

## Block view of the study programme

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### Block 1

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.

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. 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.

### Compulsory courses from the core curriculum

GBIO0029-1	<i>Bioelectronics</i> (english language) - JeanMichel REDOUTÉ - [20h Labo., 20h Proj.]	Q1	30	15	[+]	5
GBIO0012-2	<i>Biomechanics</i> (english language) - Davide RUFFONI - [1d FW]	Q1	26	26	[+]	5
GBIO0008-2	<i>Medical imaging</i> (english language) - Christophe PHILLIPS - [8h Labo., 1d FW]	Q2	33	12	[+]	5
GBIO0014-2	<i>In silico medicine</i> - Thomas DESAIVE	Q2	30	30	-	5
GBIO0027-1	<i>Medical device design projects (Service Learning)</i> (english language) - Liesbet GERIS, Davide RUFFONI - [8h Labo., 1d FW] <b>Corequisite :</b> GBIO0026-1 - Physiologie des systèmes GBIO0025-1 - Biologie générale et cellulaire GBIO0001-1 - Biophysique et biochimie	TA	30	90	[+]	10
GEST3162-1	<i>Principles of management</i> (english language) - Michaël PARMENTIER, Willem STANDAERT - [25h Proj.]	Q1	30	-	[+]	5

### Focus courses

Choose one of the following options :

#### Biomechanics, Biomaterials & Tissues Engineering

BIOC0430-1	<i>Interactions materials - living systems</i> (english language) - Dorien VAN HEDE	Q1	25	-	-	3
MECA0139-1	<i>Additive manufacturing and 3D printing</i> (english language) - Anne MERTENS	Q1	26	26	-	5
PROT0430-3	<i>Biomedical robotics and active prostheses</i> (english language) - Olivier BRULS	Q1	15	10	-	3
GBIO0018-2	<i>Introduction to tissue engineering</i> (english language) - Liesbet GERIS	Q2	20	5	-	4
MECA0008-1	<i>Microfluidics</i> (english language) - Tristan GILET - [16h Labo., 14h Proj.]	Q2	22	8	[+]	5
MECA0036-2	<i>Finite Element Method</i> (english language) - JeanPhilippe PONTHOT - [40h Proj.]	Q2	26	26	[+]	5

#### In silico medicine

ELEN0062-1	<i>Introduction to machine learning</i> (english language) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]	Q1	30	5	[+]	5
INFO0939-1	<i>High performance scientific computing</i> (english language) - Christophe GEUZAINÉ - [20h Proj.]	Q1	30	15	[+]	5
MECA0036-2	<i>Finite Element Method</i> (english language) - JeanPhilippe PONTHOT - [40h Proj.]	Q2	26	26	[+]	5
INFO8010-1	<i>Deep learning</i> (english language) - Gilles LOUPPE - [60h Proj.]	Q2	30	-	[+]	5
SYST0022-1	<i>Linear Systems Design</i> (english language) - Guillaume DRION, Pierre SACRÉ - [15h Proj.]	Q2	26	26	[+]	5

**Neural systems**

GNEU0001-1	<i>Principles of Neuroengineering</i> (english language) - Guillaume DRION, Alessio FRANCI, Christophe PHILLIPS, Pierre SACRÉ - [26h Labo., 15h Proj.]	Q1	26	-	[+]	5
ELEN0074-1	<i>Sensors, microsensors and instrumentation</i> (english language) - Philippe VANDERBEMDEN - [20h Labo.]	Q2	30	-	[+]	5
SYST0022-1	<i>Linear Systems Design</i> (english language) - Guillaume DRION, Pierre SACRÉ - [15h Proj.]	Q2	26	26	[+]	5
SYST0017-1	<i>Neurodynamics</i> (english language) - Pierre DAUBY, Guillaume DRION	Q1	26	26	-	5
PHYS0128-1	<i>Magnetic Resonance Imaging - the Basics</i> (english language) - Laurent LAMALLE - [3d FW]	Q2	15	-	[+]	3
GBIO0034-1	<i>Neuroimaging data analysis</i> (english language) - Christophe PHILLIPS	Q1	10	5	-	2

**Block 2**

**Compulsory courses from the core curriculum**

ATFE0016-1	<i>Master thesis (including introduction to research methodology)</i> - Davide RUFFONI - [750h Proj.]	TA	-	-	[+]	25
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**Optional courses from the core curriculum**

Optional courses and compulsory internship  
Choose 30 credits from the following list :

Compulsory internship (choose between the 3 ECTS and 8 ECTS version)

ASTG0024-1	<i>Immersion internship</i> (english language) - Liesbet GERIS	TA	-	-	-	8
ASTG9007-1	<i>Observation internship</i> (english language) - Liesbet GERIS	TA	-	-	-	3

