MASTER OF SCIENCE IN SUSTAINABLE MATERIALS ENGINEERING

MAJORS: METAL SCIENCE AND ENGINEERING - POLYMEREN EN VEZELSTRUCTUREN (DUTCH PROGRAMME)

120 ECTS CREDITS - LANGUAGE: ENGLISH

The Faculty of Engineering and Architecture (FEA) offers most of its Engineering programmes at Master's level in English. This underlines the international ambition of the faculty, as well as the importance of an international education and multiple language skills for students.

WHAT

The Master of Science in Sustainable Materials Engineering aims at the study of the extraction, production, processing, properties, sustainable use and recycling of a whole range of materials. This implies (i) the description and modelling of material properties, specifically for the chemical, mechanical and thermal production and processing aspects in materials engineering, (ii) the effect of the chemical composition and processing conditions on the structure and the properties of materials in view of optimal performance and application, and, (iii) the behavior, durability and degradation of materials in different environmental conditions. Dealing with the limited resource availability worldwide in a sustainable way is an important objective of the programme. These concepts are applied to various important materials: metals, polymers, textiles, and composites.

STRUCTURE

The curriculum comprises four parts: (i) general compulsory course units, (ii) a choice between two majors to allow specialisation in a particular field of materials engineering, (iii) elective course units, and, (iv) the Master's dissertation. The general compulsory course units focus on material sciences, specific material types, material structure/property relations and performance analysis, and production and processing technology. These course units lay the foundation for every materials engineer. The course units are also in line with the specific (regional) sectors such as the metallurgical and the plastics/textile industry. Throughout the course units, the aspects of sustainability are addressed and new technologies are discussed, allowing future engineers to develop more eco-friendly materials and processes. Among other things, we cover and/or foster:

- the development of innovative and light-weight materials used in e.g. constructions and vehicles where stringent safety requirements apply;
- the optimisation of chemical composition and processing of metals and polymers, and, an understanding of fundamental properties of the different materials, how they relate to the material structure and how these are affected during processing;
- the simulation of material properties and subsequent interpretation of the outcome of such simulations;
- an understanding of why a material degrades with time and due to environmental influences, and how surface engineering can increase its life span;
- how to process metals from secondary sources (such as scrap or e-waste) that are just as high-performing as metals produced from primary raw materials (ores);
- etc.

In the second year, students can choose between two majors to specialise further in one material group. **The Metal Science and Engineering major** focuses on metals with an emphasis on atomistic and microscopic understanding, modelling of microstructural processes and material properties and a further deep-dive into sustainable metal processing. **The Polymer and Fibre Engineering major** focuses on polymers and textiles with an emphasis on polymer processing and recycling technologies, colouring and finishing of fibres and a deep-dive into technical and functional textiles.
The **elective course units** offer the possibility to concentrate further on specific topics such as ecology, nanotechnology, smart materials, etc. The curriculum also leaves room for a **minor** (18 credits), which students can choose as part of the electives: Operations Management, Environment and Sustainable Development and Automotive Production Engineering. The electives also offer students the option of a research work placement or an industrial work placement at a company. This is a good way to get to know the different types of material engineers and their day-to-day job content.
Finally, there is the **Master's dissertation**. Since the programme is strongly embedded in different materials research groups at our the faculty, you will also get a taste of the ongoing research activities in the discipline as well as get updated on state-of-the-art topics. The best way to illustrate this is our extensive list of dissertation topics, ranging from experimental to modelling work and from metals to textiles, all of them in line with the current research activities. The Master's dissertation stimulates

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independent and critical thinking and enhances project management skills.

LABOUR MARKET

Masters in Sustainable Materials Engineering – like all other engineers– have a wide range of career possibilities. The demand for engineers exceeds the number of graduates available, including material science engineers. Graduates have careers in the industry, public service or scientific research.
Fundamental and applied scientific research focuses on the properties, the behaviour, the processing and the production of different types of materials, such as metals, synthetic materials, ceramics, composites and 'new' materials. Others analyse and optimise existing or new production and processing methods. Researchers can work at academic and industrial research centres. In the industry, material science engineers have technical, commercial or management positions.
The innovation and development of advanced products for new markets and the application of new technologies are essential for a healthy industry. Traditional and new important industrial sectors for experts in materials are: the metal industry, the polymer and textile industry, both production and processing such as recycling of metals or polymers, assembly plants, component producers, chemical companies (e.g. corrosion or process engineer and material selection), machine manufacturers, micro-electronics companies (semiconductors), supervisory bodies and centres of expertise (material properties and study of insurance claims), packaging, transport (e.g. composites), pharmacy, agriculture, etc.
Material science engineers often work along mechanical engineers, architects or chemists but have a specific complementary profile which is of vital importance in the implementation of engineering projects. They hold leading positions in the development, production and sales of high-value materials.

