PHOTONICS

MASTER OF SCIENCE

ENGINEERING

Joint programme

GHENT UNIVERSITY

VUB

VRIJE UNIVERSITEIT BRUSSEL

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.

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).

About Gent

“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.

Ghent University	#
Academic Ranking of World Universities (Shanghai Ranking) 2023	**84**
U.S. News Best Global Universities Ranking 2023	**95**
Times Higher Education (THE) World Universities Ranking 2024	**115**
QS World University Ranking 2023	**159**
QS Sustainability Ranking 2023	**58**
Europe's most innovative universities 2019	**48**
Best Engineering Universities in Europe (EngiRank) 2024	**12**

Watch

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

Watch

About the Program

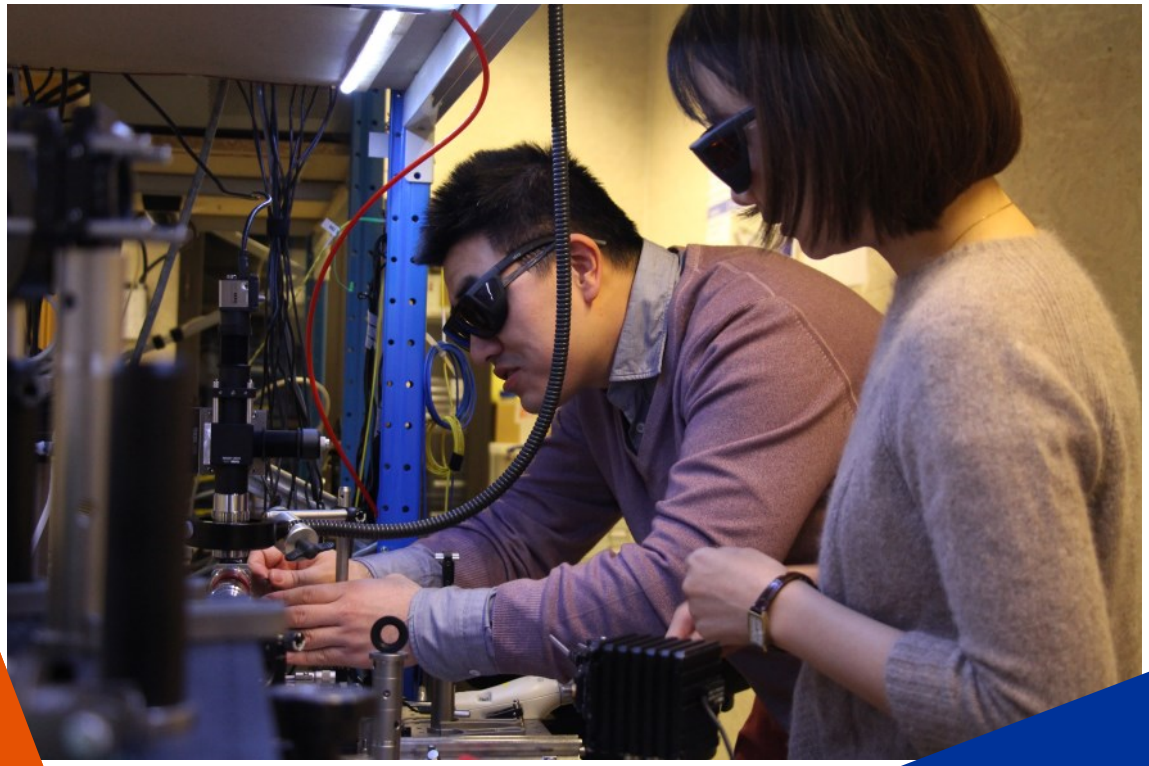
Ghent University (UGent) and Vrije Universiteit Brussel (VUB) jointly offer a two-year (120 ECTS) **Master of Science in Photonics Engineering**. It leads to a joint UGent-VUB Master of Science degree.