**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	<i>Biophysics and Biochemistry</i> - Mireille DUMOULIN, Liesbet GERIS - [6h Proj.]	Q1	29	23	[+]	5
GBIO0016-1	<i>Introduction to systems and synthetic biology</i> (english language) - Frank DELVIGNE	Q2	26	26	-	5
GBIO0022-1	<i>Biomimicry</i> (english language) - Philippe COMPÈRE, Tristan GILET, Davide RUFFONI - [45h Proj.]	TA	15	-	[+]	5
GBIO0025-1	<i>General and cell biology</i> - Christel PEQUEUX	Q2	36	10	-	5
GBIO0026-1	<i>Systems physiology</i> - Philippe KOLH	Q2	26	26	-	5
LABO0432-3	<i>Techniques for cells and tissue cultures</i> - Erik MAQUOI, MarieJulie NOKIN	Q2	8	20	-	2

**Biomechanics, Biomaterials & Tissues Engineering**

CHIM9319-1	<i>Chemistry and technology of polymers</i> (english language) - Antoine DEBUIGNE, Klaus KECKANTOINE - [10h Proj., 12h Labo.]	Q2	30	-	[+]	5
MECA0018-2	<i>Manufacturing processes</i> (english language) - Yves MARCHAL - [15h Labo., 11h Proj., 0,5d FW]	Q2	30	-	[+]	5
MECA0462-2	<i>Materials selection</i> (english language) - Anne MERTENS, Davide RUFFONI	Q1	26	26	[+]	5

- [30h Proj., 1d FW]

MECA0516-1 *Mechanical properties of biological and bioinspired materials* (english language) - Davide RUFFONI - [4h Labo.] Q1 26 22 [+] 5

**In silico medicine**

BIOL0021-1 *Biology of the systems* - Patrick MEYER - [10h Mon. WS] Q1 10 - [+] 2

ELEN0016-2 *Computer vision* (english language) - Anthony CIOPPA, Adrien DELIÈGE, Marc VAN DROOGENBROECK - [50h Proj.] Q1 30 10 [+] 5

GBIO0015-1 *A tour in genetic epidemiology* (english language) - Kristel VAN STEEN - [60h Proj.] Q2 15 15 [+] 3

MATH0024-1 *Modelling with partial differential equations* (english language) - Maarten ARNST, Romain BOMAN - [25h Proj.] Q1 30 20 [+] 5

MECA0010-1 *Uncertainty quantification and stochastic modelling* (english language) - Maarten ARNST - [28h Proj.] Q1 16 16 [+] 5

**Neural systems**

ELEN0448-1 *Applied Electricity and Electronics* (english language) - JeanMichel REDOUTÉ, Philippe VANDERBEMDEN Q1 26 26 - 5

ELEN0037-1 *Microelectronics and IC design* (english language) - JeanMichel REDOUTÉ - [40h Proj.] Q2 30 20 [+] 5

GNEU0002-1 *Brain Inspired Computing* (english language) - Alessio FRANCI - [20h Proj.] Q2 25 20 [+] 5

GNEU0003-1 *Neuromorphic Signal Processing* (english language) - Alessio FRANCI - [20h Proj.] Q2 25 20 [+] 5

GNEU0004-1 *Computational cognitive modelling* (english language) - Alessio FRANCI Q1 26 26 - 5

GBIO0036-1 *Experimental Neurophysiology for Engineers* (english language) - [15h Proj.] Q1 20 20 [+] 5

**Other optional courses**

PROJ0011-2 *Personal student project* (english language) - Liesbet GERIS, Grégoire LÉONARD - [150h Proj.] TA - - [+] 5

SYST0020-1 *Introduction to microsystems and microtechnology* (english language) - Tristan GILET, JeanMichel REDOUTÉ - [4h Labo., 20h Proj.] Q2 24 18 [+] 5

ELEN0449-1 *Computer Vision understanding* (english language) - Anthony CIOPPA - [50h Proj.] Q2 24 10 [+] 5

MATH0461-2 *Introduction to numerical optimization* (english language) - Quentin LOUVEAUX - [25h Proj.] Q1 30 20 [+] 5

MATH0462-1 *Discrete optimization* (english language) - Quentin LOUVEAUX - [25h Proj.] Q2 30 20 [+] 5

MECA0031-2 *Kinematics and dynamics of mechanisms* (english language) - Olivier BRULS - [40h Proj.] Q2 30 20 [+] 5

MECA0473-1 *Metallic materials engineering* - Anne MERTENS Q1 26 26 - 5

PHYS0904-4 *Physics of materials* - Luc COURARD, Anne MERTENS - [1d FW] Q2 26 26 [+] 5

[...] Or choose a maximum of 30 credits from the following list :

