

Master in PHOTONICS

"Photonics BCN"

(<http://www.photonics.masters.upc.edu>)



Master Erasmus Mundus EUROPHOTONICS

(<http://www.europhtonics.org/>)



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

UAB

Universitat Autònoma
de Barcelona



UNIVERSITAT DE
BARCELONA

ICFO

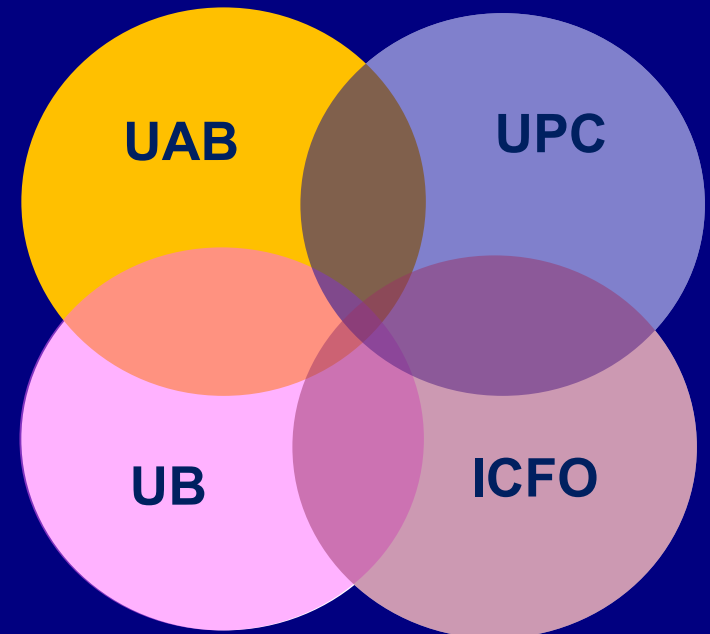
The Institute
of Photonic
Sciences

Mario Montes Usategui

(mario_montes@ub.edu)

MSc Photonics – “PHOTONICS BCN”

- 15 years ago, researchers covering different fields of Photonics in Barcelona area (**UPC**, **UAB** and **UB**) and in the Institute of Photonic Science (**ICFO**), decided to put together their complementary expertise to offer a joint Master in Photonics.
- Initiative and close collaboration between the four partner institutions: a larger number of photonic areas are covered
- The program started in 2007 – we are running the 13th edition
- Official **60 ECTS (1 year)** Spanish Degree.
- All courses are taught in English.



Universitat Politècnica de Catalunya (UPC)



Universitat Autònoma de Barcelona (UB)



Universitat de Barcelona (UB)



ICFO – The Institute of Photonic Sciences



Optics & Photonics

- A traditional area of science and technology evolving very fast.

Recent Nobel awards related with Photonics (Physics and Chemistry):

- 2018: Laser Physics: Optical tweezers y ultra-short pulses.
- 2014: Blue LEDs
- 2009: Optical fibers and CCD sensors
- 2005: Quantum theory of optical coherence
- 2001: Bose-Einstein condensates
- 2000: Heterostructures for optoelectronics
- 1997: Atom trapping and cooling
- 2014: Optical Nanoscopy
- 2008: GFP discovery

Expertise spread over the four institutions



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ICFO

Institut
de Ciències
Fotòniques

- **Optical engineering:** sensors, remote sensing, metrology, optical design, adaptive optics, vision & machine vision, confocal microscopy
- **Image processing**
- **Liquid crystal**
- **Nonlinear optics, nonlinear dynamics**
- **Nanomaterials & metamaterials**
- **Opt. fiber commun. & networks**

- **Quantum information**
- **Optical trapping, optical tweezers**
- **Applied optics: image processing, diffractive optics**
- **Optoelectronic devices, CMOS**

- **Quantum & Nonlinear Optics, Quantum information.**
- **Image processing, diffractive optics, metrology.**

- **Quantum & Atom optics**
- **Nanophotonics & metamaterials**
- **High resolution microscopy**
- **Nonlinear optics & devices, Ultrafast light**
- **Biophotonics**



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ICFO

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Fotòniques

Compulsory courses

20 ECTS

Fundamentals of Photonics

10 ECTS

- Introduction to photonics. Optics and Lasers
- Beam Propagation and Fourier Optics

5 ECTS

5 ECTS

Applied Photonics & Transversal Skills

10 ECTS

- Photonics Laboratory
- Business and Patents in Photonics

5 ECTS

5 ECTS

Elective Courses

24 ECTS

Quantum Optics (QUANTOP)

18 ECTS

Biophotonics and Imaging (BIOIMA)

12 ECTS

Materials and Nanophotonics (MATNANO)

12 ECTS

Telecomm. & Photonics Circuits (TELPHO)

12 ECTS

Optical Engineering (OPTENG)

12 ECTS

Master Thesis

16 ECTS

Total: 60 ECTS

Quantum Optics and Technology

18 ECTS

Quantum optics	3
From cooling & trapping of neutral atoms to BE condensates	3
Quantum simulators with ultracold quantum gases	3
Light and atom interaction	3
Advanced quantum optics with applications	3
Machine learning on classical and quantum data	3

