MASTER OF SCIENCE IN APPLIED SCIENCES AND ENGINEERING

APPLIED COMPUTER SCIENCE

www.vub.ac.be/applied-computer-science

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.
Responding to the demands of a digital world

The Master of Applied Computer Science is designed for students who have already completed an academic bachelor's or master's degree in exact sciences or engineering, in which they were acquainted with little or outdated computer science-related content.

This programme aims to develop computer science skills that will complement the student's primary field of expertise. The Smart Cities and Digital Health modules respond to the demands of our digitalised world, while the wide range of highly specialised elective courses gives students the opportunity to personalise their curriculum.
THE MASTER PROGRAM IN APPLIED COMPUTER SCIENCE (MACS)

Smart systems
This programme is concerned with the design and engineering of workable, practical computer-based smart systems using devices, components, electronic and photonic hardware, software technologies, sensors and actuators to meet the requirements of well-defined applications. This field of ICT engineering sciences is generally known as ‘smart systems’ or ‘systems design’ and is associated with the field of big data. Smart systems are typically characterised by their multi-modal and multi-sensory nature, resulting in large multi-dimensional, distributed datasets that need to be efficiently processed, and whose output needs to be (visually) represented in a consumer/prosumer-friendly fashion. The programme offers theoretical insight into and practical experience of the disciplines involved in the end-to-end chain of current smart systems.

Prepared for a career as an ICT engineer
The Master of Applied Computer Science provides a broad education in generic smart systems of systems design, complemented by elective minors in important fields such as digital health and smart cities. In addition, the programme offers students the skills to operate in other application domains such as the factory of the future, smart grids or food production systems. In general, the accumulated knowledge should prepare students for a career as an ICT engineer who is able to design innovative systems.

Personalise your curriculum
Computer science has become a diffuse area, covering a wide scope of topics. Because of this, the programme is highly customisable. In the first year, we focus on developing knowledge of computer science concepts and techniques. Elective courses in the second year allow the student to apply the skills acquired in this first year to a specific field, such as software development, telecommunications, multimedia, numeric engineering, bioinformatics, embedded software or robotics. Practical sessions and a master’s thesis are included in the study programme.

Interaction between researchers and students
This master’s programme is organised by two departments: the Department of Computer Science (part of the Faculty of Science) and the Department of Electronics (part of the Faculty of Engineering). Together, the departments employ more than 200 researchers, covering a wide range of research topics. The excellent interaction between researchers and students makes intense practical student participation possible.
The programme is subject to change. Check www.vub.ac.be/en for the latest information.

ECTS (European Credit Transfer System):
1 credit represents 25-30 hours of study activity.

SMART CITIES

The Smart Cities module looks at logistics and mobility, with a focus on finding sustainable solutions for environmental problems. It makes use of modern software and systems engineering technology as well as new techniques for embedded systems. The ‘internet of things’ is also considered: how cryptography, configuration and sensors, among others, function in networks. A versatile look at the science behind high-tech applications.

DIGITAL HEALTH

Combining several disciplines, the Digital Health module approaches biological problems such as protein structure from a computational angle. Digital imaging, machine learning and medical informatics are also important in this module. A multidisciplinary approach to health, biology and the medical field.

INTERNSHIPS: OUR PARTNERS IN THE FIELD

Students can opt to take up an internship, which will preferably take place during the summer to avoid delaying study progress. Registration for the internship is allowed, provided that the student doesn’t have a combined bachelor-master enrolment and has already attained 45 ECTS of the master’s programme (exemptions included). The department has partnerships with organisations including APEX R&D, TenForce, NUMECA International and Digipolis.

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<td><strong>Compulsory courses</strong> <em>(students must select one module)</em></td>
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<td>Digital Health module</td>
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<th>MASTER YEAR 2</th>
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<td><strong>Compulsory Courses</strong> <em>(students must select one module)</em></td>
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<td><strong>Elective courses</strong></td>
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MACS PROGRAM
BIG DATA AND DATA ANALYTICS STRAND

DATA HAS BECOME A TORRENT, FLOWING INTO EVERY ASPECT OF THE INTERNATIONAL ECONOMY, AND IS AN INVALUABLE CAPITAL FOR A PLETHORA OF GLOBAL CORPORATIONS. TECHNOLOGICAL GIANTS SUCH AS GOOGLE, YAHOO AND MICROSOFT HAVE ACCESS TO ZETTABYTES OR BRONTOBYTES OF DATA, AND SOCIAL MEDIA PLATFORMS CONNECT HUNDREDS OF MILLIONS OF USERS AROUND THE GLOBE.

Every minute, more than 100 hours of videos are uploaded to YouTube, more than 100,000 tweets are sent, and about 200,000 photos are shared on Facebook. Millions of networked sensors are being embedded in the physical world in devices such as mobile phones, smart energy meters and distributed cameras that sense and transmit data. It’s widely acknowledged that the effective use of such amounts of data has the potential to transform science and economy by delivering a new wave of productivity growth and consumer surplus. The McKinsey Global Institute points to $300 billion in potential annual value to US healthcare and €250 billion in potential annual value to Europe’s public sector.

The rapid growth of big data and analytics for use within businesses and corporations has created a huge demand for people who are capable of extracting meaningful knowledge from unstructured data. The McKinsey Global Institute predicts that by 2018, in the US alone, there will be a shortage of between 140,000 and 190,000 people with profound analytical expertise, as well as a demand for 1.5 million managers and analysts who know how to harness big data to make effective decisions. Any rough search in professional networking and job-seeking platforms such as LinkedIn and Indeed shows that the most in-demand positions include business intelligence analysts, data architects, data warehouse analysts and data scientists.

It is clear that graduates who understand fundamental methods of machine learning – or data mining and predictive analytics – will continue to be in high demand across all industries. At the Department of Electronics and Informatics at Vrije Universiteit Brussel, we see data science and big data analytics as the key areas in this field in recent years, and we have built an ambitious master programme. We recognise that the data science job market will require both scientists with deep technical skills and analysts with the knowledge to use the analysis of big data to make effective decisions. The Master in Applied Computer Science has been developed to provide strong learning opportunities for students in both these areas.

Prof Dr Ir Nikolaos Deligiannis

"By 2018, in the US alone, there will be a shortage of between 140,000 and 190,000 people with profound analytical expertise.”

"Data science and big data analytics: key areas to develop"
“Students in the programme come from different continents. I feel like I’m teaching the world. And I like it.”

Prof. Dr. Roger Vounckx, head of the Electronic and Informatics department
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.


SPECIFIC ADMISSION CRITERIA

This programme is intended for students with a general scientific and academic bachelor or master degree. Admission is based on acceptance and will be evaluated on a case-by-case basis.

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](http://www.vub.ac.be/en/apply)

- Students who require a visa (non-EU/EEA nationals) need to submit their application before June 1st
- 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 submit it later rather than miss 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 a year. Some programmes have higher tuition fees for students with non-EU/EEA nationality.

A detailed overview of the tuition fees can be found at [www.vub.ac.be/en/tuition-fees](http://www.vub.ac.be/en/tuition-fees)

Contact

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