EUROPEAN MASTER OF SCIENCE IN PHOTONICS

www.vub.ac.be/european-master-photonics

120 ECTS
WHY VUB

VUB education delivers strong individuals, critical minds & world citizens

The Vrije Universiteit Brussel (VUB) offers high-quality English-taught programmes, supported by outstanding research. Being a student at VUB means learning in an open atmosphere of tolerance and diversity and growing into an independent and critical-thinking individual.

All fields of study are offered on 4 student-friendly campuses in the cosmopolitan city of Brussels. At VUB, students have easy access to their lecturers and assistants. Faculty members are available and open to answer questions; small group workshops are used to ensure close interaction and hands-on experience.

VUB is a dynamic and modern university with almost two centuries of history. There are 15,000 students, 21% of whom are international students from more than 120 different countries.

The basis of our academic success

The Vrije Universiteit Brussel was founded on the principle of ‘free inquiry’ as formulated by the French mathematician and philosopher of science Henri Poincaré (1854-1912): ‘Thinking must never submit itself, neither to a dogma, nor to a party, nor to a passion, nor to an interest, nor to a preconceived idea, nor to anything whatsoever, except to the facts themselves, because for it to submit to anything else would be the end of its existence.’

Personal growth with a positive and critical attitude, a sense of responsibility and open-mindedness, these are characteristics that you will encounter in everyone at the university, from professors and researchers to students and staff. It lies at the heart of our academic success.
Technology of light

Photonics is the technology that uses the unique properties of light to accomplish a multitude of functionalities that cannot be achieved in other ways. Technological and scientific changes originated from light appear in our daily life, at a faster pace than ever. Think of 3D creation and printing of organs to reduce experiments with animals, free-form Virtual Reality masks that allow you to really step into your avatar, the transformation from WiFi to LiFi with optical fibers, innovations in the field of self-driving cars, and so on.

The possibilities are endless. As an engineer in Photonics, you might find yourself in the driver seat working in (bio)medical domains, telecom, sustainable energy or Industry 4.0. From researcher to consultant. The qualification you obtain with this master is a joint degree awarded by VUB and Universiteit Gent. The future is bright, are you ready to shine?
The European Master of Science in Photonics is a challenging programme designed for students looking for a professional career in innovative industry domains or wanting to push the academic barriers in research. If you want to be at the forefront of cutting-edge and innovative developments, this master programme might just be what you are looking for.

Bringing theory into practice
VUB was one of the founding fathers of the very first master of Photonics on the European continent, which means you will receive a solid training from professors with an impressive track record in research. The in-depth courses in photonics cover both fundamental basics and engineering of light-based phenomena and systems. Our multidisciplinary programme holds elements of electronics, physics and engineering, integrated with micro- and nanotechnology. The wide variety of elective courses broadens your knowledge and skills in domains such as ICT, biosciences, physics and chemistry. There is a great emphasis on practical experiments for optical design and measurement in our labs. The programme is complemented with courses on business economics, photonics in industry and future trends in photonics, preparing you for the job market. On top of that we integrate 21st century skills and add a glimpse of a potential international career through the external mobility tracks.

Education inspired by research
The research groups at VUB and UGent encompass relevant cutting-edge research, offering top education and unlimited research possibilities in many domains. To really immerse our students in the world of photonics, we offer hands-on training in state-of-the-art research laboratories on campus and in the Photonics Innovation Center in Gooik. Researchers use valuable high-tech equipment to create prototypes for business that can develop ready-to-market solutions. It also houses a unique technology supply chain for fundamental, applied and industrial optics, and photonics research. Does it come as a surprise that the VUB Photonics Innovation Center serves as a hub for Belgian and international research groups and companies?

A bright future
Photonics holds a bright future. For itself and for you. The qualification you obtain with this master is a joint degree awarded by Vrije Universiteit Brussel and Universiteit Gent. This degree stands for a firm basic knowledge and skills to apply to the design, realization and management of photonic systems for a broad range of application domains. The focus on employability connects students with the photonics industry through internships. Each year ends with the Photonics Summer Symposium where first and second year masters meet, defend their master thesis projects and attend lectures of world-renowned speakers in the field of photonics.

As a graduate, your career lies in research in high-tech companies or academic laboratories, in the development of innovative photonic solutions in industry, in technical support, or as a consultant. The European Master of Science in Photonics has the right ingredients to prepare you for your future job in this high-tech society.
MASTER YEAR 1

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<td>Optical Materials</td>
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<td>Microphotonics</td>
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<th>Semester 2</th>
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<td>Laboratories in Photonics Research</td>
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<td>Optical Communication Systems</td>
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<td>Sensors and Microsystem Electronics</td>
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<td>Physics of Semiconductor Technologies and Devices</td>
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<td>Business Aspects of Photonics</td>
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**Additional courses**
(At least 4 and at most 8 ECTS to be chosen in master year 1, dependent on the prior studies)

- Photonics: 4 ECTS
- Mathematics in Photonics: 4 ECTS

**Photonics Electives**
(At least 8 and at most 12 ECTS to be chosen in master year 1, dependent on the prior studies)

- Optical Spectroscopy of Materials: 4 ECTS
- Display Technology: 4 ECTS
- Non-Linear Optics: 4 ECTS
- High Speed Photonic Components: 4 ECTS
- Biophotonics: 4 ECTS
- Optical Sensors: 4 ECTS
- Design of Refractive and Diffractive Optical Imaging Systems: 4 ECTS
- Optical Design with Ray-tracing Software: Laboratory: 4 ECTS
- Introduction to Quantum Physics for Electrical Engineering: 4 ECTS
- Technological Processes for Photonics and Electronics: Laboratory: 4 ECTS
- Photovoltaic Energy Conversion: 4 ECTS
- Quantum Optics: 4 ECTS
- Micro- and Nanophotonic Semiconductor Devices: 4 ECTS
- Internship in Photonics: 4 ECTS

8-12 ECTS

**PROGRAMME STRUCTURE**

The European Master in Photonics is an English taught interuniversity curriculum of two years (120 ECTS) which leads to a joint degree from VUB and UGent.

