MASTER OF SCIENCE IN SUSTAINABLE MATERIALS ENGINEERING

MAJORS: METAL SCIENCE AND ENGINEERING – POLYMERS AND FIBRE STRUCTURES
MINORS: OPERATIONS MANAGEMENT - ENVIRONMENT AND SUSTAINABLE DEVELOPMENT – AUTOMOTIVE PRODUCTION ENGINEERING

120 ECTS CREDITS – LANGUAGE: ENGLISH – DEGREE: MASTER OF SCIENCE

COURSE CONTENT

The programme Master of Science in Sustainable Materials Engineering encompasses 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 materials

- chemical, mechanical and thermal processing aspects in materials engineering
- influence 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 course. Important materials dealt with are metals, synthetic materials, textiles, composites and ceramics.
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 optimisation 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, the student 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. The student 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 **Polymers and Fibre Structures** focuses on fibre based structures. Polymers are the main raw material of fibres, next to ceramic and mineral materials. The programme covers the materials and their physical, chemical and mechanical processing and treatment. Emphasis is put on the technology, the behaviour of the fibres and yarns during processing and the fundamental properties of the structures. By providing a physical or chemical after treatment to textile materials, additional properties (added value) can be achieved. The theory of colour, colour formation and perception and the treatment of different dye types including their application are described. As such, students obtain an understanding of textile materials and processes with special attention for the development of products with specific functionalities (flame retardant, crease resistant, antibacterial, soil resistant ...). Nanotechnology and biotechnological materials and processes are discussed. A lot of attention is paid to the development of artificial turf for sports and other recreational purposes. A specific type of functional materials relates to intelligent (interactive) textile materials. Opposite to the other Major, the courses are partially taught in Dutch, partially in English.

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.

COURSE STRUCTURE

Both options offer students 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.

CAREER PERSPECTIVES

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, both production and processing such as recycling of metals, assembly plants, chemical companies (corrosion or process engineer and material selection), machine manufacturers, micro-electronics companies (semiconductors), supervisory bodies and expertise centres (material properties and study of insurance claims) ...
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.
Textiles and polymers also belong to materials engineering. The textile and clothing sector is still one of the main industries and a growing sector. 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 sale of advanced textile materials. Such textile materials are used in almost all industries, from beverages and food to foams, electronics, pharmacy, medicine, agriculture, transport (e.g. composites) etc. In these industries, job opportunities are available for material science engineers as well.

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TOELATINGSVOORWAARDEN VOOR HOUDERS VAN EEN VLAAMS DIPLOMA

Rechtstreeks:
- Ba ingenieurswetenschappen: chemische technologie en materiaalkunde
- Ba ingenieurswetenschappen, afstudeerrichting chemische technologie
- Ba ingenieurswetenschappen, afstudeerrichting materiaalkunde
- Ba ingenieurswetenschappen: afstudeerrichting elektrotechniek, nevenrichting materiaalkunde
- Ba ingenieurswetenschappen, afstudeerrichting geotechniek en mijnbouwkunde, nevenrichting materiaalkunde
- Ba ingenieurswetenschappen, afstudeerrichting: chemie en materialen
- Ma ingenieurswetenschappen: bouwkunde / MSc in Civil Engineering
- Ma ingenieurswetenschappen: chemische technologie / MSc in Chemical Engineering
- Ma ingenieurswetenschappen: toegepaste natuurkunde / MSc in Engineering Physics
- Ma ingenieurswetenschappen: werktuigkunde-elektrotechniek, afstudeerrichting: mechanische energietechniek / MSc in Electromechanical Engineering, main subject: Mechanical Energy Engineering
- Ma ingenieurswetenschappen: werktuigkunde-elektrotechniek, afstudeerrichting: mechanische constructie / MSc in Electromechanical Engineering, main subject: Mechanical Construction

  opleiding(en) oude structuur:
  - burgerlijk bouwkundig ingenieur,
  - burgerlijk scheikundig ingenieur
  - burgerlijk natuurkundig ingenieur
  - burgerlijk werktuigkundig-elektrotechnisch ingenieur, indien zwaartepunt mechanica gevolgd werd

Rechtstreeks: (naar brugprogramma - 120 studiepunten)
- Ma fysica en sterrenkunde
- Ma fysica
- Ma chemie
- Ma in Chemistry
- Ma nanowetenschappen en nanotechnologie
- Ma industriële wetenschappen:
  - textieltechnologie
  - chemie
  - elektromechanica
- Ma of Welding Engineering
- Ma of Nuclear Engineering

  opleiding(en) oude structuur:
  - licentiaat natuurkunde
  - licentiaat scheikunde
  - industrieel ingenieur textiel
  - industrieel ingenieur chemie
  - industrieel ingenieur elektromechanica

Via voorbereidingsprogramma: (max. 90 studiepunten)
- (andere) Ba ingenieurswetenschappen ((incl. Ba ir.wet., architectuur)
- Ba bio-ingenieurswetenschappen
- Ba fysica en sterrenkunde
- Ba fysica
- Ba chemie
- Ba wiskunde
- Ba biochemie en biotechnologie
- Ba biochemie
- Ba industriële wetenschappen:
  - textieltechnologie
  - chemie
  - afstudeerrichting chemie
  - elektromechanica
  - afstudeerrichting elektromechanica
  - kunststofverwerking
- Ba ingenieurswetenschappen (KMS)

TAAL
Je voldoet aan de taalvoorwaarden op basis van je Vlaams diploma.

PRAKTISCHE INFORMATIE

Studieprogramma:
https://studiegids.ugent.be
> faculteiten > opleidingstypes > ga naar de opleiding van je keuze

Alternatieve trajecten
Meer informatie over voorbereidings- en brugprogramma's op www.ugent.be/ea
volg > alles voor toekomstige studenten > voor wie al een diploma heeft

Infomomenten
Masterbeurs
www.ugent.be/masterbeurs
Opleidingsgebonden infosessie
18 april 2018 - 17 u.-19 u. doorlopend, Campus Ufo, Ufo, Sint-Pietersnieuwstraat 33 - Foyer
www.ugent.be/nl/studeren/masteropleidingen

Contact
Trajectbegeleiding:
studietrajectplateau.ea@ugent.be

Meer info
Afdeling Studieadvies – Campus Ufo, Ufo,
Sint-Pietersnieuwstraat 33, 9000 Gent, T 09 331 00 31
studieadvies@ugent.be – www.ugent.be/studieadvies

GHENT UNIVERSITY

FACULTY OF ENGINEERING AND ARCHITECTURE

2018–19

EA04

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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.

LANGUAGE

More information regarding the required knowledge of English:
www.ugent.be/languagerequirements

PRACTICAL INFORMATION

Study programme

www.ugent.be/coursecatalogue
> by Faculty > Programme types > select your programme

Application deadline for international students

- for students who need a visa: 1st of March
- for students who do not need a visa: 1st of June

www.ugent.be/deadline

Enrolling institution

Ghent University

Tuition fee

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

Contact
Faculty of Engineering and Architecture
International Relations Officer – Degree students
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