# Cycle view of the study programme

Depending on your track record or your professional/research focus, some prerequisites/corequisites of your first year program might appear in bloc 2. You are therefore invited to go through the list of courses suggested in bloc 2 even if you enroll for the first time in this master program.

To complete their curriculum, students must earn or validate the 60 credits of the compulsory courses (including the master thesis), 30 credits of the professional focus (students have to choose one of the 3 options) and 30 credits optional courses. Ideally, students enrolling in the master program should have acquired the skills and knowledge corresponding to the 40 credits in "Biomedical" offered as part of the bachelor program in engineering.

## Compulsory Courses (B1 : 35Cr, B2 : 25Cr)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Language(s)</th>
<th>Credits</th>
<th>B1</th>
<th>Or</th>
<th>Th</th>
<th>Pr</th>
<th>Au</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBIO0029-1</td>
<td>Bioelectronics (english language)</td>
<td>JeanMichel Rédouté</td>
<td>20h Labo., 20h Proj.</td>
<td>B1</td>
<td>Q1</td>
<td>30</td>
<td>15</td>
<td>[+]</td>
<td>5</td>
</tr>
<tr>
<td>GBIO0012-2</td>
<td>Biomechanics (english language)</td>
<td>Davide Ruffoni</td>
<td>1d FW</td>
<td>B1</td>
<td>Q1</td>
<td>26</td>
<td>26</td>
<td>[+]</td>
<td>5</td>
</tr>
<tr>
<td>GBIO0008-2</td>
<td>Medical imaging (english language)</td>
<td>Christophe Phillips</td>
<td>8h Labo., 1d FW</td>
<td>B1</td>
<td>Q2</td>
<td>33</td>
<td>12</td>
<td>[+]</td>
<td>5</td>
</tr>
<tr>
<td>GBIO0014-2</td>
<td>In silico medicine</td>
<td>Thomas Desaive</td>
<td>B1</td>
<td>Q2</td>
<td>30</td>
<td>30</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>GBIO0027-1</td>
<td>Medical device design projects</td>
<td>Liesbet Geris, Davide Ruffoni</td>
<td>8h Labo., 1d FW</td>
<td>B1</td>
<td>TA</td>
<td>30</td>
<td>90</td>
<td>[+]</td>
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</tbody>
</table>

**Corequisite:**
- GBIO0001-1 - Biophysique et biochimie
- GBIO0025-1 - Biologie générale et cellulaire
- GBIO0026-1 - Physiologie des systèmes

## Elective courses (B1 : 25Cr, B2 : 35Cr)

### Single focus (B1 : 25Cr, B2 : 5Cr)

Choose one of the following options (25 credits during B1 and 5 credits during B2) : (B1 : 25Cr, B2 : 5Cr)

#### Biomechanics, Biomaterials & Tissues Engineering (B1 : 25Cr, B2 : 5Cr)

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Au</th>
<th>Cr</th>
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<tbody>
<tr>
<td>BIOC0430-1</td>
<td>Interaction of living material</td>
<td>Christian Grandfils</td>
<td>B1</td>
<td>Q1</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA0139-1</td>
<td>Additive manufacturing and 3D printing (english language)</td>
<td>Anne Mertens</td>
<td>B1</td>
<td>Q1</td>
<td>26</td>
<td>26</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>PROT0430-3</td>
<td>Biomedical robotics and active prostheses (english language)</td>
<td>Olivier Bruls</td>
<td>B1</td>
<td>Q1</td>
<td>15</td>
<td>10</td>
<td>-</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GBIO0018-2</td>
<td>Introduction to tissue engineering (english language)</td>
<td>Liesbet Geris</td>
<td>B1</td>
<td>Q2</td>
<td>20</td>
<td>5</td>
<td>-</td>
<td>4</td>
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</tr>
<tr>
<td>MECA0008-1</td>
<td>Microfluidics (english language)</td>
<td>Tristan Gilet</td>
<td>16h Labo., 14h Proj.</td>
<td>B1</td>
<td>Q2</td>
<td>22</td>
<td>8</td>
<td>[+]</td>
<td>5</td>
</tr>
<tr>
<td>MECA0036-2</td>
<td>Finite Element Method (english language)</td>
<td>JeanPhilippe Ponthot</td>
<td>40h Proj.</td>
<td>B1</td>
<td>Q2</td>
<td>26</td>
<td>26</td>
<td>[+]</td>
<td>5</td>
</tr>
<tr>
<td>BIOM0631-1</td>
<td>Human movement analysis (english language)</td>
<td>Olivier Bruls, Cédric Schwartz</td>
<td>B2</td>
<td>Q1</td>
<td>33</td>
<td>14</td>
<td>[+]</td>
<td>5</td>
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</table>

