

UGent-VUB MSc in Biomedical Engineering programme

Info for international applicants – assessing your background

Starting in academic year 2024-2025

Welcome !

First of all, thank you for the interest in our MSc in Biomedical Engineering programme! With this document, we want to provide you with some information on the background that we expect you to have and how to assess it, and some information on the structure and contents of the master programme.

Do I have the right background to be admitted to the MSc in Biomedical Engineering ?

Engineering programmes can be quite different in different institutions and it is not always trivial to tell from a course list what the exact nature of the programme is. Some programmes are practically oriented and very much hands-on, with graduates usually taking up technical jobs. In our BSc programme, students acquire a profound and deep knowledge in mathematics and basic sciences (see further) and, specific for the BSc in BME, a basis in life sciences and basic biomedical engineering courses. Our focus is not so much on reproducing this knowledge, but mastering it to such a high level that knowledge can be applied in creative and innovative ways to solve new problems. Our graduates assume top positions in R&D and management of companies and hospitals, or continue in PhD and postgraduate programmes.

To get admitted, your background should sufficiently match the background of students that went through the BSc in Biomedical Engineering at Ghent University in contents and in level. Lecturers of master courses will assume that you have an equivalent background as local students, and local students will do as well when you work together on projects.

We strongly advise incoming students to take a GRE test with especially the quantitative reasoning part being a good indicator of the attained level. In our experience, a grade of 160 is a good basis to start the master programme. We do realize that a GRE test is not for free, but the cost vanishes compared to the costs that are associated with repeated failure of exams, a prolonged study duration or failure to complete the master programme.

What is my ideal background?

We're not stating that our BSc in BME is ideal, but at least it is the ideal preparation for our MSc in BME. Below, we provide a complete overview of the BSc in Biomedical Engineering at UGent, a 3 year programme of 180 credits. Follow [this link](#) to get access to the course descriptions (full programme – version 4). Note that most courses are in Dutch, except for those indicated by [E].

| | year | credits | |
|---|------|---------|-----------|
| Mathematics | | | 33 |
| Basic Mathematics | 1 | 3 | |
| Mathematical Analysis I | 1 | 6 | |
| Mathematical Analysis II | 1 | 4 | |
| Mathematical Analysis III | 2 | 6 | |
| Discrete Mathematics I | 1 | 4 | |
| Geometry and Linear Algebra | 1 | 7 | |
| Introduction to Numerical Mathematics | 2 | 3 | |
| Physics | | | 24 |
| Physics I | 1 | 6 | |
| Physics II | 2 | 6 | |
| Electromagnetism I | 3 | 6 | |
| Medical Physics [E] | 3 | 6 | |
| Chemistry | | | 13 |
| Chemistry: the Structure of Matter | 1 | 4 | |
| Chemical Thermodynamics | 1 | 3 | |
| Organic Chemistry | 2 | 6 | |
| Materials science | | | 19 |
| Materials Technology | 1 | 4 | |
| Mechanics of Materials | 2 | 6 | |
| Molecular Structure | 3 | 3 | |
| Statistical Physics | 3 | 3 | |
| Biomedical Polymers and Processing [E] | 3 | 3 | |
| Electrical engineering | | | 11 |
| Electrical Circuits and Networks | 2 | 6 | |
| Electronic Systems and Instrumentation for Biomedical Engineers | 2 | 5 | |
| Systems and signals | | | 9 |
| Analysis of Systems and Signals | 3 | 6 | |
| Medical Signal Processing and Statistics [E] | 3 | 3 | |
| Life sciences | | | 14 |
| From Genome to Organism [E] | 2 | 3 | |
| Modelling of Physiological Systems [E] | 2 | 5 | |
| Quantitative Cell and Tissue Analysis [E] | 3 | 6 | |
| Programming (Python) | | | 6 |
| Informatics | 1 | 6 | |
| Statistics and data science | | | 12 |
| Probability and Statistics | 1 | 6 | |

| | | | |
|---|---|---|-----------|
| Statistical Data Processing | 2 | 3 | |
| Artificial Intelligence | 3 | 3 | |
| Transport and mechanics | | | 12 |
| Transport Phenomena | 2 | 6 | |
| Biomechanics [E] | 3 | 6 | |
| Engineering projects | | | 18 |
| Modelling, Making and Measuring | 1 | 4 | |
| Sustainability, Entrepreneurship and Ethics | 1 | 3 | |
| Engineering Project | 2 | 5 | |
| Cross-Course Project | 3 | 6 | |
| Other engineering topics | | | 9 |
| Sustainable Business Operations | 3 | 3 | |
| Modelling and Control of Dynamic Systems | 3 | 6 | |

