



KATHOLIEKE UNIVERSITEIT
LEUVEN



Master of Science in Chemical Engineering

Options:

- Process Engineering
- Product Engineering
- Environmental Engineering

Faculty of Engineering





The Master's programme in Chemical Engineering is primarily aimed at applying chemical engineering principles to develop technical products and to design, control and improve industrial processes. Consequently, the underlying chemistry of the elements and components, their properties and mutual reactions are not the main focal points of the programme. Students also learn to take environmental and safety issues into account during all phases of the process (research, development, design and operation). Two guiding principles of sustainable development – the rational exploitation of resources and energy, and the application of the best available technology – are emphasised, as well as the mantra “reduce, reuse, recycle”.

As a chemical engineering student, you will learn to think in a process-oriented manner and to grasp the complexity of physico-chemical systems. Even more than other specialists, you will be asked to solve problems of a very diverse nature. Insights into processes at the nano and micro scale are fundamental for the development of new products and/or (mega-scale) technologies.

The Department of Chemical Engineering attempts to integrate both classical and modern chemical technology in its education and research. More and more, the classical, process-oriented way of thinking is complemented with a modern, product-oriented approach. This, combined with the underlying rationale of sustainable development, yields the logic behind the programme's interdisciplinary and option-based curriculum. In addition to the core courses, students choose between Process Engineering, Product Engineering and Environmental Engineering, according to their interests and goals.

The chemical sector represents one of the most important economic sectors in Belgium. It provides about 90,000 direct and more than 150,000 indirect jobs. With a 53 billion euro turnover and a 35% share of the total Belgian export, the chemical sector is an indispensable part of the contemporary Belgian economy. In addition, the Antwerp Harbour region is, after Houston in the United States, the world's second most important chemical cluster. Hence, the future employment of the next generations of chemical engineers is guaranteed.

Admission requirements

Students holding the following degrees may apply directly:

- Bachelor of Science in Engineering: major Chemical Technology
- Bachelor of Science in Engineering: major Mechanical or Materials Engineering with a minor in Chemical Technology

Students holding the following degrees may apply after successfully completing a preparatory programme (12, 18 or 24 ECTS):

- All Bachelor of Science in Engineering degrees, with the exception of Architecture.

See: eng.kuleuven.be/onderwijs/tabel/intabelma

Important

The language of instruction for the Master's programme has recently changed from Dutch to English. Prospective students (including interested bachelors or masters in Industrial Sciences) are advised to contact the programme director for more information regarding the programme's (language) requirements.



The multi-disciplinarity of the curriculum and the focus on learning to work independently were the two most important aspects I remember and appreciate about the programme.

(John Dejaeger, K.U.Leuven Alumnus of the Master in Science in Chemical Technology)

Profile

The Master's programme in Chemical Engineering is envisioned as an advanced progression of the Bachelor's programme. A knowledge of the basic sciences (mathematics, physics, chemistry) is developed in the first part of the Bachelor's programme and a sound chemical-technological mindset is cultivated in the second part. Integral themes include transport phenomena (of mass, impulse and heat), separation processes, reactor engineering, chemical thermodynamics, environmental engineering, analytical chemistry and polymers.

The Master's programme builds on these areas. Based on interactions with the Industrial Advisory Board, composed of the most prominent industry leaders in the Flemish chemical sector, the programme opted for a broad core course block strengthened and fine-tuned in the second Master's year with an option-based course block. In the latter, students specialise in one of the three options: Product, Process or Environmental Engineering.

After completing the Master's programme, you will:

- possess a profound knowledge of thermodynamics, transport phenomena, physical and mechanical separation processes, reactor engineering, process optimisation and control, system analysis of chemical processes, bioprocess engineering, polymer engineering and analytical chemistry.
- have acquired knowledge and skills for the design of chemical production units and products.
- demonstrate dedicated awareness for the environment and safety.
- have acquired skills in the rational usage of resources, energy and the application of the best available technology.
- have gained sufficient skills and training to perform scientific research.
- have acquired the skills (i) to independently infer new insights into the design of new methodologies, (ii) to interpret results within the chemical engineering domain and (iii) to apply these skills in a research-related or industrial context.

Programma

The programme consists of five credit blocks with a combined total of 120 ECTS: i) General-interest courses (9 ECTS), ii) core courses (63 ECTS), iii) current trend courses (9 ECTS), iv) option-based courses (15 ECTS), and a Master's thesis (24 ECTS). The general interest courses enable you to develop yourself with respect to quality assurance, entrepreneurship and management skills. These courses have been conceived in accordance with the vision of the department's Industrial Advisory Board. The core courses block provides a broad knowledge base in chemical technology. The current trends block allows you to delve deeper into issues of contemporary importance in chemical engineering. In the option-based block, you choose one of the three options in accordance with your interests and goals. Finally, you complete a Master's thesis to round off the programme.

