MASTER OF SCIENCE IN
CHEMICAL & MATERIALS ENGINEERING

www.vub.be/chemical-materials-engineering
www.bruface.eu

120 ECTS
2020-2021
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 15,000 students, 21% of which are international students from more than 120 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.
Tackle environmental challenges and help build the future

Engineers in chemistry and materials sciences play a unique role in sustainable development. They manage resources, energy and the environment to develop and produce novel materials and chemical commodities. This master’s programme prepares you to face the demands of the modern technological employment field. With English as the working language, you are ready to start an international career and help shape the future.
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Integration of Process Technology and Materials
This master’s programme aims to train students to become engineers that shape the transition towards a sustainable society, in fields such as the petrochemical and materials industry, pharmaceutical industry, food industry, biotechnology, advanced materials processing and the recycling industry. The master's programme encompasses two distinct profiles: Process Technology and Materials. In the Process Technology profile, the student is trained to operate in production units, consultant engineering firms and the environmental sector. The Materials profile covers development, processing and application for different types of materials. The master's programme has a common core of 56 ECTS, ensuring a strong mutual interaction and integration between both profiles. The development of environmentally friendly and safe production processes for sustainable materials, the shaping and processing of materials into intermediate or finished products, and the optimal integration of materials in other disciplines are strongly related to the optimisation of environmentally friendly chemical processes in general.

Bruface: best of both worlds
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. 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.

Entrepreneurship
You can take up entrepreneurship-related courses, which are complementary to your education. During these courses, you’ll be introduced to business and economics, frameworks and tools for general management, human resource management, communication and teambuilding, marketing, and accounting. In short, everything a student with a nose for business initiative needs.

Internship
The internship is a 40- or 60-day period of training that offers students the chance to be actively involved in the professional world and gain engineering competences in real-life situations. You can take on an internship in a company in or outside Belgium, or in a laboratory or research institute outside Belgium. And what's more, your thesis research can be carried out with the company, lab or research institute you’re working at.

Study abroad: mobility window
The VUB curriculum of the first semester of the second master year can be replaced by an alternative programme worth 30 ECTS at a university abroad. This mobility window offers extra freedom and flexibility to tune the content of your curriculum with additional courses and research projects without delaying your study. It also gives you the chance to work with experts from other universities for your thesis research.
The programme is subject to change. 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.

### PROCESS TECHNOLOGY

The Process Technology profile prepares you to become an engineer who can be employed to design and manage production units (operation and optimisation of production facilities) in chemical and environmental industries. Alternatively, you could work in an engineering group, where you’d develop new sustainable production processes that meet performance specifications. The profile mainly focuses on the chemical industry, but also looks at biotechnology and the food industry. You’ll be trained to identify, solve and avoid environmental problems.

### MATERIALS

The Materials profile thoroughly prepares you for a job in the materials technology sector of metals, polymers, ceramics and composites. You’ll be trained to become a creative engineer, capable of designing sustainable and multi-functional materials for future and high-tech applications in civil, mechanical, and biomedical, engineering fields. You’ll also develop skills to engineer intermediate or finished products with these materials, using environmentally friendly and safe production processes.
RESEARCH @ VUB

ELECTROCHEMICAL AND SURFACE ENGINEERING: SURF

In the Group of Electrochemical and Surface Engineering - SURF - we focus on the research and development of materials (down to the nanoscale) and processes for sustainable and high performance applications, starting from surface engineering and electrochemical perspectives. New processing technologies like additive manufacturing of metals (3D / 4D printing), multifunctional and self-healing materials, performance of recycled metals, advanced solid-state batteries for renewable energy storage, materials’ degradation monitoring & prediction and corrosion protection, are some examples of research topics closely related to the needs of the industry like automotive and aerospace, electronics, ‘green’ energy... answering the call for a sustainable engineering future with a high societal, environmental and economic impact on a global scale.

PHYSICAL CHEMISTRY AND POLYMER SCIENCE: FYSC

The research of FYSC is focused on molecular and supramolecular structure-processing-property relations in synthetic, bio-based or natural polymers for developing sustainable materials with improved performance. A unique collection of physicochemical analytical techniques, characterisation and modelling procedures is available for this purpose. Novel macromolecular materials are designed by polymer synthesis, either in-house or with external partners. Main research topics are self-healing polymers, polymers for energy applications (organic solar cells, fuel cells), geopolymers, nano-structured (hybrid) polymers (polymer nanofibres, nanocomposites, thin polymer films on ‘solid’ substrates), stimuli-responsive systems (hydrogels, drug delivery systems) and reacting polymers (thermosets, kinetics and modelling).
A contribution to the international progress of advanced thermal analysis for materials’ characterisation is aimed at: this involves measuring transitions more sensitively, using faster techniques suitable for thin films and ultra-small samples performing spatially localized thermal analysis at the micro- and nanometre level and developing novel hyphenated thermal techniques permitting combinations of measurements on a single sample.

CHEMICAL ENGINEERING: CHIS

The CHIS research group is internationally reputed for its original and creative research in process technology and chemical engineering. In one aspect it studies the most advanced nanostructured porous solids for new or improved separation processes. In pursuit of ever better analytical separation and chromatography systems, the group aims at a better understanding of the methods and systems currently used to conduct (bio-)analytical separations, mainly high-performance liquid chromatography (HPLC) and capillary LC. Combining know-how of chemical engineering, precision and micro-machining technology, the group is also ideally positioned to develop novel devices and processes in the area of microfluidics and microreactor technology. Research is devoted to the development of sustainable chemical processes, e.g. for the production of renewable chemicals or CO2 capture and conversion. The research is supported by a strong activity in numerical modelling, both at the process level, and the mass transfer and reaction level.

Spin-off company: PharmaFluidics

Rooted in chemical engineering with advanced know-how in micro-fabrication technology, PharmaFluidics specialises in developing high-quality tailor-made solutions for any problem in the chemical and life sciences industry that would potentially benefit from miniaturization or fine material structuring.
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.

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

SPECIFIC ADMISSION CRITERIA
Admission of students from other institutions is evaluated through a complete application file. Students with a bachelor in the same field of study have direct access after the evaluation of their application file. Holders of another engineering degree must be approved 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
- 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

Contact
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