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 include a secondary engineering specialization in their program
    - 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**



Balanced Program

Multidisiplinary Program

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
- Operations Management

Program Overview

Compulsory: Core Photonics Courses	ECTS	Year	Sem
Photonics	4	1	1
Optical Materials	6	1	1
Microphotonics	6	1	1
Lasers	4	1	1
Mathematics in Photonics	4	1	1
Optical Communication Systems	6	1	2
Sensors and Microsystem Electronics	6	1	2
Physics of Semiconductor	4	1	2
Laboratories in Photonics Research	6	1	2
Recent Trends in Photonics	4	2	1
Master Dissertation	30	2	1 + 2
Electives: Advanced Photonics Courses	**ECTS**	**Year**	**Sem**
At least 16 ECTS, to be taken up in Year 1 and/or 2			
Electives: Engineering Cluster	**ECTS**	**Year**	**Sem**
At least 18 ECTS, to be taken up in Year 1 and/or 2 • Cluster **Electronics & Information Technology** • Cluster **Physics & Materials** • Cluster **Life Sciences** • Cluster **Operations Management**			
Business & Entrepreneurship Module	**ECTS**	**Year**	**Sem**
Option 1:			
Introduction to Entrepreneurship	3	1	1
Innovation Management	3	1	2
Option 2:			
Engineering Economy	6	1	1
Total	**120**		

Advanced Photonics Electives

	ECTS	Location
Optical Spectroscopy of Materials	4	UGent
Biophotonics	4	UGent
Optical Sensors	4	VUB
Display Technology	4	UGent
Lighting Technology	4	VUB
Photovoltaic Energy Conversion	4	UGent
Non-linear Optics	4	UGent
Quantum Optics	4	UGent
Introduction to Quantum Physics for Electrical Engineering	4	VUB
High Speed Photonic Components	4	UGent
Photonic Integrated Circuits	4	UGent
Micro- and Nanophotonic Semiconductor Devices	4	UGent
Technological Processes for Photonics and Electronics: Laboratory	4	UGent
Design of Refractive and Diffractive Optical Systems	4	VUB
Optical Design with Ray-tracing Software: Laboratory	4	VUB
Research in Photonics *(intended for 3+2 students who need to finalize a BSc project)*	6	UGent
Short Internship in Photonics	5	Academic or industrial
Long Internship in Photonics	10	Academic or industrial

All courses and full course descriptions:

https://studiekiezer.ugent.be/2024/master-of-science-in-photonics-engineering-EMPHOE-en/programma

PROGRAM DETAILS

UGent BSc Students

Students who enter the program with a BSc from UGent in Electrical Engineering or Engineering Physics, follow a slightly modified program.

For students with a BSc degree from UGent:			
Compulsory: Core Photonics Courses			
Photonics → Not to be taken up as this is covered in BSc program			
Electives: Advanced Photonics Courses			
Between 16 and 20 ECTS, to be taken up in Year 1 and/or 2			
Electives: Engineering Cluster			
Between 18 and 22 ECTS, to be taken up in Year 1 and/or 2			
Business & Entrepreneurship module			
No changes			
Total	**120**		

Program Details

Fast Track

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).

Fast Track program	ECTS	Year
Compulsory: Core Photonics Courses		
Recent Trends in Photonics	4	2
Master Thesis	30	2
Electives: Advanced Photonics Courses		
At least 16 ECTS, to be taken up in Year 2		
Electives: Engineering Cluster		
At least 10 ECTS, to be taken up in Year 2		
Total	**60**	

Already obtained a Master degree? Interested in Silicon Photonics and Photonic Integrated Circuits?

Why not opt for a

MSc Silicon Photonics

- 1 year advanced master program
- 60 ECTS
- € 3672,00

A unique, one-of-a-kind Master in Europe, focusing on Silicon Photonics and Photonic Integration.

Collaboration Models 3 + 2

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)
- Master of Science degree in Photonics from UGent-VUB (after year 2)

DALIAN UNIVERSITY OF TECHNOLOGY

大连理工大学

HUAZHONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Nankai University

南開大學

BEIJING JIAOTONG UNIVERSITY

北京交通大學

Collaboration Models 1+1

With our double degree programs students study 1 year (either first or second) in their home university and study 1 year (either second or first) at UGent or VUB. In the end students will receive two Master of Science degrees.

