



PHOTONICS

MASTER OF SCIENCE

ENGINEERING

Joint programme



**GHENT
UNIVERSITY**



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.



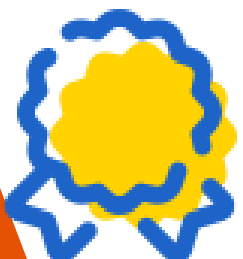
Annual intake of about 28 students,

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

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**
(internship, entrepreneurship, photonics in industry)
- includes a **master thesis project** in a research lab



ONLINE FIRST MASTER YEAR / SEMESTER

A special feature of the Photonics MSc program is the option to join the program on campus or online during your first year (or first semester).

However, in preference, students follow the entire program from the start of the first semester on campus.

BALANCED PROGRAM



MULTIDISCIPLINARY 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).

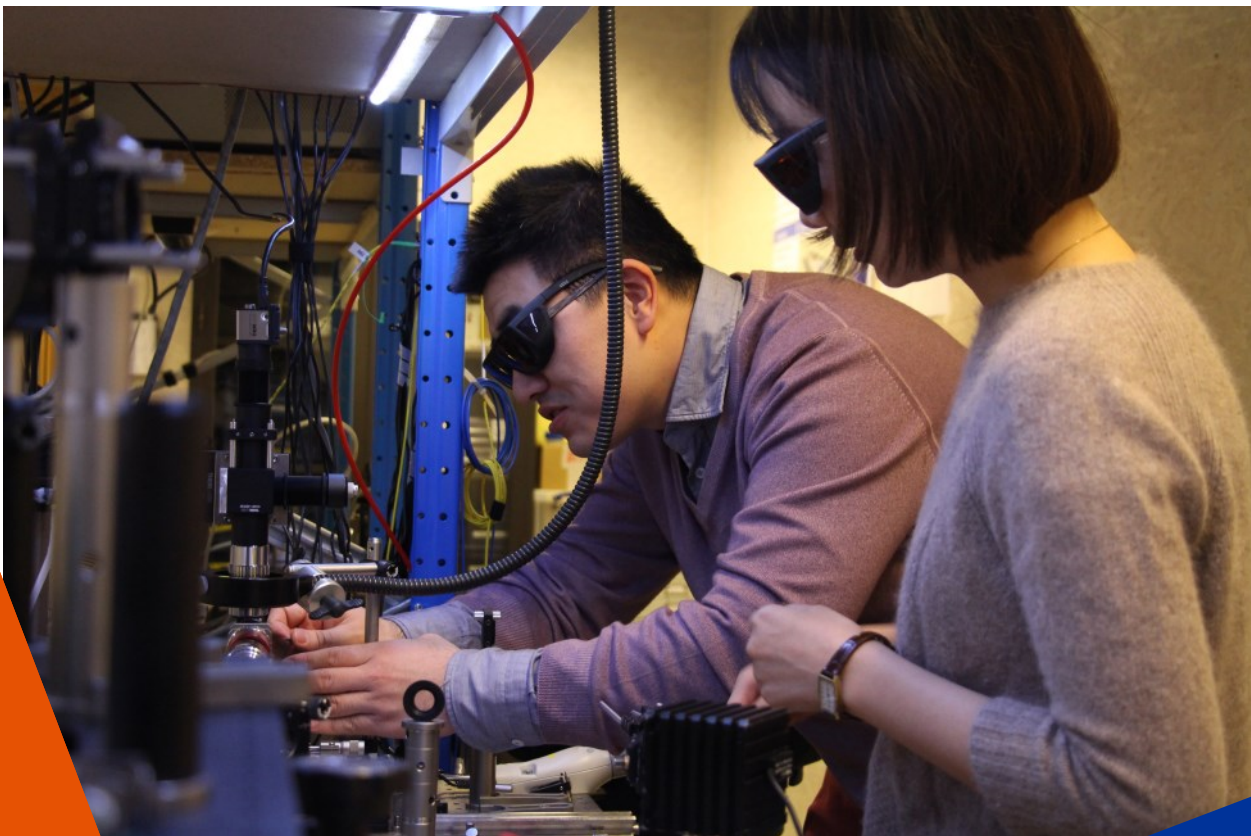
We therefore broaden the background and the degree of the graduates, with a **secondary specialization** in 1 out of 4 Engineering Clusters

Electronics &
Information Technology






Physics &
Materials

Life Sciences

Operations
Management



5 DIFFERENT MOBILITY TRACKS

	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
	Online		On Campus	On Campus

HYBRID TEACHING

All first year mandatory courses and most electives courses can be taken either on-campus or fully online or in a hybrid mode.