Materials, Nanophotonics & Photonics Circuits

18 ECTS

Photonic materials and metamaterials	3
Nonlinear optics	3
Nanophotonics	3
Ultrafast and ultraintense laser light	3
Optoelectronics and photovoltaic technology	3
Integrated photonics	3

Optical Engineering

15 ECTS

Laser systems and applications	3
Optical design	3
Managing light with devices	3
Measuring with light (optical metrology)	3
Fibers and telecommunications	3

Biophotonics and Imaging

12 ECTS

Experimental optical techniques in biology	3
Active and spectral imaging	3
Visual optics and biophotonics	3
Image processing in biophotonics	3

Additive key competencies

5 ECTS

Business and Patents in Photonics

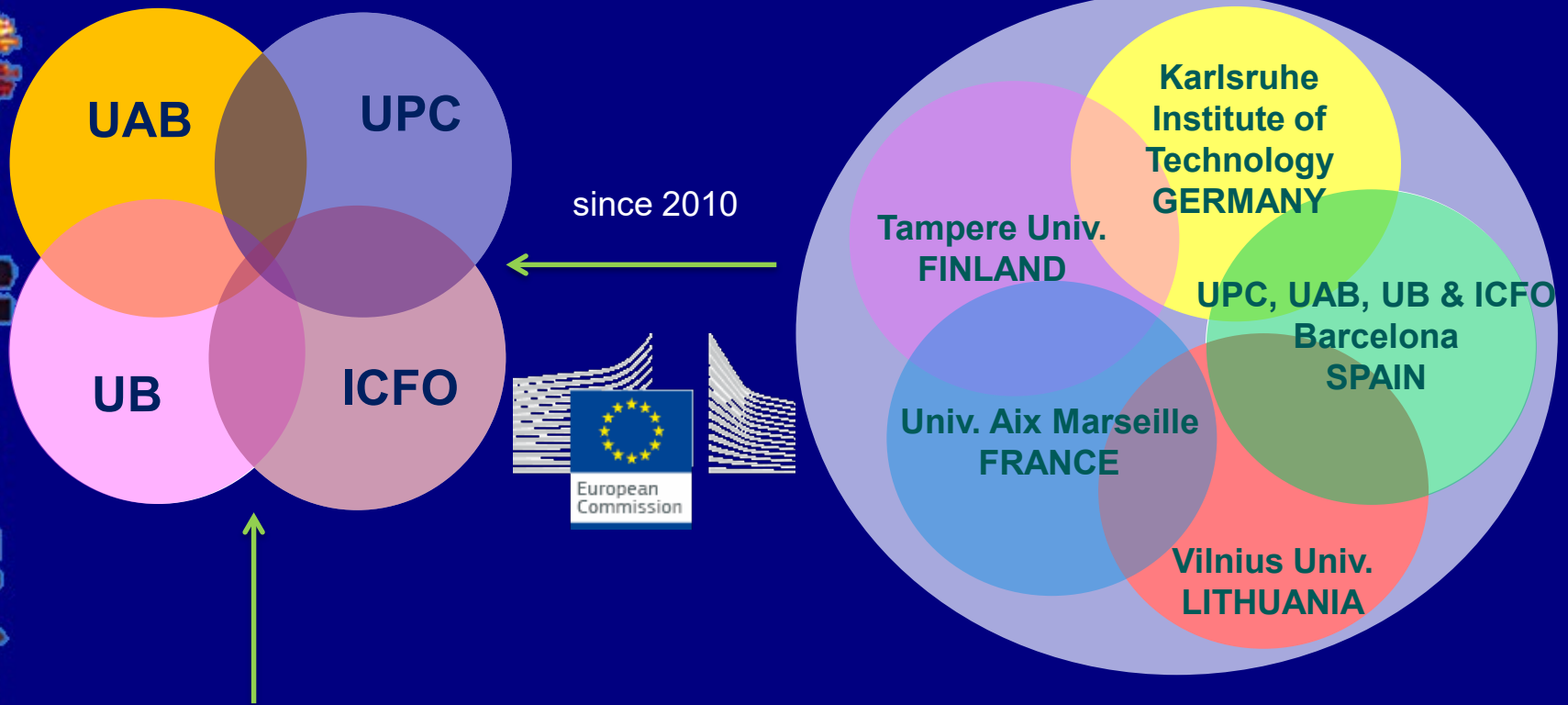
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- provide fundamental entrepreneurial skills required to successfully start and develop a technology based business,
- learn how to develop a project in a large company environment.
- incite business awareness and to explore the hard and fascinating way leading from cutting-edge research to the marketplace.

- Many opportunities to start your scientific research (fundamental or applied), in different areas of Photonics in a research lab or in a company.
- **More than 50 project proposals every year** (see list of proposals for 2020_2021 at: <https://photonics.masters.upc.edu/en/list-of-proposals-2020-21>).
- Possibility to carry out your Master Thesis in an external research center, university or company;
- **Members of SECPHO:** contact with companies (<https://www.secpho.org>)



Masters in Photonics “PHOTONICS BCN” & Master Erasmus+ “EUROPHOTONICS”



Erasmus Mobility Scheme

European Erasmus+ Program

(2 years): multiple degree