- Master of Science degree in Photonics from their home university
- Master of Science degree in Photonics from UGent-VUB

We currently have double degree agreements with National Sun Yat-sen University and are finalizing agreements with Zewail City of Science and Technology and National Taiwan University. Our own student (local or international) can also join in these double degree programmes.

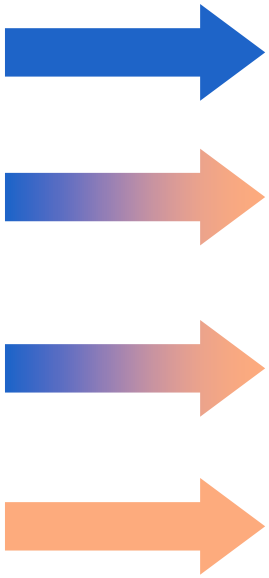
國立中山大學
National Sun Yat-sen University

ZEWAIL CITY

Other collaborations

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

International Experience



Year 1		Year 2, sem 1	Year 2, sem 2
On Campus	(international) internship	On Campus	On Campus
On Campus		On Campus	Mobility track
On Campus		Mobility track	On Campus
On Campus		Mobility track	Mobility track

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

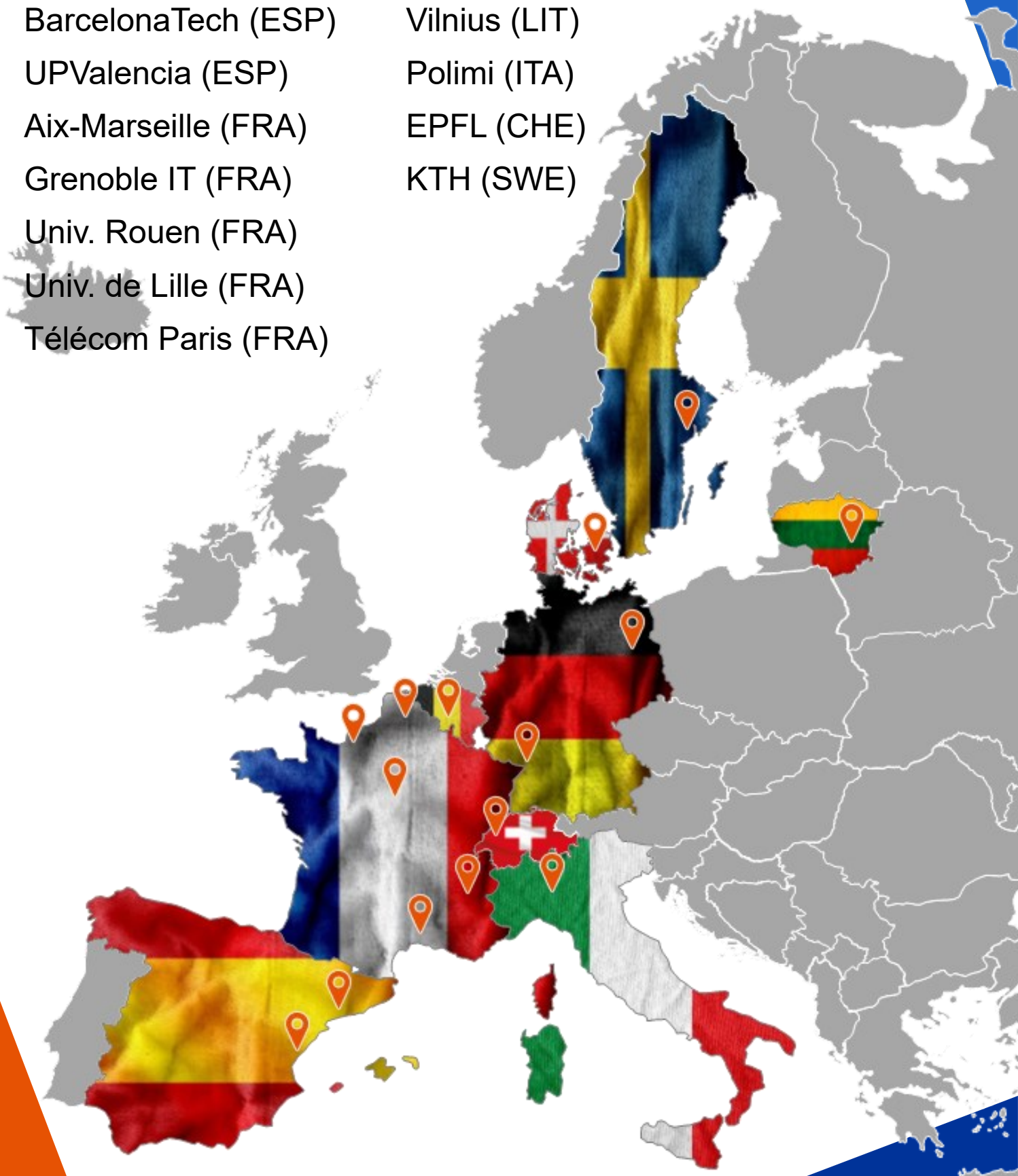
Short/Long (International) internship (5/10 ECTS)
in a company or research lab

