Master in PHOTONICS BCN
(http://www.photonics.masters.upc.edu)

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Optics & Photonics

- A traditional area of science and technology evolving very fast (one of the most relevant branches for the XXI<sup>th</sup> Century)

- **Imaging** (displays, ...) and **vision**

- **Sensors and** new **light sources** (lasers, ...)

- **Biophotonics** and **medicine**: instruments for diagnosis and treatment (ophthalmology)

- **Optical communications** (fibers, ...)

- New **materials** (nanophotonics, ...) and **processing** (cutting, 3D printing,...)

- **Energy & environment** (LED lighting, solar panels,...)

- **Quantum and nonlinear optics** (Photonic computers, ...)

**XXI century:** - 8 Nobel Prize in Physics
- 2 Nobel Prize in Chemistry

related to PHOTONICS
Photonics in Science and Technology

Highly multidisciplinary

2010 EU selects Photonics as one of the five KET ("Key-Enabling Technologies")
2020 EU renews the KET list keeping Photonics as one of them
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.

- The program started in 2007
- Official 60 ECTS (1 year) Spanish Degree.
- All courses are taught in English.
Masters in Photonics – “Photonics BCN”

OBJECTIVES

- Provide knowledge and training in different areas of PHOTONICS
- **Flexibility**: the student can choose from many elective courses, to get either general training, or more specialized training in different possible areas.
- Develop competences and skills that will help the student to initiate a research (PhD thesis) or a professional carrier in a company.

ADDRESS TO

- Bachelor in Physics, Physical Engineering
- Bachelor in Telecommunication and Electronics Engineers
- Bachelor in Optics and Optometry
- Other degrees

- 30-40 students
### Compulsory courses

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of Photonics</td>
<td>10 ECTS</td>
</tr>
<tr>
<td>• Introduction to photonics (Optics and Lasers)</td>
<td>5 ECTS</td>
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<tr>
<td>• Beam Propagation and Fourier Optics</td>
<td>5 ECTS</td>
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<tr>
<td>Applied Photonics &amp; Transversal Skills</td>
<td>10 ECTS</td>
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<tr>
<td>• Photonics Laboratory</td>
<td>5 ECTS</td>
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<tr>
<td>• Business and Patents in Photonics (entrepreneurship, contacts with companies)</td>
<td>5 ECTS</td>
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### Elective Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>Quantum Optics (QUANTOP)</td>
<td>18 ECTS</td>
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<tr>
<td>Biophotonics and Imaging (BIOIMA)</td>
<td>12 ECTS</td>
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<tr>
<td>Materials and Nanophotonics (MATNANO)</td>
<td>12 ECTS</td>
</tr>
<tr>
<td>Telecomm. &amp; Photonics Circuits (TELPHO)</td>
<td>12 ECTS</td>
</tr>
<tr>
<td>Optical Engineering (OPTENG)</td>
<td>18 ECTS</td>
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<tr>
<td>Master Thesis</td>
<td>16 ECTS</td>
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</tbody>
</table>

**Total:** 60 ECTS
**Biophotonics and imaging**  
12 ECTS

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

**Optical Engineering**  
18 ECTS

- Laser systems and applications  
- Managing light with devices  
- Measuring with light (optical metrology)  
- Optical design

**TIMETABLE**

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
</tr>
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<tbody>
<tr>
<td>10:00-11:00</td>
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<td></td>
<td>SEMINARS (A215M)</td>
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<td>11:00-12:00</td>
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<td>12:00-13:00</td>
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<td>13:00-14:00</td>
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<tr>
<td>14:00-15:00</td>
<td>INTRODUCTION TO PHOTONICS (A43M)</td>
<td>Quantum Optics (A43M) / Active and Spectral Imaging (A43M)</td>
<td>INTRODUCTION TO PHOTONICS (A43M)</td>
<td>Optoelectronics &amp; Photovoltaic Technology (A43M)</td>
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<td>15:00-16:00</td>
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<tr>
<td>16:00-17:00</td>
<td>BEAM PROPAGATION AND FOURIER OPTICS (A43M)</td>
<td>Measuring with light (A43M)</td>
<td>BEAM PROPAGATION AND FOURIER OPTICS (A43M)</td>
<td>Measuring with light (A43M)</td>
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<td>17:00-18:00</td>
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<td>18:00-19:00</td>
<td>Optoelectronics &amp; Photovoltaic Technology (A43M)</td>
<td>Machine Learning on Classical and Quantum Datas (A43M)</td>
<td>Photonic Materials and Metamaterials (A43M)</td>
<td>Machine Learning on Classical and Quantum Datas (A43M)</td>
</tr>
<tr>
<td>19:00-20:00</td>
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Note: The TIMETABLE is a simplified representation and actual class schedules may vary.
Masters in Photonics “PHOTONICS BCN” &
Master Erasmus+ “EUROPHOTONICS”

UAB  UPC  UB  ICFO

Erasmus Mobility Scheme

since 2010

European Erasmus+ Program
(2 years): multiple degree

Karlsruhe Institute of Technology
GERMANY

Tampere Univ.
FINLAND

Univ. Aix Marseille
FRANCE

Vilnius Univ.
LITHUANIA

UPC, UAB, UB & ICFO
Barcelona
SPAIN

European Commission
Careers in Photonics  Statistics

How long did it take you to find a position after graduation?
42 responses

- Less than 3 months: 76.2%
- Less than 6 months: 14.3%
- Less than 1 year: 4.8%
- More than 1 year: 4.8%

In which country?
42 responses

- Spain (27)
- UK (5)
- Germany (3)
Careers in Photonics  Statistics

Which was your first position after graduation?

- PhD student/researcher: 64.3%
- Photonics Company: 21.4%
- Other Companies: 7.1%
- Others: 6.2%

Is your current professional career related to photonics?

- Yes: 90.5%
- No: 9.5%
If your first position was “PhD student/researcher”, which was your main Research Field?

- Bio-photonics and Imaging: 32.3%
- Materials and Nanophotonics: 18.1%
- Optical Engineering: 19.4%
- Quantum Optics: 25.8%
- Telecommunications and Photonics Circuits:

If your first position was “Photonics Company”, which was your Photonics Sector?

- Lasers and optoelectronics: 55.6%
- Optics: 11.1%
- Manufacturing technology for optics: 11.1%
- Sensors, test and measurement applications: 11.1%
- Imaging: 11.1%
- Lasers and laser systems for production: 11.1%
- Optical information and communication technology: 11.1%
- Biophotonics and medical engineering: 11.1%
MSc in Photonics

http://www.photonics.masters.upc.edu

Contact for information about the program, course contents, timetable:
master.photonics@etsetb.upc.edu

For application, registrations and administrative questions:
masters@etsetb.upc.edu

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