## 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>Code</th>
<th>Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBIO0029-1</td>
<td>Bioelectronics (english language)</td>
<td>JeanMichel REDOUTÈ</td>
<td>30</td>
<td>[+5]</td>
</tr>
<tr>
<td>GBIO0012-2</td>
<td>Biomechanics (english language)</td>
<td>Davide RUFFONI</td>
<td>26</td>
<td>[+5]</td>
</tr>
<tr>
<td>GBIO0008-2</td>
<td>Medical imaging (english language)</td>
<td>Christophe PHILLIPS</td>
<td>33</td>
<td>[+5]</td>
</tr>
<tr>
<td>GBIO0014-2</td>
<td>In silico medicine</td>
<td>Thomas DESAIVE</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>GBIO0027-1</td>
<td>Medical device design projects (english language)</td>
<td>Liesbet GERIS, Davide RUFFONI</td>
<td>30</td>
<td>[+10]</td>
</tr>
</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)

#### Professional 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>
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</tr>
</thead>
<tbody>
<tr>
<td>BIOC0430-1</td>
<td>Interaction of living material</td>
<td>Christian GRANDFILS</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td>MECA0139-1</td>
<td>Additive manufacturing and 3D printing (english language)</td>
<td>Anne MERTENS</td>
<td>26</td>
<td>-</td>
</tr>
<tr>
<td>PROT0430-3</td>
<td>Biomedical robotics and active prostheses (english language)</td>
<td>Olivier BRULS</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>GBIO0018-2</td>
<td>Introduction to tissue engineering (english language)</td>
<td>Liesbet GERIS</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>MECA0008-1</td>
<td>Microfluidics (english language)</td>
<td>Tristan GILET</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>MECA0036-2</td>
<td>Finite Element Method (english language)</td>
<td>JeanPhilippe PONTHOT</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>BIOM0631-1</td>
<td>Human movement analysis (english language)</td>
<td>Olivier BRULS, Cédric SCHWARTZ</td>
<td>33</td>
<td>14</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
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<th>Title</th>
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<th>Credits</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEN0062-1</td>
<td>Introduction to machine learning (english language)</td>
<td>Pierre GEURTS, Louis WEHENKEL</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>INFO0939-1</td>
<td>High performance scientific computing (english language)</td>
<td></td>
<td>30</td>
<td>15</td>
</tr>
</tbody>
</table>
Study programmes 2022-2023
Faculty of Applied Sciences
Master of Science (MSc) in Biomedical Engineering

Christophe GEUZAIN - Suppl : David COLIGNON - [20h Proj.]
MECA0036-2 Finite Element Method (english language) - JeanPhilippe PONHTOT - [40h Proj.]
INFO8010-1 Deep learning (english language) - Gilles LOUPPE - [55h Proj.]
SYST0022-1 Linear Systems Design (english language) - Guillaume DRION, Pierre SACRE - [15h Proj.]
GBIO0033-1 (pas organisé en 2022-2023) Advanced in silico medicine (english language) - N...

Neural systems (B1 : 25Cr, B2 : 5Cr)
GNEU0001-1 Principles of Neuroengineering (english language) - Guillaume DRION, Christophe PHILLIPS, Pierre SACRE - [26h Labo., 15h 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.]
SYST0022-1 Linear Systems Design (english language) - Guillaume DRION, Pierre SACRE - [15h Proj.]
SYST0017-1 Advanced topics in systems and control (english language) - Guillaume DRION

PHYS0128-1 Magnetic Resonance Imaging - the Basics (english language) - N... - Suppl : Laurent LAMALLE - [3d FW]
STAT0722-1 Introduction to medical statistics (english language) - Christophe PHILLIPS

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
ASTG9007-1 Observation internship (english language) - Liesbet GERIS

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.]
GBIO0016-1 Introduction to systems and synthetic biology (english language) - Frank DELVIGNE, JeanDenis DOQUIER, Philippe JACQUES
GBIO0022-1 Biomimicry (english language) - Philippe COMPÈRE, Liesbet GERIS, Tristan GILET, Davide RUFFONI - [45h Proj.]
GBIO0025-1 General and cell biology - Christel PEQUEUX
GBIO0026-1 Systems physiology - Philippe KOLH
LABO0432-1 Techniques for cells and tissue cultures - Erik MAQUOI
### 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
- **Chemistry and organic materials** - Lionel DELAUDE
  - B2 Q2 33 19 - 5
- **Chemical reactor engineering** - Dominique TOYE - [15h Labo.]
  - B2 Q1 30 10 [+ 5
- **Macromolecules and Polymerisation processes** (english language) - Antoine DEBUGNE, AnneSophie DUWEZ, Klaus KECKANTOINE - [10h Proj., 12h Labo.]
  - B2 Q2 30 - [+ 5
- **Introduction to chemical reaction engineering** - Nathalie JOB, Dominique TOYE
  - B2 Q1 24 24 - 5
- **Manufacturing processes** (english language) - Yves MARCHAL - [15h Labo., 11h Proj., 0,5d FW]
  - B2 Q2 30 - [+ 5
- **Materials selection** (english language) - Anne MERTENS, Davide RUFFONI - [30h Proj., 1d FW]
  - B2 Q1 26 26 [+ 5
- **Mechanical properties of biological and bioinspired materials** (english language) - Davide RUFFONI - [4h Labo.]
  - B2 Q1 26 22 [+ 5