Master thesis project
in collaboration with a partner university
1-2 visits (6 ECTS) to the partner's research labs

Partner Universities

ULB (BEL)
DTU (DNK)
BarcelonaTech (ESP)
UPValencia (ESP)
Aix-Marseille (FRA)
Grenoble IT (FRA)
Univ. Rouen (FRA)
Univ. de Lille (FRA)
Télécom Paris (FRA)

Karlsruhe IT (DEU)
TUBerlin (DEU)
Vilnius (LIT)
Polimi (ITA)
EPFL (CHE)
KTH (SWE)



EMPLOYABLILITY

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

- **Courses**

  Business & Entrepreneurship module

  Operations Management cluster

- **Internships opportunities**

  Short Internship in Photonics - 5 weeks

  Long Internship in Photonics - 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

- **45 %** **industry**

  R&D

  project management

  consultancy

  sales/business support

- **55 %** **PhD**

* based on over 400 graduates since 2006-2007

Photonics Companies in Belgium

ON Semiconductor

PHOTONICS RESEARCH @UGENT

PHOTONICS
RESEARCH GROUP

Liquid Crystals and Photonics

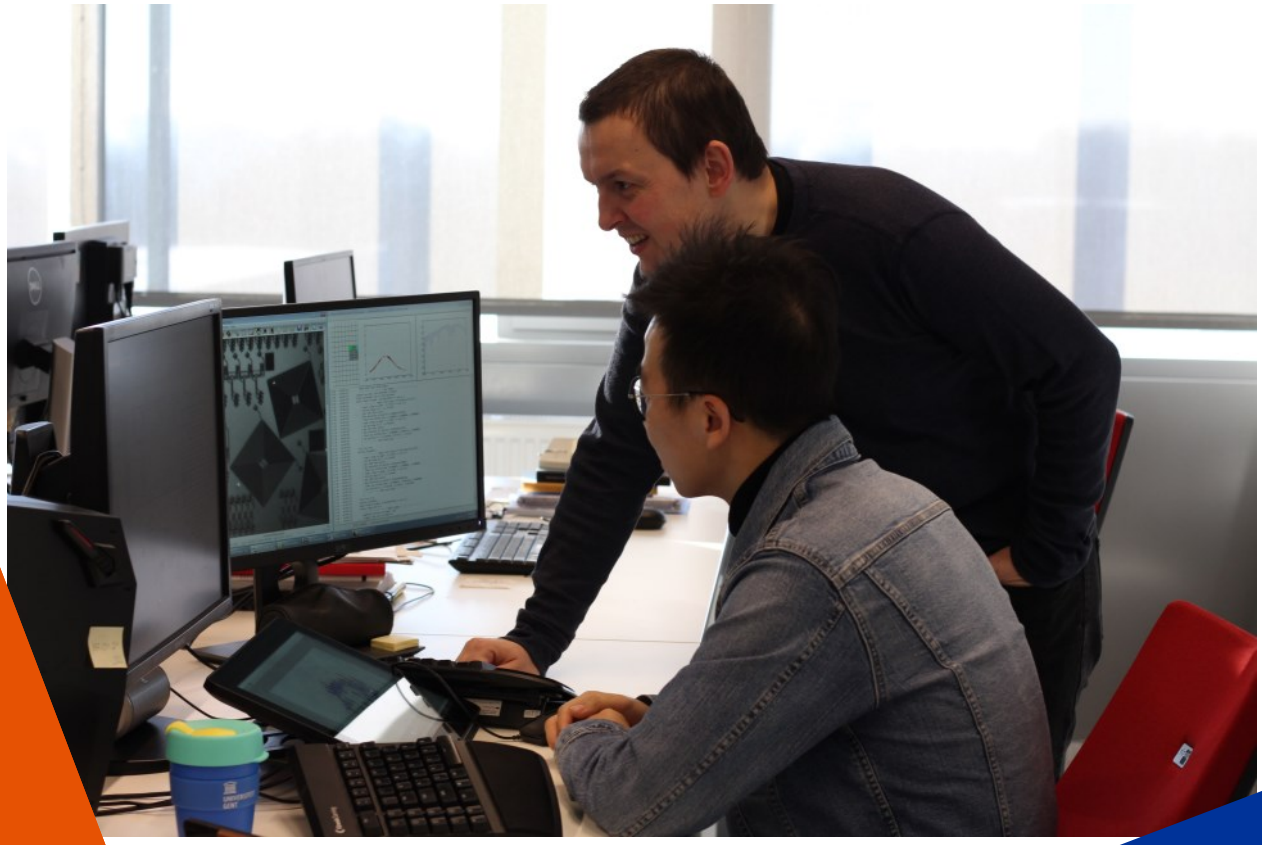
IDLab
INTERNET & DATA LAB

Cmst

- 4 research groups, 20+ professors, 150+ researchers

Supported by a UGent Core Facility:

NAMIFAB - CORE FACILITY FOR NANO- AND MICROFABRICATION



