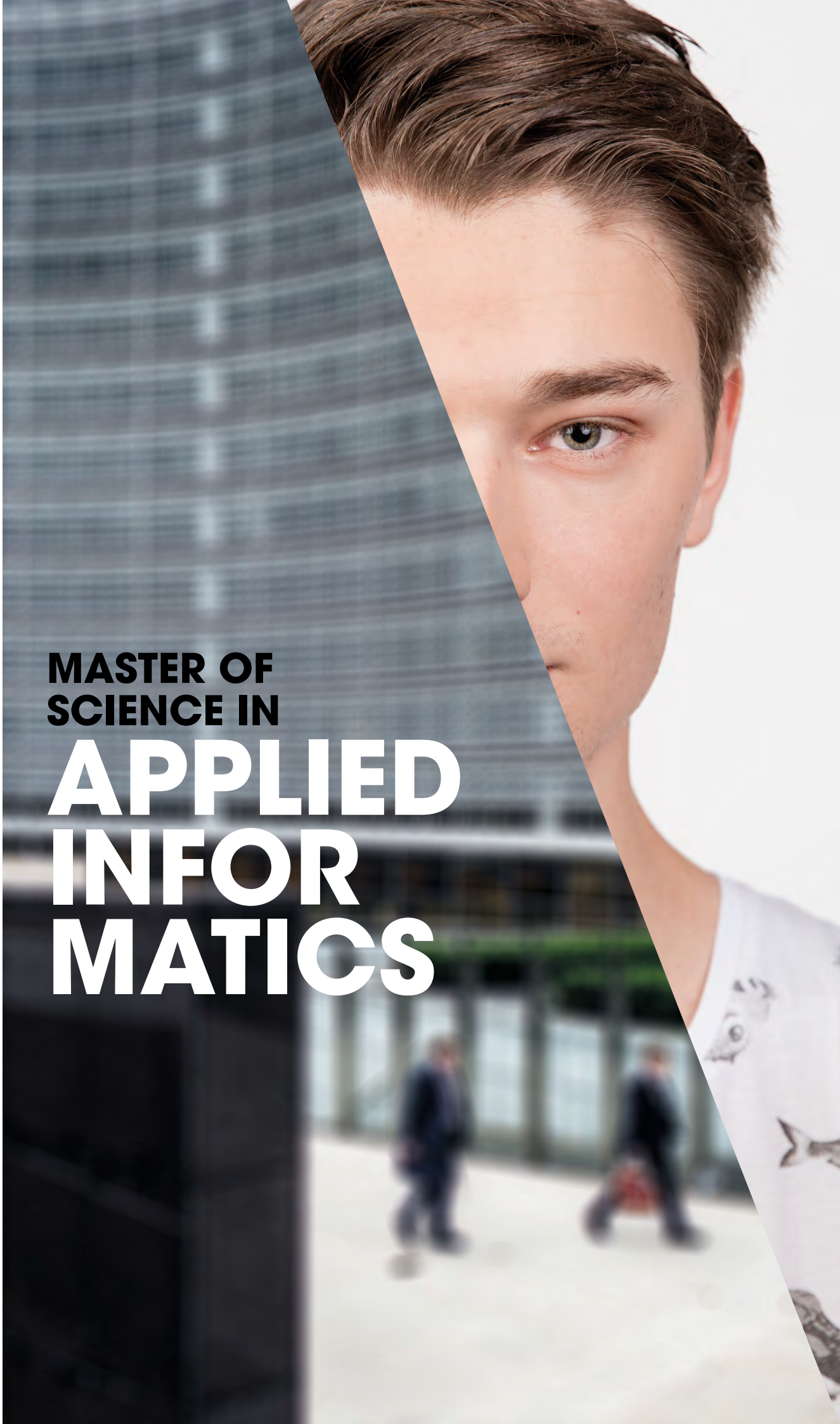
VRIJE
UNIVERSITEIT
BRUSSEL

MASTER OF SCIENCE IN APPLIED INFORMATICS



60
ECTS

2023-2024

WHY VUB?

VUB education shapes strong individuals, critical minds and world citizens

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

VUB is a comprehensive university that offers education on student-friendly campuses in the cosmopolitan city of Brussels. At VUB, lecturers and assistants are available and approachable to students. Faculty members are on hand to answer questions and teaching often takes place in small groups to ensure close interaction and hands-on experience.

