

Course guide

820731 - ESEC - Power System

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.
748 - FIS - Department of Physics.

Degree: MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Compulsory subject).
MASTER'S DEGREE IN ELECTRIC POWER SYSTEMS AND DRIVES (Syllabus 2021). (Compulsory subject).
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2022). (Compulsory subject).

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

LECTURER

Coordinating lecturer: Freixa Terradas, Jordi

Others: Villafáfila Robles, Roberto
Freixa Terradas, Jordi

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEMT-2. Identify and describe the components of electrical systems (production, transportation, distribution, markets, procurement and consumption) and evaluate the technological solutions used in the production of electricity.

TEACHING METHODOLOGY

Theoretical lectures
Practical sessions
Guided work

LEARNING OBJECTIVES OF THE SUBJECT

To describe the different technologies related to the production of electric energy
To have an insight into the more significant aspects of electricity transportation and distribution
To apply the acquired knowledge to solve practical cases

STUDY LOAD

Type	Hours	Percentage
Hours large group	40,5	33.61
Self study	80,0	66.39

Total learning time: 120.5 h



CONTENTS

Topic 1: Introduction

Description:

This first topic describes the main characteristics of the structure of the world power supply, concerning both demand and production.

Specific objectives:

To give the students a general overview of the power system.

Full-or-part-time: 3h

Theory classes: 2h

Self study : 1h

Topic 2: Electrical energy production

Description:

Description of different technologies of electrical energy production: Coal-fired power plants, combined cycle power plants, nuclear power plants, hydroelectric power plants, wind parcs and solar facilities (FV and thermal-solar).

For each one of these technologies the operating principle, equipment, environmental impact and other relevant aspects are presented.

Related activities:

Resolution of practical cases

Full-or-part-time: 35h

Theory classes: 14h

Guided activities: 7h

Self study : 14h

Topic 3: Transport and distribution

Description:

Description of the main characteristics of transport and distribution infrastructures (transmission and distribution systems, transforming stations and conversion stations)

Analysis of the technological aspects related to the grid regulation.

Specific objectives:

Students should know the difference between transport and distribution.

They should be aware of the causes of electrical energy losses during its transport and distribution in order to reason about maximum lengths of the grid.

Students should know the main characteristics of transport and distribution infrastructures.

Related activities:

Calculation of power lines.

Resolution of practical cases.

Full-or-part-time: 26h

Theory classes: 10h

Guided activities: 6h

Self study : 10h



GRADING SYSTEM

Evaluation of the guided activities
Final exam

BIBLIOGRAPHY

Basic:

- Cengel, Yunus A. and Boles, Michael A.. Thermodynamics : an engineering approach. 8th ed. New York: McGraw Hill, 2015. ISBN 9780073398174.