MASTER OF SCIENCE IN PHARMACEUTICAL ENGINEERING

120 ECTS CREDITS - LANGUAGE: ENGLISH

WHAT

The Master of Science in Pharmaceutical Engineering (hereafter abbreviated as MPE) is an English-taught programme. It consists of 120 credits and is unique in Flanders and Belgium. The inflow in the master programme is provided from bachelor programmes in pharmaceutical sciences, bio-science engineering, chemistry, bio-industrial sciences and bioscience engineering technology (module biotechnology) and international students with similar previous education.

The way medicines have been produced during the last decades, is mainly based on inefficient, suboptimal and not very sustainable batch processes for which final product quality is evaluated via off-line laboratory testing conducted on limited randomly collected samples after production. The strict regulations for the production of medicines were also a “bottleneck” for manufacturing innovation. However, the legislative authorities (such as FDA, EMA) in the early 2000s urged to make (bio-) pharmaceutical manufacturing processes more science-based, more efficient, more flexible and based on in-process quality monitoring and control. The vision of the MPE programme is that pharmaceutical production processes of the future will (need to) undergo a major transition to be able to manufacture the increasingly complex and more tailor-made/personalized drug products. On the one hand the implementation of novel manufacturing concepts (e.g., switching from batch to continuous manufacturing) is needed and on the other hand a high degree of digitalisation and automation (implementation of “industry 4.0” concepts such as soft sensors and digital twins) is essential. It requires a combination of pharmaceutical and engineering knowledge and skills to develop these pharmaceutical production processes of the future for tomorrow’s drug products and supply needs. Hence, these transitions will lead to new job and skill requirements.

A Master in Pharmaceutical Engineering should be able to design and develop innovative, flexible, cost-efficient, automated and sustainable processes for the production of future complex and individualized drug products, enabling targeted delivery of the active molecules into the human body.

STRUCTURE

The Master of Science in Pharmaceutical Engineering is a two-year English-taught programme of 120 credits.

All holders of a bachelor's degree in pharmaceutical sciences, bio-science engineering, chemistry, bio-industrial sciences and bioscience engineering technology (module biotechnology) and international students with similar previous education can start the programme. Differences in starting competences, which are obvious and inevitable since students with different bachelor degrees can start the programme, are wiped out thanks to the wide range of courses. During the first year, the students are required to take up a partially different set of compulsory subjects, depending on the discipline of their preliminary bachelor education (see programme table). The fact that students from different bachelor programs will enter this master programme in pharmaceutical engineering, will only further promote its pharmaceutical-engineering interdisciplinary character.

The programme is built around specific learning paths leading to the profile of "pharmaceutical engineering":

- **Pharmaceutical process engineering**: this learning path includes the engineering of drug products and their associated processes. The student learns to develop and design drug manufacturing processes. Examples of courses within this learning path are process engineering, pharmaceutical technology,....
- **Sustainable and high quality pharmaceutical products**: students learn through this learning path to realize high-quality pharmaceutical products in a sustainable way. Examples of courses within this learning path are process analytical technology and quality-by-design, process control and automation, Clean Technology....
- **Data-to-decision**: this learning path includes experimental design for data collection, data analysis, mechanistic and data-driven modeling, optimization and process control, applied to unit processes as well as process trains for pharmaceutical manufacturing.
- **Research and innovation**: this learning path includes problem solving and critical thinking in the context of research tasks and projects to be carried out (e.g. master's dissertation) on topics related to 'pharmaceutical engineering', and this in collaboration with the pharmaceutical industry.

The dissertation makes up 30 credits of the master's programme. The dissertation starts in year 2 and spans it entirely.

Finally, also elective courses are foreseen within the

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programme giving students the opportunity to further explore their field of interest, encourage them to take responsibility and promote self-management.

