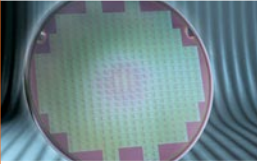




KATHOLIEKE UNIVERSITEIT
LEUVEN



Master of Engineering: Materials Engineering

Options:

- Metals and Ceramics
- Polymers and Composites
- Materials for Nanotechnology

Faculty of Engineering



Master of Engineering: Materials Engineering

Materials are at the heart of our quality of life and economic welfare, and will become even more so in the future, considering our need for a sustainable world and the intelligent use of resources. Materials engineers invent, design, make and use materials for products, processes and services and they deploy these activities based on an in-depth understanding of materials processing, the structure of materials and materials properties, including the intricate relationships between them.



The Faculty of Engineering of the Katholieke Universiteit Leuven organises a two-year Master of Materials Engineering.

The programme offers three options: **Metals and Ceramics, Polymers and Composites and Materials for Nanotechnology**. The programme is composed of a set of core courses covering both the fundamentals and principles of materials science and engineering

in combination with more specialised option-specific courses and a number of electives.



The materials engineering programme also offers ample opportunity to develop strong analytical skills and problem-solving abilities, for example through the incorporation of case studies and mini-projects that familiarise the student with the development, processing, characterisation and evaluation

of the most important material families: metals, ceramics, polymers and composites. Moreover, practical experience will be gained in advanced material characterisation and evaluation techniques. In the Master's Thesis project, the student can apply his/her knowledge to a research topic of choice. These topics are usually embedded in a cutting edge research project in co-operation with other institutions and industrial companies.

Graduates with a Master's degree of Materials Engineering play a crucial role in the fields of materials research and development, materials production and materials recycling.

The organising department

The department of Metallurgy and Materials Engineering (MTM) (www.mtm.kuleuven.be/index_E.html) is involved in several strategic fields of materials research and development: advanced alloys and production processes, ceramics, nanomaterials, high temperature processing of liquid metals, intermetallics, polymers and composites, computational thermodynamics, deformation processing, materials performance and degradation, non-destructive testing, surface engineering, biomaterials and nanomaterials. A healthy mix of people working both in experimental and computational materials science makes it a very dynamic place (currently about sixty PhD students and twenty post-doctoral fellows, with a majority of international researchers). The department operates as one unit with one departmental manager and a high level infrastructure. MTM is also the driving force of the Leuven Materials Research Centre (Leuven MRC) (www.leuvenmrc.be).

Facilities, activities, and social events



- Industrial visits
- Computer and wifi internet facilities
- Campus library across the road in a beautiful and historical environment
- Unique research environment and infrastructure
- Social activities: soccer, squash, film, bowling, barbecue, parties, etc.

Admission requirements

Direct access:

- Bachelor in de ingenieurswetenschappen: materiaalkunde
- Bachelor in de ingenieurswetenschappen: elektrotechniek / geotechniek en mijnbouw / werktuigkunde / chemische technologie, met nevenrichting materiaalkunde

Admission decisions are based upon evaluation of a complete application file:

- Bachelor of Applied Sciences; Bachelor of Engineering

Students with a good command of English, both spoken and written, can successfully complete the programme. Applicants are required to demonstrate their proficiency in English, either by proving that some of their previous studies were successfully completed in English, or by submitting the results of a recognized language proficiency test or another equivalent English test: TOEFL test (score of 580 (paper based test), 237 (computer based test) or 92 (internet based test)), IELTS (6.5-7 pt).



Profile

Students strongly motivated to pursue a career in materials science and engineering or heading for industrial sectors dealing with materials and who hold a basic three or four year Bachelor's degree in one of the engineering or physical sciences can apply for the programme.

The programme relies on the basics of materials science: i.e., physics, mathematics, and chemistry. Courses on physical, mechanical, and chemical properties of materials and on thermodynamics are prerequisites for the Master's programme. Transition courses, however, are organised for those who have followed a Bachelor's programme that did not provide these fundamental courses.

