MASTER OF SCIENCE IN

ELECTRICAL ENGINEERING

www.vub.be/electrical-engineering
www.bruface.eu

120 ECTS
2020-2021
WHY BRUSSELS

VUB and ULB shape students to be strong individuals, critical thinkers and world citizens

Vrije Universiteit Brussel (VUB) and Université libre de Bruxelles (ULB) offer high-quality English-taught programmes, supported by state-of-the-art research. Being a student in Brussels means learning in the capital of Europe and in one of the most cosmopolitan and diverse cities of the world.

At VUB and ULB, students have easy access to their teachers and assistants. Academic and administrative staff is available to answer questions; small group workshops are used to ensure close interaction between students and teachers; and fieldwork and visits in- and outside of Brussels provide you with important hands-on experience for your later career.

VUB and ULB are the two main universities in Brussels with a shared history of almost two hundred years. Together, both universities have around 40,000 students, almost 30% of whom are international students from across the world.

The root of our academic success

VUB and ULB were 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, a positive and critical attitude, sense of responsibility and an open mind are shared values at our university from professors and researchers to students and staff members. It lies at the root of our academic success.
Information technology: omnipresent and ever-evolving

Electronics and information technology spans a broad range of topics related to omni-present systems and devices: smartphones, laptops, robots, games, cars, medical imagers, solar farms, the 'Internet of Things', and so on. At VUB you can become an expert in this field, ensuring a career in an ever-evolving aspect of society.

The programme combines a rigorous scientific and technical education with the development of practical skills. It encourages independence, creativity and inventiveness, and it shapes competent engineers who can contribute to society on many levels.

This programme is part of Bruface, which means it is organised jointly with Université Libre de Bruxelles. This allows students to use the technical and scientific infrastructure of both institutions, as well as giving them the opportunity to study in a multicultural context. Study in Brussels, the beating heart of Europe, and help build the future.
From components to systems
Being an engineer means keeping in touch with the ever-changing needs of society. Electronics and informatics have an enormous impact on global industry, economics and worldwide trade. This programme offers students a practice oriented research track where they enhance their researching skills while contributing to technological and scientific innovations. Graduates have a profound theoretical knowledge of the possible applications of electronics and information technology – from component all the way up to system level.

Plenty of job opportunities
Technology is a key component in today’s society and the rapid evolutions in this field ensure that there's never a shortage of job opportunities. Graduates are ready for the international job market because of their thorough training with English as the working language. The job possibilities are virtually endless; 90% of students enrolled in the programme receive interesting job offers before they graduate. VUB helps them take their first steps on the job market with workshops, networking events, job fairs and tips for job interviews. It's all an ambitious student needs!

Research is the key to innovation
The engineering departments encourage students to actively participate in research activities. With more than 100 researchers working on a wide range of research projects, you are sure to find a project that interests you. You will get the opportunity to team up with our researchers and develop new, cutting-edge technologies. The involved departments work with high-tech companies and research centres, ensuring that your research results will contribute to society. If you would like to do your own research, you can also pursue an academic career and get your PhD at VUB. Some PhD students have even managed to start successful university spin-off companies, based on their master and PhD research results.

Bruface: best of both worlds
The Master of Science in Electrical Engineering is a Bruface master. Bruface, short for Brussels Faculty of Engineering, is a cooperation of the Vrije Universiteit Brussel (VUB) and Université Libre de Bruxelles (ULB). The two universities in the city of Brussels join forces to offer English-taught programmes in the field of engineering.

The Master of Science in Electrical Engineering is a Bruface master. Bruface offers you the opportunity to study in an international context and to make use of the best facilities of both universities. But most of all, this cooperation allows for expertise of both universities to be at your disposal. High-level education is within reach, at a reasonable tuition fee. At the end of the programme, you even take home a joint degree from VUB and ULB.
The programme is subject to change. Check [www.vub.be/en](http://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.

### MASTER YEAR 1

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<tr>
<th>Course</th>
<th>ECTS</th>
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<tbody>
<tr>
<td><strong>Compulsory courses</strong></td>
<td>56</td>
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<tr>
<td>Communication Networks: Protocols and Architectures</td>
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<tr>
<td>Sensors and Microsystem Electronics</td>
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<tr>
<td>Digital Signal Processing</td>
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<td>Digital Architectures and Design</td>
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<td>Analog Electronics</td>
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<td>Communication Channels</td>
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<td>Image Processing</td>
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<td>Microprocessor Architecture</td>
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<td>Modulation and Coding</td>
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<td>Measurement and Identification</td>
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<td>Control System Design</td>
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<td>Signal Theory</td>
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| Elective courses                                           | 4    |
| (students must select 4 ECTS)                              |      |
| Operating Systems and Security                             |      |
| Project Electronics and Telecommunication                  |      |