VUB is a dynamic and modern university with almost two centuries of history. We welcome more than 21,500 students, 24% of which are international students from more than 152 different countries.

The root of our academic success

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 development, open-mindedness, a positive and critical attitude and a sense of responsibility are values that characterise everyone at our university: from professors and researchers to students and staff members. It lies at the root of our academic success.

Mastering Applied Informatics

The Master of Science in Applied Informatics will enable you to master advanced and practical aspects of informatics. It prepares you for a job in the informatics industry, working, for example, in software development, data processing, or system analysis.

The programme is primarily intended for students who already have a bachelor's degree in informatics (e.g., computer science or artificial intelligence) or who have a solid background in computer science and want to further develop their skills. The programme is designed around two major themes: **Artificial Intelligence** and **Big Data Technology**.

The programme is offered both in conventional daytime education and through evening classes. The evening classes option makes use of online materials and occasional on-campus or online classes. It is specifically tailored to working students who are already established as informaticians, but who wish to retrain or to upskill in the areas offered. All our courses promote an active style of learning. Apart from standard lectures, we use a broad range of instruction techniques, such as group and individual projects, seminars, workshops, and research training.



MASTER OF SCIENCE IN APPLIED INFORMATICS

A truly international context

About half of the students in our master's programme come from Belgium; the other half come from all over the world. Courses are taught and guided by a similarly diverse mix of professors and assistants. The membership of the research groups is truly international, and you can communicate with the university administration in English.

Pathways to a successful career

After obtaining your master's degree, you are perfectly prepared for a job in the ICT industry. You will have the expertise to enter a wide range of professional sectors, but no matter where you are employed, you are bound to find yourself at the cutting edge of technological innovation. You will be equipped with exactly the skills that are necessary for a successful career in the high-tech industry: a sharp, inquisitive mind dedicated to pushing the boundaries of knowledge and human accomplishment.

Evening classes for working students

In addition to a regular daytime offering, we also offer the programme to working students in a variant with evening classes. As time is precious for working students, the evening classes do not mirror the regular daytime lectures for which recordings already exist in our online learning platform. Instead, for each course, evening lectures are organised online or on campus 4 to 5 times per semester at 18:00. The lecturer focuses on important meta-information such as how to study a particular topic, answers questions that might have arisen during self study, or practises important practical skills with you.

Outline of the programme

The programme is built around two predefined majors, each offering a specialised degree title:

- **Master of Science in Applied Informatics: Artificial Intelligence** offers a broad range of important technologies in this increasingly important area of industry.
- **Master of Science in Applied Informatics: Big Data Technology** offers an emphasis on the management of and discovery from large bodies of data, including the practicalities of storing and processing very large bodies of data.

Within each major, you study 5 compulsory courses (30 ECTS) and 2 electives (12 ECTS), allowing you to tailor your programme to your needs and interests. In agreement with the programme management, further personalisation is also possible. All students complete a research-based thesis relevant to their major and get trained in methods for scientific research (18 ECTS).



MASTER IN APPLIED INFORMATICS: ARTIFICIAL INTELLIGENCE	60 ECTS
Methods for Scientific Research	3
Reinforcement Learning	6
Current Trends in AI	6
Declarative Programming	6
Natural Language Processing	6
Statistical Foundations of Machine Learning	6
ELECTIVES	**12**
Information Visualisation	6
Cloud Computing and Big Data Processing	6
Parallelism and Distribution	6
Higher Order Programming	6
Web Technologies	6
Machine Learning	6
Introduction to Artificial Intelligence	6
Scalable Data Management Systems	6
Master's Thesis in Applied Informatics	**15**

MASTER IN APPLIED INFORMATICS: BIG DATA TECHNOLOGY	60 ECTS
Methods for Scientific Research	3
Data and Information Management	6
Security in Computing	6
Information Visualisation	6
Multicore Programming	6
Cloud Computing and Big Data Processing	6
ELECTIVES	**12**
Software Architectures	6
Declarative Programming	6
Parallelism and Distribution	6
Higher Order Programming	6
Web Technologies	6
Machine Learning	6
Introduction to Artificial Intelligence	6
Scalable Data Management Systems	6
Master's Thesis in Applied Informatics	**15**

The programme is subject to change. Please check **www.vub.be/en** *for the latest information about the programme. ECTS (European Credit Transfer System): 1 credit represents 25-30 hours of study activity.*

A SAMPLE OF THE COURSES

Scalable Data Management Systems
Modern data-intensive applications require modern data management solutions. This course covers theory and practice underlying systems for data management at scale. We study various techniques and algorithms that can be applied in today's Big Data landscape. We look into traditional data problems like transaction and query processing as well as data problems that are unique to popular system environments and frameworks in which distribution and parallelization are central.