### In silico medicine (B1 : 25Cr, B2 : 5Cr)

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Pr</th>
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<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEN0062-1</td>
<td>Introduction to machine learning</td>
<td>Pierre Geurts, Louis Wehenkel</td>
<td>40h Proj.</td>
<td>B1</td>
<td>Q1</td>
<td>30</td>
<td>5</td>
<td>[+]</td>
<td>5</td>
</tr>
<tr>
<td>INFO0939-1</td>
<td>High performance scientific computing (english language)</td>
<td>-</td>
<td>B1</td>
<td>Q1</td>
<td>30</td>
<td>15</td>
<td>[+]</td>
<td>5</td>
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### Study programmes 2022-2023

#### Faculty of Applied Sciences

**Master of Science (MSc) in Biomedical Engineering**

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<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECA0036-2</td>
<td><strong>Finite Element Method</strong> (english language)</td>
<td>Jean-Philippe Ponthot</td>
<td>5</td>
</tr>
<tr>
<td>INFO8010-1</td>
<td><strong>Deep learning</strong> (english language) - Gilles Luppé</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>SYST0022-1</td>
<td><strong>Linear Systems Design</strong> (english language) - Guillaume Drion, Pierre Sacré</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>GBIO0033-1</td>
<td><em>(pas organisé en 2022-2023)</em> <strong>Advanced in silico medicine</strong> (english language) - N...</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Neural systems (B1 : 25Cr, B2 : 5Cr)**

- GNEU0001-1 **Principles of Neuroengineering** (english language) - Guillaume Drion, Christophe Phillips, Pierre Sacré - 26h Labo., 15h Proj. - 5 Cr
- ELEN0062-1 **Introduction to machine learning** (english language) - Pierre Geurts, Louis Wehenkel - 40h Proj. - 5 Cr
- ELEN0074-1 **Sensors, microsensors and instrumentation** (english language) - Philippe Vandenbemden - 20h Labo. - 5 Cr

**Optional courses and compulsory Internship**

Choose 30 credits from the following list: (B2 : 30Cr)

- Compulsory internship (choose between the 3 ECTS and 8 ECTS version)
  - ASTG0024-1 **Immersion internship** (english language) - Liesbet Geris - 8 ECTS
  - ASTG9007-1 **Observation internship** (english language) - Liesbet Geris - 3 ECTS

**Optional courses**

The thematic structuring is indicative only. You can choose amongst all the listed courses regardless of the option chosen in the professional focus.

The subjects GBIO0001-1, GBIO0025-1 et GBIO0026-1 are corequisite to some compulsory courses of the master program. They must be taken as a priority, unless they were already taken as part of the bachelor in engineering, or unless the corresponding knowledge and skills have been acquired previously.

**Biomedical engineering & sciences**

- GBIO0001-1 **Biophysics and Biochemistry** - Mireille DUMOULIN, Liesbet GERIS - 6h Proj. - 5
- GBIO0016-1 **Introduction to systems and synthetic biology** (english language) - Frank DELVIGNE, Jean-Denis DOQUERIER, Philippe JACQUES - 5
- GBIO0022-1 **Biomimicry** (english language) - Philippe COMPÈRE, Liesbet GERIS, Tristan GILET, Davide RUFFONI - 45h Proj. - 5
- GBIO0025-1 **Biologie générale et cellulaire** - Christel PEQUEUX - 5
- GBIO0026-1 **Systems physiology** - Philippe KOLH - 5
- LABO0432-1 **Techniques for cells and tissue cultures** - Erik MAQUOI - 2

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University of Liège - Academic Affairs Department

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Study programmes 2022-2023
Faculty of Applied Sciences
Master of Science (MSc) in Biomedical Engineering

SBIM0495-2  Molecular and cellular basis of disease (english language) - Jo CAERS, Pierre CLOSE, Charlotte CORNIL, Laurence DELACROIX, Mireille DUMOULIN, Keith DURKIN, Carla GOMES DA SILVA, Céline KEMPENEERS, Vincent SEUTIN, Sabine WISLET - [40h Pers. Res.]