ELEN0062-1 *Introduction to machine learning* (english language) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.] Q1 30 5 [+] 5

ELEN0074-1 *Sensors, microsensors and instrumentation* (english language) - Philippe VANDERBEMDEN - [20h Labo.] Q2 30 - [+] 5

GNEU0001-1 *Principles of Neuroengineering* (english language) - Guillaume DRION, Alessio FRANCI, Christophe PHILLIPS, Pierre SACRÉ - [26h Labo., 15h

	Proj.]								
PHYS0128-1	<i>Magnetic Resonance Imaging - the Basics</i> (english language) - Laurent LAMALLE - [3d FW]	Q2	15	-	[+]	3			
GBIO0034-1	<i>Neuroimaging data analysis</i> (english language) - Christophe PHILLIPS	Q1	10	5	-	2			
SYST0017-1	<i>Neurodynamics</i> (english language) - Pierre DAUBY, Guillaume DRION	Q1	26	26	-	5			
SYST0022-1	<i>Linear Systems Design</i> (english language) - Guillaume DRION, Pierre SACRÉ - [15h Proj.]	Q2	26	26	[+]	5			
GBIO0033-1	<i>Advances in in silico medicine</i> (english language) - Liesbet GERIS	Q1	26	26	-	5			
MECA0036-2	<i>Finite Element Method</i> (english language) - JeanPhilippe PONTHOT - [40h Proj.]	Q2	26	26	[+]	5			
INFO0939-1	<i>High performance scientific computing</i> (english language) - Christophe GEUZAINÉ - [20h Proj.]	Q1	30	15	[+]	5			
INFO8010-1	<i>Deep learning</i> (english language) - Gilles LOUPPE - [60h Proj.]	Q2	30	-	[+]	5			
GBIO0018-2	<i>Introduction to tissue engineering</i> (english language) - Liesbet GERIS	Q2	20	5	-	4			
MECA0008-1	<i>Microfluidics</i> (english language) - Tristan GILET - [16h Labo., 14h Proj.]	Q2	22	8	[+]	5			
MECA0139-1	<i>Additive manufacturing and 3D printing</i> (english language) - Anne MERTENS	Q1	26	26	-	5			
PROT0430-3	<i>Biomedical robotics and active prostheses</i> (english language) - Olivier BRULS	Q1	15	10	-	3			
BIOC0430-1	<i>Interactions materials - living systems</i> (english language) - Dorien VAN HEDE	Q1	25	-	-	3			
BIOM0631-1	<i>Human movement analysis</i> (english language) - Olivier BRULS, Cédric SCHWARTZ - [15h Proj.]	Q1	33	14	[+]	5			
[...]	With the agreement of the jury, choose 5 credits in any course programme of the University or from the UNIC course catalog.								

### Focus courses

Choose one of the following options :

#### Biomechanics, Biomaterials & Tissues Engineering

BIOM0631-1	<i>Human movement analysis</i> (english language) - Olivier BRULS, Cédric SCHWARTZ - [15h Proj.]	Q1	33	14	[+]	5			
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#### In silico medicine

GBIO0033-1	<i>Advances in in silico medicine</i> (english language) - Liesbet GERIS	Q1	26	26	-	5			
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#### Neural systems

GBIO0035-1	<i>Advanced Magnetic Resonance Imaging</i> (english language)	Q1	-	-	-	5			
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### Bloc d'aménagement du programme de l'année

## Bridging courses Master in biomedical engineering

### Optional courses

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 :

GBIO0025-1	<i>General and cell biology</i> - Christel PEQUEUX	Q2	36	10	-	5			
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GBIO0026-1	<i>Systems physiology</i> - Philippe KOLH	Q2	26	26	-	<b>5</b>
GBIO0002-1	<i>Genetics and bioinformatics</i> (english language) - Franck DEQUIEDT, Kristel VAN STEEN - [15h Proj.]	Q1	30	15	[+]	<b>5</b>
GBIO0011-1	<i>Biological Systems Modelling</i> - Pierre DAUBY, Liesbet GERIS	Q2	26	26	-	<b>5</b>
GBIO0001-1	<i>Biophysics and Biochemistry</i> - Mireille DUMOULIN, Liesbet GERIS - [6h Proj.]	Q1	29	23	[+]	<b>5</b>
GBIO0021-1	<i>Laboratory Project</i> - Thomas DESAIVE, Liesbet GERIS - [16h Labo., 8h Proj.]	Q2	-	44	[+]	<b>5</b>
GBIO0013-1	<i>Phénomènes de transport en biologie</i> - Dominique TOYE - [25h Proj.]	Q2	26	26	[+]	<b>5</b>
GBIO0005-1	<i>Introduction to cognitive neurosciences</i> - Gilles VANDEWALLE	Q1	26	26	-	<b>5</b>