

Master's degree in Advanced Telecommunication Technologies

The **master's degree in Advanced Telecommunications Technologies** is a joint project of the Barcelona School of Telecommunications Engineering (ETSETB) and the Castelldefels School of Telecommunications and Aerospace Engineering (EETAC). The programme offers a broad selection of optional credits that are organised by concentration but also provide enough flexibility for students to create their own profile. On this master's degree, you can choose one of the concentrations proposed by the schools (technical and technological specialisation at the ETSETB or cross-disciplinary courses at the EETAC) or build your own specific profile by selecting the optional subjects you are interested in at each school.

GENERAL DETAILS

Duration and start date

1 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, €2,766 (€4,149 for non-EU residents).

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

[More information about grants and loans](#)

Language of instruction

English

Location

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

[Castelldefels School of Telecommunications and Aerospace Engineering \(EETAC\)](#)

ADMISSION

General requirements

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

Specific requirements

Direct admission:

- Bachelor's degree in Telecommunications Science and Technology
- Bachelor's degrees that qualify the holder to practise the profession of technical telecommunications engineer: bachelor's degrees in Audiovisual Systems Engineering, Electronic Systems Engineering, Telecommunications Systems Engineering, and Network Engineering
- Degree in Telecommunications Engineering (pre-EHEA qualification)

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](#).

Professional opportunities

Designing, managing and executing projects in the field of telecommunications engineering, including projects related to:

- Radio, fibre-optic and copper-cable communications systems.
- Computer networks, the internet, local area networks (Ethernet, Wi-Fi).
- Audiovisual content distribution systems: voice networks, video and television distribution networks, and streaming and peer-to-peer (P2P) networks.
- Mobile phone networks.
- Radionavigation, positioning systems (GNSS).
- Information processing systems: coding, compression, error correction, image recognition, recognition of video sequences, voice recognition, voice generation.
- Artificial intelligence systems based on structured data (textual information) and unstructured data (video, speech).
- Security in communication networks: cryptography, user authentication, digital signatures.
- Electronic circuits and components: microprocessors, devices (routers, switches, etc.), sensors, actuators, transducers.
- Analogue and digital electronic technology: electronic instrumentation, medical electronics, consumer electronics, control systems, robotics, automation, etc.
- Microtechnology and nanotechnology.
- Applications in bioengineering, telemedicine, e-commerce platforms, smart cities, sensor networks, smart homes, green computing, cloud computing, etc.
- Management and administration of telecommunications companies, including both firms oriented towards planning and design and those involved primarily in the execution of engineering projects.
- Freelance work as an adviser and consultant in the field of telecommunications engineering.
- Sales engineering.
- Public administration: as a member of the statutory or contractual staff of a technical unit of any public administration (in the European Union, Spain, autonomous communities and cities) in the areas of telecommunications and ICT innovation.
- Research, development and innovation: research at public or private centres, or in the RDI departments of large companies.
- Teaching at public and private universities.

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:

- Select and use—in telecommunications applications and services such as monitoring and management of network operations, analysis and interpretation of audiovisual data, and design and verification of microelectronic circuits—a variety of automatic learning techniques and build systems that use such techniques for decision making (including autonomous decision making).
- Analyse software-managed complex systems in the area of telecommunications and its applications, such as software-defined radio systems, coding and decoding standards for audiovisual content, and firmware for embedded electronic systems.
- Design and build applications and services in the area of telecommunications based on object-oriented software, in both static and iterative development frameworks, such as software-defined radio systems, coding and decoding standards for audiovisual content, and firmware for embedded electronic systems.
- Design and implement, in the area of telecommunications and its applications, projects that are economically viable, socially acceptable and environmentally friendly.
- Integrate telecommunications engineering technologies and systems of a general nature in broader, more multidisciplinary contexts, such as automobiles and mobility, bioengineering, telemedicine and smart cities.
- Individually produce, and present and defend before an examination committee, an original work consisting of an engineering project of a professional nature in the field of information and communication technologies that draws on and demonstrates the competencies acquired on the master's degree.

UPC school

[Casteldefels School of Telecommunications and Aerospace Engineering \(EETAC\)](#)
[Barcelona School of Telecommunications Engineering \(ETSETB\)](#)

Academic coordinator

[David Rincon Rivera](#)
[Marcos Postigo Boix](#)

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](#)

CURRICULUM

MATT Curriculum

The master's degree in Advanced Telecommunications Technologies, which is taught by the ETSETB in conjunction with the EETAC, is worth 60 ECTS credits and is taught entirely in English. It can be taken full-time or part-time and is designed in such a way that it can be adapted to the needs of students, who have a great deal of flexibility when it comes to choosing courses.

