



PHOTONICS

MASTER OF SCIENCE

ENGINEERING

Joint programme



**GHENT
UNIVERSITY**



VRIJE
UNIVERSITEIT
BRUSSEL

WHAT DO WE OFFER ?



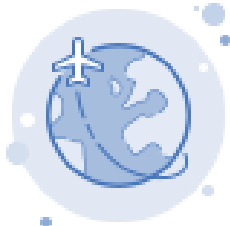
FUNDAMENTAL & SPECIALIZED PHOTONICS COURSES

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.



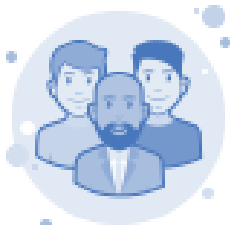
INTERNATIONAL EXPERIENCE

Acquire the indispensable international experience which is required in today's society and the current job market.



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



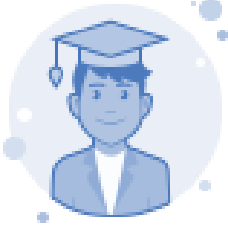
Photonics plays an essential role in a variety of new and innovative technologies such as green energy, biotech, industry 4.0, ICT, multimedia & healthcare.

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).

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	Position
Academic Ranking of World Universities (Shanghai Ranking) 2020	66
National Taiwan University Ranking 2019	70
U.S. News Best Global Universities Ranking 2019	92
Times Higher Education (THE) World Universities Ranking 2020	103
QS World University Ranking 2021	135
World's most innovative universities 2018	88

Watch



- 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.

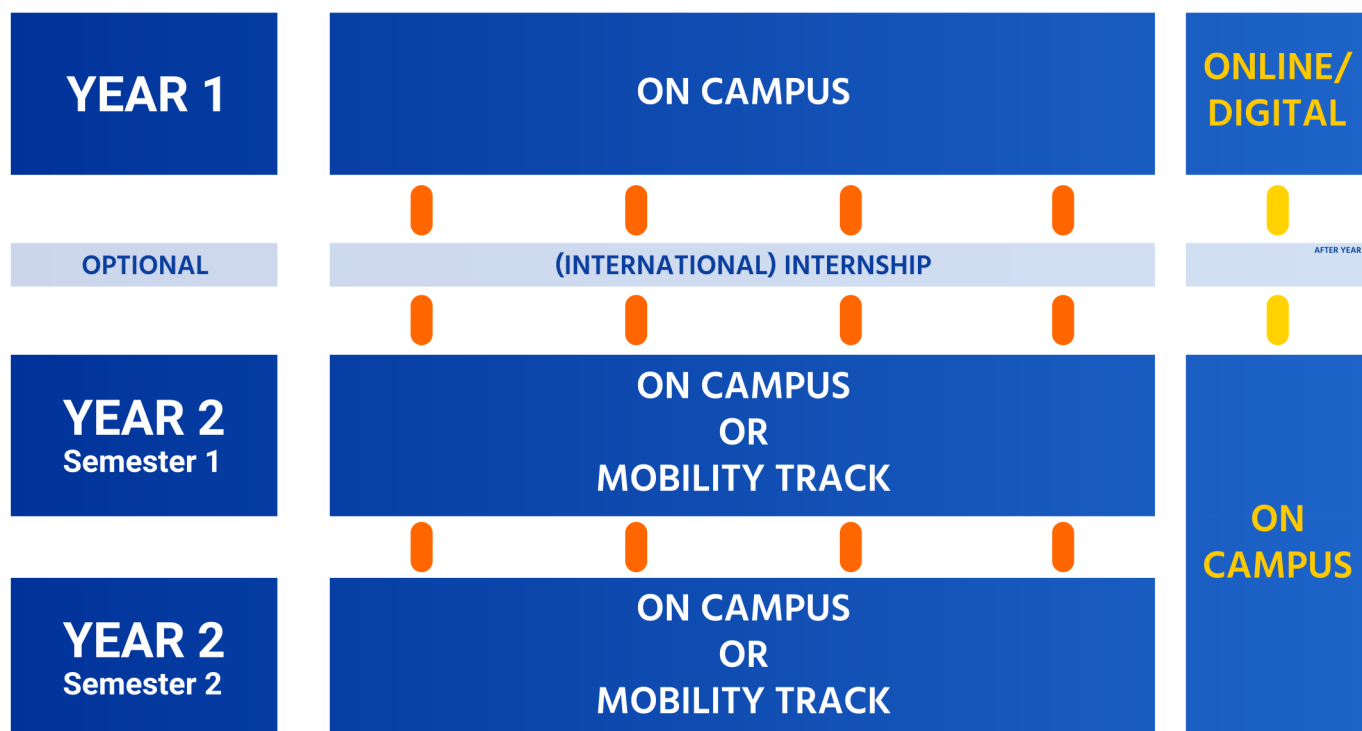
Photonics graduates move into PhD positions in top level research groups all around the world or into industry.