UGent Photonics Spin-Offs

trinean

Caliopa
silicon photonics

COMSENS
Matching fibre optic sensors and composites

LUCEDA PHOTONICS

indigo

SENTEA

meep

MORROW

QustomDot

AZALEA VISION

axithra

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

Didi Shi (China)

- Bachelor at Dalian University of Technology
- Master in photonics: 2018-2020
- R&D Engineering at **Huawei**: 2020 - …

Watch

Alvaro Casas Bedoya (Colombia)

- 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...

Maria Anagnosti (Greece)

- 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 - 2019
- Engineer at Apple (USA): 2019 - ...

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.

Student Life

- **Photonics Society Ghent**

  - SPIE Ghent chapter
  - SID Lowlands Branch
  - Optica Ghent chapter

- **SPIE/Optica B-Phot Chapter**

- **IEEE Photonics Benelux Chapter**

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

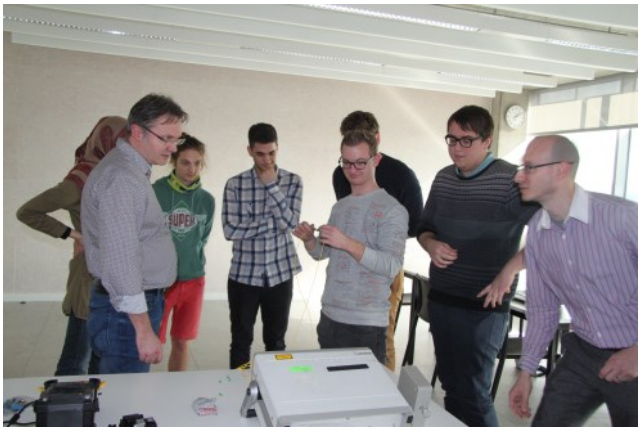
Each semester a **Light Night** is organized by one of the chapters whereby a guest lecturer is invited (from industry or academics) or a workshop is organized or the students engage in a quiz or game-night.

