Joint programme
**WHAT DO WE OFFER?**

**FUNDAMENTAL & SPECIALIZED PHOTONICS COURSES**
A large number of fundamental and specialized photonics courses are available.

**MASTER THESIS PROJECTS & RESEARCH**
Do cutting-edge research in one of our research labs. Many topics are multidisciplinary in nature and combine photonics with electronics, physics, biomedical engineering or data science.

**INTERNATIONAL EXPERIENCE**
Acquire the indispensable international experience which is required in today’s society and the current job market.

**DIGITAL FIRST MASTER YEAR**
Choose whether you join the program on campus or online during your first year.

**WORLDWIDE NETWORK**
Meet new people and build a network all around the world. Joining one of the student chapters can bring you in touch with local & international students as well as other exchange students.

**VIBRANT CITY LIFE**
Enjoy the city of Ghent or Brussels, a student city with plenty of leisure possibilities, cinemas, museums, exhibitions, bars & clubs, restaurants, sports facilities, ...
Why choose Photonics?

Photonics
Photonics plays an essential role in a variety of new and innovative technologies such as green energy, biotech, industry 4.0, ICT, multimedia & healthcare.

Education by world-class researchers
The education is given by professors who not only excel in teaching but also excel in research on a European and even worldwide scale. A fair number of professors have received a prestigious European Research Council Grant.

Mixed student population
The photonics classes are followed by a diverse mix of students: local Belgian students, students from elsewhere in Europe and students from outside Europe. Besides photonics students, other engineering students can attend the photonics courses as well.

Annual intake of about 28 students, of which 80% is and 20% . About 30% has nationality, 20% comes from another country and 50% are from outside EU.

Accreditation
Our photonics courses and curriculum were audited by CTI (Commission des Titres d'Ingénieur), as part of the EUR-ACE® quality audit carried out by ENAEE (European Network for Accreditation of Engineering Education).
“Smack in the middle of Brussels, Bruges and Antwerp, Ghent distils their greatest attributes into one engaging and enchanting city.”
ABOUT UGENT

Ghent University, founded in 1817, is one of the top 100 universities worldwide and located in the Dutch language area, with more than 44,000 students and 15,000 staff members.

Our 11 faculties are divided into 86 departments and offer high-quality and research-supported training courses in most scientific disciplines.

<table>
<thead>
<tr>
<th>Ghent University</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Ranking of World Universities (Shanghai Ranking) 2020</td>
<td>66</td>
</tr>
<tr>
<td>National Taiwan University Ranking 2019</td>
<td>70</td>
</tr>
<tr>
<td>U.S. News Best Global Universities Ranking 2019</td>
<td>92</td>
</tr>
<tr>
<td>Times Higher Education (THE) World Universities Ranking 2020</td>
<td>103</td>
</tr>
<tr>
<td>QS World University Ranking 2021</td>
<td>135</td>
</tr>
<tr>
<td>World's most innovative universities 2018</td>
<td>88</td>
</tr>
</tbody>
</table>

FACULTY OF ENGINEERING AND ARCHITECTURE

- 12 departments
- About 50 research teams
- About 130 FTE Professors
- Over 100 Doctoral Degrees per year
- Over 700 International publications per year
- Total student population (BSc + MSc): 4900
ABOUT THE PROGRAM

Ghent University (UGent) and Vrije Universiteit Brussel (VUB) jointly offer a two-year (120 ECTS) Master of Science in Photonics Engineering. It leads to a joint UGent-VUB Master of Science degree.

The program provides an in-depth education in photonics, with a focus on both the fundamental science and the engineering of light-based phenomena and systems. Photonics graduates move into PhD positions in top level research groups all around the world or into industry.