As such, students can opt to take the full first year in an online mode; however for the second year on-campus presence is required.

But also the on-campus students can opt to attend certain courses, or just some classes or some days (or hours) per week online or vice versa, some professors may decide to give some classes in an online mode (eg when they are abroad on a conference).

In practice, they will mostly mean that the professor is teaching in the lecture room for some students on-campus while other are following the class 'live' remote through teleclassing platform (and being able to interact with the on-campus students and professor).

Furthermore, all lectures are recorded to be viewed afterwards. So, if you miss a class, you can follow it asynchronously.

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			
<ul style="list-style-type: none"> • Cluster Electronics & Information Technology • Cluster Physics & Materials • Cluster Life Sciences • Cluster Operations Management 			
Business & Entrepreneurship Module	ECTS	Year	Sem
<i>Option 1:</i>			
Introduction to Entrepreneurship	3	1	1
Innovation Management	3	1	2
<i>Option 2:</i>			
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 <i>(intended for 3+2 students who need to finalize a BSc project)</i>	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

Online Students

Students who opt for the online first year, follow a slightly modified program.

For online students:

Compulsory: Core Photonics Courses

ECTS

Year

Sem

Laboratories in Photonics Research

6

1

2



is being replaced by



Laboratories in Photonics

4

2

1

Electives: Advanced Photonics Courses

Between 16 and 18 ECTS, to be taken up in Year 1 and/or 2

Electives: Engineering Cluster

Between 18 and 20 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	



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)



大连理工大学

DALIAN UNIVERSITY OF TECHNOLOGY



HUZHONG UNIVERSITY
OF SCIENCE & TECHNOLOGY



南开大学

Nankai University



北京交通大学

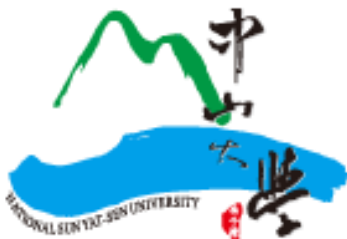
BEIJING JIAOTONG UNIVERSITY

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



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

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)

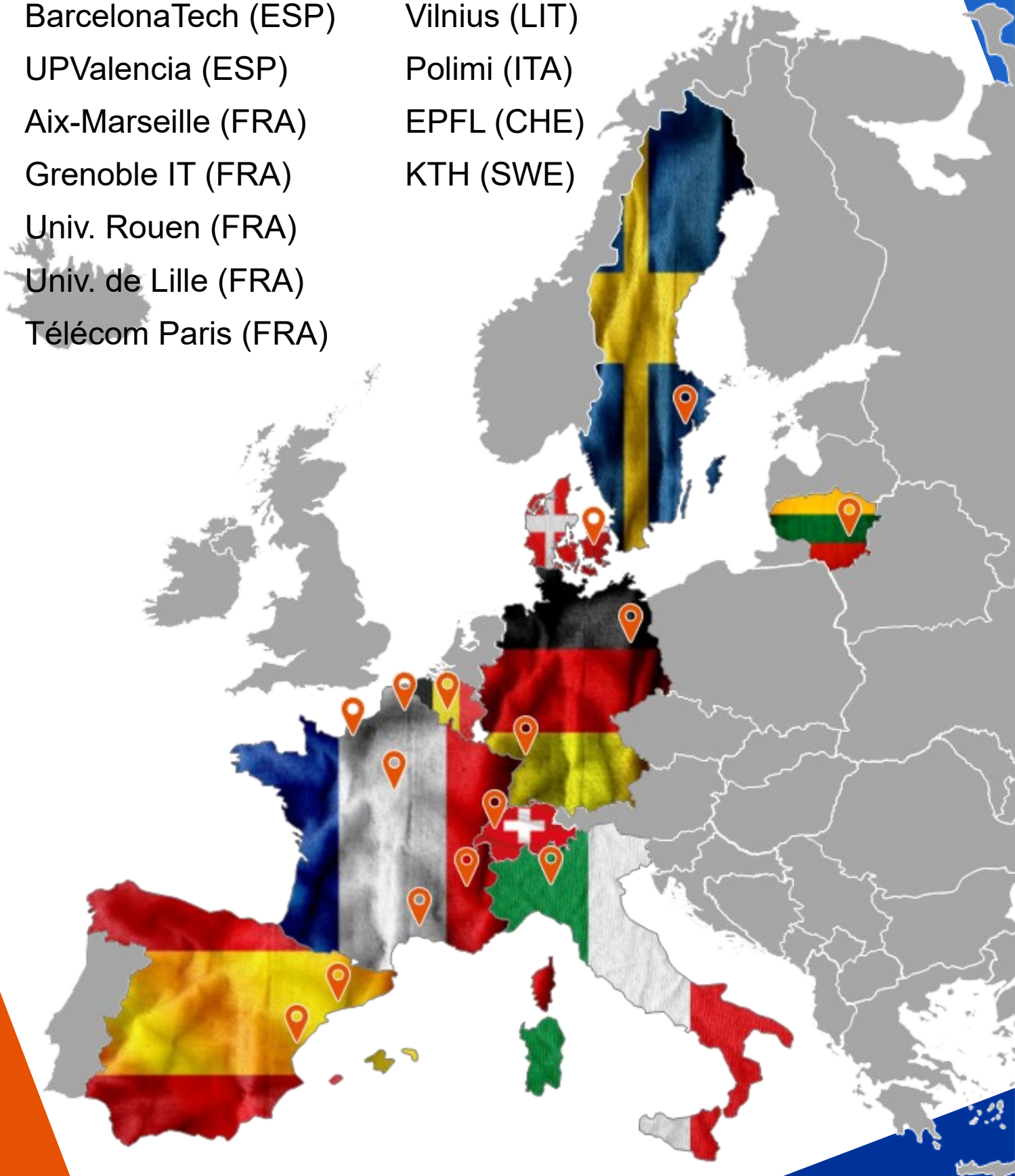
TUBerlin (DEU)

