

Master's degree in Electronic Engineering (MEE)

The **master's degree in Electronic Engineering** caters for the needs of two types of students: those who wish to focus on a professional career and those looking to pursue a doctoral degree in Electronic Engineering.

This master's degree provides graduates with a broad profile that includes skills and expertise in power, analogue and RF electronics, instrumentation and sensors, digital systems, micro and nanotechnologies, and microelectronics. After the first, compulsory subject area, students can choose from a wide variety of subjects in order to acquire a general profile, specialise in a field, or engage in research and pursue a doctoral degree.

The aim is for the graduates to enter modern industry as benchmark professionals in a new multidisciplinary work and production scenario. To increase their employability, students can take both the master's thesis and some of the ECTS credits for optional subjects in a company or laboratory.

MEE has a strong international character. It is taught entirely in English and attracts a large number of students from other countries.

GENERAL DETAILS

Duration and start date

Two academic years, 120 ECTS credits. Starting September and February

Timetable and delivery

Afternoons. Face-to-face and blended learning

Fees and grants

Approximate fees for the master's degree, excluding other costs, €5,533 (€8,300 for non-EU residents).

Scholarships for the degrees

- **Fórum TIC**: 1 scholarship with a grant of €3,000.
- **HP**: 1 scholarship with a grant of €2,773.35, and an additional employment contract linked to the duration of the scholarship.
- **HP Academy**: 1 scholarship with a grant that covers the enrollment expenses of the master's degree, with a work contract linked to the duration of the scholarship.
- **Telecogresca**: 1 scholarship for the 1st.

[More information about grants and scholarships for the degree](#)

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

[More information about grants and loans](#)

Language of instruction

English

Location

[Barcelona School of Telecommunications Engineering \(ETSETB\)](#)

Official degree

[Recorded in the Ministry of Education's degree register](#)

ADMISSION

General requirements

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

Specific requirements

This 120-credit master's programme consists of four semesters: bridging, core, specialisation and thesis. The syllabus of the first two semesters is compulsory, depending on the admission level. The syllabus of the specialisation semester is optional and focuses on both professional training and research. There are four specialisations: Power Electronics, Devices and Microsystems, Integrated Circuits and Systems, and Instrumentation and Measurements.

The **bridging courses** include subjects that some students will be required to take if they are not graduates of the bachelor's degree in Electronic Systems Engineering or the equivalent from another university. The maximum number of ECTS credits that students are allowed to earn for bridging courses is 30, and these are included in the total of 120 ECTS credits for the master's degree.

- Most students will have degrees in Telecommunications Engineering, Electronic Engineering, Electrical Engineering, Computer Engineering or Applied Physics. Students may be admitted to different semesters of the master's programme on the basis of the subject of their degree and their academic CV.
- Potential master's degree candidates include both Spanish and foreign students with a bachelor's degree (a three- or four-year undergraduate university degree) in electrical engineering, computer engineering or applied physics. Until bachelor's programmes have been fully established, candidates may also come from pre-EHEA diploma programmes.
- Students with a bachelor's degree in Telecommunications or Electronic Engineering may be admitted to the core semester.
- Students admitted to the official postgraduate programme for the doctoral degree in Electronic Engineering who are required to take bridging courses may be admitted to the specialisation semester. Students from the pre-EHEA second cycle degree in Electronic Engineering who have completed all core and compulsory subjects may also be admitted to the specialisation semester.

Admission criteria

Language requirements:

CEFR English Level B2, which you can demonstrate in one of the following ways:

- Your mother tongue is English.
- You have studied in an English-speaking country (for at least one semester).
- You have taken an academic university programme taught in English (for at least one semester).
- You hold a European Higher Education Area degree that includes English Level B2.
- You hold one of the following English language certificates:
 - Cambridge: FCE
 - TOEFL PBT: ≥ 567 ; CBT: ≥ 227 ; IBT: ≥ 87
 - IELTS: 5.5
 - TOEIC: 750
 - Escuela Oficial de Idiomas: Certificado de nivel avanzado (Level 5)

- You obtain a B2 [English certificate at the UPC](#)

Knowledge of Catalan and Spanish may be helpful for daily life. Find more information on the [Language services and resources at the UPC website](#).

