

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 the Master's programmes in Engineering in English. This underlines the international ambition of the faculty, as well as the importance of international education and multiple language skills for students.

WHAT

The programme Master of Science in Materials Engineering: sustainable materials aims at the study of properties, production or extraction, processing, use and recycling of a whole range of materials. This implies:

- description and modelling of properties of material
- chemical, mechanical and thermal processing aspects in materials engineering
- effect of the chemical composition and processing conditions on the structure and properties of materials in view of optimal performance
- behaviour of materials in different user circumstances and how degradation can be limited.

Dealing with limited resource availability worldwide in a sustainable way is an important objective of the programme. Important materials dealt with are metals, synthetic materials, textiles, composites and ceramics.

STRUCTURE

In order to specialise in specific types of materials, students can choose between two majors.

The major **Metal Science and Engineering** focuses on metals with an emphasis on understanding and developing innovative, light metals used in constructions where these metals have to fulfil increasingly stringent safety requirements. Both optimization of the chemical composition (alloy formation) and processing are discussed in detail. Ceramic materials are also highlighted. The concept of sustainability is addressed. On the one hand, the student will acquire knowledge to understand why a material deteriorates and how surface engineering can increase its life span. On the other hand, you will learn to process metals from secondary sources, such as scrap or e-waste, and will understand that metals can be produced that are equally performing as metals produced from primary raw materials (ores). Further, emphasis is put on modelling. You will become familiar with the available options to simulate the material properties and their evolution and subsequently will learn to adequately interpret the outcome of these simulations.

The Major **Polymer and Fibre Engineering** focuses on polymers, fibres and fibre-based materials such as textiles or composites. The programme covers these materials, both natural and man-made, and their physical, chemical and

mechanical processing and treatment. Emphasis is put on understanding the fundamental properties and behaviour of the different materials, how they relate to the material structure, and on understanding processing technology and sustainable engineering. You will learn about additives and colourants and dyes, which are used to give polymers and textile-based materials a specific aesthetic and better or even new properties (flame retardancy, crease resistance, antibacterial, soil resistance...), thus creating added value. As such, you obtain an understanding of textile materials and processes with special attention for the development of products with specific functionalities. You will acquire knowledge on new technologies such as nanotechnology and bio-based materials and processes. A specific type of functional materials relates to intelligent (interactive) textile materials. In addition, thematic clusters of elective courses offer students the possibility to concentrate further on specific materials (possibly from the other Major), or on specific themes such as ecology, nanotechnology, smart materials, chemistry or business-oriented technical and non-technical topics.

In both majors students have two possibilities: either an advanced programme of materials sciences or a more broad approach (by choosing a Minor) which – next to a thorough study of materials science – gives the opportunity to specialise in one of the following fields: Management, Environment and Sustainable Development, Automotive Production Engineering.

LABOUR MARKET

Graduates (Masters in Materials Engineering) – like all other engineers (Masters in Engineering) – have a wide range of possibilities. The demand for engineers (MSc in Engineering) exceeds the number of graduates available including material science engineers. Graduates have careers in industry, public service or scientific research. Fundamental and applied scientific research concentrates 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 in academic and industrial research centres. In industry, material science engineers have technical, commercial or management positions.

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

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engineer and material selection), machine manufacturers, micro-electronics companies (semiconductors), supervisory bodies and expertise centres (material properties and study of insurance claims), packaging, transport (e.g. composites), pharmacy, agriculture... Material science engineers often work along with mechanical engineers, architects or chemists but have a specific complementary profile which is of vital importance in the implementation of engineering projects. Innovation and development of advanced products for new markets and the application of new technologies are essential for a healthy industry. This requires an increasing number of Masters in Engineering with a specialisation in Materials Engineering. 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
- 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

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- 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

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/admission

Additional information:

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.

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

Information sessions

Graduation Fair

afstudeerbeurs.ugent/en/students/further-studies

Open Days

30 April 2021 - - virtual tours

Application deadline

For students who **need a visa**: 1st of March

For students who **do not need a visa**: 1st of June

[Read more](#)

Tuition fee

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

Contact (for international degree students)

International Relations Officer

+32 9 264 36 99

internationallea@ugent.be

PRACTICAL INFORMATION

Study programme

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