Bachelor's degree in Telecommunications Technologies and Services Engineering

The bachelor's degree in **Telecommunications Technologies and Services Engineering** provides a solid grounding in the fundamentals of ICT engineering and the specific skills pertaining to each of the majors that are offered. It produces versatile professionals who are able to change work environments and meet the sector's future challenges and those that will occur in industrial sectors that employ these technologies. The degree also ensures concentrated learning in the following majors: Audiovisual Systems, Telecommunications Systems and Network Systems.

Given that ICTs are crucial in any industrial, research and innovation sector, graduates' professional opportunities are wide-ranging: they will be able to accomplish a broad range of technical and management tasks and start new entrepreneurial projects in this technological field.

Communications are ever more necessary in all environments and scenarios, and specialists are highly sought after in fibre optics; in mobile communications, to serve the fourth generation and develop the foundations of the fifth; and in GPS technologies and services. Other examples are projects involving cities whose intelligence increases as networks of sensors, such as cameras and pollution sensors, are implemented to improve the lives of citizens, and the extensive use of communication networks and the so-called Internet of Things, a use that demands that the privacy and security of our data be protected. The audiovisual sector also requires highly skilled professionals to design advanced systems, for 3D sound and image technologies, for example, and not just for direct consumers of media, such as music shows or the cinema, but also for important sectors such as health and the automotive and transport industries. In these sectors, there is a clear need for developing electronic devices and instruments that provide accurate and reliable data, to monitor patients' progress, for example. Another area that is emerging forcefully is the design of new solar cells and photovoltaic systems in the energy sector.

Major in Audiovisual Systems
You will acquire the knowledge to conceive, design, implement and operate products, systems and services in the field of audiovisual systems engineering, including the fields of acoustics, image, audio, video and multimedia environments.

Major in Telecommunications Systems
You will acquire the knowledge to conceive, design, implement and operate telecommunications systems based on generating, transmitting, receiving and processing electrical, acoustic and optical signals across the frequency spectrum and processing related information.

Major in Network Systems
You will acquire the knowledge to conceive, design, implement and operate telematic networks, their security mechanisms and the data that are transmitted through them; the protocols that allow them to function; and the distributed and centralised services and applications that they offer.

Majors

- Audiovisual Systems
- Telecommunications Systems
- Network Systems

GENERAL DETAILS

Duration
    4 academic years

Study load
    240 ECTS credits (including the bachelor's thesis). One credit is equivalent to a study load of 25-30 hours.

Delivery
    Face-to-face

Admission mark 2024-2025 academic year
   7,754

Language of instruction

   Check the language of instruction for each subject (and timetable) in the course guide in the curriculum.

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

Fees and grants
   Approximate fees per academic year: €1,107 (€2,553 for non-EU residents). Consult the public fees system based on income (grants and payment options).

Location
   Barcelona School of Telecommunications Engineering (ETSETB)

Official degree
   Recorded in the Ministry of Education's degree register

ADMISSION

Places
   180

Pre-enrolment code
   31086

Places places via a change of degree
   5

Admission mark 2024-2025 academic year
   7,754. Admission mark

Weighting. University entrance examinations (PAU)
   Weighting. University entrance examinations (PAU)

Registration and enrolment
   What are the requirements to enrol in a bachelor's degree course?

CFGS credit transfer
   Consult the university studies search engine of the Universities Channel of the Generalitat de Catalunya

Legalisation of foreign documents
   All documents issued in non-EU countries must be legalised and bear the corresponding apostille.

DOUBLE-DEGREE AGREEMENTS

Within the framework of the courses offered by the Interdisciplinary Higher Education Centre (CFIS)
You can also take an interdisciplinary double degree coordinated by the CFIS at two UPC schools.
Further information on the CFIS website

PROFESSIONAL OPPORTUNITIES

Professional opportunities
   - Leadership positions.
   - Business and entrepreneurship.
   - Management and administration.
   - Management of an area or department.
   - Project management.
   - Technological advice and consulting in ICT solutions for any area of industry or research.
   - Design and implementation of telecommunications, telematic, audiovisual and electronic systems and applications.
   - Administration and implementation of telecommunications, telematic, audiovisual and electronic systems.

- Development and programming of telecommunications, telematic, audiovisual and electronic applications.
- Research, innovation and product design in ICTs or any field that requires ICT solutions.
- Training.
- Marketing and logistics.

ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

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

Academic regulations
> Academic regulations for bachelor's degree courses at the UPC

Language certification and credit recognition
> Queries about language courses and certification

> Barcelona School of Telecommunications Engineering (ETSETB)

CURRICULUM

CURRICULUM

The studies are structured annually in two four-month periods. There are a fall semester (September - January) and a spring semester (February - June).

The curriculum of the degree has a common part that encompasses the **education in basic engineering** and **fundamentals of the different specialties** . This common part extends from the first quarter (Q1A) to the fifth quarter (Q3A).
Subsequently, from the sixth four-month period (Q3B) to the eighth four-month period (Q4B), the training in the specialty chosen by the student is developed.
The chart below details the **common training** , showing the basic subjects (in yellow in the diagram) and compulsory subjects (in grey in the diagram). To see in detail the formation of each specialty, you can go to:
- **Audiovisual Systems**
- **Electronic systems (specialty in extinction)**
- **Telecommunications Systems**
- **Telematics Systems**

You can consult the tables of prerequisites, corequisites and pre-corequisites in the following links:

- Common block table
- Table of mention blocks
- Table of optional requirements

The Curriculum of the Degree in Telecommunications Technologies and Services Engineering consists of 240 ECTS, separated in subjects as follows:

Modules	Credits
Basic formation	**60**
Compulsory training	**96**
Mention elective training	**48**
Common elective training	**18**
Final degree project	**18**
Total Credits	**240**

Basic formation
The basic training module consists of 60 credits divided between Mathematics, Computer Science, Physics, Electronics and Business; with 24, 12, 11, 7 and 6 ECTS respectively.
This module will be taken in the first half of the curriculum, i.e. in the first three semesters of the degree (1A, 1B and 2A). In addition, these credits will be distributed in subjects mainly of 6 credits each one.