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TOELATINGSVOORWAARDEN VOOR HOUDERS VAN EEN VLAAMS DIPLOMA

1 **Rechtstreeks:**

a opleidingen nieuwe structuur:

- Bachelor in de ingenieurswetenschappen, afstudeerrichting: chemie en materialen
- Bachelor in de ingenieurswetenschappen, afstudeerrichting: chemische technologie
- Bachelor in de ingenieurswetenschappen, afstudeerrichting: chemische technologie en materiaalkunde
- Bachelor in de ingenieurswetenschappen, afstudeerrichting: materiaalkunde
- Bachelor in de ingenieurswetenschappen: chemische technologie en materiaalkunde
- Master in de ingenieurswetenschappen: bouwkunde
- Master in de ingenieurswetenschappen: chemische technologie
- Master in de ingenieurswetenschappen: toegepaste natuurkunde
- Master in de ingenieurswetenschappen: werktuigkunde-elektrotechniek, afstudeerrichting: mechanische constructie
- Master in de ingenieurswetenschappen: werktuigkunde-elektrotechniek, afstudeerrichting: mechanische energietechniek
- Master of Chemical Engineering
- Master of Civil Engineering
- Master of Electromechanical Engineering, afstudeerrichting: Mechanical Construction
- Master of Electromechanical Engineering, afstudeerrichting: Mechanical Energy Engineering
- Master of Engineering Physics

b opleidingen oude structuur:

- Burgerlijk bouwkundig ingenieur
- Burgerlijk natuurkundig ingenieur
- Burgerlijk scheikundig ingenieur

2 **Rechtstreeks, na check door de inrichtende faculteit van formele toelatingsvereisten:**

a opleidingen nieuwe structuur:

- Bachelor in de ingenieurswetenschappen, afstudeerrichting: elektrotechniek nevenrichting: materiaalkunde
- Bachelor in de ingenieurswetenschappen, afstudeerrichting: geotechniek en mijnbouwkunde nevenrichting: materiaalkunde

b opleidingen oude structuur:

- Burgerlijk werktuigkundig-elektrotechnisch ingenieur op voorwaarde dat uit het diplomasupplement blijkt dat de student een zwaartepunt mechanica gevolgd heeft.

3 **Na het met succes voltooien van een voorbereidingsprogramma:**

MIN 39 SP - MAX 90 SP

- Bachelor in de bio-industriële wetenschappen
- Bachelor in de bio-ingenieurswetenschappen
- Bachelor in de biochemie en de biotechnologie
- Bachelor in de chemie
- Bachelor in de fysica
- Bachelor in de fysica en de sterrenkunde
- Bachelor in de industriële wetenschappen, afstudeerrichting: chemie
- Bachelor in de industriële wetenschappen, afstudeerrichting: elektromechanica
- Bachelor in de industriële wetenschappen: chemie
- Bachelor in de industriële wetenschappen: elektromechanica
- Bachelor in de industriële wetenschappen: kunststofverwerking
- Bachelor in de industriële wetenschappen: textieltechnologie
- Bachelor in de ingenieurswetenschappen (KMS)
- Bachelor in de wiskunde
- Bachelor of Engineering Technology, afstudeerrichting: Chemical Engineering
- Bachelor of Engineering Technology, afstudeerrichting: Electromechanical Engineering
- Een diploma van een opleiding 'Bachelor of Science in de ingenieurswetenschappen' (met inbegrip van 'architectuur')
- Master in de industriële wetenschappen: industrieel ontwerpen

4 **Rechtstreekse toelating voor het volgen van een brugprogramma (horizontale instroom):**

a opleidingen nieuwe structuur:

- Master in de chemie
- Master in de fysica
- Master in de fysica en de sterrenkunde

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- Master in de industriële wetenschappen: chemie
- Master in de industriële wetenschappen: elektromechanica
- Master in de industriële wetenschappen: textieltechnologie
- Master in de nanowetenschappen en de nanotechnologie
- Master in de nanowetenschappen, nanotechnologie en nano-engineering
- Master in de nanowetenschappen, nanotechnologie en nano-engineering
- Master in de welding engineering
- Master of Chemical Engineering Technology
- Master of Chemistry
- Master of Electromechanical Engineering Technology
- Master of Nuclear Engineering
- Master of Physics
- Master of Welding Engineering

b opleidingen oude structuur:

- Industrieel ingenieur in chemie
- Industrieel ingenieur in elektromechanica
- Industrieel ingenieur in textiel
- Licentiaat in de natuurkunde
- Licentiaat in de scheikunde

ADMISSION REQUIREMENTS FOR INTERNATIONAL DEGREE STUDENTS

Students who wish to enrol for the Master of Science in Sustainable Materials Engineering can enter the programme without any prerequisites if they hold the following diploma: an academic diploma of Bachelor (or Master) of Science in Engineering (university level, minimum of three years), with the main subject in Chemical Engineering and/or Materials Science and/or Civil Engineering and/or Engineering Physics and/or Electromechanical Engineering, or an equivalent to this.
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. The Study Programme Committee can decide that students need to follow a preparatory course or an individual master's programme, for instance for students who hold another diploma of Bachelor or Master.

Information on admission requirements and the administrative procedure for admission on the basis of a diploma obtained abroad, can be found on the following page: www.ugent.be/prospect/en/administration/enrolment-or-registration.

LANGUAGE REQUIREMENTS

Language requirements	Dutch: no language requirements English: CEFR level B2

The language requirements for this study programme can be found on: www.ugent.be/languagerequirements

PRACTICAL INFORMATION

Study programme

studiekiezer.ugent.be/master-of-science-in-sustainable-materials-engineering-en/programma

Information sessions

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

Open Days
26 April 2022 17u00 - 19u00 - Ufo, Campus Ufo, Sint-Pietersnieuwstraat 33, Gent

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

Contact
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course website