### In silico medicine
- **Biology of the systems** - Patrick MEYER - [10h Mon. WS]
  - B2 Q1 10 - [+ 2
- **Computer vision** (english language) - Marc VAN DROOGENBROECK - [50h Proj.]
  - B2 Q2 30 - [+ 5
- **A tour in genetic epidemiology** (english language) - Kristel VAN STEEN - [60h Proj.]
  - B2 Q2 15 15 [+ 3
- **Computational approaches to statistical generics** (english language) - Kristel VAN STEEN - [35h Proj.]
  - B2 Q2 25 15 [+ 5
- **Learning from genomic data** (english language) - Kristel VAN STEEN - [150h Proj.]
  - B2 Q2 - - [+ 5
- **Modelling with partial differential equations** (english language) - Maarten ARNST, Romain BOMAN - [25h Proj.]
  - B2 Q1 30 20 [+ 5
- **Multiphysics integrated computational project** (english language) - Romain BOMAN, Christophe GEUZAIN - Suppl : Koen HILLEWAERT - [30h Proj.]
  - B2 TA 33 - [+ 5
- **Uncertainty quantification and stochastic modelling** (english language) - Maarten ARNST - [28h Proj.]
  - B2 Q1 16 16 [+ 5

### Neural systems
- **Advanced electrical measurement systems** (english language) - Philippe VANDERBEMDEN - [20h Labo.]
  - B2 Q2 30 10 [+ 5
- **Microelectronics and IC design** (english language) - JeanMichel REDOUTE - [40h Proj.]
  - B2 Q2 30 20 [+ 5
- **Introduction to machine learning** (english language) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]
  - B2 Q1 30 5 [+ 5
- **Sensors, microsensors and instrumentation** (english language) - Philippe VANDERBEMDEN - [20h Labo.]
  - B2 Q2 30 - [+ 5

### Other optional courses
- **Personal student project** (english language) - Georges DE PELSEMAEKER, Pierre DUYSNX, Liesbet GERIS,
Grégoire LÉONARD - [150h Proj.]

INGE0012-1 (pas organisé en 2022-2023) Scientific research in engineering and its impact on innovation (english language) - Rodolphe SEPULCHRE

GNEU0001-1 Principles of Neuroengineering (english language) - Guillaume DRION, Christophe PHILLIPS, Pierre SACRE - [26h Labo., 15h Proj.]

INFO8006-1 Introduction to artificial intelligence (english language) - Gilles LOUPPE - [45h Proj.]

PHYS0128-1 Magnetic Resonance Imaging - the Basics (english language) - N... - Suppl : Laurent LAMALLE - [3d FW]

STAT0722-1 Introduction to medical statistics (english language) - Christophe PHILLIPS

SYST0017-1 Advanced topics in systems and control (english language) - Guillaume DRION

SYST0020-1 Introduction to microsystems and microtechnology (english language) - Tristan GILET, JeanMichel RÉDOUTÈ - [4h Labo., 20h Proj.]

SYST0022-1 Linear Systems Design (english language) - Guillaume DRION, Pierre SACRE - [15h Proj.]

GBIO0033-1 Advanced in silico medicine (english language) - N...

MECA0036-2 Finite Element Method (english language) - JeanPhilippe PONTHOT - [40h Proj.]

INFO0939-1 High performance scientific computing (english language) - Christophe GEUZAIN - Suppl : David COLIGNON - [20h Proj.]

INFO8010-1 Deep learning (english language) - Gilles LOUPPE - [55h Proj.]

GBIO0018-2 Introduction to tissue engineering (english language) - Liesbet GERIS

MECA0008-1 Microfluidics (english language) - Tristan GILET - [16h Labo., 14h Proj.]

MECA0139-1 Additive manufacturing and 3D printing (english language) - Anne MERTENS

PROT0430-3 Biomedical robotics and active prostheses (english language) - Olivier BRULS

BIOC0430-1 Interaction of living material - Christian GRANDFILS

BIOM0631-1 Human movement analysis (english language) - Olivier BRULS, Cédric SCHWARTZ - [15h Proj.]

[...]

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 General and cell biology - Christel PEQUEUX

GBIO0026-1 Systems physiology - Philippe KOLH

GBIO0002-1 Genetics and bioinformatics (english language) - Franck DEQUIEDT, Kristel VAN STEEN - [15h Proj.]
### Study programmes 2022-2023
**Faculty of Applied Sciences**
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<tr>
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<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>
</tr>
<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.