The basic structure is the following:

- 15 ECTS credits for compulsory subjects that are cross-disciplinary and the content of which may be useful in a whole range of ICT specialisations.
- 33 ECTS credits for optional subjects in various ICT areas.
- 12 ECTS credits for the master's thesis.

Non-curricular placements can be taken alongside the subjects of the master's degree. In the case of the ETSETB, you will find the information by clicking on the link [Work placement](#), and a list of companies with which it has had agreements in recent years by clicking on this [link](#). In the case of the EETAC, the information is [here](#).

Mobility is possible but has certain limitations. You can take all the subjects over two semesters at the UPC and carry out your master's thesis at another university in the third semester. Because abroad master's theses are rarely worth just 12 ECTS credits, it is common for students to carry out a master's thesis of more than 12 ECTS credits on a mobility programme, even though the UPC will only recognise 12 ECTS credits. If you click on the link [Mobility stays](#) you will find the information for the ETSETB; if you click on the link [Mobility](#) you will find the information for the EETAC.

Because the master's degree has many optional subjects, they are grouped into pathways that allow students to concentrate on a particular area of ICT. If students take one of these pathways, the ETSETB or the EETAC issues a certificate stating that they have taken this concentration. The certificate has no legal validity but it can be attached to your curriculum to demonstrate your knowledge of this area.

Each pathway consists of three or four recommended pathway subjects and one or two optional pathway subjects. The

certificate is issued to students who pass 25 ECTS credits for subjects in the pathway, regardless of whether these are recommended or optional.

The subject [Introduction to Research I \(RES1\)](#) may be included in the credits for a pathway if the topic of the project lies within the area of knowledge of the pathway.

If students' bachelor's degrees insufficiently prepared them to take the pathway they have chosen, they will be asked to take additional subjects in the pathway, which, in general terms, should not mean that they take more than 60 ECTS credits on the master's degree. The academic committee of the master's degree is responsible for analysing students' academic background and proposing bridging courses.

The master's degree can be taken without following a pathway; in this case, students take 33 ECTS credits in an unrestricted choice of optional subjects.

At the EETAC, optional subjects are worth 3 ECTS credits and this allows students to take the required 33 ECTS credits. At the ETSETB, optional subjects are worth 5 ECTS credits, so students can take seminars, which are optional subjects worth 3 ECTS credits that are taught in an intensive format once the examination period at the end of each semester has ended. Two seminars cannot be taken at the same time, but more than one can be taken over the course of the master's degree. Therefore, at the ETSETB there are various ways of completing the 33 optional ECTS credits.

- 6 subjects worth 5 ECTS credits and 1 seminar worth 3 ECTS credits. Students have 60 ECTS credits when they get to the end of the master's degree.
- 5 subjects worth 5 ECTS credits and 3 seminars worth 3 ECTS credits. Students have 60 ECTS credits when they get to the end of the master's degree.
- 7 subjects worth 5 ECTS credits and no seminars. Students have 62 ECTS credits when they get to the end of the master's degree.

[Compulsory subjects](#) are taught at the EETAC and the ETSETB at the same time and every semester (twice a year). Optional subjects are taught at just one school and just once a year, whether in the autumn semester or the spring semester. The pathways are also taught at just one school.

Cross-disciplinary pathways (EETAC)

- [5G Networks](#)
- [Internet of Things](#)

Communications pathways (ETSETB)

- [Antennas, Microwaves and Photonics for Communications and Earth Observation](#)
- [Wireless Communications](#)

- [Optical Networks](#)

Networks and Communication Protocols pathways (ETSETB)

- [Network Engineering](#)
- [Cybersecurity](#)

Multimedia pathways (ETSETB)

- [Deep Learning for Multimedia Processing](#)

Electronics pathways (ETSETB)

- [Integrated Systems](#)
- [Instrumentation and Sensors](#)
- [Micro- and Nanotechnologies for Energy Management](#)

Click here to see the [classes timetable](#)



Master Compulsory Machine Learning from data (MLEARN)
 Software Architecture (ARQSOFT)
 Entrepreneurship for world challenges (EWOC)

Internet of Things (EETAC)

Recommended Mobile Communications (MOBCOM)
 Network Science (NETSCI)
 Optimization Techniques (OPTECH)

Elective Internet of Things and Ubiquitous IP (IOT-IP)
 Sensors and Interfaces (SENSORS)
 Low-power Systems with Energy Harvesting (LOWPOW)
 Body Sensor Nodes (BODYSENS)
 Software Defined Radio (SDR)
 Network Security: Authentication and Authorization (NETAUTH)

Leveling Circuitos Electrónicos y Sistemas de Alimentación (CESA)
Wireless Communications (CSF)
Mobility, Networks and Services (MXS)