The program:






- teaches all the **core photonics courses**
- offers **advanced photonics courses in multiple fields of specialization**
- allows students to broaden their degree to with 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

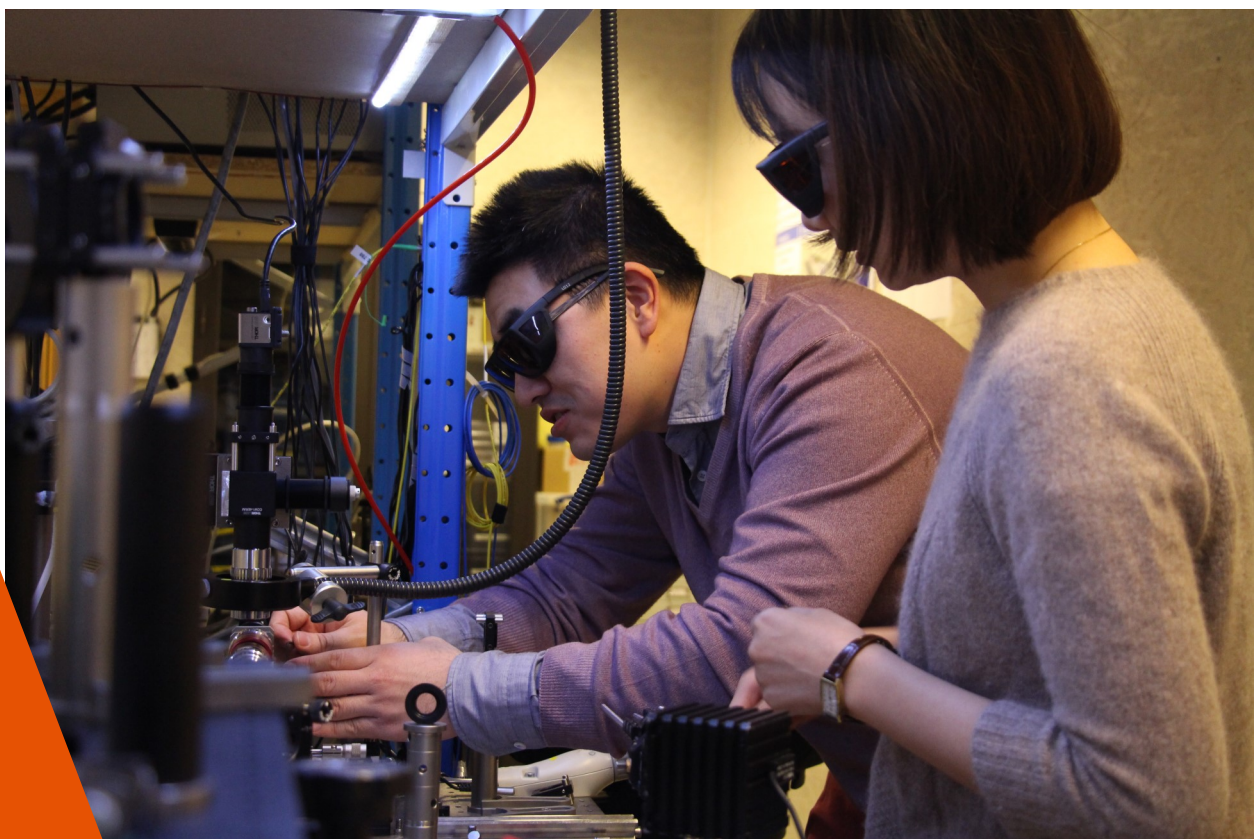


STRUCTURE



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	EU Mobility track