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 **1116 Euro**.

* The regular fee for other Master programs at the Faculty of Engineering is 6672 Euro.

Grants & Scholarships

UGent Photonics Excellence Grant consists of:

- Study Grants of **5000 Euro** per academic year

VUB Scholarships consists of :

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

B-PHOT VUB Excellence Scholarships consists of:

- Study Grants of **5000 Euro** per academic year

Other Scholarship Opportunities

- Flemish Master Mind Scholarships
- CSC (China)
- Science Without Borders (Brazil)
- SPIE

…

Application

1st Step

application @ **www.studyphotonics.com**

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

or direct application at UGent *(or in parallel with the application above)*:
@ **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

SECRETARIAT@STUDYPHOTONICS.COM

FACEBOOK.COM/MASTERPHOTONICS

TWITTER.COM/MASTERPHOTONICS

INSTAGRAM.COM/MASTERPHOTONICS

Chairs of the Program Board:

Prof. Nicolas Le Thomas
(Nicolas.lethomas@ugent.be)

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

Other Engineering Programs

At Ghent University, we offer most of our Master of Science in Engineering programs in English. These students are also open for EU and non-EU students. Programs related to photonics (e.g. with a photonics minor) are:

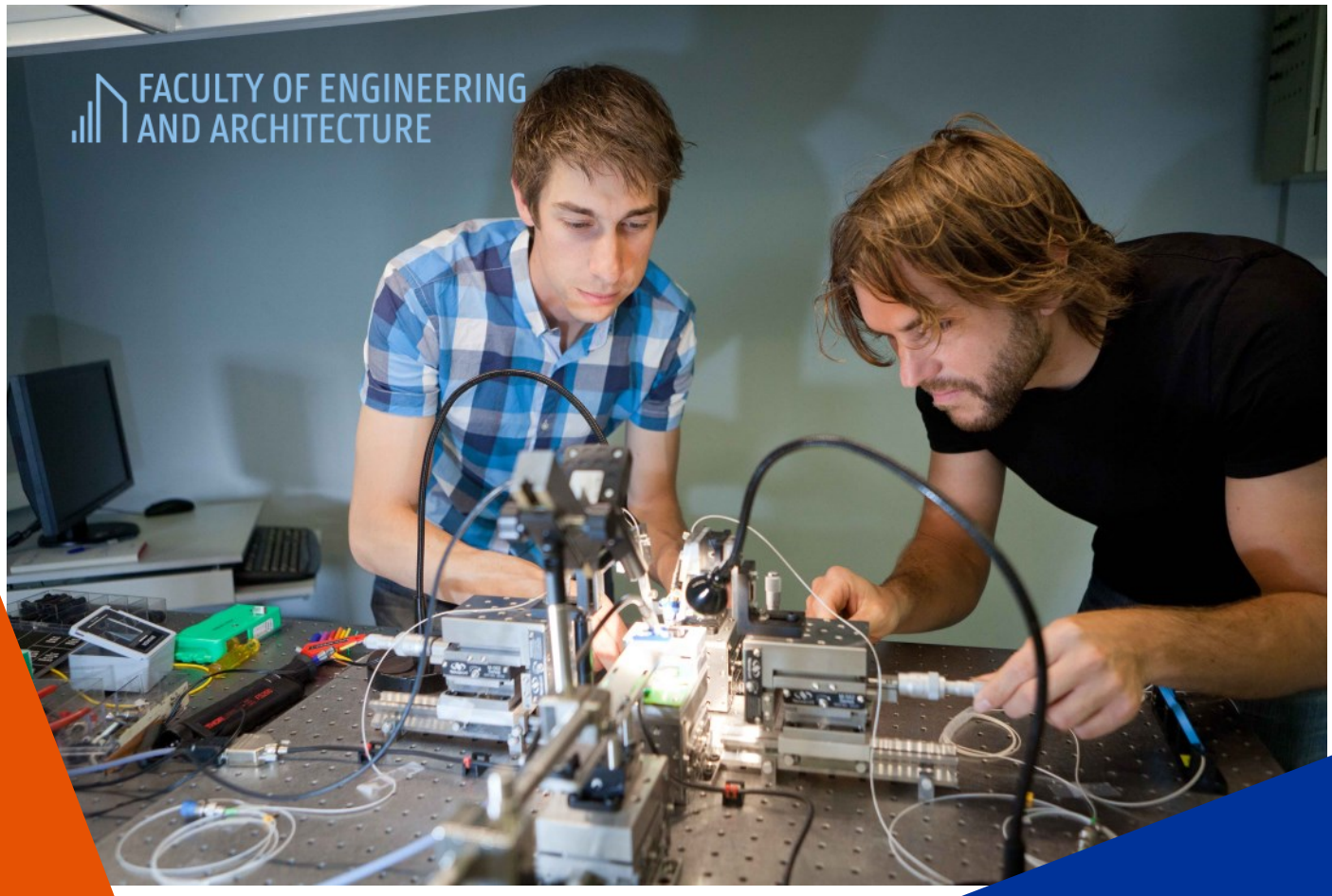
- **Master of Science in Engineering Physics**
- **Master of Science in Electrical Engineering**

