

Academic Year: (2023 / 2024)

Review date: 06/09/2023 14:08:44

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: MONTEAGUDO MEZO, BLANCA

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

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

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. Energy and the Sustainable Energy Goals.

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
 Decarbonization of energy systems and Sustainable Development Goals (SDGs). Emissions markets.
 Electric system. Characteristics. Optimization of costs in the electrical system.
 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

% end-of-term-examination/test:	40
% of continuous assessment (assignments, laboratory, practicals...):	60
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 final exam to pass the course. Theory and problems in this exam will have additional requirements of minimum grade.
 Attendance at practical activities is compulsory to pass the subject in ordinary call.

% end-of-term-examination/test: 40

% of continuous assessment (assignments, laboratory, practicals...): 60

In the extraordinary call the evaluation conditions are the same, and the exam will include contents from all the course.

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

ADDITIONAL BIBLIOGRAPHY

- A.E. Boardman, D.H. Greenberg, A.R. Vining, D.L. Weimer Cost-Benefit Analysis, Pearson - Prentice Hall 2011.
- P.A. Schwarz Energy Economics, Routledge, 2018
- S. Managy, K. Kuriyama Environmental Economics, Routledge, 2017

BASIC ELECTRONIC RESOURCES

- International Energy Agency . Home page: <http://https://www.iea.org/>
- United Nations. Department of Economic and Social Affairs . Sustainable Development: <http://https://sdgs.un.org/>