	On Campus		EU Mobility track	On Campus
	On Campus		EU Mobility track	EU Mobility track
	Online		On Campus	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).

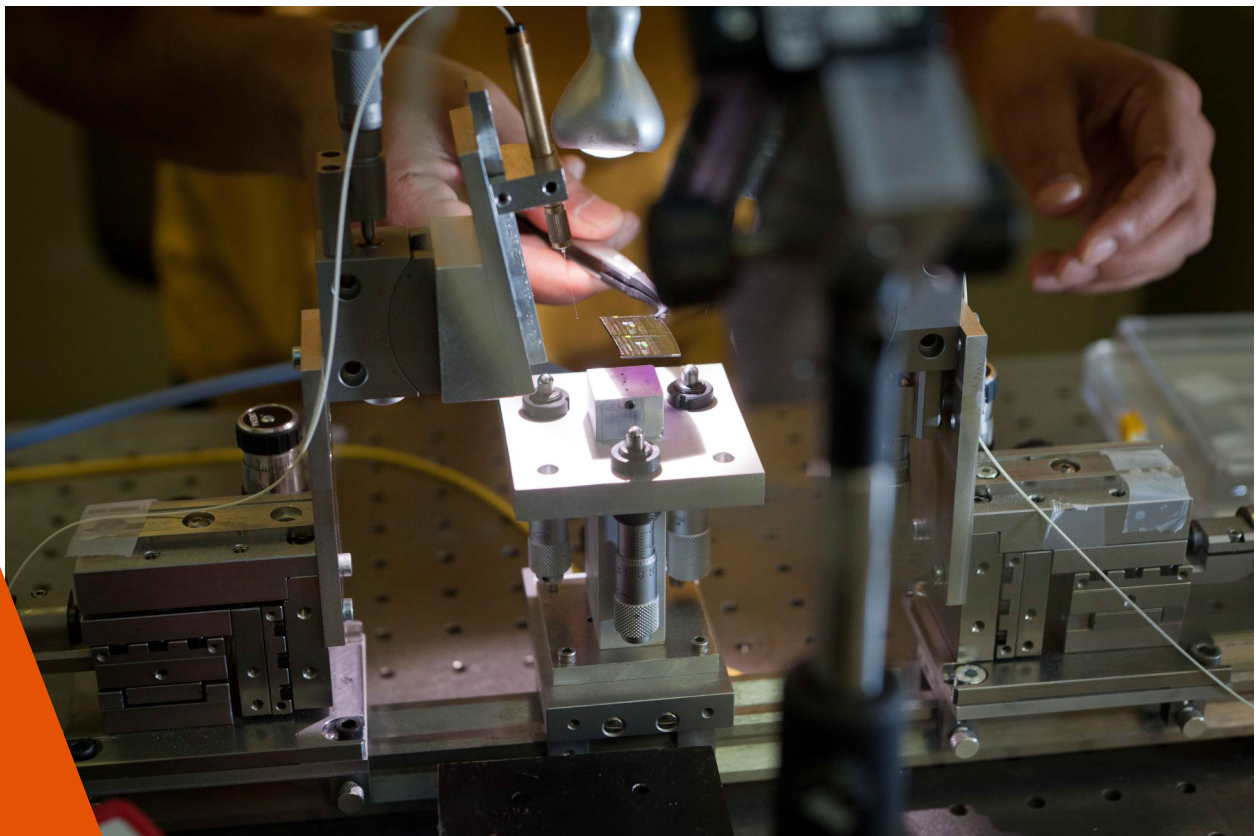
We therefore broaden the background and the degree of the graduates, with a **secondary specialization** in 1 out of 4 Engineering Clusters

