Master's degree in Energy Engineering

The **international master's degree in Energy Engineering** (**master's degree website**) deals with current energy problems from different perspectives: resources, production technologies, transport and distribution of energy, environmental impact, efficiency, saving and rational use, etc. Students on this course will obtain the knowledge and skills necessary to analyse case studies and manage projects on the generation, transformation, distribution and consumption of different types of energy.

The EIT Label is a quality seal awarded by the European Institute of Innovation and Technology (EIT) to a KIC educational programme that has been assessed positively by the EIT on the implementation of the EIT Quality Assurance and Learning Enhancement (EIT QALE) system and the application of specific quality criteria with focus on the EIT Overarching Learning Outcomes (EIT OLOs), robust entrepreneurship education, highly integrated, innovative learning by doing curricula, international mobility and outreach.

Specialisations

- Renewable Energies
- Electrical Energy
- Thermal Energy
- Energy Management.
  The master's degree is part of theInnoEnergy educational project, as are the following International master's degrees: Environomical Pathways for Sustainable Energy Systems (SELECT), Renewable Energy (RENE), Energy for Smart Cities, and Smart Electrical Networks and Systems (SENSE).

GENERAL DETAILS

Duration and start date

Two academic years, 120 ECTS credits. Starting September

Timetable and delivery

Afternoons. Face-to-face

Fees and grants

Approximate fees for the master's degree, excluding other costs, €3,320 (€8,300 for non-EU residents).
More information about fees and payment options
More information about grants and loans

Language of instruction

Check the language of instruction for each subject in the course guide in the curriculum. The specialty of Renewable Energies and associated EIT InnoEnergy is taught entirely in English.

Information on language use in the classroom and students' language rights.

Location

- Barcelona School of Industrial Engineering (ETSEIB)

Official degree

Recorded in the Ministry of Education's degree register

ADMISSION

General requirements

Academic requirements for admission to master's degrees

Specific requirements

An admissions committee for the master's degree comprising six tenured lecturers and an academic manager will be set up. The committee will review the academic records of students admitted to the master's degree and will determine the need for bridging courses.

Admission criteria

- English level B2.2 and Spanish level B2 are required (foreign students; not applicable in the case of courses taught in English).
- Academic record.
- First degree and university of origin.
- Professional experience

Places

60 (30 for KIC InnoEnergy master's degrees)

Pre-enrolment

Pre-enrolment period open.
Expected deadline: 15/05/2023.
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.

DOUBLE-DEGREE AGREEMENTS

Double-degree pathways at a single school

- Master's degree in Energy Engineering + Master's degree in Industrial Engineering

PROFESSIONAL OPPORTUNITIES

Professional opportunities

Graduates of this master's degree will be experts in energy engineering who will be able to develop their professional career in various fields: energy management, energy auditing, energy planning, technological development and exploitation of energy systems, energy economy and the social and environmental impacts of energy systems.

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.

On completion of the course, students will be able to:

Specialisation in Electrical Energy:

- Apply technical and economic criteria in selecting the most appropriate electrical equipment for a given application.
- Measure electrical equipment and installations.
- Recognise and evaluate the latest technological applications in the fields of electrical energy production, transport, distribution, storage and use.

Specialisation in Renewable Energies:

- Understand the role of renewable energies in global and regional energy systems, their economic, social and environmental connotations, and the impact of technology in a local and global context. Assess the opportunities, threats and barriers that affect the use of energy.
- Know the main international projects of the major organizations, the most relevant sources of information, energy markets and regulatory frameworks related to the use of renewable energy sources.
- Efficiently obtain and analyse data on renewable energy resources for the design and assessment of technological solutions related to the use of renewable energy sources.
- Carry out feasibility studies, consulting and engineering projects related to the use of renewable energy sources in a range of industrial and service sectors, and work in international, multidisciplinary teams.
- Know the main lines of research and development in the field of renewable energy. Conceive innovative ideas on the development of new products and services, and integrate in research teams and begin doctoral studies in this field.

Specialisation in Energy Management:

- Understand, describe and analyse, clearly and broadly, the way in which energy markets work.
- Procure energy supplies in an optimised manner.
- Carry out projects related to energy management in a range of production and service sectors, recognise and evaluate advances and new developments in this field, and contribute new ideas.

Specialisation in Thermal Energy:

- Have specialised knowledge of the subjects that make up the scientific and technical basis for research and development in the field of thermal engineering.
- Have a functional scientific grounding, i.e. skills that enable them to correctly and rationally solve design and construction problems in industrial equipment for generating, transferring and using thermal energy.
- Be familiar with the mathematical formulae and currently available tools for dealing with heat and mass transfer phenomena. Apply their knowledge to calculating and designing thermal systems and equipment to optimise energy efficiency and reduce environmental impact.

Students taking the thermal energy specialisation of the master's degree can orient their degree toward research or professional careers depending on the subjects and master's thesis they choose to do. They will be qualified to work in the fields of traditional and renewable thermal energies.

ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

UPC school

Barcelona School of Industrial Engineering (ETSEIB)

Academic coordinator

Enric Velo Garcia

Academic calendar

General academic calendar for bachelor's, master's and doctoral degrees courses

Academic regulations

CURRICULUM

Subjects		ECTS credits	Type
FIRST SEMESTER			
Energy and Environment		5	Compulsory
Energy Conversion Systems		6	Optional
Energy Resources		5	Compulsory
Power System		5	Compulsory
Rene Project (II)		5	Optional
Renewable Energy Technology		5	Compulsory
Specialisation in (Eng) Especialitat en Energia Elèctrica	Electric Drives with High Efficiency and Low Environmental Impact	5	Optional
	Integration of Renewables in the Electric Grid	5	Optional
	Energy and Environment	5	Compulsory
	Energy Conversion Systems	6	Optional
	Energy Resources	5	Compulsory
	Power System	5	Compulsory
	Rene Project (II)	5	Optional
	Renewable Energy Technology	5	Compulsory
Specialisation in (Eng) Especialitat en Energia Tèrmica	Advanced Course on Heat and Mass Transfer	5	Optional
	Computational Methods in Energy Technology	5	Optional
	Energy and Environment	5	Compulsory
	Energy Conversion Systems	6	Optional
	Energy Resources	5	Compulsory
	Power System	5	Compulsory
	Rene Project (II)	5	Optional
	Renewable Energy Technology	5	Compulsory
Specialisation in (Eng) Especialitat en Gestió de l'Energia	Energy Economy and Comprehensive Energy Planning Models	5	Optional
	Energy Management and Optimization of Electrical Power Systems	5	Optional
	Energy and Environment	5	Compulsory
	Energy Conversion Systems	6	Optional
	Energy Resources	5	Compulsory
	Power System	5	Compulsory
	Rene Project (II)	5	Optional
	Renewable Energy Technology	5	Compulsory

Subjects		ECTS credits	Type
Specialisation in (Eng) Specialitat en Energies Renovables	Solar Photovoltaics	5	Optional
	Wind Power	5	Optional
	Energy and Environment	5	Compulsory
	Energy Conversion Systems	6	Optional
	Energy Resources	5	Compulsory
	Power System	5	Compulsory
	Rene Project (II)	5	Optional
	Renewable Energy Technology	5	Compulsory
SECOND SEMESTER			
Electrical Equipment		5	Optional
Energy Efficiency and Rational Use of Energy		5	Compulsory
Energy Engineering Project		5	Compulsory
Energy Markets		5	Compulsory
Energy Storage		4	Optional
Entrepreneurship Skills		5	Optional
Thermal Equipment		5	Optional
Specialisation in (Eng) Especialitat en Energia Elèctrica	Control of Electrical Machines and Power Electronics	5	Optional
	Dc Technology and Systems	5	Optional
	Electrical Power Systems in a Distributed Environment	5	Optional
	Power Electronics and Electrical Machines Application in Renewable Generation	5	Optional
	Electrical Equipment	5	Optional
	Energy Efficiency and Rational Use of Energy	5	Compulsory
	Energy Engineering Project	5	Compulsory
	Energy Markets	5	Compulsory
	Energy Storage	4	Optional
	Entrepreneurship Skills	5	Optional
	Thermal Equipment	5	Optional
Specialisation in (Eng) Especialitat en Energia Tèrmica	Thermal Conditioning of Buildings. Bioclimatic Architecture	5	Optional
	Thermal Energy Storage	5	Optional
	Electrical Equipment	5	Optional
	Energy Efficiency and Rational Use of Energy	5	Compulsory
	Energy Engineering Project	5	Compulsory
	Energy Markets	5	Compulsory
	Energy Storage	4	Optional
	Entrepreneurship Skills	5	Optional
	Thermal Equipment	5	Optional

Subjects		ECTS credits	Type
Specialisation in (Eng) Especialitat en Gestió de l'Energia	Efficiency and Rehabilitation in Building Energy	5	Optional
	Industrial Energy Efficiency	5	Optional
	Electrical Equipment	5	Optional
	Energy Efficiency and Rational Use of Energy	5	Compulsory
	Energy Engineering Project	5	Compulsory
	Energy Markets	5	Compulsory
	Energy Storage	4	Optional
	Entrepreneurship Skills	5	Optional
	Thermal Equipment	5	Optional
Specialisation in (Eng) Specialitat en Energies Renovables	Geothermal Energy	5	Optional
	Hydropower and Ocean Energy	5	Optional
	Electrical Equipment	5	Optional
	Energy Efficiency and Rational Use of Energy	5	Compulsory
	Energy Engineering Project	5	Compulsory
	Energy Markets	5	Compulsory
	Energy Storage	4	Optional
	Entrepreneurship Skills	5	Optional
	Thermal Equipment	5	Optional
THIRD SEMESTER			
Specialisation in (Eng) Especialitat en Energia Elèctrica	Power Electronics and Electrical Machines Application in Electrical Mobility and Industrial Application	5	Optional
	Power Quality	5	Optional
	Smart Grids	5	Optional
Specialisation in (Eng) Especialitat en Energia Tèrmica	Experimental Energy Technology	5	Optional
	Heat Engines and Combustion	5	Optional
	Heat Exchangers	5	Optional
	Thermal Equipments for Heat and Cold Generation	5	Optional
	Turbulence: Phenomenology, Simulation, Aerodynamics	5	Optional
Specialisation in (Eng) Especialitat en Gestió de l'Energia	Control and Automation for the Efficient Use of Energy	5	Optional
	Data Science Applied to Electrical Energy Systems	5	Optional
	Efficiency in Power Systems	5	Optional
	Energy Storage	5	Optional
Specialisation in (Eng) Specialitat en Energies Renovables	Biogas and Biofuels	5	Optional
	Biomass and Waste	5	Optional
	Hydrogen and Fuel Cells	5	Optional
	Photovoltaic Devices	5	Optional
	Solar Thermal Energy	5	Optional
FOURTH SEMESTER			

Subjects		ECTS credits	Type
Master's Thesis		30	Project
Specialisation in (Eng) Especialitat en Energia Elèctrica	Master's Thesis	30	Project
Specialisation in (Eng) Especialitat en Energia Tèrmica	Master's Thesis	30	Project
Specialisation in (Eng) Especialitat en Gestió de l'Energia	Master's Thesis	30	Project
Specialisation in (Eng) Specialitat en Energies Renovables	Master's Thesis	30	Project