Master's degree in Telecommunications Engineering (MET)

The master’s degree in Telecommunications Engineering is a training proposal that is adaptable to the needs of two types of students: those who wish to focus on a professional career and those who wish to pursue a doctoral degree in the area of telecommunications engineering.

This master’s degree provides graduates with a broad profile that includes skills and expertise in communications systems, networks, electronics and audiovisual systems to ensure that they have the professional competencies that they need to practise as telecommunications engineers. After the first, compulsory subject area, students can choose from a wide variety of subjects 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 the 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.

MET has a strong international character. It is taught entirely in English as it is expected that a large number of students will be from other countries. There is also the possibility of obtaining a joint degree with another internationally renowned university.

Specialisations

- Antennas, Microwaves and Photonics for Communications and Earth Observation
- Electronics
- Fibre Optic Communications
- Internet Networks and Technologies
- Multimedia
- Wireless Communications

GENERAL DETAILS

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

Timetable and delivery
Mornings and afternoons. Face-to-face

Fees and grants
Approximate fees for the master's degree, excluding degree certificate fee, €5,300 (€7,950 for non-EU residents).

Grants for the degree
- Everis: 2 scholarships with a grant of €3,000 each, and carrying out practices in Everis during a semester..
- Fòrum TIC: 1 scholarship 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.
- Telecogresca: 1 scholarship for the 1st.

More information about own scholarships
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

- Bachelor’s degree in Telecommunications Technologies and Services Engineering
- Bachelor’s degree in Telecommunications Science and Technology
- Bachelor’s degree in Audiovisual Systems Engineering
- Bachelor’s degree in Electronic Systems Engineering
- Bachelor’s degree in Telecommunications Systems Engineering
- Bachelor’s degree in Network Engineering.
- Bachelor's degree in Electrical Engineering.

- Pre-EHEA five-year degree in Telecommunications Engineering: 60 ECTS credits may be recognised if the degree is homologated in Spain.
- Pre-EHEA five-year degree in Electronic Engineering: 45 ECTS credits may be recognised if the degree is homologated in Spain.
- Pre-EHEA diploma in Telecommunications Engineering: an additional 30 ECTS credits must be passed.
- Bachelor's degree in Engineering Physics: an additional 60 ECTS credits must be passed (30 of them can be taken as optional courses on the bachelor's degree in Engineering Physics).

Applicants who have other technology degrees in fields such as Computer Engineering, Software Engineering, Informatics Engineering, Industrial Electronics and Automatic Control Engineering, Science and Technology, etc. may need to pass some courses in addition to those of the master's degree. These bridging courses are part of the bachelor's degree in Telecommunications Technologies and Services Engineering and are taught in Catalan or Spanish. The maximum number of credits for bridging courses is 60 ECTS. The exact number of additional ECTS credits depends on the degree held by the applicant and will be decided by the academic committee of the master's degree.

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
60 in September; 20 in February

Pre-enrolment
Pre-enrolment period open.
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 with universities around the world

- Master’s degree in Telecommunications Engineering (MET, ETSETB) + one of the following master's degrees from the KTH Royal Institute of Technology, School of Electrical Engineering, Stockholm, Sweden:
  - Master’s programme in Electric Power Engineering
  - Master’s programme in Electrophysics
  - Master’s programme in Information and Network Engineering
  - Master’s programme in Systems, Control and Robotics
- MET + Ingénieur ISAE-SUPAERO (École Nationale Supérieure de l’Aéronautique et de l’Espace, Toulouse, France)
- MET + one of the following master's degrees from the Illinois Institute of Technology:
  - Master of Science in Electrical Engineering
  - Master of Science in Computer Engineering
  - Master of Biomedical Imaging and Signals
  - Master of Network Engineering
  - Master of Telecommunications and Software Engineering
  - Master of Information Technology and Management
  - Master of Cyber Forensics and Security
  - Master of Information Technology and Management
- MET + Laurea Magistrale in Ingegneria delle Telecomunicazioni (Politecnico di Milano, Italy)
- MET + Maestría en Ingeniería de las Telecomunicaciones (Pontificia Universidad Católica del Perú, Perú)
- MET + one of the following master's degrees from the École Nationale Supérieure des Télécommunications de Bretagne (Telecom Bretagne):
  - Diplôme d'ingénieur
  - Diplôme national de master
- MET + Master's degree in Electrical and Computer Engineering, specialisation in Telecommunications or Electronics (Instituto Superior Técnico, Lisbon)
- MET + Mestría en Sistemas de Información (Universidad Católica Andrés Bello, Caracas, Venezuela)

