

## CAREER

Students can develop their future profession in a very broad area given the interdisciplinary character and increasing relevance of PHOTONICS, both in science and research as well as in technology and medicine.

Possible career:

- PhD in Photonics, Optics, Physics, Optical Engineering, Nanophotonics, Biophotonics, Telecommunications, Electronics, Imaging, Quantum Information, etc.
- Join education and high-level training in the field of Photonics.
- Join PhD, R&D and innovation programs in companies, basic or applied research center and universities.
- Join a company as a consultant or engineer on photonics-related issues, as applications development engineer, or as commercial or laboratory technical professional.
- Freelance advisor and consultant in Photonics.
- High-level qualification technical positions for photonic applications like microscopy, x-ray diffraction, thin films, etc.
- Join (and promote) spin-off or other technology-based small companies.



# PHOTONICS BCN

PHOTONICS, the science and technology of LIGHT, is one of the disciplines that plays a key role in the 21st century technological development. It has been selected by the European Union as one of the five KET “Key-Enabling Technologies”.

Four leading research and academic institutions in the BARCELONA area joined their efforts and experience to offer a comprehensive MSc in PHOTONICS program as a combination of basic and advanced elective courses covering the main branches of PHOTONICS:

Basics of Photonics

Laser systems

Quantum Optics and Technology

Nonlinear and Ultrafast Optics

Biophotonics and Imaging

Photonic Materials and Metamaterials

Nanophotonics

Photonic Circuits and Telecommunications

Photonics Engineering

Photonics Technologies

The Master aims at educating future researchers and also promoting entrepreneurial activity and technological applications in PHOTONICS.

The Master in Photonics has a strong international character and it is thought entirely in English. There is also a strong collaboration with the European Master Erasmus + Europhotonics - POESII offered jointly with France and Germany.



# Master in Photonics

[www.photonics.masters.upc.edu](http://www.photonics.masters.upc.edu)

## ADMISSION REQUIREMENTS AND PROFILES

Admission requirements include a bachelor's degree in Science or Engineering that entitles the holder to seek admission to a master's degree in the country in which it was awarded.

- Bachelor degree in Physics or Engineering Physics.
- Bachelor degree in Electronics and/or Electrical Engineering.
- Bachelor degree in Telecommunications Engineering.
- Bachelor degree in Industrial Engineering (Mechanics, Automatics etc.)
- Bachelor degree in Nanoscience and Nanotechnology.
- Bachelor degree in Aeronautics Engineering.
- Bachelor degree in Optics and Optometry.
- Other scientific or technical bachelor degrees (Chemistry, Materials, Biology, etc.), with some training complements required (bridging courses).

## ENROLMENT AND FEES

Student's registration is taken care by **ETSETB** (Escola Tècnica Superior d'Enginyeria de Telecomunicacions de Barcelona, at Campus Nord of UPC University, building B3, Barcelona).

**Fees:** €50 per ECTS credit (aprox.). For non-resident foreign students who are not EU nationals, the fee is 1.5 the amount stated.

Interested students can send a message to [master.photonics@etsetb.upc.edu](mailto:master.photonics@etsetb.upc.edu).

More information can be found at: [www.photonics.masters.upc.edu](http://www.photonics.masters.upc.edu)

## MASTER'S EXECUTIVE COMMITTEE

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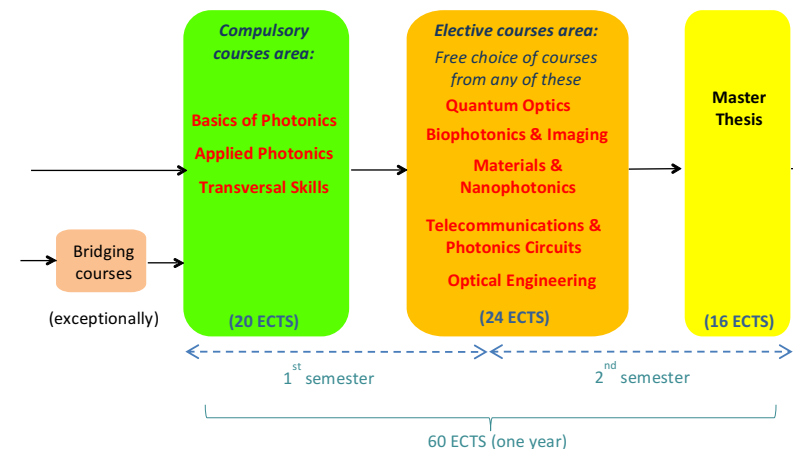
Graphene technology