Electronics &
Information Technology

Physics &
Materials

Life Sciences

Business Engineering &
Entrepreneurship



PROGRAM DETAILS

Mandatory courses

ECTS		Location
Year 1, Semester 1		
Optical Materials	6	UGent or VUB or online
Microphotonics	6	
Lasers	4	
Mathematics in Photonics	4	
Introduction to Entrepreneurship	3	
Year 1, Semester 2		
Laboratories in Photonics Research (for Year 1 on-campus students only)	6	UGent + VUB
Optical Communication Systems	6	UGent or VUB or Online
Sensors and Microsystem Electronics	6	
Physics of Semiconductor Technologies and Devices	4	
Innovation in Photonics	3	
Year 2, Semester 1		
Laboratories in Photonics (for Year 1 online students only)	4	UGent + VUB
Recent Trends in Photonics	4	UGent or VUB
Year 2, Semester 2		
Master Thesis Project	30	UGent or VUB
Electives	38 to 40	
Total	120	

PROGRAM DETAILS

Elective courses

	ECTS	Location
Basic Photonics		
Photonics	4	UGent or VUB or online
<i>The Photonics course is only intended for students without Bachelor's Degree from Ghent University and must be taken up in Y1.</i>		
Advanced Photonics	16	UGent or VUB or online
<i>See list of Photonics Elective courses. Students with a UGent Bachelor Degree, must take up 4 additional ECTS credits.</i>		
Engineering Cluster	18	UGent or VUB
Electronics & Information Technology		
Physics & Materials		
Life Sciences		
Business Engineering & Entrepreneurship		
Total	38	

Typical weekly calendar example at UGent

Lecture schedule Year 1 – Semester 1

Monday	Tuesday	Wednesday	Thursday	Friday
8:30-11:30 Microphotronics	10:00-11:30 Lasers	<i>Reserved for electives</i>	08:30-11:30 Mathematics in Photonics	10:00-13:00 Optical Materials Lab
	11:30-13:00 Lasers Lab		11:30-13:00 Optical Materials	
13:00-16:00 Microphotronics Lab	13:00-14:30 Optical Materials			
	15:30-18:00 Introduction to entrepreneurship			

Lecture schedule Year 1 – Semester 2

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

PROGRAM DETAILS

Advanced Photonics

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

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

1. can be taken online

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	Location
Mandatory courses		
Recent Trends in Photonics	4	UGent or VUB
Advanced Photonics	16	UGent or VUB
Engineering Cluster	10	UGent or VUB
Electronics & Information Technology		
Physics & Materials		
Life Sciences		
Business Engineering & Entrepreneurship		
Master Thesis	30	UGent or VUB
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)



大连理工大学

DALIAN UNIVERSITY OF TECHNOLOGY



HUAZHONG UNIVERSITY
OF SCIENCE & TECHNOLOGY



南开大学

Nankai University



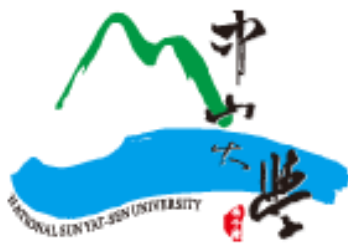
北京交通大学

BEIJING JIAOTONG UNIVERSITY

COLLABORATION MODELS **1 + 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



國立中山大學
National Sun Yat-sen University

© UGent

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

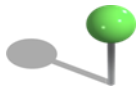
Master thesis (30 ECTS) project
at a partner university