The program:

- teaches all the core photonics courses
- offers advanced photonics courses in multiple fields of specialization
- allows students to broaden their degree to a secondary engineering specialization
  - in electrical engineering & information technology
  - in applied physics & material science
  - in life sciences & biomedical engineering
  - in business engineering & entrepreneurship
- has a strengthened focus on:
  - Photonic skills
    (measurement, engineering and research skills)
  - Employability
    (internship, entrepreneurship, photonics in industry)
- includes a master thesis project in a research lab
STRUCTURE

YEAR 1
- On Campus

YEAR 2
Semester 1
- On Campus or Mobility Track

YEAR 2
Semester 2
- On Campus or Mobility Track

5 DIFFERENT MOBILITY TRACKS

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2, sem 1</th>
<th>Year 2, sem 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Campus</td>
<td>On Campus</td>
<td>On Campus</td>
</tr>
<tr>
<td>(International) internship</td>
<td>On Campus</td>
<td>EU Mobility track</td>
</tr>
<tr>
<td>On Campus</td>
<td>EU Mobility track</td>
<td>On Campus</td>
</tr>
<tr>
<td>On Campus</td>
<td>EU Mobility track</td>
<td>EU Mobility track</td>
</tr>
<tr>
<td>Online</td>
<td>On Campus</td>
<td>On Campus</td>
</tr>
</tbody>
</table>
Photonics plays a vital role in numerous application fields. As such, we want to prepare our students to combine an in-depth knowledge of photonics with one or more application areas (electronics, physics, biomedical engineering, data science or even architecture, arts, archeology).

We therefore broaden the background and the degree of the graduates, with a secondary specialization in 1 out of 4 Engineering Clusters.

- Electronics & Information Technology
- Physics & Materials
- Life Sciences
- Business Engineering & Entrepreneurship
<table>
<thead>
<tr>
<th></th>
<th>ECTS</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 1, Semester 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical Materials</td>
<td>6</td>
<td>UGent</td>
</tr>
<tr>
<td>Microphotonics</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Lasers</td>
<td>4</td>
<td>VUB</td>
</tr>
<tr>
<td>Mathematics in Photonics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Introduction to Entrepreneurship</td>
<td>3</td>
<td>Online</td>
</tr>
<tr>
<td><strong>Year 1, Semester 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratories in Photonics Research (for Year 1 on-campus students only)</td>
<td>6</td>
<td>UGent + VUB</td>
</tr>
<tr>
<td>Optical Communication Systems</td>
<td>6</td>
<td>UGent</td>
</tr>
<tr>
<td>Sensors and Microsystem Electronics</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Physics of Semiconductor Technologies and Devices</td>
<td>4</td>
<td>VUB</td>
</tr>
<tr>
<td>Innovation in Photonics</td>
<td>3</td>
<td>Online</td>
</tr>
<tr>
<td><strong>Year 2, Semester 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratories in Photonics (for Year 1 online students only)</td>
<td>4</td>
<td>UGent + VUB</td>
</tr>
<tr>
<td>Recent Trends in Photonics</td>
<td>4</td>
<td>UGent or VUB</td>
</tr>
<tr>
<td><strong>Year 2, Semester 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master Thesis Project</td>
<td>30</td>
<td>UGent or VUB</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td>38 to 40</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>
The Photonics course is only intended for students without Bachelor’s Degree from Ghent University and must be taken up in Y1.

See list of Photonics Elective courses. Students with a UGent Bachelor Degree, must take up 4 additional ECTS credits.
### Typical weekly calendar example at UGent

#### Lecture schedule Year 1 – Semester 1

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-11:30 Microphotonics</td>
<td>10:00-11:30 Lasers</td>
<td></td>
<td>08:30-11:30 Mathematics in Photonics</td>
<td>10:00-13:00 Optical Materials Lab</td>
</tr>
<tr>
<td>11:30-13:00 Lasers Lab</td>
<td></td>
<td></td>
<td>11:30-13:00 Optical Materials</td>
<td></td>
</tr>
</tbody>
</table>
| 13:00-16:00 Microphotonics Lab | 13:00-14:30 Optical Materials | Reserved for electives | 15:30-18:00 Introduction to entrepreneurship | }

#### Lecture schedule Year 1 – Semester 2

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00-13:00 Optical Communication Systems</td>
<td>Laboratories in Photonics Research</td>
<td>Reserved for electives</td>
<td>10:00-13:00 Physics of Semiconductor Technologies and Devices</td>
<td>10:00-11:30 Optical Communication Systems Lab</td>
</tr>
<tr>
<td>16:00-19:00 Innovation in Photonics</td>
<td></td>
<td></td>
<td>14:30-17:30 Sensors and Microsystem Electronics</td>
<td>13:00-16:00 Sensors and Microsystem Electronics Lab</td>
</tr>
</tbody>
</table>

Lectures | Labs | Entrepreneurship
**Program Details**

**Advanced Photonics**

In total students can spend between 16 & 20 ECTS credits from the list below.

