

# Master's degree in Electric Power Systems and Drives

The aim of the **master's degree in Electric Power Systems and Drives** is to prepare students to meet the many challenges facing the electricity sector, including massive integration of renewable generation systems, the electrification of mobility, the digitalisation of the power grid and the modernisation of the industry. To tackle these challenges, students need to acquire specific know-how and learn to use and develop new analysis tools and methods.

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## GENERAL DETAILS

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### Duration and start date

One academic year, 60 ECTS credits. Starting September

### Timetable and delivery

Mornings and afternoons. Face-to-face

### Fees and grants

Approximate fees for the master's degree, **excluding other costs** (does not include non-teaching academic fees and issuing of the degree certificate):

€1,660 (€6,331 for non-EU residents).

[More information about fees and payment options](#)

[More information about grants and loans](#)

### Language of instruction

English

Information on [language use in the classroom and students' language rights](#).

### Location

[Barcelona School of Industrial Engineering \(ETSEIB\)](#)

### Official degree

Official degree

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## ADMISSION

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### General requirements

[Academic requirements for admission to master's degrees](#)

### Specific requirements

#### Direct admission

The master's degree is designed for students who have completed a degree in engineering and acquired at least basic multidisciplinary knowledge of fields such as circuit theory, electromagnetism, electrotechnics and electrical machines. The following are therefore the most suitable entrance qualifications and provide direct admission:

- Bachelor's degree in Industrial Technology Engineering
- Bachelor's degree in Industrial Technologies and Economic Analysis
- Bachelor's degree in Energy Engineering
- Bachelor's degree in Electrical Engineering
- Bachelor's degree in Industrial Electronics and Automatic Control Engineering
- Bachelor's degree in Engineering Physics

#### Bridging courses

As a general rule, students with qualifications other than those that provide direct admission will not be admitted to the master's degree.

However, applications from students who hold degrees other than those specified will be reviewed by the academic committee of the master's degree to determine the suitability of their qualifications. For those admitted, the academic committee will specify what bridging courses, if any, must be taken (max. 15 ECTS credits).

### Admission criteria

- Academic record: 40 %
- Correspondence between the competencies of the entrance qualification and the competencies of the master's degree: 50 %
- Curriculum vitae: 10 %

### Places

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### Pre-enrolment

Pre-enrolment period open.

Expected deadline: 13/05/2024.

[How to pre-enrol](#)

### Enrolment

[How to enrol](#)

### Legalisation of foreign documents

All documents issued in non-EU countries must be [legalised and bear the corresponding apostille](#).

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## PROFESSIONAL OPPORTUNITIES

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### Professional opportunities

Students develop a high level of technological expertise that qualifies them to perform a wide range of roles, including:

- Planning of electrical networks.
- Operation and control of optical systems.
- Simulation and analysis of electrical equipment, drives and systems.
- Design of electric machines and drives.
- Analysis of electricity markets.
- Procurement of electric power.

Graduates find work with:

- RDI departments of companies.
- Universities, technology centres and research centres.
- Manufacturers of electrical systems and equipment.
- Companies in the renewable energy and electric mobility sectors.
- Consulting and engineering companies related to the electric power field.

### Competencies

#### Generic competencies

Generic competencies are the skills that graduates acquire regardless of the specific course or field of study. The generic competencies established by the UPC are capacity for innovation and entrepreneurship, sustainability and social commitment, knowledge of a foreign language (preferably English), teamwork and proper use of information resources.

#### Specific competencies

- The ability to identify the necessary fundamentals—in terms of electrical technology and systems and electricity markets—for the analysis of electrical power systems.
- The ability to analyse and design electrical equipment, including electrical machines, transformers, power electronics-based converters, switches and other equipment.
- The ability to operate and control electrical equipment, including electrical machines, transformers, power electronics-based converters, switches and other equipment.
- The ability to apply electrical technologies in different areas, including renewable and conventional energy

generation, electric mobility, buildings, and industrial, agri-food and service sectors.

- The ability to interpret and analyse the operation of electrical power systems under normal operating conditions and in the context of events and disturbances that may occur in electrical systems, including faults and transients.
- The ability to develop control and operation techniques to ensure the stability, resilience and efficiency of electrical systems, taking into account contingencies that may affect internal or external networks.
- The ability to clearly and comprehensively interpret, describe and analyse the functioning of national and supranational electricity markets, as well as applicable legislation.
- The ability to apply data management, data optimisation and data science techniques to the operation of electrical systems and electricity markets.
- The ability to carry out and present and defend before an examination committee an original, individual piece of work consisting of a comprehensive electrical engineering project that synthesises the competencies acquired on the degree.

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## ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

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### UPC school

[Barcelona School of Industrial Engineering \(ETSEIB\)](#)

### Academic coordinator

[Oriol Gomis Bellmunt](#)

### Academic calendar

[General academic calendar for bachelor's, master's and doctoral degrees courses](#)

### Academic regulations

[Academic regulations for master's degree courses at the UPC](#)

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## CURRICULUM

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Subjects	ECTS credits	Type
<b>FIRST SEMESTER</b>		
Control and Automation for the Efficient Use of Energy	5	Optional
Data Science Applied to Electrical Energy Systems	5	Optional
Electric Energy Conversion	5	Compulsory
Energy Economy and Comprehensive Energy Planning Models	5	Optional
Energy Management and Optimization of Electrical Power Systems	5	Optional
Energy Storage	5	Optional
Integration of Renewables in the Electric Grid	5	Optional
Power Electronics and Electrical Machines Application in Electrical Mobility and Industrial Application	5	Optional
Power Quality	5	Optional
Power System	5	Compulsory
Smart Grids	5	Optional
Wind Power	5	Optional
<b>SECOND SEMESTER</b>		
Analysis and Control of Modern Power Electronics Dominated Power Systems	5	Optional
Application of Power Electronics for Renewable Generation	5	Optional

<b>Subjects</b>	<b>ECTS credits</b>	<b>Type</b>
Control of Electrical Machines and Power Electronics	5	Optional
Dc Technology and Systems	5	Optional
Energy Markets	5	Compulsory
High Tension Technology	5	Optional
Industrial Energy Efficiency	5	Optional
Master's Thesis	15	Project

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April 2024. [UPC](#). Universitat Politècnica de Catalunya · BarcelonaTech