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)

DTU (DNK)

ICFO / UPC (ESP)

UPV (ESP)

Vilnius (LIT)

ITMO (RUS)

KIT (GER)

ECM / Aix-Marseille

(FRA)

ETH Zurich (CHE)

TUBerlin (GER)

Institute d'Optique (FRA)

KTH (SWE)

Polimi (ITA)

Univ. Rouen (FRA)



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



EU MSc. in Photonics
@eu_photonics



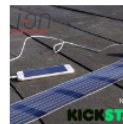
Caro (UGent Photonics student on exchange at DTU) participates with her team at the mai Bangkok Business Challenge



EU MSc. in Photonics
@eu_photonics



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



infinityPV @infinityPV
Nov 9th: @infinityPV at @kickstarter
HeLi-on hell-on.com, the flexible organic solar cell #OPV charger.



EU MSc. in Photonics
@eu_photonics



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



StartupWeekend BRU @swbru
Shield 3rd place

IRDiagnostics

Technical University of Denmark, Denmark



“ 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

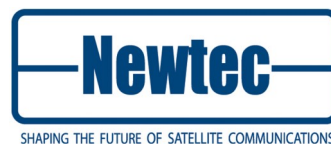
- **65 % industry**
 - R&D
 - project management
 - consultancy
 - sales/business support

- **35 % PhD**

* based on over 300 graduates since 2006-2007



PHOTONICS COMPANIES IN BELGIUM



ON Semiconductor



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

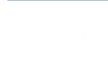
Ericsson



Alcatel-Lucent



ASML



TNO

Phoenix Software



Osram

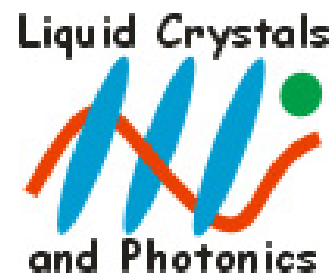
Garmin



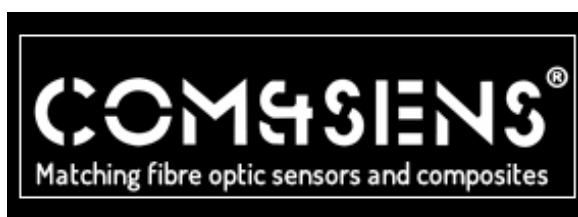
Acacia

Infinera

PHOTONICS RESEARCH @UGENT



UGENT PHOTONICS SPIN-OFFS



ALUMNI TESTIMONIALS



Alex Liles

- Master in photonics : 2011 - 2013
Internship at CETH (Greece)
Thesis at DTU (Denmark)
- PhD at **St Andrews** University: 2013 - 2107
- 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

- Master in photonics : 2007 - 2009
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





Camiel 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.



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.



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**

SPIE.

- **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.