Biomechanics, Biomaterials & Tissues Engineering

CHIM0604-2  Chemistry and organic materials - Lionel DELAUDE
CHIM9277-1  Génie chimique (étude des réacteurs) - Dominique TOYE - [15h Labo.]
CHIM9319-1  Macromolecules and Polymerisation processes (english language) - Antoine DEBUIGNE, AnneSophie DUWEZ, Klaus KECKANTOINE - [10h Proj., 12h Labo.]
CHIM9320-1  Introduction to chemical reaction engineering - Nathalie JOB, Dominique TOYE
MECA0018-2  Manufacturing processes (english language) - Yves MARCHAL - [15h Labo., 11h Proj., 0,5d FW]
MECA0462-2  Materials selection (english language) - Anne MERTENS, Davide RUFFONI - [30h Proj., 1d FW]
MECA0516-1  Mechanical properties of biological and bioinspired materials (english language) - Davide RUFFONI - [4h Labo.]

In silico medicine

BIOL0021-1  Biology of the systems - Patrick MEYER - [10h Mon. WS]
ELEN0016-2  Computer vision (english language) - Marc VAN DROOGENBROECK - [50h Proj.]
GBIO0015-1  A tour in genetic epidemiology (english language) - Kristel VAN STEEN - [60h Proj.]
GBIO0030-1  Computational approaches to statistical generics (english language) - Kristel VAN STEEN - [35h Proj.]
GBIO0031-1  Learning from genomic data (english language) - Kristel VAN STEEN - [150h Proj.]
MATH0024-1  Modelling with partial differential equations (english language) - Maarten ARNST, Romain BOMAN - [25h Proj.]
MATH0471-2  Multiphysics integrated computational project (english language) - Romain BOMAN - [30h Proj.]
MECA0010-1  Uncertainty quantification and stochastic modelling (english language) - Maarten ARNST - [28h Proj.]

Neural systems

ELEC0054-1  Advanced electrical measurement systems (english language) - Philippe VANDERBEMDEN - [20h Labo.]
ELEN0037-1  Microelectronics and IC design (english language) - JeanMichel REDOUTE - [40h Proj.]
ELEN0062-1  Introduction to machine learning (english language) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]
ELEN0074-1  Sensors, microsensors and instrumentation (english language) - Philippe VANDERBEMDEN - [20h Labo.]

Other optional courses

PROJ0011-2  Personal student project (english language) - Georges DE PELEMAEKER, Pierre DUYSNX, Liesbet GERIS,
With the agreement of the jury, choose 5 credits in any course programme of the University

**Additional ECTS Master in biomedical engineering**

**Optional courses (B0 : 60Cr)**

The program of each candidate will be determined by the Jury according to his previous training. If a candidate does not master certain prerequisites, his program may include up to 60 credits of additional courses mainly from the list below: (B0 : 60Cr)

- **GBIO0025-1** Biologie générale et cellulaire - Christel PEQUEUX  
  B0 Q2 36 10 - 5
- **GBIO0026-1** Systems physiology - Philippe KOLH  
  B0 Q2 26 26 - 5
- **GBIO0002-1** Genetics and bioinformatics (english language) - Franck DEQUIEDT, Kristel VAN STEEN - [15h Proj.]  
  B0 Q1 30 15 [+ 5]
<table>
<thead>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>GBIO0011-1</td>
<td>Biological Systems Modelling</td>
<td>Pierre DAUBY, Liesbet GERIS</td>
<td>5</td>
</tr>
<tr>
<td>GBIO0001-1</td>
<td>Biophysics and Biochemistry</td>
<td>Mireille DUMOULIN, Liesbet GERIS</td>
<td>5</td>
</tr>
<tr>
<td>GBIO0021-1</td>
<td>Laboratory Project</td>
<td>Thomas DESAIVE, Liesbet GERIS</td>
<td>5</td>
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<tr>
<td>GBIO0013-1</td>
<td>Phenomenon of Transport in Biology</td>
<td>Dominique TOYE</td>
<td>5</td>
</tr>
<tr>
<td>GBIO0005-1</td>
<td>Introduction to cognitive neurosciences</td>
<td>Gilles VANDEWALLE</td>
<td>5</td>
</tr>
</tbody>
</table>

To this list may be added, within the limit of 60 credits, other technical courses depending on the skills acquired by the student.