Basic training module	Credits
Mathematics	24
Computer Science	12
Physics	11
Electronics	7
Business	6

COURSE GUIDE:

Subjects	ECTS credits	Type
FIRST SEMESTER		
Calculus	6	Compulsory
Fundamentals of Computers	6	Compulsory
Fundamentals of Electronics	7	Compulsory
Fundamentals of Physics	5	Compulsory
Introduction to Mathematics	2	Optional
Introduction to Mathematics and Telecommunications Engineering	3	Optional
Linear Algebra	6	Compulsory
SECOND SEMESTER		
Introduction to Networks	6	Compulsory
Linear Circuits and Systems	6	Compulsory
Mathematics for Telecommunications	6	Compulsory
Object-Oriented Programming	6	Compulsory
Vector Calculus	6	Compulsory
THIRD SEMESTER		
3D with Kinect, Hands-On Seminar	2	Optional
A Practical Introduction to Matlab	2	Optional
Circuit Simulation and Analysis Using PSpice	2	Optional
Cooperation Project with Wifi Technologies	2	Optional
Create Your Future: Just a Job or Your True Passion	2	Optional
Digital Design	6	Compulsory
Electromagnetism	6	Compulsory
Financial Engineering for Economic Planning of Investments	2	Optional
Introduction to ICT Engineering	6	Compulsory
Leadership and Professional Development Techniques in Engineering	2	Optional
Learning with Python	2	Optional
Linear Algebra, Linear Codes and Secret-Sharing Schemes	2	Optional
Linux System Administration	2	Optional
Machine Learning for Satellite Imagery	2	Optional
Photovoltaic Solar Energy	2	Optional
Pigment Identification with Raman Spectroscopy	2	Optional

Subjects	ECTS credits	Type
Probability and Statistics	6	Compulsory
Renewable Energy	2	Optional
Signals and Systems	6	Compulsory
FOURTH SEMESTER		
Electromagnetics Waves	6	Compulsory
Electronic Functions and Systems	6	Compulsory
Introduction to Audiovisual Processing	6	Compulsory
Introduction to Communications	6	Compulsory
Network Applications and Services	6	Compulsory
FIFTH SEMESTER		
Audiovisual and Communication Signal Processing	6	Compulsory
Basic Engineering Project	6	Compulsory
Data Transmission	6	Compulsory
Design of Microprocessor-Based Systems	6	Compulsory
Introduction to Deep Learning	2	Optional
Machine Learning: from Theory to Practice	2	Optional
Music Signal Processing	2	Optional
Problem Solving with Artificial Intelligence: a Practical Approach	2	Optional
Quantum Technologies for Cybersecurity: Networks and Systems	2	Optional
Radiation and Propagation	6	Compulsory
Reinforcement Learning	2	Optional
SIXTH SEMESTER		
Acoustics and Electroacoustics	6	Compulsory
Advanced Digital Communications	6	Compulsory
Antennas	6	Compulsory
Astronomy and Radio Astronomy	6	Optional
Audio and Speech Processing	6	Compulsory
Automotive Electronic Systems	2	Optional
Description and Retrieval of Audiovisual Content	6	Optional
Earth Observation Systems and Remote Sensing	6	Optional
Economics and Management	6	Compulsory
Image and Video Processing	6	Compulsory
Information Security and Privacy	6	Optional
Internet Management	6	Optional
Internet Transport, Control and Management	6	Compulsory
Matlab and its Applications in Engineering	6	Optional
Microwaves	6	Compulsory
Mobile Communications Laboratory	6	Optional

Subjects	ECTS credits	Type
Multimedia Communications	6	Compulsory
Network Analysis and Evaluation	6	Compulsory
Network Infrastructure	6	Compulsory
Network Simulation	6	Optional
Optical Communications	6	Compulsory
Planning Communications Networks	6	Optional
Programming of Multimedia Applications	6	Optional
Quantum Physics	6	Optional
Radar	6	Optional
Sensors, Actuators and Microcontrollers in Mobile Robots	6	Optional
Smart Electronics	6	Optional
Smart Optical Networks	6	Optional
Software for Distributed Applications	6	Compulsory
Space Telecommunications	6	Optional
SEVENTH SEMESTER		
Advanced Project in Audiovisual Systems Engineering	12	Compulsory
Advanced Project in Network Systems Engineering	12	Compulsory
Advanced Project in Telecommunication Systems Engineering	12	Compulsory
Audiovisual Coding	6	Compulsory
Audiovisual Technology and Production	6	Compulsory
Big Data and R Programming	6	Optional
Blockchain Technologies	6	Optional
Challenge-Based Innovation	6	Optional
Data Science in Bioinformatics and Computational Biology	6	Optional
Ethics in Science and Engineering	6	Optional
Introduction to Research in Data Science Engineering	6	Optional
Mobile Communication Support Systems	6	Compulsory
Network Application Design	6	Compulsory
Radio Communications	6	Compulsory
Reinforcement Learning and Deep Learning	6	Optional
EIGHTH SEMESTER		
Work Placement	0	Optional
Bachelor's Thesis	18	Project