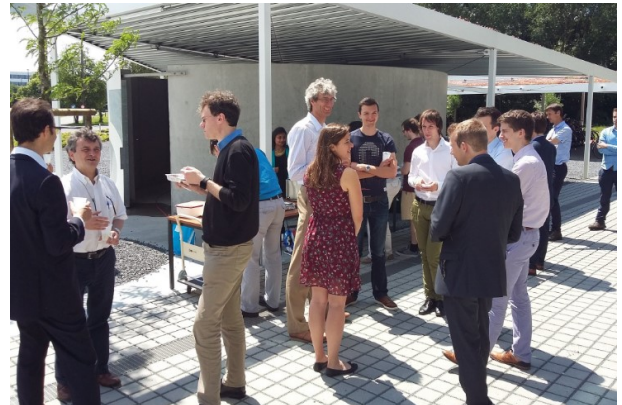


*Company visit to ASML
(the Netherlands)*

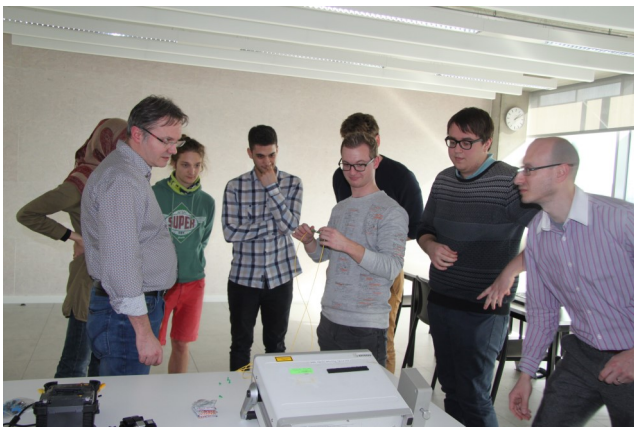
*Student chapter activity:
Laser Game: Khet 2.0*



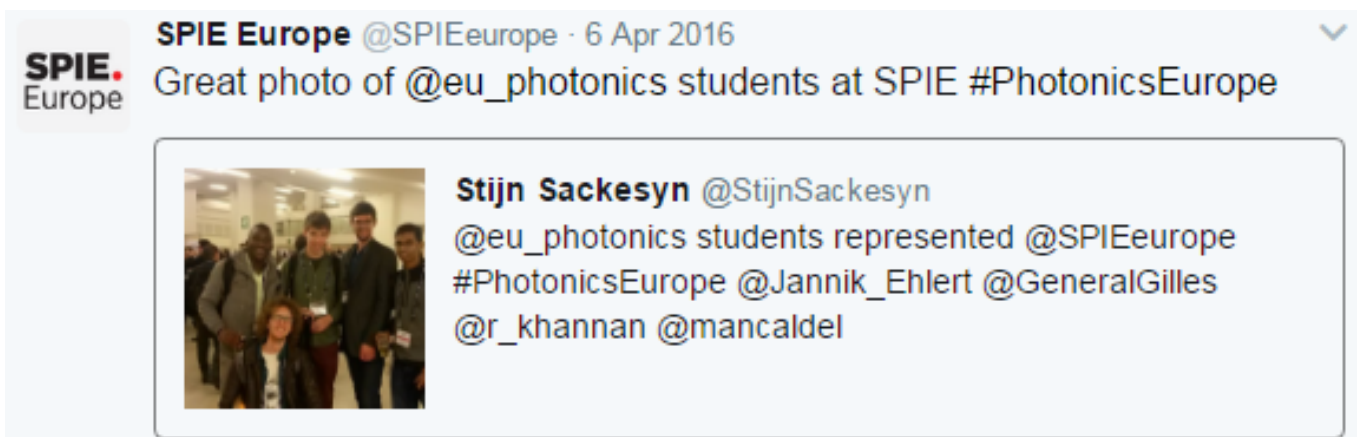
During the two-day **Photonics Summer Symposium** the final year students defend their master thesis dissertation and some international speakers are invited to give a talk.



