activities and cost structure - End-user energy price design: Default tariff design - Just energy transition
26	3	
27	2	
28	3	
29	2	EXAM 2
30	3	TERM PAPERS' DISCUSSION

BIBLIOGRAFÍA Y RECURSOS