Background check

Please complete the table below as a self-assessment of your background.

| | BSc in BME - UGent | | My BSc (in BME) | |
|------------------------------------|--------------------|----------|-----------------|----------|
| | Credits | % | Credits | % |
| Mathematics | 33 | | | |
| Physics | 24 | | | |
| Chemistry | 13 | | | |
| Material science | 19 | | | |
| Electrical engineering | 11 | | | |
| Systems and signals | 9 | | | |
| Life Sciences | 14 | | | |
| Transport and mechanics | 12 | | | |
| Programming (Python) | 6 | | | |
| Statistics and data science | 12 | | | |
| Engineering project work | 18 | | | |
| Other engineering | 9 | | | |

Preparatory programs

Students missing some background in the subjects listed above may still be admitted after taking a preparatory program. Most of the above described BSc program is taught in Dutch, but we do have 30 credits taught in English that can be included in a preparatory program. In addition, thanks to our interuniversity collaboration with VUB, we can provide the preparatory programme below:

| credits | Life Sciences (21 credits) |
|--|--|
| 6 | Quantitative Cell and Tissue Analysis |
| 3 | From Genome to Organism |
| 6 | Modelling of Physiological Systems |
| 6 | Medical Physics |
| Biomedical Engineering (18 credits) | |
| 6 | Biomechanics |
| 5 | Biomaterials (VUB) |
| 3 | Bioelectronics (VUB) |
| 3 | Medical Signal Processing and Statistics |
| Mathematics (15 credits) | |
| 3 | Analysis-Part 1 (VUB) |
| 3 | Analysis-Part 2 (VUB) |
| 3 | Analysis-Part 3 (VUB) |
| 3 | Linear Algebra-Part 1 (VUB) |
| 3 | Linear Algebra-Part 2 (VUB) |
| Engineering (3 credits) | |
| 3 | System programming (VUB) |
| 3 | Artificial intelligence |

UG/VUB: courses existing at both at UGent and VUB and taught in parallel (34 credits)

VUB: courses taught solely at VUB (26 credits)

Preparatory programs will be defined on an individual basis, with courses selected from the list above.

What does the master programme look like?

We are happy and proud to be able to offer as redesigned MSc program to our students, which we believe will lead to a better training and preparation for any job in this fascinating domain.

| Master 1 | | Master 2 | |
|---|---|--|---|
| semester 1 | semester 2 | semester 3 | semester 4 |
| Hospital Technology (7) | Hospital Project | Clinical Study Design and Biostatistics (UGent) | Health Information and Decision Support Systems (VUB) |
| | Neuro-engineering Science (UGent) | Biomaterials and Tissue Engineering (joint)or Biomedical Robotics and Assistive Technologies (VUB) | Itroduction to Medical Device Regulations (UGent) |
| | Micro- and Nanotechnologies for Medical Device Design and Fabrication (joint) | | WHO SDG elective (min 3) |
| Biomedical Robotics and Assistive Technologies (VUB) or Biomaterials and Tissue Engineering (joint) | Data Analytics in Healthcare and Connected Care (parallel) | Elective and/or Compulsory Computational Elective (10) | Elective (9) |
| Leadership in Health Care (joint) | | | |
| Medical Imaging (joint) | Elective (10) | Master thesis | Master thesis |
| Elective and/or Compulsory Computational Elective (6) | | | |
| Biomedical Product Development (Parallel) | Biomedical Product Development (Parallel) | | |

Some courses are taught by Ghent University (UGent), some jointly by Ghent University and VUB (joint), some in parallel at UGent and VUB and some at VUB.

We refer to [this website](#) for a complete overview of electives. Students can compose their own track and choose electives from all clusters, or choose to specialise in one of our specialisation domains (18 credits of electives from the cluster and a master thesis in the domain):

- Biomechanics and Biomaterials
- Neuro-engineering
- Sensors and Medical Devices
- Radiation Physics
- Artificial Intelligence and Digital Health