<table>
<thead>
<tr>
<th>Course</th>
<th>ECTS</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Spectroscopy of Materials</td>
<td>4</td>
<td>UGent</td>
</tr>
<tr>
<td>Display Technology</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>Non-linear Optics</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>High Speed Photonic Components</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>Biophotonics</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>Photonic Integrated Circuits</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>Optical Sensors</td>
<td>4</td>
<td>VUB ¹</td>
</tr>
<tr>
<td>Design of Refractive and Diffractive Optical Systems</td>
<td>4</td>
<td>VUB</td>
</tr>
<tr>
<td>Optical Design with Ray-tracing Software: Laboratory</td>
<td>4</td>
<td>VUB</td>
</tr>
<tr>
<td>Technological Processes for Photonics and Electronics: Laboratory</td>
<td>4</td>
<td>UGent</td>
</tr>
<tr>
<td>Photovoltaic Energy Conversion</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>Quantum Optics</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>Micro- and Nanophotonic Semiconductor Devices</td>
<td>4</td>
<td>UGent ¹</td>
</tr>
<tr>
<td>Short Internship in Photonics</td>
<td>5</td>
<td>Research institute or company</td>
</tr>
<tr>
<td>Long Internship in Photonics</td>
<td>10</td>
<td>Research institute or company</td>
</tr>
</tbody>
</table>

1. can be taken online
Students who already obtained a Master degree or a 4-/5-year Bachelor degree with a dedicated focus on Photonics, can apply for a fast track of this master program whereby the master can be completed in 1 academic year (60 ECTS).

<table>
<thead>
<tr>
<th>Fast Track program</th>
<th>ECTS</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandatory courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recent Trends in Photonics</td>
<td>4</td>
<td>UGent or VUB</td>
</tr>
<tr>
<td>Advanced Photonics</td>
<td>16</td>
<td>UGent or VUB</td>
</tr>
<tr>
<td>Engineering Cluster</td>
<td>10</td>
<td>UGent or VUB</td>
</tr>
<tr>
<td><strong>Electronics &amp; Information Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physics &amp; Materials</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Life Sciences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business Engineering &amp; Entrepreneurship</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Master Thesis</strong></td>
<td>30</td>
<td>UGent or VUB</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td></td>
</tr>
</tbody>
</table>
With the Master of Science in Photonics Engineering, the following 3+2 programs are in place (see list below) whereby student can enroll after their 3rd year of their Bachelor into the Photonics program and are awarded:

- Bachelor degree from home university (after year 1)
The Photonics department of National Sun Yat-Sen University established a double degree program whereby master students spend 1 year at NSYSU and the 2nd year at UGent or VUB in the Photonics programme and upon completion, they are awarded:

- Master of Science degree in Photonics from NSYSU
- Master of Science degree in Photonics from UGent-VUB

Other collaborations

Collaborations in place for joint PhD programs, student exchanges on Master or PhD level.
International Experience

The programme strongly recommends & supports students to complete part of their programme abroad. This can be a short research visit of a couple of weeks in the context of a master thesis or a longer visit (up to one year) with one of our renowned partner institutes.

Students can apply for a Erasmus+ scholarship in order to get a monthly stipend to compensate (part of) their costs.

We collaborate with prestigious high-level European partner universities.

The program supports the students in an active manner by selecting, together with the students, the appropriate courses at the partner universities or to define, together with professors or research labs from the partner universities, a suitable master thesis project.