  Option: Communication and Information Technology

  Option: Electronic Circuits and Systems
- **Master of Science in Biomedical Engineering**

But also in the field of Computer Science Engineering, Civil Engineering, Nuclear Fusion, Textile Engineering, Chemical Engineering, Electromechanical Engineering, Industrial Engineering & Operations Research, Sustainable Materials Engineering and Fire Safety Engineering.

→ All details: www.ugent.be/prospect/en



MSc Silicon Photonics

New Advanced MSc starting in '25-'26

Taking into account the full ecosystem, the international renowned expertise of the Photonics Research Group (PRG) in Silicon Photonics, materials at LCP (Liquid Crystals and Photonics group), packaging at CMST (Centre for Microsystems Technology), Electronic-optical integration at IDLab Design, spinoffs, … and being associated to IMEC (Interuniversity MicroElectronics Centre, a world-leading research and innovation hub in nanoelectronics and digital technologies),

Ghent University is the best place in the world to study "Silicon Photonics".

A unique, one-of-a-kind Master in Europe, focusing on Silicon Photonics and Photonic Integration.

Entry Requirements

- MSc degree in (Applied) Physics, Photonics, Electrical Engineering, Nanotechnology, Nanosciences, Computer Science or related disciplines

or

- 5-year degree at university level in (Applied) Physics, Photonics, Electrical Engineering, Nanotechnology, Nanosciences, Computer Science or related disciplines

Tuition Fee

- 3500 Euro

Supported by

imec, PhotonDelta, Ligentec, HPE Labs, X-Fab, Luceda Photonics, meep, Sentea, LioniX, Melexis, Scantinel Photonics, and many more ...

Program Structure

Compulsory	ECTS	Sem
	52	
Photonics Integrated Circuits: from Concept to Application	8	1 + 2
Theory of PIC Devices	6	1
Integrated Lasers	4	1
Materials for PICs	4	1
Optical Communication and Information Processing	4	1
Processing and Packaging Technologies for Photonic Integration	4	1
Electronics for Photonics	4	1
Dissertation Project	18	1 + 2
Electives: Advanced Photonics Courses	**ECTS**	**Sem**
	8	
Integrated Photonic (Bio)Sensing	4	1
Non-linear Optics	4	1
Quantum Optics	4	2
Micro- and Nanophotonic Semiconductor	4	2
Technological Processes for Photonics and Electronics: Laboratory	4	1 + 2
Total	60	

PHOTONICS RESEARCH @UGENT

PHOTONICS RESEARCH GROUP

Liquid Crystals and Photonics

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Cmst

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Caliopa silicon photonics

COMSENS Matching fibre optic sensors and composites

trinean

indigo

SENTEA

BiFAST By far the fastest

MORROW

meep

AZALEA VISION

QustomDot

axithra

Enabled by Silicon Photonics

GHENT UNIVERSITY

PHOTONICS ENGINEERING

MASTER OF SCIENCE