Places

40 in September; 20 in February

Pre-enrolment

Pre-enrolment closed (consult the new pre-enrolment periods in the [academic calendar](#)).

[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

MEE + *Laurea Magistrale in Ingegneria Elettronica* (Politecnico di Milano, Itàlia)

Professional opportunities

Given the cross-disciplinary nature of electronics, graduates of this degree may pursue careers in a broad range of sectors related to electronic technology, such as ICT systems, medical electronics, consumer electronics, control systems, robotics, automation, electromagnetic compatibility, microelectronic design, smart sensors and data acquisition systems.

Companies operating in these sectors offer high added value in terms of technology and are therefore in need of professionals trained to master's degree level. Many of these companies foster technology innovation and have a highly dynamic presence in a strongly competitive market, which they achieve through research.

Labour market

Every three years, the Catalan University Quality Assurance Agency (AQU) publishes a [study](#) on the employability of Catalan university graduates.

The last of these studies, [Universities and Employment in Catalonia 2014](#), analyses the employability of students who graduated in the 2009-2010 academic year.

The [most significant labour market data](#) for electronic engineers are the following:

- The graduate employment rate is 97.4%.
- It takes 88.6% of graduates less than three months to find their first job.
- Of students who graduated in the 2009-2010 academic year, 90.3% earn over €2000 a month.
- Electronic engineering is in second place in the ranking of degree courses according to the Job Quality Index.

The Everis Foundation has issued a [ranking of universities](#) based on companies' views on the employability of new graduates. The UPC is the top Spanish university in the area of information and communication technologies (ICTs).

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 competences

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

- Model, design and control power electronic systems for various functions and applications.
- Conceive and design electronic circuits for RF analogue signal processing.
- Design, implement and integrate high-performance instrumentation systems.
- Analyse and design micro- and nanoelectronic devices within the margins of use.
- Analyse and design digital circuits and systems-based (multi-) processors and configurable devices.
- Analyse and design mixed-signal integrated circuits.
- Manage and generate innovative business projects in the field of electronic technology.

ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

Organizing teaching center

- [Technical School of Telecommunications Engineering of Barcelona \(ETSETB\)](#)

Academic program manager

- [Isidro Martín García](#)

Academic calendar

- [General academic calendar for degrees, masters and doctorates](#)
- [Current course \(Class timetable, calendar of masters, exams, teachers, ...\)](#)

Academic regulations

- [Academic regulations for masters at the UPC](#)
- [Specific academic regulations for the MET and MEE masters](#)

Academic and administrative procedures

- [Pre-enrollment, registration, master's thesis, ...](#)
- [Mobility agreements to carry out the master's thesis at universities and foreign companies](#)
- [Business practices](#)

List of courses and teaching guide

- [Bridge](#)
- [Core](#)
- [Elective](#)

CURRICULUM

MEE curriculum

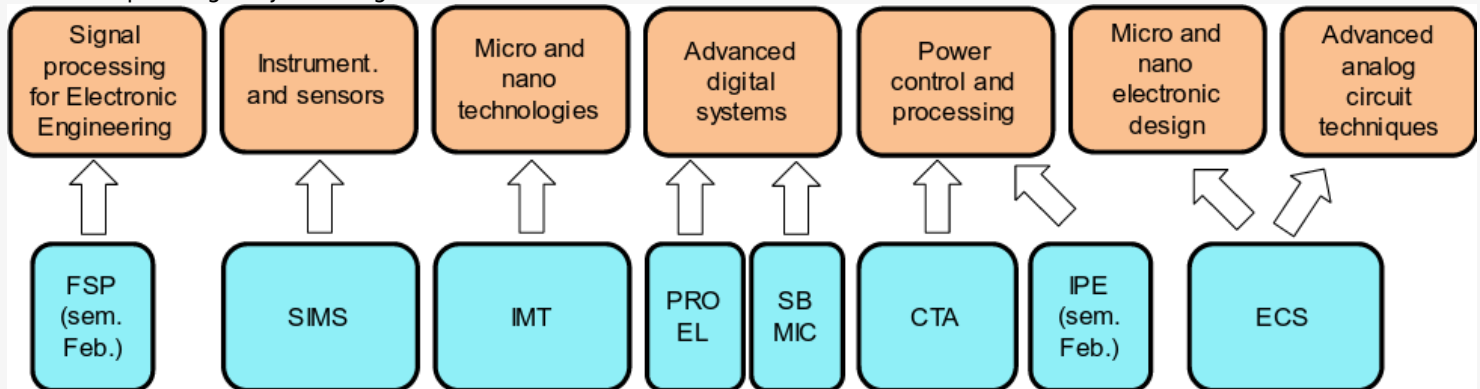
Master MEE offers 2 types of academic paths:

