

Academic Year: ( 2023 / 2024 )

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Department assigned to the subject: Economics Department

Coordinating teacher: ESCRIBANO SAEZ, ALVARO

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

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

The prerequisite to follow the first part of this course is a basic knowledge usually introduced in courses of Principles of Economics.

**LEARNING OUTCOMES**

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.

CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.

CG7. Assess, control, and reduce the social and environmental impact of projects and facilities within the field of energy engineering.

CG8. Know and deal with current legislation in addition to mandatory specifications, regulations and norms within the energy engineering field.

CG10. Being able to work in a multi-lingual and multidisciplinary environment

CE3 Módulo TE. Knowledge on energy demand management with special emphasis on finance-based decisions and risk management in non-financial companies.

CE9 Módulo TE. Basic knowledge on the estimation of optimal prices based on companies cost structure and demand.

CE10 Módulo TE. Ability to evaluate when competitive markets can work without government intervention and when the public sector must intervene.

CE11 Módulo TE. Analysis of the economic and social profitability of energetic investment projects.

CE13 Módulo TE. Understanding the relation between the different variables seizing in the operation of electric power systems and the electric energy demand coverage.

CT1. Ability to communicate knowledge orally as well as in writing to a specialized and non-specialized public.

CT2. Ability to establish good interpersonal communication and to work in multidisciplinary and international teams.

CT3. Ability to organize and plan work, making appropriate decisions based on available information, gathering and interpreting relevant data to make sound judgement within the study area.

CT4. Motivation and ability to commit to lifelong autonomous learning to enable graduates to adapt to any new situation.

By the end of this content area, students will be able to have:

RA1.1 knowledge and understanding of the scientific and mathematical principles underlying energetic planning and regulation.

RA1.2 a systematic understanding of the key aspects and concepts of the branch of energetic planning and regulation.

RA1.3 coherent knowledge of their branch of engineering including some at the forefront of energetic planning and regulation.

- RA1.4 awareness of the wider multidisciplinary context of engineering.
- RA2.3 the ability to select and apply relevant analytic and modelling methods.
- RA4.1 the ability to conduct searches of literature, and to use data bases and other sources of information.
- RA4.2 the ability to interpret the data and draw conclusions.
- RA4.3 workshop skills.
- RA6.2 use diverse methods to communicate effectively with the engineering community and with society at large.
- RA6.3 demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.
- RA6.4 demonstrate an awareness of project management and business practices, such as risk and change management, and understand their limitations.

## OBJECTIVES

The material taught in the first part of this course will lead the students to acquire the ability to model the demand and the supply of energy and to address the difficulties faced to match the supply of energy produced with the amount of energy demanded at different time periods (hours, days, weeks, months, years, etc.). Regarding the electricity sector, the main role played by the system operator (REE) will be discussed.

Financial decisions and alternative portfolio investment considerations are important issues in any company. Therefore, in the second part of this course financial decision related to asset and risk management are addressed. The risk management tools required to evaluate decisions in the energy sector are in many cases similar to the ones used by financial companies, but in other cases are different. In particular, the evaluation of the risks faced by companies of the electricity sector when selecting different technologies in the generation of electricity, using alternative natural resources or raw materials, might require the use of risk management techniques. Simulation of different energy scenarios.

## DESCRIPTION OF CONTENTS: PROGRAMME

### Part I: Energy management

Demand and Supply of a firm. Demand and Supply of the Market. Equilibrium in a Competitive Market. The concepts of Elasticity. Estimation of Demand Functions and Supply Functions: the Identification Problem. The need to Forecast the Demand of Electricity and the role of the System Operator (REE).

### Part II: Risk management in non financial companies

Introduction to forward and future contracts. Introduction to option markets. The Black-Scholes model. Term structure of interest rates. Credit risk, credit spread, credit spread estimations. Hedging the interest rate risk. Market efficiency and portfolio choice. Hedging strategies: practical applications. Capital Asset Pricing Model (CAPM). Risk management and firm value. Risk management with forwards and swaps. Risk management with futures and options. Hedging options. Market risk. Credit risk measurement and derivatives.

## LEARNING ACTIVITIES AND METHODOLOGY

The teaching method will be the following:

- (1) Lectures, where the theoretical concepts will be developed in detail. To facilitate understanding and learning of this material by the student, the students will have access to the class material (slides, etc.) via Aula Global. They will also receive an ample list of complementary materials that will permit them to understand and go deeper into issues covered in class, and into some related issues of interest that may not have been covered in class.
- (2) Discussion of the exercises done by the students.
- (3) Discussions on current issues regarding economics of energy to make students familiar with the concepts acquired in the course and to deepen their understanding.
- (4) Practical classes in reduced groups where the students will learn to make arguments and discuss them in public.

## ASSESSMENT SYSTEM

**% end-of-term-examination/test:** 35

**% of continuous assessment (assignments, laboratory, practicals...):** 65

The final grade will be the result of weighting the grade obtained in the final exam (35%) and the continuous evaluation (65%), which will be based on two midterms, quizzes, class participation and a report to be done and presented in groups.

The student must achieve at least 40% (4 over 10) of the grade in the final exam to pass the course. This rule applies both in the regular and the second call. In those cases in which, after weighting the grades from the continuous assessment and the final exam, the weighting grade is above (or equal to) 5, but the required minimum grade in the final exam is not fulfilled, the final grade in the course will be 4 (Fail), unless the exam grade is below 3, in which case the final grade will be 3 (Fail).

#### BASIC BIBLIOGRAPHY

- Bhattacharyya, S.C Energy Economics: Concepts, Issues, Markets , and Governance, Springer ¿Verlag, London, 2011
- Grinblatt, M., & S. Titman Financial Market and Corporate Strategy. Irwin/McGraw-Hill, Irwin/McGraw-Hill, 2003
- Hull, J. Futures and other Derivatives, Prentice-Hall International, Inc., 1997

#### ADDITIONAL BIBLIOGRAPHY

- Smithson, C. W. Managing Financial Risk, 3rd edition. McGraw-Hill., 1998