Information Visualisation
In this course students learn about the representation and presentation of data in terms of different visualisation techniques supporting the exploratory analysis for scientific discovery as well as the design of tools for the presentation of large datasets. We cover specific elements of human perception and colour theory, and discuss different design principles and interaction techniques for human-in-the-loop data exploration underlined by various case studies. The theory is applied and further deepened in a group assignment where interactive visualisations are designed and implemented for rich datasets.

(Applied) Computer Science or Applied Informatics?

VUB offers three English-taught masters that prepare you for a career in ICT:

The more **applied 1-year "Master of Science in Applied Informatics"** covers the state of the art in Artificial Intelligence or in Big Data Technology from a scientific perspective, but with a focus on applications. Graduates can apply their knowledge in society, industry, and in other scientific disciplines. It welcomes academic bachelors in Computer Science, Artificial Intelligence, Informatics, or equivalent.

The more **research-driven 2-year "Master of Applied Sciences and Engineering: Computer Science**" goes deeper into the foundations of these technologies, and leads to an engineering degree. This master offers 4 different specialisations: 1) Artificial Intelligence, 2) Data Management & Analytics, 3) Software Languages & Software Engineering, and 4) Multimedia. Graduates are well-prepared to contribute themselves to the state of the art, in industry as well as in academia. It welcomes academic bachelors in Computer Science, and Artificial Intelligence with a minor in Computer science, Informatics, or equivalent.

Finally, the **2-year "Master of Applied Sciences and Engineering: Applied Computer Science"** also leads to an engineering degree, but is intended for bachelors in Engineering or Applied Sciences who do not have a strong background in ICT. It therefore also includes introductory courses on programming and algorithms & datastructures.

Please consult the VUB website for more information about the latter two programmes.

"My name is Samuel from Kenya. I consider VUB as the most impactful learning institution I have ever attended. It not only has modern sport and learning infrastructure, but also experienced professors and diverse student pool.

Learning in VUB is two-fold. First, in a friendly and relaxed environment, professors impact students with relevant knowledge and skills. Second, the students immerse themselves into social activities that deepen good relations among Belgian and international peers. Social activities extend beyond VUB campuses. Students get a chance to explore and experience the city of Brussels, other Belgian cities and the rest of Europe.

I definitely recommend VUB to anyone hoping to further their education. "

Samuel Ngugi Ndung'u

"I am from Italy, and I have done a master's in computer science at the VUB. Studying computer science at the VUB was a very interesting, challenging, and formative experience, in which I had the opportunity to learn in deep about several aspects of computer science. All courses are in English, and the teaching staff is helpful and friendly. In general, the VUB hosts a very international environment, with several programs in English and activities aimed at international students. Brussels is a very international city, a great place if you want to meet new people or learn new languages! I had the opportunity to meet people from anywhere in the world, and even to make some Belgian friends! Based on my experience, I would definitely recommend studying computer science at the VUB!"

Matteo Marra

VRIJE UNIVERSITEIT BRUSSEL

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 79 for the internet-based test (IBT)
  - IELTS: minimum level academic module 6.5
  - ITACE: minimum level B2
  - Cambridge English Qualification Scale: B2 First (FCE) with minimum score 170
- having a diploma of secondary or higher education where English was the language of instruction;
- having successfully completed secondary education in a Belgian educational establishment

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

DIRECT ADMISSION

Application prerequisite for the programme Master of Science in Applied Informatics is an academic bachelor's degree in Computer Science, Informatics, Software Engineering, Artificial Intelligence, or equivalent. Equivalency and admission to the programme will be based on a review of the student's academic record and will be evaluated case by case.

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.be/en/apply**

- Students who require a visa (non-EU/EEA nationals) need to submit their application before **April 1st.**
- Students who do not require a visa must apply before **September 1st**.
- Note: if the proof of English proficiency or APS certificate is not ready before the deadline, you can always submit it later.

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 approximately €1000/year, but some programmes have higher tuition fees for students with a non EU/EEA nationality. A detailed overview of the tuition fees can be found on: **www.vub.be/en/tuition-fees**