Vilnius (LIT)

Polimi (ITA)

EPFL (CHE)

KTH (SWE)



EMPLOYABILITY

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



Caro (UGent Photonics student on exchange at DTU) participates with her team at the mai Bangkok Business Challenge



Nice work from EMSP-alumnus Francesco (et al.) @infinityPV @eu_photonics #EMSPalumni@work! Good luck!



Congrats to EMSP alumnus Chiao-Wei Hsu with third place! #swbru



“ 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



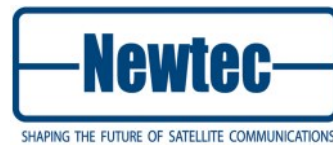
CAREER OPPORTUNITIES

- **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



IDLab

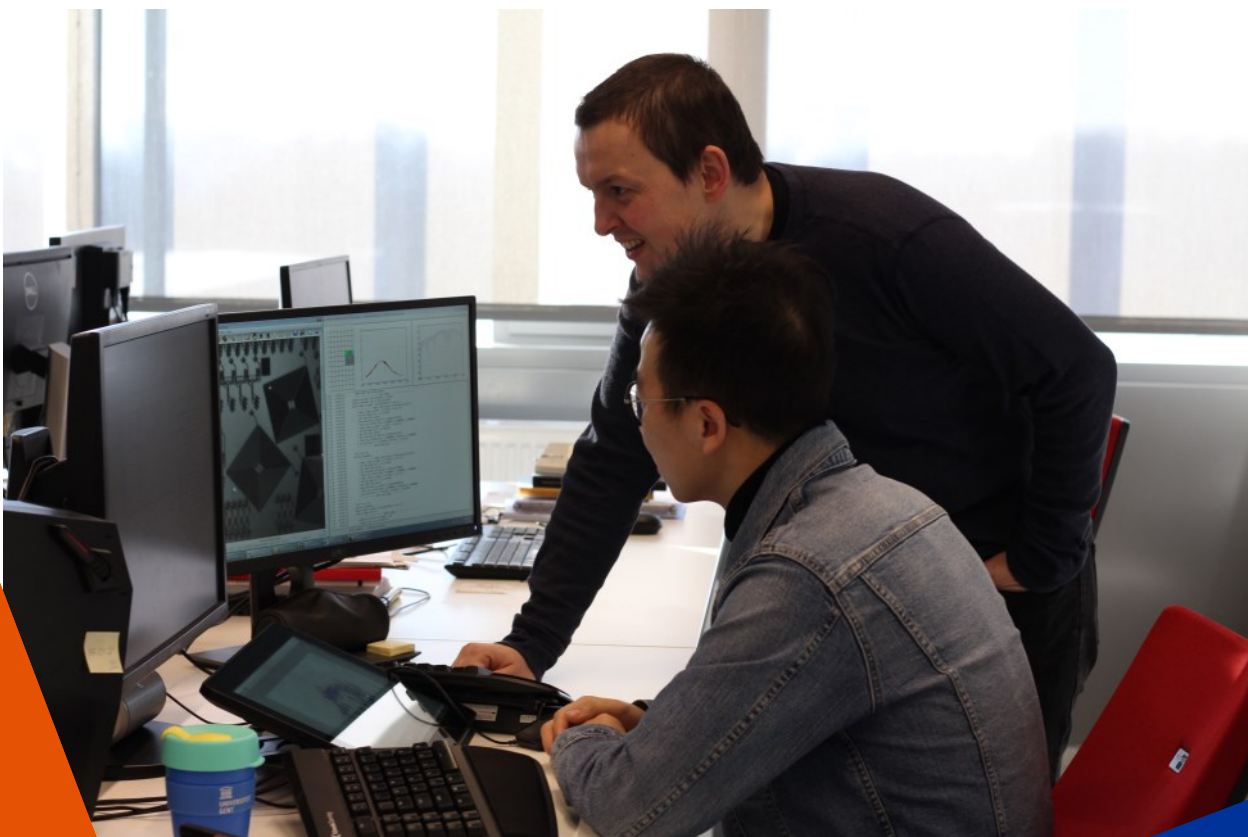
INTERNET & DATA LAB

Cmst

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

Supported by a UGent Core Facility:

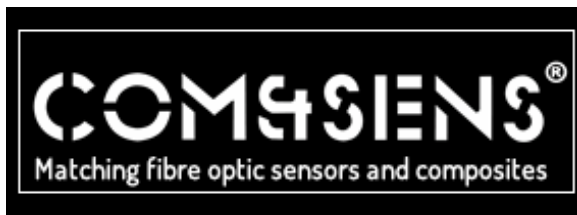
NAMIFAB - CORE FACILITY FOR NANO- AND MICROFABRICATION



UGENT PHOTONICS SPIN-OFFS


trinean


Caliopa
silicon photonics


COM4SENS®
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

Xenomatrix

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



The Society for
Information Display

OPTICA
Formerly OSA

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

SPIE.

- **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*



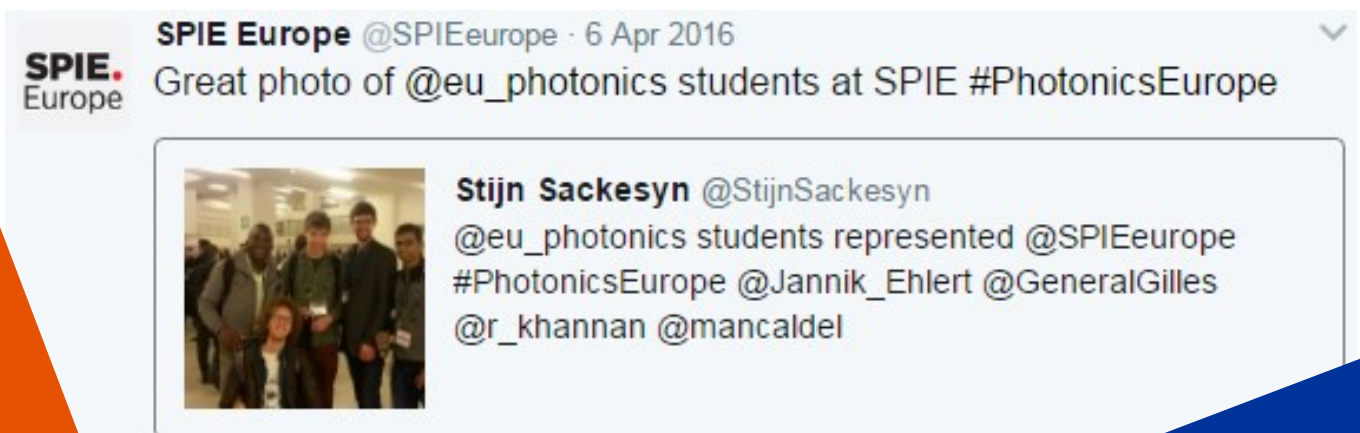
During the two-day **Photonics Summer Symposium** the final year students defend their master thesis dissertation and some international speakers are invited to give a talk.



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.