5G Networks (EETAC)

Recommended Mobile Communications (MOBCOM)
Network Science (NETSCI)
Optimization Techniques (OPTECH)

Elective 5G Network Support (5GNET)
5G Network Planning (5GPLAN)
Optical Networks for Cloud-Based Services (OPTICAL)
Software Defined Radio (SDR)
Network Security: Authentication and Authorization (NETAUTH)
Internet of Things and Ubiquitous IP (IOT-IP)

Leveling Wireless Communications (CSF)
Mobility, Networks and Services (MXS)

Antennas, microwaves and photonics for communications and Earth observation (ETSETB)

Recommended Microwaves and photonics for comm. and Earth observation (MPCE)
Remote sensing for Earth observation (RSEN)
Wireless links and antennas (WLA)

Elective Lab. of antennas, microwave and photonics for communication systems (AMPLAB)
Laser, terahertz and microwave research and applications (LTM)
Microwave imaging for remote sensing (MRS)
Numerical methods for electromagnetic engineering (NMEE)
Optical remote sensing LIDAR (ORS)
Radar, radionavigation and location systems (RADN)

Leveling Antennas and microwaves (AAM)

Wireless communications (ETSETB)

Recommended Advanced communications for wireless systems (ACWS)
5G mobile communications systems (5GMCS)
Short range communications (SHORT)

Elective Array processing and smart antennas (ARRAYS)
Information theory (IT)
Artificial Intelligence-Enabled 5g Radio Networks (AI5G)
Wireless access networks (WAN)
Wireless laboratory (WLAB)

Leveling Digital Communications (DC)
Telecommunication systems fundamentals (TSF)

Optical Networks (ETSETB)

Recommended Advanced fiber optical communications (AFOC)
Optical networks (OPNET)
Optical fiber telecommunications laboratory (OFLAB)

Elective Optical fiber telecommunications (OFT)
Optical fiber sensor technologies (OSEN)

Leveling Telecommunication systems fundamentals (TSF)

Cybersecurity (ETSETB)

Recommended Network security (NS)
Internet applications and security (IAS) [FIB -Facultat d'informàtica]
Network Security, Authentication & Authorization (NSAA)
Cybersecurity use cases (UCASES)

Elective	Cybersecurity management (CSMAGT) Data protection (DPROT) Web & mobile app development (WMAD) Optimization and Artificial Intelligence Techniques in Network Management (INMAN)
Network engineering (ETSETB)	
Recommended	Web & mobile app development (WMAD) Overlay Networks (OVNET) Network Security (NS)
Elective	Wireless access networks (WAN) Quality of service in networks (QSN) Networks Science (NET) Internet and networked economy (INE) Optimization and Artificial Intelligence Techniques in Network Management (INMAN)
Leveling	Communication networks (CN)
Deep learning for multimedia processing (ETSETB)	
Recommended	Computer Vision with deep learning (CVDL) Deep Learning for AI (DLAI) Speech and language processing with deep learning (SLPDL)
Elective	Biometrics (BIOM) Advanced human language technologies (AHLT) Social networks: theory and an implementation (SNET)
Leveling	Digital speech and audio processing (DSAP) Digital image and video processing (DIVP)
Integrated systems (ETSETB)	
Recommended	Advanced analog circuit technologies (AACT) Advanced digital systems (ADS) Micro and nano electronic design (MND)
Elective	Custom smart adaptive systems (CSAS) Analog and mixed system-on-a-chip design (AMS) Edison: energy management for distributed and integrated syst. (EDIS) System-on-a-chip physical design (SCPD) Radiofrequency integrated circuits and systems (RICS)
Leveling	Programable electronics (PROEL) Introduction to microelectronic technologies (IMT)
Instrumentation and sensors (ETSETB)	
Recommended	Instrumentation and sensors (IS) Signal Processing for Electronic Engineering (SPEE) Biomedical Instrumentation design (BID)
Elective	Introduction to biomedical electronic systems (IBES) Microelectromechanical systems (MEMS) Electromagnetic compatibility in electronic design (EMC) Ultrasonic Systems. Instrumentation and Applications (US)
Leveling	Sensors, instruments and measurement systems (SIMS)
Micro and nanotechnologies for energy management (ETSETB)	
Recommended	Micro and nano technologies (MNT) Power control and processing (PCP) Photovoltaic systems (PVS)

Elective

Microelectromechanical systems (MEMS)

Power control for renewable energy systems (PCRES)

Modelling, simulation and control of power electronic systems (MOSIC)

Fabrication and Characterization Techn. for Micro and Nano Devices (TECHDEV)

Energy management for distributed and integrated syst. (EDIS)