Our Master's programme provides the sound scientific knowledge needed for our graduates to excel in the development and evaluation of new materials and processes applicable in the wide field of materials science and engineering. Additionally, communication, presentation and social skills will be honed in an international environment.

Programme

Time frame

The programme covers two full academic years, each starting in the last week of September and finishing in the first week of July. First-semester classes end in the third week of December, followed by a two-week break, a one-week study period and a three-week examination period. After a one-week break, second-semester classes start in the second week of February and continue until the last week of May (with a two-week break at Easter), followed by a two-week study period and a four-week examination period. The re-sit period covers the last two weeks of August and the first two weeks of September.

Full or half-time

The Master of Engineering: Materials Engineering programme is a two-year programme leading to the degree of Master of Materials Engineering. The programme can be followed on a full- or half-time basis.

Metals and Ceramics

New and advanced metallic and ceramic materials are being developed in response to the growing demands of a knowledge-based society and industry. The automotive, energy, aerospace and biomedical industries require new materials for structural (car bodies, turbines, aircraft, prostheses, etc.) as well as functional (transformers, sensors, actuators, fuel cells, batteries, etc.) applications. Materials research is also a key factor for progress in the fields of microelectronics and nanotechnology. The development of the next generation of opto-electronic components, solar cells, fuel cells and sensors, for example, poses severe materials challenges.

The Metals & Ceramics option of the Master's programme is geared towards educating young people who want to participate in this developmental process as researchers, development engineers or production engineers. The programme focuses on the basic concepts as well as on the emerging trends in materials engineering and covers the development of materials, the study of material properties, optimising processing routes, as well as characterisation and evaluation of final products. Special attention is given to biomaterials, joining techniques, surface technology, physical properties, quality control, non-destructive testing and recycling of materials. Students will be involved in current case studies and will learn to apply computer modelling to new materials and processing techniques. The programme is embedded in the Department of Metallurgy and Materials Engineering, which has longstanding experience in the metals and ceramics field and enjoys close links with industrial partners in many national and international projects. Students will have frequent contact with industrial partners through plant visits, practical exercises and a Master's thesis.

Polymers and Composites

The Polymers & Composites option is rooted in the EUPOCO programme founded in 1991 as a collaborative initiative involving six leading European universities: Katholieke Universiteit Leuven, Université Catholique de Louvain-la-Neuve, Ecole Des Mines Paris, Technische Universiteit Delft, Rheinisch-Westfälische Technische Hochschule Aachen and Imperial College London. During the past fifteen years, more than 250 Master's students from more than twenty-five different countries have followed the programme. The basic characteristics of the EUPOCO programme will be maintained in the Polymers & Composites option, which again involves lecturers from the universities of Leuven, Louvain-la-Neuve, Aachen or Delft. The programme is unique because it covers both polymers and composites, preparing students for a career in the polymer and composites processing industry as well as in the aerospace, automotive and sports industries, which are each increasingly using advanced composites. The subject matter in the polymers and composites courses ranges from fundamental theory to the most advanced characterisation, processing, and simulation methods and from commodity polymers to nano-composites.

Materials for Nanotechnology

The world of small dimensions remains a source of fascination for scientists and engineers alike. In the words of the Nobel laureate Richard Feynman: 'There is plenty of room at the bottom'. The progress in domains such as nanostructured materials, nano-electronics and nano-electromechanical systems (NEMS) occur at a fast pace and are introduced in numerous applications in ICT, transport, energy production and storage, biomedical technologies, etc. Materials engineers and scientists are extremely well positioned to move the boundaries of our knowledge and capabilities in these domains: the strategies and insights that are used to develop advanced materials are also used in nano-electronics or NEMS. Materials engineers are therefore recruited heavily by cutting-edge and world-class companies such as IMEC, Siemens and Philips.

