

Course guide

240SEL85 - 240SEL85 - Energy Markets

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 732 - OE - Department of Management.

Degree: MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2022). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer: Lucas van Wunnik

Others: Lucas van Wunnik
Carlos González de Miguel

PRIOR SKILLS

Basic knowledge of energy systems and their operation, economics and linear programming.

TEACHING METHODOLOGY

- CLASSROOM TEACHING

Lectures (CM)

Participatory classes (problem solving, kahoots, etc.) (CP)

Presentation of a discussion topic (TD)

Evaluation activities (final exam) (EV)

- STUDENT'S HOME ACTIVITY

Limited scope activity (small assignments, warming-up exercises...) (PR)

Broad Scope activity (Discussion Topic: Written Paper and Class Presentation) (PA)

Self-Study (EA)

LEARNING OBJECTIVES OF THE SUBJECT

The objective of the course is double. We would like the student:

(1) to acquire and assimilate the microeconomic tools presented and to be able of using them to analyse questions related to energy.

(2) to acquire the knowledge about the concrete functioning of some energy markets (natural gas, electricity, GHG emission allowances).

CONTENTS

Tools to analyse energy markets

Description:

Economic concepts: costs, opportunity cost, sunk costs, income, profit, economic profit, supply and demand, elasticity, tax incidence, externalities, abatement costs, common resources, public goods, cost-benefit analysis, entry barriers, economies of scale, etc.

Market structures: models of perfect competition, monopoly and oligopoly.

Government policies: taxes and subsidies, emissions tax, tradable emission allowances, price control, tax on windfall profits, subsidies, etc.

Specific objectives:

Understand the functioning of the markets, the consequences of market failures, the effect of taxes and subsidies in the markets, the consequence of the introduction of a CO₂ emission trading system.

Related activities:

Analysis of energy markets with microeconomics tools: oil market, natural gas market, electricity market and CO₂ emissions markets.

Full-or-part-time: 83h

Theory classes: 12h

Guided activities: 16h

Self study : 55h

Structure of the energy markets

Description:

Introduction to energy markets. Agents, operating rules of the different energy markets and participation of agents in the markets. Procurement. Impact of environmental changes on the electricity market.

Specific objectives:

Understand the functioning of the energy markets in the socio-technical-economic environment, its particularities according to the type of energy, as well as the contracting options.

Related activities:

Analysis of the markets for natural gas, electricity and CO₂ emission allowances. Calculations of the equilibrium price and quantity in the markets with different scenarios.

Full-or-part-time: 42h

Theory classes: 8h

Guided activities: 6h

Self study : 28h

ACTIVITIES

Lectures

Description:

Presentation of contents (theory/description and applications of the theory/description to the present).

Material:

- Photocopies (available in Atenea).
- Slides used by the teacher (available in Atenea).
- Databases (available in Atenea).
- Bibliography (books, articles, press articles...).

Full-or-part-time: 21h

Theory classes: 21h

Classroom activities directed by the teacher

Description:

Resolution of exercises and problems.

Analysis of market scenarios, introductory exercises of the sessions, multiple-choice questions, experiments, calculations and activities to assimilate concepts and the functioning of markets, critical analysis of market design, proposals for changes.

Group activities: Analysis of a discussion topic and presentation of the conclusions in class.

Specific objectives:

Analyse rules, structures and characteristics of an energy market, analyse and evaluate government policies in the field of energy markets (emissions tax, tradable emission allowances, subsidies, environmental standards, etc.)

Material:

- Photocopies (available in Atenea).
- Slides used by the teacher (available in Atenea).
- Databases (available in Atenea).
- Bibliography (books, articles, press articles...).

Delivery:

Report with the analysis of a discussion topic, answers to multiple choice questions.

Full-or-part-time: 18h

Theory classes: 18h

Final exam

Description:

Written exam (final exam) that the student has to take (theory, concepts, exercises, text comments).

Full-or-part-time: 3h

Theory classes: 3h

Individual preparation work before the session

Description:

1. For some sessions: Do the warm-up exercise before the session and upload the solutions on Atenea.
2. For other sessions: Read texts or watch videos beforehand about the theme of the session to be able to answer to the multiple-choice questions asked during the session.

Specific objectives:

Possessing the basic knowledge to be able to follow the sessions more easily.

Material:

- Statement of the exercise
- Bibliography (texts to read or videos to watch)

Delivery:

Answers to warm-up exercise.

Full-or-part-time: 18h

Theory classes: 18h

Group work to be done outside of class

Description:

1. Discuss a topic and present the conclusions in class (big assignment)
2. Solve exercises and answer open questions (small assignments).

Specific objectives:

Evaluation of the students' knowledge and the richness of their ideas and arguments on a discussion topic.

Material:

- Problem sets (statement) (small assignments)
- Presentation of the discussion topics (big assignment)

Delivery:

- Answers to the problems/exercises (small assignments)
- Report with the analysis of a debate topic raised (big assignment)

Full-or-part-time: 36h

Theory classes: 36h

Final exam preparation

Description:

Study of the contents of the course.

Specific objectives:

Evaluation of the students knowledge of the subject.

Material:

Class notes, slides used in class, solved old exams, bibliography.

Full-or-part-time: 29h

Theory classes: 29h

GRADING SYSTEM

Written final exam (PE): 60%

Individual and group assignment during the course (TR): 40%

EXAMINATION RULES.

The written final exam will include a theoretical and a practical part (problems, exercises, text commentary...).

During the course, the students will have to do activities (assignments, exercises, multiple choice questions) (individually and in group).

BIBLIOGRAPHY

Basic:

- Frank, Robert H.; Cartwright, E. Microeconomics and behaviour. 2nd ed. London: McGraw-Hill Education, 2016. ISBN 9780077174088.

Complementary:

- Bhattacharyya, S. C. Energy Economics : Concepts, Issues, Markets and Governance. 1st edition. London: Springer London, 2011. ISBN 0857292684.

- Dahl, Carol A. International energy markets : understanding pricing, policies, and profits. 2nd edition. Tulsa, Oklahoma: PennWell Corporation, 2015. ISBN 9781593702915.

- Kirschen, D. S. and Strbac, G.. Fundamentals of power system economics [on line]. 2nd edition. Chichester: John Wiley, 2019 [Consultation : 24/03/2023]. Available on : <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=5446642>. ISBN 9781119309888.

- CORE Team. The Economy [on line]. [s.l.]: CORE Econ, [s.d.] [Consultation: 22/05/2023]. Available on: <https://www.core-econ.org/the-economy/book/text/0-3-contents.html>.

- Cowen T. ; A. Tabarrok [et al.]. Course: Principles of Economics: Microeconomics [on line]. Fairfax: Marginal Revolution University, [s.d.] [Consultation: 22/05/2023]. Available on: <https://mru.org/principles-economics-microeconomics>.

RESOURCES

Other resources:

- Slides used in class
- Articles