LABOUR MARKET

Concerning outflow and employability, the pharmaceutical sector in Belgium states that there is an increasing need for people with combined pharmaceutical and engineering competences, as the drugs of the future are becoming more complex, more personalised and require new sustainable production methods and technologies.
The MPE integrates in one interdisciplinary programme the pharmaceutical and engineering knowledge available at UGent in the field of development of (innovative) pharmaceutical production technologies, methods and solutions on a scientific basis for small and large drug molecules and products. This interdisciplinary profile is necessary within the context of the regional, national and international pharmaceutical industry and companies and comes at their request. The industry is slowed down by a lack of personnel with appropriate skills. The necessary competences are too fragmented between the pharmaceutical and engineering programmes. To meet this need, the MPE programme is set up to create a unique profile that is immediately employable on the labour market.
Masters of Science in Pharmaceutical Engineering work in the pharmaceutical and biopharmaceutical industry and represent the link between drug development and production. They are involved, for example:

- in various stages of pharmaceutical product and process development
- quality assurance in production areas
- plant design
- the introduction of new production approaches & processes
- the introduction of industry 4.0 concepts (including automation and digitalization)
- all aspects of the plant planning and operation, such as economic efficiency and sustainable manufacturing

In R&D, they develop new methods and technologies for the production of new drug substances and drug products.

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FACULTY OF PHARMACEUTICAL SCIENCES

2026-27

TOELATINGSVOORWAARDEN VOOR HOUDERS VAN EEN VLAAMS DIPLOMA

1 **Rechtstreeks:**
- Bachelor in de bio-industriële wetenschappen
- Bachelor in de chemie
- Bachelor in de farmaceutische wetenschappen
- Bachelor of Environmental Technology
- Bachelor of Food Technology
- Bachelor of Molecular Biotechnology
- Een diploma van een opleiding 'Bachelor of Science in de bio-ingenieurswetenschappen'

2 **Rechtstreeks, na check door de inrichtende faculteit van formele toelatingsvereisten:**
- Bachelor in de biowetenschappen, op voorwaarde dat het door de student gevolgde curriculum een module 'biotechnologie' omvat

ADMISSION REQUIREMENTS FOR INTERNATIONAL DEGREE STUDENTS

International students holding a non-Flemish degree will have to check the admission requirements and the administrative procedure for admission on www.ugent.be/prospect/en/administration/enrolment-or-registration.
Students who wish to enrol for the Master of Science in Pharmaceutical Engineering can apply for the programme if they hold the following diploma: an academic diploma (at least 180 credits and/or 3 years of study) of Bachelor (or Master) of Science in in pharmaceutical sciences, bio-science engineering, chemistry, bio-industrial sciences and bioscience engineering technology (module biotechnology).
International students with similar previous education must be able to demonstrate through their transcripts that they received basic science training in the following fields: (i) Mathematics, and/or basic statistics; (ii) Physics; (iii) Organic chemistry; (iv) Biochemistry; (v) Inorganic chemistry; (vi) Analytical chemistry. Some lab experience is required too.
Admission can only be granted after an individual application procedure. The Study Programme Committee will make the final decision whether to accept the application or not.

LANGUAGE REQUIREMENTS

Language requirements Dutch: no language requirements

Language requirements for this study programme differ from the required standard level for English taught study programmes as specified in the Ghent University Education and Examination Code:
English:
- TOEFL 580 (paper-based)
- TOEFL 92 (internet-based)
- TOEFL 237 (computer-based)
- IELTS: 6.5

PRACTICAL INFORMATION

Study programme
studiekiezer.ugent.be/master-of-science-in-pharmaceutical-engineering-en/programma

Information sessions
EVOLV
evolv.gent/en/students/further-studies

Enrolling institution
Information on enrolment at Ghent University.

Application Deadline (for International degree students)
For students who **need a visa**: before 1st of April
For students who **do not need a visa**: before 1st of June
Read more

Tuition fee
More information is to be found on: www.ugent.be/tuitionfee

Master of Science in Pharmaceutical Engineering — Faculty of Bioscience Engineering — Ghent University (ugent.be)

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