MASTER OF ENGINEERING: MATERIALS ENGINEERING **120**COURSES **CREDITS****General educational courses** **9****Core courses** **45**

- Degradation and corrosion 3
- Metals: production and recycling 6
- Advanced metal processing & case studies 6
- Materials characterisation techniques I 6
- Ceramics and powder metallurgy 6
- Finite elements modelling 3
- Chemical materials science II 3
- Materials selection 3
- Design and analysis of experimentation 3
- Project work and problem solving 6

Option **42****Metals & Ceramics**

- Option-specific courses 15
 - Solidification phenomena
 - Joining techniques
 - Coatings and surface engineering
 - Functional properties
 - Quality control and non-destructive testing
- Option broadening courses 27

Polymers & Composites

- Option-specific courses 15
 - Polymer processing techniques
 - Process technology of composites
 - Engineering with composites & case studies
 - Polymer composites II
- Option broadening courses 27

Materials for Nanotechnology

- Option-specific courses 15
 - Surface engineering
 - Functional properties
 - Solid state physics
 - Nanomaterials for nanotechnology
 - Materials characterisation techniques II
- Option broadening courses 27

Master's thesis **24**

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

The core courses provide a good insight into the characterisation and modelling techniques as well as into materials production and transformation. The option-specific courses are directed toward the nano-technology field and there is a wide range of elective courses to allow the student to select either nanotechnology related or broadening courses.

Master's thesis

A Master's thesis project will be carried out during the second year at the MTM Department as part of new or ongoing research projects and often in collaboration with industry or external research institutions. A thesis text is due by the end of the second year and the results are to be presented orally to the professors, assistants and fellow students.

Practical information

Application instructions for international students

Applicants must fill in the online application form (www.kuleuven.be/applicationform), print it out and send it, along with the documents requested, to the International Admissions and Mobility Office by regular mail, express mail, or registered mail.

International Admissions and Mobility (IAM)

Atrecht College, Naamsestraat 63 bus 5410
3000 LEUVEN, Belgium

Applications via e-mail or fax will not be accepted. Please add a photocopy of the complete file. Due to the formalities involved in preparing visa applications, non-European

students should apply before 1 March at the latest. European students, for whom the application procedure is simpler and shorter, should apply preferably before 1 June. More detailed information can be found at www.kuleuven.be/english/admissions/master.

Tuition fees

The tuition fees per academic year for Master's degree students may be consulted at www.kuleuven.be/registration/fees. Students also need to fund their own accommodation and living expenses. Information on the general funding schemes at K.U.Leuven can be found on the university's website in the funding section of 'Living in Leuven' (www.kuleuven.be/english/living), where ample information can also be found concerning the cost of living in Leuven.

Career prospects

Graduates with a Master's degree in materials engineering have access to a wide range of engineering sectors. Prominent economy driving industries such as the automotive, aerospace, energy, microelectronics, and chemical industries, and emerging sectors such as nano-technology, biomaterials, and recycling are keen to hire qualified and talented people with a focus on materials.

The materials engineer may be oriented as a process engineer, material or product developer, design specialist, quality control engineer or consultant, whereas Master's graduates with an interest in research can apply for a R&D position or start a PhD. Several alumni have also started their own companies.

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More information

Visit this programme's website at <http://sirius.mtm.kuleuven.be/MME/>

www.kuleuven.be/ma/MME

General information

International programmes: www.kuleuven.be/internationalprogrammes

International Office: www.kuleuven.be/english

Master of Materials Engineering Office

MME Office

Phone: + 32 16 32 13 14

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This brochure provides the most complete information available for this Master's programme offered by K.U.Leuven during the 2010-2011 academic year. However, small changes to the composition of the programmes may be approved after the publication of this brochure. In no way is the university legally bound by the information provided in this brochure. The most recent information on all our academic programmes can be consulted on www.kuleuven.be/onderwijs/aanbod/opleidingen/E.

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