MASTER OF SCIENCE CHEMICAL ENGINEERING **120 credits**

COURSE CREDITS

General-interest courses **9**

These courses enable you to develop yourself with respect to quality assurance, entrepreneurship and management issues

Core courses **63**

• Transport Phenomena: Chemical Engineering Applications	6
• Applied Physical Chemistry	6
• Systems Analysis of Chemical Processes	6
• Advanced Separation Processes	3
• Chemical Process Design	4
• Analytical Chemistry	3
• Process Control in the Chemical Industry	6
• Biochemical Process Engineering	6
• Chemical Process Design: Practical Chemical Engineering Design Problem	5
• Hazardous Materials and Safety in the Process Industries	3
• Design and Analysis of Multiphase Reactors	3
• Management Challenges in the Chemical Industry	3
• Industrial Chemical Processes	6
• Materials Selection or Degradation and Corrosion	3

Current trend courses **9**

Choose 3 of the following 4 courses

• Exergy Route to Sustainable Chemistry	3
• Microbial Process Technology	3
• Process Intensification in the Chemical Industry	3
• Chemical Product Design	3

Option-based courses **15**

- Chemical and Biochemical Process Engineering
- Product Engineering
- Environmental Engineering

Master's Thesis **24**

For detailed descriptions of this programme's courses and for the course timetable, please consult www.kuleuven.be/coursecatalogue

Studying abroad

One or two semesters of the programme can be completed abroad in the context of the Erasmus programme. Additionally, you can apply for an industrial internship abroad through the departmental internship coordinator. Such internships take place between the third Bachelor's year and the first Master's year or between the two Master's years. New in this respect are upcoming exchange programmes with the University of Delaware.

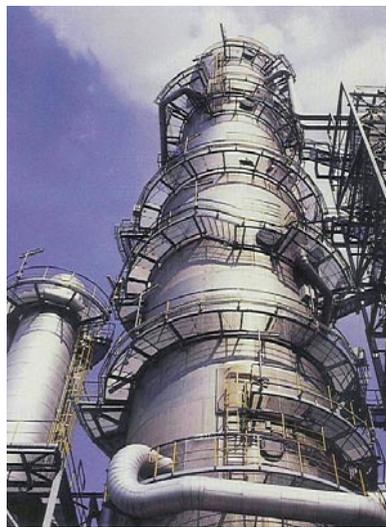
The Department of Chemical Engineering is actively involved in the Erasmus Mundus Education Engineering Rheology, which represents an extra asset for the students to explore the university education possibilities outside Belgium's borders.

The faculty's exchange programmes are complemented by the BEST-network, i.e., the Board of European Students of Technology. This student organisation offers the opportunity to follow short courses. The Faculty of Engineering also participates in international networks such as CESAER, CLUSTER and T.I.M.E. More info can be found at: www.kuleuven.be/studenten/buitenland/erasmus

I opted for the Master of Science in Chemical Technology within the Faculty of Engineering offered by the Department of Chemical Engineering. Specifically with Antwerp (and Flanders in general) as a world player in the (petro)chemical industry, I realised the significant added value the education at the Department of Chemical Engineering could offer me. Both the course content and the department's close contacts with industry were an asset for me. Much of the knowledge that I gained during my five years of study at the university has already been useful in my current job situation.

(Jurn De Cleyn, Facilities Planner at Exxon Mobil)





Career prospects

As a chemical engineer you will predominantly work in industrial branches involved in (the production of) bulk and specialty chemicals, oil and natural gas (petrochemical companies and refineries), non-ferrometallurgics, energy, waste treatment, food, cosmetics, pharmacy and biotechnology.

The following professional activities await you:

- design, planning and building of installations ('project engineer')
- monitoring and optimisation of existing processes ('process engineer')
- design/formulation and optimisation of products ('product engineer')
- R&D of technical products, processes and devices
- customer services, retailing ('sales engineer')
- management

Apart from these traditional career options, graduates of the Master's programme in Chemical Engineering are also much appreciated in other sectors for their insight in complex processes. This fact is reflected by jobs in the financial and governmental sector where chemical engineers are often employed to supervise industrial activities, to deliver permissions and to compose regulations with respect to safety and environmental issues. As self-employed persons, chemical engineers work in engineering offices or as consultants. Due to their often very dynamic personality, chemical engineers are often also quite successful as entrepreneurs.

Communications Office

Oude Markt 13 box 5005
BE-3000 LEUVEN, Belgium
tel. + 32 16 32 40 10 • fax + 32 16 32 40 14
onderwijscommunicatie@kuleuven.be
www.kuleuven.be

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Faculty of Engineering

Peter.VanPuyvelde@cit.kuleuven.be

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