- **Academic path without intensification:** If you want maximum flexibility in the elective subjects, choose this option. There are 45 compulsory ECTS credits and 45 ECTS to choose among the different elective options without any restriction. The master thesis has 30 ECTS.
- **Academic path with intensification:** If you want to be a specialist in one of the multiple areas of the electronic

engineering, choose this option. There are 45 compulsory ECTS credits and among the 45 ECTS elective credits a minimum of 20 ECTS must be chosen from the intensification of your interest. The final thesis has 30 ECTS.

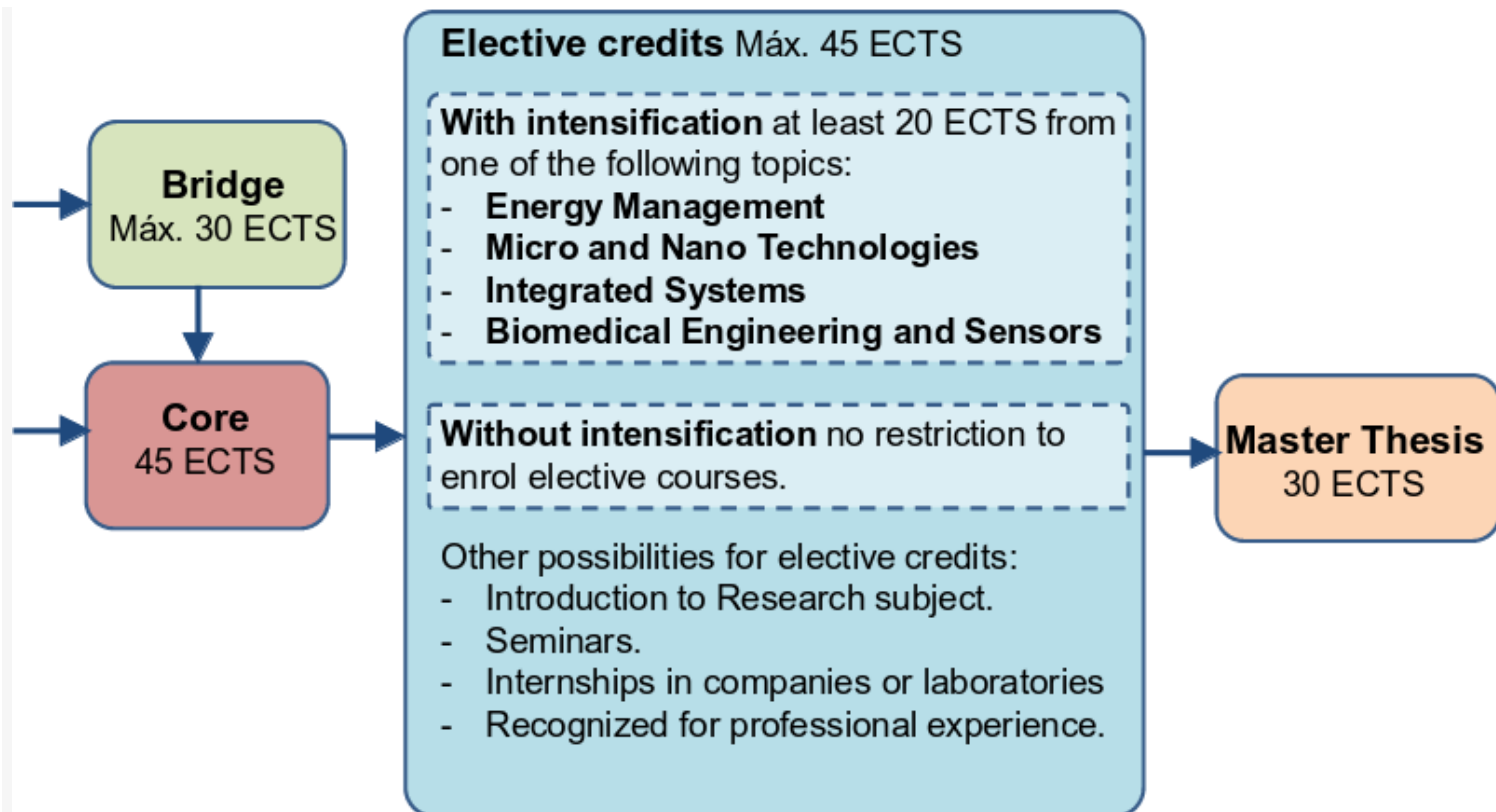
Subjects are structured in different blocks:

- **Bridge subjects:** To be taken by students whose academic profile is not a general bachelor of telecommunications engineering. The Academic Commission of Masters assigns these courses to new students. These subjects do not extend the master as they use elective credits. In the following figure, the relation between bridge subjects and core subjects is shown. This information could be useful for students that are not comfortable with the level of the core or bridge subject because is too high or too low. At the beginning of every semester, this mismatch can be solved by replacing the enrolled subject by the corresponding subject of higher or lower level.



- **Core subjects:** Compulsory subjects. There is a lot of flexibility enrolling these subjects. The only three things to consider are:
 - In case of being assigned some bridge subjects, do not enrol the core subjects related to them until you have passed the bridge course.
 - MND should be enrolled simultaneously or after having done AACT.
 - MTP should be enrolled as late as possible (3rd semester).
- **Elective subjects:** If the student does not want to follow any of the intensification tracks, any of the available elective subject can be chosen. In case of following an intensification track, the student must do a minimum of 20 ECTS of elective subjects from the chosen intensification track (**Energy Management, Integrated Circuits, Biomedical Engineering and Sensors, Micro and Nano Technologies**). If the student fulfils this requirement, the school will certified the followed intensification track.
- **Elective credits:** apart from elective subjects, these credits can be done with another activities like:
 - Introduction to Research subjects.
 - [Seminars](#).
 - [Internships in companies or laboratories](#) (15 ECTS)
 - Recognized for professional experience in master's degree (15 ECTS maximum).
- **Master's Thesis.** The duration is 30 ECTS. You can check in [Departament d'Enginyeria Electrònica](#) the diferent research groups where the student can develop his thesis.

Master structure



Enrolment guide:

First semester (30 ECTS): 6 core subjects. Any core subject except MTP. MTP has to be enrolled as late as possible.

Second semester (30 ECTS): LThe rest of core subjects except MTP + elective subjects. Without restrictions.

Third semester (30 ECTS): MTP + elective subjects. Without restrictions.

Fourth semester (30 ECTS): Master's thesis.

In case that bridge subjects are required, these will be enrolled in first and second semesters depending on the subject availability and the academic profile of each applicant.

Students can make [mobility stays](#) of half or full year to choose among a great number of foreign universities. Usually, the period is the third semester and/or the master's thesis during the fourth semester.

In case that the student is taking a double degree or a mobility stay in the second year, MTP must be passed during first and second semesters.

Internships in companies:

It is also possible to perform [internships in companies](#). In the master's framework, these internships can be curricular equivalent to 15 elective ECTS, curricular to do the master's thesis or extracurricular (do not recognize credits). In the following [link](#) a list of companies that have received students in the last years can be found.