Internationalisation Possibilities

Courses (30 ECTS) at a partner university

Master thesis (30 ECTS) project at a partner university

Courses (30 ECTS) and master thesis (30 ECTS) project at a partner university

Short/Long (International) internship (5/10 ECTS) in a company or research lab

Master thesis project in collaboration with a partner university

1-2 visits (6 ECTS) to the partner’s research labs
Partner Universities

St Andrews (GBR) (FRA)
DTU (DNK) ETH Zurich (CHE)
ICFO / UPC (ESP) TUBerlin (GER)
UPV (ESP) Institute d’Optique (FRA)
Vilnius (LIT) KTH (SWE)
ITMO (RUS) Polimi (ITA)
KIT (GER) Univ. Rouen (FRA)
ECM / Aix-Marseille
EMPLOYABILITY

Within the program, there is a strong focus on both employability and on entrepreneurship / entrepreneurial skills.

- **Courses**
  - Introduction to Entrepreneurship
  - Innovation in Photonics

- **Internships opportunities**
  - (Industrial) Internship in Photonics - 5 weeks
  - International (Research / Industrial) Internship - 10 to 12 weeks

- **Company visits**

- **Lectures** by people from industry
"For the industry, photonics engineers can make the quantum leap. Shaping the photonic industrial revolution starts with the right education."

- Jan Watté -
group leader R&D Optics
CommScope

"I enjoyed my internship within AMS/CMOSIS very much. A great experience to learn how companies work and how vital precise measurements are in real-life."

- Cheyenne Goeminne -
student
European MSc. in Photonics
CAREER OPPORTUNITIES

- 65% industry
  R&D
  project management
  consultancy
  sales/business support

- 35% PhD

* based on over 300 graduates since 2006-2007
PHOTONICS COMPANIES IN BELGIUM
## OUR ALUMNI WORK @

### PHD
- CUDOS, Sydney
- TU Wien
- UGent
- VUB
- KUL
- DTU
- Paris-Sud
- TU Berlin
- Uni Koln
- Max Planck
- NUI Tyndall
- NUI Galway
- University of Naples
- Twente
- TU Eindhoven
- Trondheim
- UPM
- KTH
- Uppsala
- EPFL
- St Andrews University
- ORC Southampton
- Heriot-Watt
- Stanford
- Yale
- Columbia University
- MIT

### INDUSTRY
- Barco
- imec
- Huawei
- Melexis
- Xenomatix
- Televic
- Proximus
- Nokia
- Philips
- Luceda Photonics
- Larian Studios
- Trinean
- Accenture
- Deloitte
- Ericsson
- Alcatel-Lucent
- ASML
- TNO
- Phoenix Software
- Osram
- Garmin
- Acacia
- Infinera
ALUMNI TESTIMONIALS

Alex Liles
- Master in photonics: 2011 - 2013
  - Intership at CERTH (Greece)
  - Thesis at DTU (Denmark)
- PhD at St Andrews University: 2013 - 2017
- Silicon Photonics Engineer at imec Florida: 2018 - ...

The MSc. in Photonics offers the students exposure to cutting-edge research and top-level infrastructure in leading European academic institutes, providing knowledge and skills necessary for pursuing a career in academia as well as in industry.

Most importantly, the mobility tracks of the program sets an excellent ground for professional networking and cultural education which combined can make you stand out from the -competitive- crowd. Intensive, demanding but I would recommend it any time!”

Pierre Wahl
  - Courses at KTH (Sweden)
- PhD at VUB & Stanford (USA): 2009 - 2014
- Co-founder Luceda Photonics (spin-off): 2014 - ...

The level of the courses is high. After completing the program I feel prepared to be a researcher and for the job market.

Didi Shi
- Bachelor at Dalian University of Technology
- Master in photonics: 2018-2020
- R&D Engineering at Huawei: 2020 - ...

Watch
Maria Anagnosti
• Master in photonics : 2009 - 2011
  Internship at Xio Photonics (Netherlands)
• Internship at NTT (Japan)
• R&D at Alcatel-Lucent / Nokia (France): 2012 - 2015
• Hardware Engineer at Infinera (USA): 2016 - …

The MSc. in Photonics programme was a life-time opportunity for me to study and learn about High Technology Photonic sciences, experience different cultures and meet a lot of interesting people. The courses provided prepare the students for both an academic career and also an industrial position.