More information

PROFESSIONAL OPPORTUNITIES

Professional opportunities

The areas in which graduates of this master’s degree may find employment are similar to those for graduates of the five-year degree in Telecommunications Engineering, although their profiles are enhanced by an extra academic year. Their careers may lead them to practise as:

Telecommunications engineers in any of the following areas:

- Telecommunications operations.
- Telecommunications equipment industry.
- Electronic equipment industry.
- Semiconductor industry.
- IT consulting firms (network solution designers, network planners and designers, network project leaders, etc.).
- IT companies, from content producers and distributors to service providers.
- Regulatory bodies.
- Software editing firms.
- Other industries such as cars manufacturers and consumer and industrial electronics companies, and areas such as health, energy, intelligent transport systems, logistics and mobility, agricultural and food, air and maritime transport, railway infrastructure, control systems and security of facilities and electronic services transactions, as well as rapidly expanding areas such as smart cities, smart homes, smart grids and smart health.
Freelance professionals acting as telecommunications engineering advisors and consultants.

Sales engineers.

Civil servants or employees of public administrations at EU, national, regional and local level in the field of telecommunications and ICT innovation.

Research, development and innovation specialists in public and private companies.

Researchers and academics at public or private universities.

In addition to professionally oriented topics, the master’s degree offers highly specialised optional subjects intended for those students who are looking to pursue a **doctoral degree in Telecommunications Engineering**.

**Labour Market**

Every three years, the Catalan University Quality Assurance Agency (AQU) publishes a **study** about the employability of Catalan university graduates.

The last of these studies, *Universites 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 telecommunication engineers are the following:

- The graduate employment rate is 92.6%.
- It takes 84% of graduates less than three months to find their first job.
- Of students who graduated in the 2009-2010 academic year, 78.5% earn over €2000 a month.
- Telecommunications engineering is in fourth place in the ranking of degree courses according to the Job Quality Index.

The Eversis 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 software and telecommunications engineering.

**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**

On completion of the course, students will have achieved competence in the following areas:

- Communication systems: wired and wireless, optical fibre.
- Computer networks, internet, local area networks (Ethernet, Wi-Fi).
- Radio navigation, global positioning systems (GPS).
- Radar.
- Information processing: encoding, compression, error correction, image recognition, video clip recognition, voice recognition, voice generation.
- Electronic components and circuits: microprocessor devices (routers, switches, etc.), sensors, actuators, transducers.
- Technology and electronics, analogue and digital electronic instrumentation, medical electronics, consumer electronics, control systems, robotics, automation.
- Micro- and nanotechnologies.
- Bioengineering applications, telemedicine, e-commerce platforms, smart cities, smart metering, sensor networks, smart homes, green computing, cloud computing.
Organizing teaching center

- Technical School of Telecommunications Engineering of Barcelona (ETSETB)

Academic program manager

- Marcos Postigo

Academic calendar

- General academic calendar for degrees, masters and doctorates
- Current course (class schedules, master's calendar, exams, teachers, ...)