Subjects	ECTS credits	Type
COMPULSORY		
Advanced Analog Circuit Techniques	5	Compulsory
Advanced Digital Systems	5	Compulsory
Innovation Based Service Management	5	Compulsory

Subjects	ECTS credits	Type
Instrumentation and Sensors	5	Compulsory
Management of Telecommunications Projects	5	Compulsory
Micro and Nano Electronic Design	5	Compulsory
Micro and Nanotechnologies	5	Compulsory
Power Control and Processing	5	Compulsory
Signal Processing for Electronic Engineering	5	Compulsory
OPTIONAL		
Advanced Analog System Design	5	Optional
Advanced Control of Sensors and Actuators	5	Optional
Analog and Mixed-Signal System-On-Chip Design	5	Optional
Applied Convex Optimization	5	Optional
Automotive Embedded Systems	5	Optional
Big Gns Data: From Remote Sensing to Space Weather	3	Optional
Biomedical Instrumentation Design	5	Optional
Building Your Career. From Academia to Startups & Beyond	2.5	Optional
Control Theory and Applications	5	Optional
Critical Thinking and Creativity	5	Optional
Custom Smart Adaptive Systems	5	Optional
Earth and Cosmos	5	Optional
Edison: Energy Management for Distributed and Integrated Systems	5	Optional
Electric Motor Drives	5	Optional
Electronic Devices Modelling	5	Optional
Electronic Systems for Internet of Things	5	Optional
Electronics for Communications Systems	5	Optional
Electronics Instrumentation Systems for Marine Applications	5	Optional
Emc in Electronic Design	5	Optional
Fabrication and Characterization Technologies for Micro and Nano Devices	5	Optional
Fiber Optic Infrastructure for 5G Networks	2.5	Optional
Fibers and Telecommunications	3	Optional
Financial Engineering: Applications to Information Technology Projects	2.5	Optional
Fundamentals of Discrete-Time Signal Processing	2.5	Optional
GPS and Galileo Data Processing: From Fundamentals to High Accuracy Navigation	5	Optional
Graphene and Carbon Nanotubes Introduction and Fundamentals	2.5	Optional
Integrated Photonics	3	Optional
Interdisciplinary Innovation Project	5	Optional
Introduction to Biomedical Electronic Systems	5	Optional
Introduction to Microelectronic Technologies	5	Optional
Introduction to Power Electronics	2.5	Optional

Subjects	ECTS credits	Type
Introduction to Research	15	Optional
Laser Applications in Remote Sensing: Lidar	3	Optional
Lidar Processing and Inversion: Applications to Remote Sensing of Physical Parameters	2.5	Optional
Lidar Remote Sensing	2.5	Optional
Marine Technology Instrumentation	5	Optional
Matlab Programed Arduino for Control Applications	2.5	Optional
Matlab: Fundamentals And/Or Applications	5	Optional
Mems. Microelectromechanical Systems	5	Optional
Microwave Circuits	5	Optional
Microwave Photonics	2.5	Optional
Mosic. Modelling, Simulation and Control of Power Electronic Systems	5	Optional
Optical Fiber Telecommunications	5	Optional
Optoelectronics and Photovoltaic Technology	3	Optional
Photonic Systems in Telecommunications: Lidar (Laser Radar)	3	Optional
Photonics Systems in Telecommunications	3	Optional
Photovoltaic Systems	5	Optional
Power Control for Renewable Energy Systems	5	Optional
Power Electronic Circuits	5	Optional
Printed Circuit Board Design	2.5	Optional
Programmable Electronics	5	Optional
Radiofrequency Integrated Circuits and Systems	5	Optional
Sensors, Instruments and Measurement Systems	5	Optional
Software-Based Digital Control Applications	2.5	Optional
Solar Cell Engineering	5	Optional
Solar Cells for Dummies	2.5	Optional
System on Chip Physical Design	5	Optional
Systems Based on Microprocessors	5	Optional
Technology Asset Management	5	Optional
Telecommunication Markets	5	Optional
Telecommunications and Electronics Seminar	2.5	Optional
The Connected Vehicle	2.5	Optional
Ultrasonic Systems. Instrumentation and Applications	5	Optional
PROJECT		
Master's Thesis	30	Project