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

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

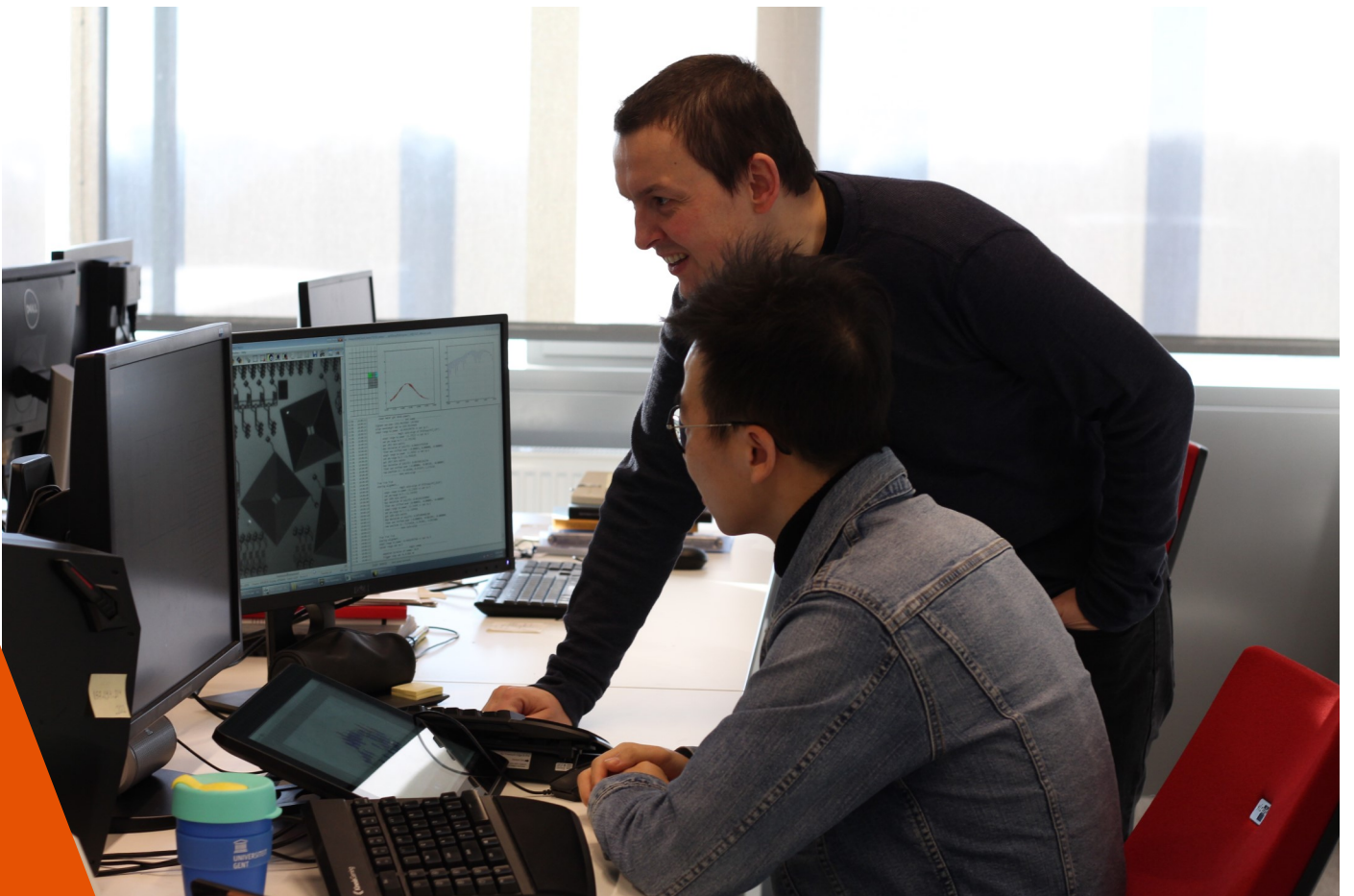
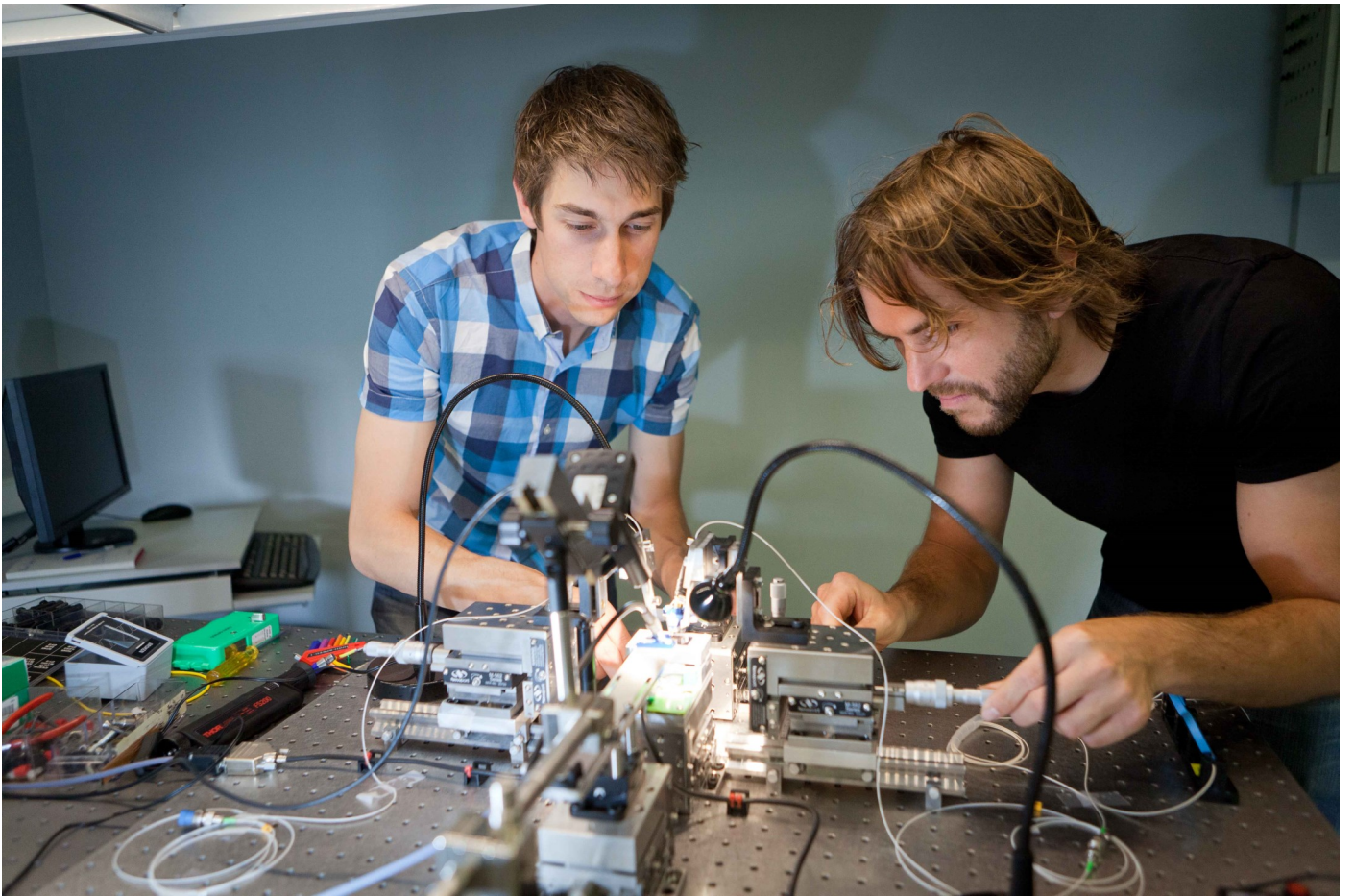
2ND STEP

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



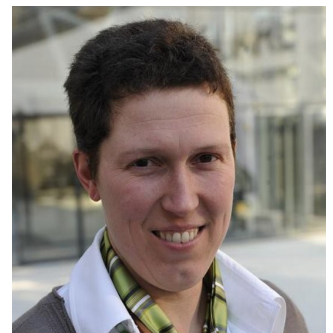
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Chairs of the Program Board:



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

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





GHENT UNIVERSITY



PHOTONICS

MASTER OF SCIENCE

ENGINEERING