Camil Op de Beeck
• Master in photonics : 2014 - 2016
  Courses + Thesis at UPV (Spain)
• PhD at UGent: 2016 - …

After my BSc. in Physics Engineering, I was in doubt about how to proceed. The MSc. in Photonics offered me a very flexible and customizable program that fitted my interests. The photonics courses open up a world of possibilities where all the theory from the bachelor becomes relevant. The international aspect might seem like a hurdle at first, but it really is an invaluable experience for any engineer.

Alvaro Casas Bedoya
• Master in photonics : 2007 - 2009
  Courses + Thesis at University of St Andrews (UK)
• PhD at Sidney University (Australia): 2009 - 2013
• Research Associate at CUDOS (Australia): 2013 - …
  Cleanroom manager, OSA Ambassador

Surprisingly for me, the researchers, who are writing the science right now, were my professors. This is surely one of the best options for any photonics aspirant...
STUDENT LIFE

- Photonics Society Ghent
  - SPIE Ghent chapter
  - SID Lowlands Branch
  - OSA Ghent chapter

- SPIE/OSA B-Phot Chapter

- IEEE Photonics Benelux Student Chapter

Both chapters/societies consist of researchers, PhD-students and master students. The master students actively participate in both societies.

Each semester a Light Night is organized by one of the chapters whereby a guest lecturer is invited (from industry or academics) or a workshop is organized or the students engage in a quiz or game-night.

Company visit to ASML (the Netherlands)

Student chapter activity:
Laser Game: Khet 2.0
During the two-day **Photonics Summer Symposium** the final year students defend their master thesis dissertation and some international speakers are invited to give a talk.

During the annual **Photonics Event** companies come to present themselves to the students and researchers. Last year imec, Luceda Photonics, Commscope, Huawei and Trinean organized a hands-on workshop whereby students could interact with the companies.

Students have the opportunity to attend **conferences** or participate in **summer schools** or **workshops**. In 2016 students attended SPIE Photonics Europe (conference), the IEEE Photonics Benelux Annual Symposium and the ePIXfab Silicon Photonics Summer School.
**FEES & SCHOLARSHIPS**

**TUITION FEES**

Students in the Master of Science in Photonics Engineering pay a reduced* annual tuition fee of **950 Euro**.

* The regular fee for other Master programs at the Faculty of Engineering is 5424 Euro.

**GRANTS & SCHOLARSHIPS**

UGent Photonics Excellence Grant consists of:

- 5 Grants of **5000 Euro** for year 1
- 5 Grants of **5000 Euro** for year 2

VUB Scholarships (5 available) consists of:

- Full tuition fee waiver + Insurance
- **Annual amount** of **10000 Euro**

B-PHOT VUB Excellence Scholarships consists of:

- 3 Entry grants of **1000 Euro** for semester 1
- 3 Continuation grants of **1500 Euro** for semester 2
- 1 Excellence grant of **5000 Euro** for year 2

**OTHER SCHOLARSHIP OPPORTUNITIES**

- UGent Master Grants
- UGent Top-Up Grants
- Flemish Master Mind Scholarships
- CSC (China)
- Science Without Borders (Brazil)
- SPIE

...
**APPLICATION**

**1st Step**

online application @ [www.masterphotonics.be](http://www.masterphotonics.be)

**DEADLINE:**
- before April 1 (EU & non-EU Students)
- @UGent before June 1 (for EU-students only)
- before September 30 (for Belgian students only)

In parallel: online application
@ [ugent.be/prospect/en/administration/application](http://ugent.be/prospect/en/administration/application)

**2nd Step**

interview with a UGent or VUB professor

**Language Requirements**

TOEFL or IELTS test needed at time of enrollment
(minimum marks: IELTS 6.5 overall, TOEFL iBT 87)
CONTACT

WWW.STUDYPHOTONICS.COM

WWW.MASTERPHOTONICS.BE

SECRETARIAT@MASTERPHOTONICS.BE

FACEBOOK.COM/MASTERPHOTONICS

TWITTER.COM/MASTERPHOTONICS

INSTAGRAM.COM/MASTERPHOTONICS

Chairs of the Program Board:

Prof. Peter Bienstman
(peter.bienstman@ugent.be)

Prof. Heidi Ottevaere
(heidi.ottevaere@vub.be)