Master of Science in Biomedical Engineering

Faculty of Engineering Science
Master of Science in Biomedical Engineering

The role of technology in contemporary medicine has evolved considerably over the past decades. Computers and other high-tech devices are essential in hospitals, rehabilitation centres and private medical practices. Moreover, engineering breakthroughs have increased our fundamental insight into the functioning of the human body, tissue generation and regeneration, physiological processes and locomotion.

The Master of Science in Biomedical Engineering provides students with a state-of-the-art overview of all areas of biomedical engineering: biomechanics, biomaterials, medical sensors and signal processing, medical imaging and tissue engineering. The teaching curriculum builds on the top-class research conducted by the faculty, most of whom are members of the Leuven Medical Technology Centre. This network facilitates industrial fellowships for our students and coordinates design projects and Master's theses completed in cooperation with industry partners and as well as in internationally recognised research labs.

Biomedical engineers are trained to integrate engineering science with basic medical knowledge. This competence is developed in coursework, practical exercises, interactive sessions, a design project and a Master's thesis project. Upon graduating, biomedical engineers are employed in the medical device industry, in hospitals, research centres and government. The broad technological education also makes biomedical engineers attractive to various classical industrial sectors.

Admission requirements

The following candidates are eligible for direct admission to the programme:

- Graduates of the KU Leuven Bachelor of Science in Engineering programme with a sub-specialisation in either mechanical engineering or electrical engineering
- Holders of a Master’s degree in engineering from a partner institution of the KU Leuven Association, including holders of a degree in electromechanical engineering or electrical engineering

Holders of a Bachelor’s degree in mechanical, electrical and biomedical engineering not issued by KU Leuven may be admitted to the programme at the discretion of the Permanent Education Committee of the Master of Science in Biomedical Engineering. The Permanent Education Committee may require applicants to complete a preparatory programme of 6 or 12 ECTS (to be integrated in the Master’s programme) or a preparatory programme of up to 60 ECTS.
Profile

The ideal candidate has a broad technological background, preferably combining basic elements from mechanical and electrical engineering. The student has an interest in medicine and in the role of technology in medical treatments and healthcare in general. By the end of the programme, the graduate will have acquired:

- a basic knowledge of anatomy, physiology and biochemistry,
- the competence to translate engineering knowledge into the design and production of medical devices and processes,
- the competence to apply engineering knowledge for the advancement of science and technology, both in an academic context and in an industrial context,
- management skills and skills to act as an integrator between engineering science and medical/clinical science and practice.

In Belgium, graduates of the Master of Science in Biomedical Engineering obtain the degree of ‘Burgerlijk ingenieur’.

Studying abroad

The Faculty of Engineering at KU Leuven is involved in several Erasmus exchange programmes. For the Master of Science in Biomedical Engineering, this means that the student can follow one or two semesters of the first or second phase at a number of selected universities abroad. An industrial fellowship is possible (3-6 ECTS) either between the Bachelor’s and the Master’s programme, or between the two phases of the Master’s programme.

Students are also encouraged to consider the fellowships and short courses offered by BEST (Board of European Students of Technology) and ATHENS. KU Leuven organises a joint biomedical engineering programme with the Université Catholique de Louvain that leads to a dual degree from both universities. Interested students should contact the Programme Director for more information. The Faculty of Engineering Science is part of the international networks CESAE, CLUSTER and T.I.M.E.
Programme

Three courses provide students with basic medical knowledge on anatomy and function of the human body. The core of the programme consists of biomedical engineering courses that cover the entire range of contemporary biomedical engineering: biomechanics, biomaterials, medical imaging, biosensors, biosignal processing, medical device design and regulatory affairs. Elective courses allow the student to broaden and deepen his/her knowledge according to his/her own interests. A design project and a Master’s thesis familiarise the student with the daily practice of a biomedical engineer.

<table>
<thead>
<tr>
<th>MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING</th>
<th>120 ECTS</th>
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<tbody>
<tr>
<td>COURSE</td>
<td>ECTS</td>
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<tr>
<td><strong>First phase</strong></td>
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<tr>
<td>• Human Cell Biology</td>
<td>4</td>
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<tr>
<td>• Biomedical Measurements and Stimulation</td>
<td>6</td>
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<tr>
<td>• Biomedical Data Processing</td>
<td>6</td>
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<tr>
<td>• Functional Anatomy of the Human Locomotor System</td>
<td>3</td>
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<tr>
<td>• Biomaterials</td>
<td>3</td>
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<td>• Musculoskeletal Biomechanics</td>
<td>6</td>
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<tr>
<td>• Medical Imaging and Analysis</td>
<td>6</td>
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<tr>
<td>• Human System Physiology</td>
<td>5</td>
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<tr>
<td>• Design in Medical Technology</td>
<td>6</td>
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<td><strong>Second phase</strong></td>
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<tr>
<td>• Biofluid Mechanics</td>
<td>3</td>
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<tr>
<td>• Medical Equipment and Regulatory Affairs</td>
<td>6</td>
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<tr>
<td>• Master’s thesis</td>
<td>24</td>
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<td><strong>Spread over the two phases of the programme</strong></td>
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<tr>
<td>• Elective courses, among which an industrial internship</td>
<td>min. 33</td>
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<td>• General educational courses</td>
<td>min. 8</td>
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For detailed descriptions of this programme’s courses and for the course timetable, please consult the course catalogue: www.kuleuven.be/ma/mbiel
Career prospects

The Master of Science in Biomedical Engineering was created to respond to increased needs for healthcare in our society. These needs result from the ageing population, the challenge to provide more and better care with less people and to obtain cost-effectiveness in our healthcare system. Industry, government, hospitals and social insurance companies require engineers with a specific training in the multidisciplinary domain of biomedical engineering. A biomedical engineer acts as an integrator between medical specialists and technological specialists. He/she is able to understand medical needs and translate them into engineering requirements. Conversely, biomedical engineers are able to design medical devices and procedures that can effectively solve problems through their integration in clinical practice. The broad technological background that is essential in biomedical engineering also makes biomedical engineers attractive to conventional industrial sectors.

Employment by function profile

- Research and development: 30%
- Teaching: 4%
- Consultancy: 5%
- Software engineering: 8%
- Management: 8%
- Technical positions: 20%
- Production engineers: 6%
- Medical doctors: 1%
- Quality assurance: 11%
- Sales: 5%
- Support engineer: 4%
Learn more

www.kuleuven.be/ma/mbiel

General information
Application: www.kuleuven.be/application
International programmes: www.kuleuven.be/internationalprogrammes
International Office: www.kuleuven.be/english

Faculty of Engineering
Prof. Harry van Lenthe (Programme Director), Prof. Sabine Van Huffel
Mrs. Rita Vanroelen (Administrative Officer)
pocbmt@mech.kuleuven.be

You may also be interested in learning more about the Postgraduate Programme in Biomedical Engineering. For more information, see www.mech.kuleuven.be/en/bme/education/PostgraduateProgramme

This brochure provides the most complete and accurate information available concerning this Master's programmes offered at KU Leuven. However, amendments to the composition of this programme may be approved at any time. Consequently, KU Leuven is in no way legally bound by the information provided in this brochure. The most recent information on all our academic programmes can be consulted at www.kuleuven.be/coursecatalogue

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