UPC studies

MASTER'S DEGREE IN ENGINEERING PHYSICS

ETSETB
Barcelona School
of Telecommunications Engineering

UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

1st

Spanish university in Telecommunications, Electrical and Electronic Engineering

Source: QS World University Rankings by Subject 2024

MASTER'S DEGREE IN ENGINEERING PHYSICS

A new kind of engineering is emerging on the grounds of the Key Enabling Technologies defined by the European Commission. New professional profiles are needed to develop cutting-edge engineering tools and interdisciplinary knowhow. The master's degree in Engineering Physics of the Barcelona School of Telecommunications Engineering aims to train a new generation of scientist and engineers who are able to create new knowledge and develop new tools in these emerging areas, with range from biophysics, nanoengineering and nanoelectronics to advanced materials and quantum technologies.

The master's degree in Engineering offers a one-year intensive programme that allows physicists and interested engineers to finish off their training profile in a large number of fields within modern physics and also broadening their scope. The programme is oriented towards frontier engineering based on advanced education in physics.
It includes advanced courses on statistical and quantum physics, the physics and engineering of large facilities such as synchrotons, and pathways towards the physics of complexity in different areas.

Curriculum

This information may be subject to change.
Up-to-date information is available at upc.edu

60 ECTS credits

Elective subjects can be chosen in the area of physics or engineering.
Elective subjects in engineering up to a total of 14 ECTS credits can be chosen from other master's degrees offered by the UPC.
The master's thesis can be performed at the UPC or at other universities or institutes.

1st semester

Critical Phenomena and Complexity	**5** ECTS credits
Quantum Matter	**5** ECTS credits
Surface Engineering and Microdevices	**5** ECTS credits
Project Management	**3** ECTS credits
Elective subjects	**8** ECTS credits

2nd semester

Large Facilities: Synchrotron and Neutron Sources	**5** ECTS credits
Elective subjects	**12** ECTS credits
Master's Thesis	**17** ECTS credits

Compulsory Subjects

96%

UPC master's degree graduate employment rate

Source: Graduate employment survey of master's degree graduates of Catalan universities (AQU Catalunya) 2023

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research groups to complete the master's thesis

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 effective use of information resources.

Specific competencies

- The ability to solve physics and engineering problems using advanced numerical tools, including the proper analysis of stability, accuracy and computational cost.
- Knowledge of the properties of matter at the nanoscale and optimal methods for synthesising nanomaterials and their applications in nanotechnology.
- The ability to determine the structure of matter and its properties at atomic and molecular levels.
- Knowledge of the main functional and structural applications of materials and the influence of dimensionality.
- The ability to select the best materials for specific applications in engineering.
- Knowledge of complexity in different physical phenomena and at different scales.
- The capacity to propose new projects in science/technology and take on their leadership.
- Knowledge of large facilities in physics such as synchrotron and neutron sources and their possible ranges of application in measuring the properties of materials.
- The ability to manage big sets of data using advanced technologies such as machine learning.

Professional opportunities

The career prospects include the following:

- Achieving a doctoral degree in applied physics, materials, quantum systems, numerical simulation, astrophysics, etc.
- Participating in doctoral programmes, R&D and innovation programmes in companies, basic or applied research centres and universities.
- Joining a company as a consultant or engineer on advanced topics that require advanced knowledge of physics.
- Working in highly specialised technical positions for controlling services such as synchrotrons, neutron sources, specialised instrumentation, etc.
- Participating in –and promoting– spin-offs and other small technology-based companies.
- Joining the education system for high-level training in the field of applied and fundamental physics.

Research at the Department of Physics

The staff of the UPC's Department of Physics is composed of 120 permanent professors working in a wealth of research fields ranging from astrophysics to quantum matter, from photonics to complex fluids and from smart materials to biophysics. The Department has received funds for more than 460 projects from national and international agencies and publishes more than 200 papers annually in international journals. Currently, the Department is supervising 60 PhD students. The Department of Physics is heavily involved in the bachelor's degree in Engineering Physics offered by the UPC, which has one of the highest admission marks in Catalonia, and offers a full PhD programme in Computational and Applied Physics.

Language of instruction

English.

Duration and start data

One academic year, starting in September or one and a half academic years, starting in February.

MASTER'S DEGREE IN
ENGINEERING PHYSICS

The **Barcelona School of Telecommunications Engineering (ETSETB)** has been devoted to teaching and research in the field of ICT since 1971. It has strong ties to industry and its professors and researchers carry out innovative activities that benefit businesses and the production sector.

The **ETSETB** is a school of the **Universitat Politècnica de Catalunya - BarcelonaTech (UPC)**, a benchmark public institution of research and higher education in the fields of engineering, architecture, science and technology. With 50 years of history and more than 30,000 students, the UPC has the greatest concentration of research and innovation in IT in southern Europe. It is the best Spanish university in Telecommunications, Electrical and Electronic Engineering, according to the 2024 QS World University Rankings by Subject.

telecos BCN

Physics for engineering in the 21st century

Further information:
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