



## Guía docente

# 240209 - 240EN36 - Ciencia de Datos Aplicada a los Sistemas Eléctricos

Última modificación: 13/03/2025

**Unidad responsable:** Escuela Técnica Superior de Ingeniería Industrial de Barcelona

**Unidad que imparte:** 709 - DEE - Departamento de Ingeniería Eléctrica.

**Titulación:** MÁSTER UNIVERSITARIO EN INGENIERÍA DE LA ENERGÍA (Plan 2013). (Asignatura optativa).  
MÁSTER UNIVERSITARIO EN SISTEMAS Y ACCIONAMIENTOS ELÉCTRICOS (Plan 2021). (Asignatura optativa).  
MÁSTER UNIVERSITARIO EN INGENIERÍA DE LA ENERGÍA (Plan 2022). (Asignatura optativa).

**Curso:** 2025

**Créditos ECTS:** 5.0

**Idiomas:** Inglés

## PROFESORADO

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**Profesorado responsable:** MÒNICA ARAGÜÉS PEÑALBA

**Otros:** MÒNICA ARAGÜÉS PEÑALBA

## CAPACIDADES PREVIAS

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Programming

Statistics

Electrotechniques



## METODOLOGÍAS DOCENTES

Teaching methodology:

The course teaching methodologies are as follows:

- Lectures and conferences: presentation of knowledge by lecturers or guest speakers.
- Participatory sessions: collective resolution of exercises, debates and group dynamics, with the lecturer and other students in the classroom; classroom presentation of an activity individually or in small groups.
- Theoretical/practical supervised work (TD): classroom activity carried out individually or in small groups, with the advice and supervision of the teacher.
- Homework assignment of reduced extension: carry out homework of reduced extension, individually or in groups.
- Homework assignment of broad extension: design, planning and implementation of a project or homework of broad extension by a group of students, and writing a report that should include the approach, results and conclusions.
- Evaluation activities (EV).

Training activities:

The course training activities are as follows:

- Face to face activities
  - o Lectures and conferences: learning based on understanding and synthesizing the knowledge presented by the teacher or by invited speakers.
  - o Participatory sessions: learning based on participating in the collective resolution of exercises, as well as in discussions and group dynamics, with the lecturer and other students in the classroom.
  - o Presentations (PS): learning based on presenting in the classroom an activity individually or in small groups.
  - o Theoretical/practical supervised work (TD): learning based on performing an activity in the classroom, or a theoretical or practical exercise, individually or in small groups, with the advice of the teacher.
- Study activities
  - o Homework assignment of reduced extension (PR): learning based on applying knowledge and presenting results.
  - o Homework assignment of broad extension (PA): learning based on applying and extending knowledge.
  - o Self-study (EA): learning based on studying or expanding the contents of the learning material, individually or in groups, understanding, assimilating, analysing and synthesizing knowledge.

## OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

- 1) Understand the main concepts around Big Data and Machine Learning
- 2) Understand the potential applications of Machine Learning in the electrical energy sector
- 3) Learn how to develop a Machine Learning model
- 4) Explore the main Machine Learning types (Supervised and Unsupervised)
- 5) Get used to Python coding for Machine Learning applications
- 6) Develop Machine Learning models for electrical energy problems

## HORAS TOTALES DE DEDICACIÓN DEL ESTUDIANTADO

Tipo	Horas	Porcentaje
Horas grupo pequeño	15,0	12.00
Horas grupo grande	30,0	24.00
Horas aprendizaje autónomo	80,0	64.00

**Dedicación total:** 125 h



## CONTENIDOS

### título castellano

**Descripción:**

This course explains data science for power system applications

**Objetivos específicos:**

- Introduction to Big Data and Machine learning applications to the electrical energy sector. -
- Creation of a Machine Learning Model: Introduction to Python
- Descriptive statistics
- Supervised learning I: classification
- Supervised learning II: regression
- Unsupervised learning: clustering and dimensionality reduction
- Electric power system applications

**Dedicación:** 125h

Grupo grande/Teoría: 30h

Actividades dirigidas: 15h

Aprendizaje autónomo: 80h

## SISTEMA DE CALIFICACIÓN

In order to be able to have an evaluation of the subject, it is a necessary condition to have attended, carried out and delivered the reports of all the laboratory assignments and final project. In case this necessary condition is not met, the grade will be NP (Not Presented). If the necessary condition is met, then the calculation will be as follows:

70 % Exam\_mark

30 % Lab\_reports\_mark

There is no re-take exam.

## BIBLIOGRAFÍA

**Básica:**

- Brownlee, Jason. Machine Learning Mastery with Python : understand your data, create accurate models and work projects end-to-end. [Lloc de publicació no identificat]: Independently published, 2021. ISBN 9798540446273.

## RECURSOS

**Otros recursos:**

Kaggle: [www.kaggle.com/learn/python](http://www.kaggle.com/learn/python)

Aprende Python: [www.learnpython.org](http://www.learnpython.org)

Glosario sobre aprendizaje automático: <https://developers.google.com/machinelearning/glossary> />Librería para Machine Learning: <https://scikit-learn.org/stable>