

Course guide

240208 - 240EN35 - Energy Management and Optimisation of Electrical Power Systems

Last modified: 13/03/2025

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

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

Academic year: 2025 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer: Roberto Villafáfila Robles

Others: Eduard Bullich Massagué

PRIOR SKILLS

Background on electrotechnics, energy systems and linear programming.

TEACHING METHODOLOGY

- In-person class:
Lectures (CM): 20 h
Active lectures: 10 h
Theoretical-practical work (TD): 13 h
Evaluation activities (EV): 2 h
- No attendance:
Limited scope project/activity (PR): 15 h
Broad scope project/activity (PA): 25 h
Self-study (EA): 40 h

LEARNING OBJECTIVES OF THE SUBJECT

Know, understand and be able to apply the concepts linked to the energy management of electrical installations and their optimization.

STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	33.33
Hours large group	30,0	66.67

Total learning time: 45 h

CONTENTS

T1. Energy management

Description:

Introduction to the energy management of electrical installations. Retailing of electricity. Measurement and monitoring of electrical energy.

Specific objectives:

To have an understanding of the more significant aspects of energy management in order to obtain savings and improve energy efficiency in electrical systems.

Related activities:

Energy management assessment

Full-or-part-time: 70h

Theory classes: 14h

Guided activities: 16h

Self study : 40h

T2. Optimal design and operation of electrical systems

Description:

Optimal sizing of electrical facility. Optimal sizing of self-consumption facility without and with storage.

Specific objectives:

To apply optimization techniques to solve practical cases in order to obtain savings and improve energy efficiency in electrical systems

Related activities:

Optimization of an electrical installation

Full-or-part-time: 70h

Theory classes: 14h

Guided activities: 16h

Self study : 40h

ACTIVITIES

T1. Evaluation of energy management

Description:

Activity to be carried out individually to deepen energy management in electrical installations, based on what was explained in the theoretical sessions and conferences.

Specific objectives:

Analyze rules, strategies and characteristics of energy management in electrical installations.

Material:

Lectures notes, bibliography.

Delivery:

Report dealing with topic proposed.

Full-or-part-time: 8h 30m

Guided activities: 8h 30m

T2. Optimization of an electrical installation

Description:

Activity to be carried out individually to deal with optimal sizing of electrical installations, based on what was explained in the theoretical sessions and conferences.

Specific objectives:

Be able to sizing optimal solution with mathematical optimization software .

Material:

Lecture notes. Mathematical optimization software. Bibliography.

Delivery:

Report dealing with topic proposed.

Full-or-part-time: 8h 30m

Guided activities: 8h 30m

GRADING SYSTEM

There are 2 individual assignments to be developed, one for T1 and one for T2, weighting 50% each one.

For each assignment, a report has to be submitted and explained orally.

Each report weights 30% and its defense 20%.

Minimum mark for passing the course is 5.

EXAMINATION RULES.

There are two assignments that are developed individually. The assignments will be delivered in writing format first, and there will be also a presentation of them.

The delivery of both writing reports and the presentation of such a reports must be done in order to be evaluated.