### MASTER YEAR 2

<table>
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<tr>
<th>Course</th>
<th>ECTS</th>
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<tr>
<td><strong>Compulsory option packages</strong></td>
<td>24</td>
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<tr>
<td>Option 1: Nano-, Opto-electronics and Embedded Systems</td>
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<td>Option 2: Information and Communication Technology Systems</td>
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<td>Option 3: Measuring, Modelling and Control</td>
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| Elective courses                                           | 12   |
| (possibly including internship)                            |      |
| Master Thesis                                              | 24   |

### INTERNSHIPS

Between the first and the second year, students can take up an internship worth either 6 ECTS (40 working days) or 10 ECTS (60 working days). The student can get actively involved in a real company where they carry out real tasks and are expected to integrate and communicate in a work team, gaining industrial engineering competences through real-life situations in a professional context. This can take place in- or outside Belgium, as long as the theme is related to the professional life of an engineer in the enterprise of choice. It can be a laboratory or a research institute – not including university laboratories in Belgium. Students can even link their internship to their master thesis. To avoid interference with studies in the second year, students are advised to plan their internship as much as possible during the summer holiday between the two master years.

### ELECTIVES

Students can also choose to postpone the company experience until after the master programme, and choose 12 ECTS from the more than 20 electives courses offered by the academic staff and their research groups. The electives have a wide variety of subjects, covering more in-depth specialisation as well as topics like entrepreneurship and even languages.
BUILDING THE FUTURE

POSITIONS FOR PHD FOLLOW-UP TRACK

More than 100 PhD students are working on new research topics at the four EE departments at VUB and ULB. They do research on cutting edge technology, for building the future. Every year a selected set of 10-20 EE master students are invited to become a PhD student after graduation. They participate in innovative research on mind dizzying topics, in rapidly evolving fields. Topics range from new analog circuits, to embedded systems, internet of things (IoT), advanced medical imaging, gesture recognition, car collision detection, novel battery systems, novel semi-conductor devices, solar cells, 3D-displays, big data applications, gyroscopic sensors, 3D-image sensors, electric engines, ...

OUTCOME OF RESEARCH RESULTS

All of these research topics contribute to society in one way or another. The most entrepreneurial outcomes are those that lead to university spin-offs in which the developed technology can optimally come to fruition. A success story is that of SoftKinetic Sensors that resulted from VUB research in 3D time-of-flight imaging. In 6 years’ time it grew from 4 PhD students to 120 engineers delivering products for gesture recognition, car collision detectors, drone guidance, 3D face recognition etc. Big companies like Intel, Texas Instruments, Melexis collaborate with Softkinetic. SONY acquired the spin-off in 2015, renamed it to "SONY Depthsensing Solutions", and it has now become the center of gravity for all types of 3D imaging developed by SONY worldwide. Another outcome of research is licensing of patented results. PhD-students, supported by VUB professors and the research center IMEC, were the first to improve the brightness of Light Emitting Diodes (LEDs), increasing their efficiency from 3% to over 50%. Thanks to their work, old lamps can now be replaced by LED lamps that give the same brightness for one 10th of the power consumption. The knowhow and patents for these improvements were sold to a major LED manufacturer.
MASTER THESIS PROJECTS

In many of the courses a large emphasis is put on practical work, during both individual and group projects. Technological principles are first exercised during lab sessions under guidance of teaching assistants, followed by a project that has to be fulfilled in a small group and whereby a high level of perseverance and creativity is expected from the students. These small scale projects are very exemplary of what is expected from EE engineers in company and research environments. The master thesis is a larger project that requires the student to research or develop something completely new in an EE-field of his/her choice. Below you see the picture of a board that contains an analog chip that has been designed during such a master-thesis. The chip will be used for a novel medical imaging principle that is based on fluorescence lifetime imaging for locating tumors during surgery, aiding the surgeon.
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 Certificate of Advanced English (CAE), grade B
  - Cambridge Certificate of Proficiency in English (CPE), grade C

- 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

Direct enrolment for this study plan is possible if the applicant has obtained a bachelor degree in Engineering or Engineering Technology at VUB. Admission decisions for students from other institutions are based on evaluation of a complete application file. Students with a bachelor in the same field of study have direct access after the evaluation of their application file. Admission for holders of another engineering degree is based on evaluation and approval by the curriculum council.

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](http://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 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 €920/year. Some programmes have higher tuition fee 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](http://www.vub.be/en/tuition-fees)

Contact

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