Academic regulations

- Academic regulations of the masters of 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 guides

- Bridge
- Core
- Intensification
- Specialization
- Elective
MET Curriculum
Master MET offers 3 types of academic paths:
**Academic path without specialization:** If you want maximum flexibility in the elective subjects, choose this option. There are 45 compulsory ECTS credits, 15 ECTS credits from one intensification and you will have 30 more ECTS to choose among the different elective options. The final thesis has 30 ECTS.
**Academic path with specialization:** If you want to be a specialist in one of the multiple areas of the electrical engineering, choose this option. There are 45 compulsory ECTS credits, 30 ECTS credits from the intensification that you prefer, and you will still have 15 more ECTS to choose among the different elective options. The final thesis has 30 ECTS.
The different specialisations are:

- Antennas, Microwaves and Photonics for Communications and Earth Observation
- Electronics
- Fibre Optic Communications
- Internet Networks and Technologies
- Multimedia
- Wireless communications

**Academic path with double-degree (limited places):** If you prefer maximum internationalization and another master degree, choose this option. You will have to enrol 45 compulsory ECTS credits, 15 ECTS credits from one intensification and 60 or 90 ECTS credits (that include the 30 ECTS of the thesis) at the foreign university.
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, they use elective credits.
• **Core subjects:** Compulsory subjects.
• **Intensification subjects (Academic path without specialization):** The student must choose one intensification (Communications, Electronics, Multimedia or Networks) and take 3 subjects from a choice of 9. These subjects can be enrolled in different semesters, but the student must have passed 3 of the same intensification before finishing the master.

• **Specialization subjects (Academic path with specialization):** The student will take 4 specialization compulsory subjects and 2 specialization elective subjects.

• **Elective credits:** These credits can be divided between:
  
  ○ Elective subjects.

  ○ Introduction to research subjects.

  ○ Seminars.

  ○ Internships in companies or laboratories (15 ECTS).

  ○ Recognized for professional experience (15 ECTS maximum).

• **Master's Thesis.**
NO SPECIALIZATION - MAXIMUM FLEXIBILITY
Choose 15 ECTS from one intensification and 30 elective ECTS
Double-Degree students must follow this path

BRIDGE
MAX: 30 ECTS
ASSIGNED BY MASTER ACADEMIC COMISSION

CORE
COMPULSORY
45 ECTS

WITH SPECIALIZATION
Each specialization has 30 ECTS:
4 compulsory subjects + 2 specialization elective subjects

SPECIALIZATIONS
Antennas, microwaves and photonics for communications and Earth observation
30 ECTS

Electronics
30 ECTS

Fiber-Optic communications
30 ECTS

Multimedia
30 ECTS

Networks and Internet technologies
30 ECTS

Wireless communications
30 ECTS

ELECTIVE CREDITS
15 ECTS

ELECTIVE CREDITS
30 ECTS

THESIS
30 ECTS
Enrolment guide:

**IMPORTANT NOTICE:** Students willing to take a **double degree** or a **mobility stay** should:

- Take the intensification path.
- Pass all core subjects + 3 intensification subjects before the mobility.
- Should you have to enroll bridge courses during the first semester, set up a meeting with Vice-Dean Head of Master Studies (sotsdirmasters@etsetb.upc.edu) to plan the enrolment for first and second semesters.

**First semester (30 ECTS).**

1. All bridge subjects that have been assigned to you.

2. Core subjects. Any of them except MTP.

3. None or one elective/intensification/specialization subject. Any except IT and having into account these restrictions:
   - AFOC requires to simultaneously enrol TSYS.
   - AMC requires to simultaneously enrol TSYS.
   - QSN requires to simultaneously enrol CN and OVNET.
   - WAN requires to simultaneously enrol CN.

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

**Third semester (30 ECTS):** MTP + intensification subjects + 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 and the 3 intensification subjects 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).

The ETSETB has a long collaboration tradition with companies. In this link you may see the companies that have offered internships during the last years.

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<td>Quality of Service in Networks</td>
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<td>Web &amp; Mobile App Development</td>
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<td>Radar, Radionavigation and Location Systems</td>
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