The Barcelona School of Telecommunications Engineering (ETSETB) has been an institution dedicated to teaching and research in the field of ICT since 1971. It has strong relations with the industry sector and develops an innovative activity through professors and researchers that reverse into the business and productive sector.

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 Computer Science and Engineering and one of world’s 100 best universities, according to the 2018 Best Global University Rankings.

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Further information:
engineeringphysics.masters.upc.edu
master.engineering.physics@etsetb.upc.edu

Physics for engineering in the 21st century
**Curriculum**

**1st semester**

- Critical Phenomena and Complexity: 5 ECTS credits
- Quantum Matter: 5 ECTS credits
- Surface Engineering and Microdevices: 5 ECTS credits
- Large Facilities: Synchrotrons and Neutron Sources: 5 ECTS credits
- Project Management: 3 ECTS credits
- Elective subjects: 7 ECTS credits

**2nd semester**

- Elective subjects: 13 ECTS credits
- Master's thesis: 17 ECTS credits

**Elective subjects can be chosen in the area of physics or engineering.**

Elective subjects in engineering up to a total of 12 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.

**TOP 1**

*The top Spanish University in Engineering and Technology*

**93%**

*UPC graduate employment rate**

**20**

*research groups to complete the Master's Thesis*

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**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 broaden their scope. The master's degree in Engineering Physics of the Barcelona School of Telecommunications Engineering aims to train a new generation of scientists and engineers who are able to create new knowledge and develop new tools in these emerging areas, with range from biophysics, nanotechnology 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 synchrotrons, and pathways towards the physics of complexity in different areas.

**Generic competencies**

- Knowledge of complexity in different physical phenomena and at different scales.
- The ability 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.

**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.

**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 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.

**Language of instruction**

English

**Duration and start data**

One academic year. Starting in September.