## PROGRAM AND CALENDAR

This is a full-time, one-year program (60 ECTS).

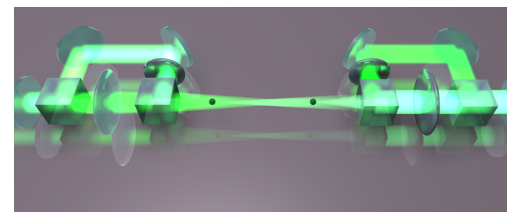
After 4 compulsory subjects (20 ECTS) providing a basic background and complementary skills in PHOTONICS, students can choose 24 ECTS from a variety of elective subjects to define their personal curriculum. Finally, 16 ECTS credits are obtained through the Master Thesis.

Entrepreneurial skills and employability are promoted through a specific course. The Master Thesis can be done in collaboration with a research centre or company.

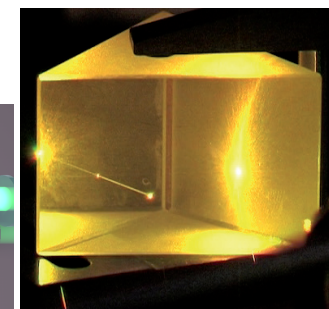


The master's degree starts in September. Lecture period ends at the beginning of April of subsequent year, and the Master Thesis can be presented in July or September.

The master's degree can be taken on a full- or part-time basis. Lectures are mostly given in the afternoons.



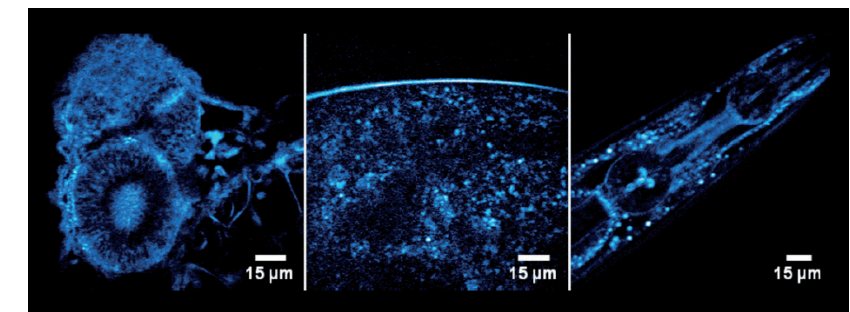
Optical trapping



Optical components

## ACQUIRED COMPETENCES

- Understanding of the physical principles of optics and light-matter interaction, at classical and quantum levels.
- Capacity to perform basic experiments and to analyze and understand advanced experiments or calculations in photonics.
- Understanding of laser physics and knowledge of the variety of laser types and main related applications.
- Knowledge of image formation fundamentals, light propagation through different class of media, and Fourier optics.
- For the photonics field(s) chosen by the student through elective courses (quantum optics, biophotonics and imaging, nanophotonics, telecomm, optical engineering, etc.), knowledge of the main concepts, underlying phenomena and most recent applications.
- Ability to deal with a problem of advanced research in photonics from start to finish; i.e., from conceptual planning and bibliographic search to oral and written communication of the results, according to the procedures and conventions of scientific presentations in English.
- Ability to understand optical engineering as an economic and business activity considering, among others, social, ethical and sustainability aspects.
- Awareness of the importance of patents, and ability to understand and write a patent in the field of photonics.



Nonlinear microscopy