SPIE Europe @SPIEEurope · 6 Apr 2016
Great photo of @eu_photonics students at SPIE #PhotonicsEurope

Stijn Sackesyn @StijnSackesyn
@eu_photonics students represented @SPIEEurope #PhotonicsEurope @Jannik_Ehlert @GeneralGilles @r_khannan @mancaldel

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)

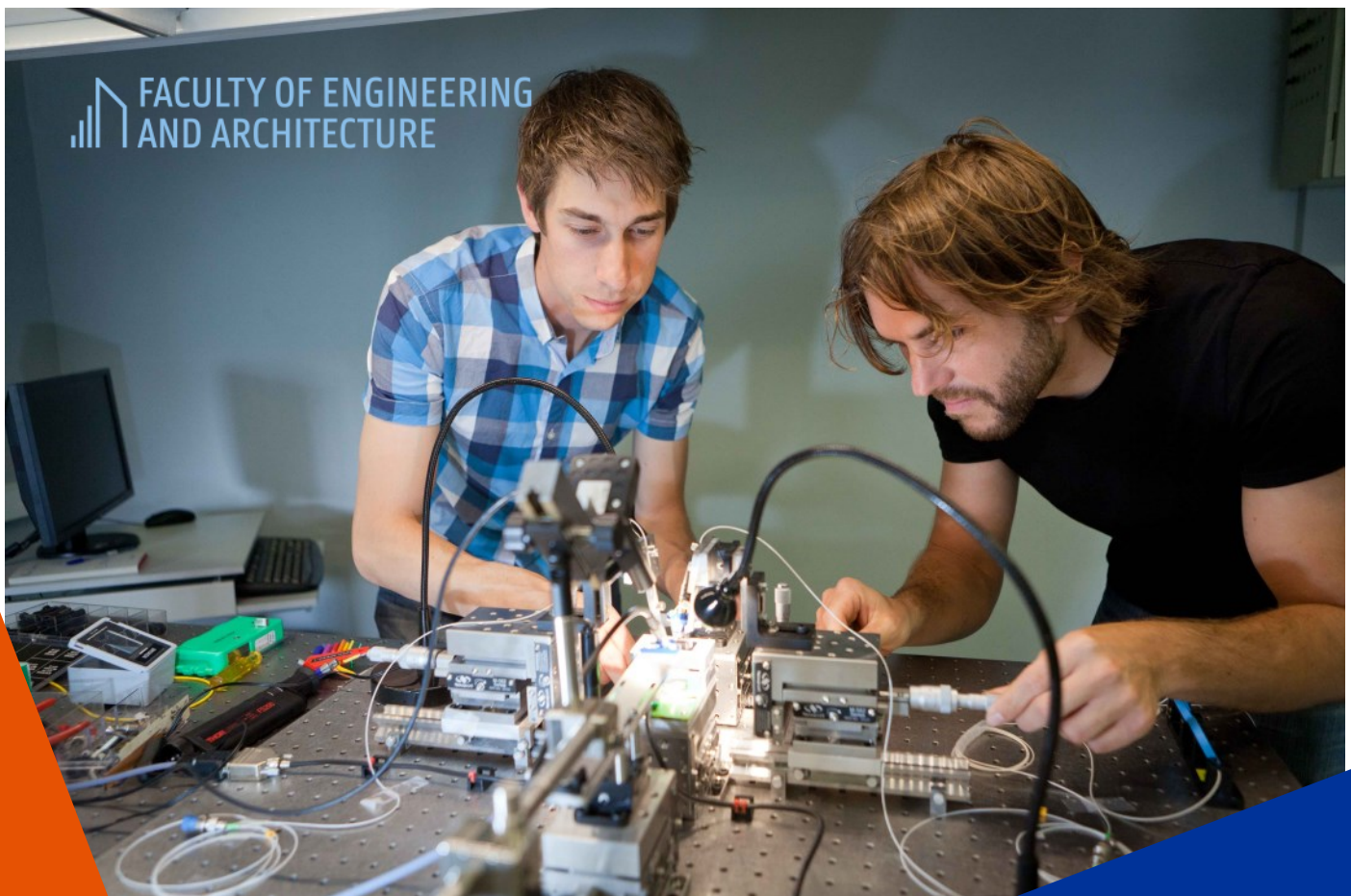
OTHER ENGINEERING PROGRAMS

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





GHENT UNIVERSITY



JOIN US NEXT YEAR AT GHENT UNIVERSITY



PHOTONICS

MASTER OF SCIENCE

ENGINEERING