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 Computer Science, Engineering and Technology, according to the 2021 QS World University Rankings by Subject.

Physics for engineering in the 21st century

Further information:
engineeringphysics.masters.upc.edu
masters.etsetb@upc.edu

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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 physics 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 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.
- The capacity to propose new projects in science/technology and take on their leadership.
- Knowledge of the properties of information resources.
- The ability to manage big sets of data.
- English, teamwork and effective use of a foreign language (preferably English).

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.

Curriculum

1st semester
- Critical Phenomena and Complexity: 5 ECTS credits
- Quantum Matter: 6 ECTS credits
- Surface Engineering and Microdevices: 6 ECTS credits
- Large Facilities: Synchrotron and Neutron Sources: 6 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

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. In 2018, the Department received funds for more than 110 projects from national and international agencies and published more than 200 papers 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.

Research at the Department of Physics
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Language of instruction
English

Duration and start data
One academic year. Starting in September.
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