The first semester is devoted to the fundamental basics of photonics, while the second focuses on engineering skills and photonics applications. The first year has an optional internal mobility component, in which you can choose to take the courses entirely at one of the two Belgian universities or to spend one semester at each university.

**INTERNATIONAL PROGRAMME**

The second year contains a mandatory external mobility component. You can spend one semester or do your master thesis abroad. Alternatively, you can do both thesis and courses abroad during two semesters, or do a 12-week industrial internship in the photonics industry or a research institute. You choose one of the four mobility tracks, allowing you to define the extent of your stay abroad. It allows you to benefit from the enriching expertise of our partner universities.

**MASTER YEAR 2**

| LOCATION | MOBILITY TRACK 1
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<td>Courses</td>
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<td>Master thesis</td>
<td>VUB or UGent</td>
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<th>MOBILITY TRACK 2</th>
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**The programme is subject to change.**


ECTS (European Credit Transfer System):

1 credit represents 25-30 hours of study activity.
JOIN A STRONG RESEARCH NETWORK

GROUNDBREAKING RESEARCH AT VUB

VUB has more than 30 years of experience in the exciting field of optics and photonics research and innovation through its research group B-PHOT. Today it is a world leader in photonics research and has received world-renowned awards and prizes in various fields of technology. B-PHOT has many collaboration agreements with top-notch research groups all over the world and maintain strong ties with Flemish and European companies through development services, training and consulting, and ready-to-market prototypes. VUB is also recognised for its leadership in European photonics research and innovations through its coordinating role in large-scale European Commission-supported projects and for its international networking activities with world-class research teams.

By studying photonics at VUB, you will work in a top-class team and will be able to join one of many research areas. Today our photonics department is internationally recognised for its distinct scientific and technological contributions to the photonics field.

THE WORLD IS AT YOUR FEET

When you study the European Master of Science in Photonics, you join a strong network of academic and business partners. VUB and Universiteit Gent have firm connections with partner universities in and outside Europe, all of them excellent in photonics, and each with their specific research focus. Depending on the focus you want to pursue, you can study at one of the partner universities or any other institution with which VUB has an agreement. Some of the possible destinations are Sweden, Russia, Spain, the UK, Switzerland, Germany, France, China and Taiwan.
“The programme provides you with an analytical skillset that is far above average. In combination with the very valuable focus on industrial photonics applications, you will be prepared to go the extra mile and tackle challenging problems in your future career.”

Alumnus Gilles Claeys
product manager Barco (Belgium)
ADMISSION CRITERIA
Admission is based on the review of each application: proof of meeting academic and language requirements, personal motivation, etc.

LANGUAGE REQUIREMENTS
Prospective students can provide proof of sufficient knowledge of English as language of instruction by meeting one of the following criteria:
- having successfully completed one of the following language proficiency tests:
  - TOEFL: minimum level: 213 for the computer-based test (CBT); 72 for the internet-based test (IBT); 550 for paper-based test
  - TOEIC: minimum level: 785
  - IELTS: minimum level academic module 6
  - CAE: minimum grade B
  - CPE: minimum grade C
  - ITACE for Students certificate with ERK/CEFR score B2
  - Cambridge English First (FCE)
  - Cambridge English: Business Vantage (BEC Vantage)
  - Cambridge Michigan ECCE
  - Trinity College London: ISE II, GESE Grade 7-9; or ALTE Q mark
  - The Pearson Test of English General (PTE General): minimum level 3
  - The Pearson Test of English Academic (PTE Academic): minimum level 59
- having successfully completed at least one year of secondary education with English as language of instruction, or having successfully completed secondary school in a Belgian institution;
- having successfully completed programme units in higher education with a minimum of 54 ECTS-credits where English was the language of instruction.

For more details on admission requirements and application: www.vub.ac.be/en/apply

DIRECT ADMISSION
The programme is open to applicants with a bachelor or master’s degree in Electrical Engineering, (Applied) Physics, Materials Sciences or equivalent. Students in their last year of such programmes will also be considered. Applicants holding a bachelor or master degree in another field of engineering are welcome to join the programme through a personalised preparatory programme. Applications will be considered through an application procedure.

For more details on admission requirements and application: www.vub.ac.be/european-master-photonics

Application deadline
Prospective students are advised to apply as soon as possible, even if they have not yet obtained their degree. Applications can only be submitted through our website www.vub.ac.be/en/apply
- Students who require a visa (non-EU/EEA nationals) need to contact us for the correct deadline.
- Students who do not require a visa must apply before June 1st.
- Note: if the proof of English proficiency or APS certificate is not ready before the deadline, you can always submit it later instead of missing the deadline

Tuition fees
All Flemish universities in Belgium are subsidised by the government, which results in relatively low tuition fees. The general tuition fee for our master programmes is €890/year for EEA and non-EEA students.
A detailed overview of the tuition fees can be found on: www.vub.ac.be/en/tuition-fees

Grants
The master’s programme board awards several grants on a competitive basis among all accepted students, such as EMSP Excellence Grant, Erasmus+ credit mobility scholarships, EMA2-partnerships Grants. Additionally, there are other institutions awarding external grants, scholarships or loans to students.

Contact
www.vub.ac.be/european-master-photonics