

**Vue bloc du programme des cours**

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**Bloc 1**

Certain prerequisites/corequisites of your first-year programme may 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 programme.

To complete their curriculum, students must earn or validate the 90 credits of compulsory courses (including the master's thesis) and 30 credits from the research focus.

Ideally, students enrolling in the master program programme should have acquired the skills and knowledge corresponding to the 40 credits in "Physics" offered as part of the bachelor programme in engineering.

**Compulsory courses**

**Applied physics**

ELEN0004-1	<i>Semiconductor devices</i> (anglais) - Benoît VANDERHEYDEN <b>Corequis :</b> ELEN0076-1 - Electromagnétisme	Q1	26	26	-	<b>5</b>
CHIM9308-1	<i>Physical chemistry</i> (anglais) - Bernard LEYH <b>Corequis :</b> PHYS0211-3 - Mécanique quantique	Q1	30	10	-	<b>4</b>
CHIM0698-1	<i>Introduction to the Physical Chemistry of Nanomaterials</i> (anglais) - Cédric GOMMES	Q2	20	10	-	<b>3</b>
MECA0008-1	<i>Microfluidics</i> (anglais) - Tristan GILET - [16h Labo., 14h Proj.]	Q2	22	8	[+]	<b>5</b>
MECA0446-2	<i>Continuum Mechanics</i> (anglais) - JeanPhilippe PONTHOT - [50h Proj.]	Q2	26	26	[+]	<b>5</b>
MECA0023-1	<i>Advanced solid mechanics</i> (anglais) - JeanPhilippe PONTHOT - [30h Proj.] <b>Corequis :</b> MECA0036-2 - Finite Element Method	Q1	26	26	[+]	<b>5</b>

**Mathematical and numerical methods**

MATH0024-1	<i>Modelling with partial differential equations</i> (anglais) - Maarten ARNST, Romain BOMAN - [25h Proj.] <b>Corequis :</b> MECA0025-3 - Mécanique des fluides	Q1	30	20	[+]	<b>4</b>
INFO0939-1	<i>High performance scientific computing</i> (anglais) - Christophe GEUZAINÉ - [20h Proj.]	Q1	30	15	[+]	<b>4</b>
MATH0471-3	<i>Multiphysics integrated computational project</i> (anglais) -- Romain BOMAN, Christophe GEUZAINÉ - [30h Proj.] -- Romain BOMAN, Christophe GEUZAINÉ - [40h Proj.] <b>Corequis :</b> MATH2015-1 - Perturbation methods INFO0939-1 - High performance scientific computing MATH0024-1 - Modelling with partial differential equations	TA	33	-	[+]	<b>7</b>
MATH2015-1	<i>Perturbation methods</i> (anglais) - Vincent DENOËL	Q2	15	15	-	<b>3</b>
SYST0022-1	<i>Linear Systems Design</i> (anglais) - Guillaume DRION, Pierre SACRÉ - [15h Proj.]	Q2	26	26	[+]	<b>5</b>

**Experimental methods**

ELEN0074-1	<i>Sensors, microsensors and instrumentation</i> (anglais) - Philippe VANDERBEMDEN - [20h Labo.]	Q2	30	-	[+]	<b>5</b>
APRI0006-1	<i>Personal experimental project</i> (anglais) - Tristan GILET - [60h Proj.]	TA	6	6	[+]	<b>5</b>

**Innovation and management**

**Bloc 2**

**Compulsory courses**

GEST3162-1	<i>Principles of management</i> (anglais) - François PICHault, Willem STANDAERT - [25h Proj.]	Q1	30	-	[+]	5
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**Master's thesis**

ATFE9007-1	<i>Master's thesis</i> - Benoît VANDERHEYDEN - [750h Proj.]	TA	-	-	[+]	25
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**Optional courses**

**Single focus**

**Research focus**

Choose one of the following four options :

**Electronics and materials**

**Remark : with the agreement of the President of the Jury, students may choose to take CHIM0664-1 Electrochemical energy conversion and storage [15h Laboratory work] (3 credits) instead of CHIM0664-2 Electrochemical energy conversion and storage (2 credits)**

ELEN0069-1	<i>Nanoelectronics / Optoelectronics</i> (anglais) - Benoît VANDERHEYDEN - [40h Proj.]	Q2	30	-	[+]	5
ELEN0047-1	<i>Superconductivity</i> (anglais) - Philippe VANDERBEMDEN - [15h Labo.]	Q1	30	-	[+]	5
ELEN0446-1	<i>Physics of electrical insulating materials</i> (anglais) - Philippe VANDERBEMDEN - [15h Labo.]	Q1	15	-	[+]	3
CHIM0664-2	<i>Electrochemical energy conversion and storage, partim théorique</i> (anglais) - Nathalie JOB	Q1	15	-	-	2

**Fluids**

PHYS3133-1	<i>Complex fluids and non-Newtonian flows</i> (anglais) - Vincent TERRAPON	Q1	26	26	-	5
PHYS0961-1	<i>Irreversibility, instabilities and chaos</i> (anglais) - Pierre DAUBY	Q1	30	30	-	5
OCEA0071-1	<i>Geophysical fluid dynamics - part 1</i> (anglais) - JeanMarie BECKERS	Q2	30	15	-	5

**Solids**

MECA0464-1	<i>Large deformation of solids</i> (anglais) - Romain BOMAN, JeanPhilippe PONTHOT - [60h Proj.]	Q1	26	26	[+]	5
MECA0058-1	<i>Fracture mechanics, damage and fatigue</i> (anglais) - Ludovic NOELS - [75h Proj.]	Q1	30	10	[+]	5
MECA0516-1	<i>Mechanical properties of biological and bioinspired materials</i> (anglais) - Davide RUFFONI - [4h Labo.]	Q1	26	22	[+]	5

**Mathematical and numerical methods**

MECA0470-1	<i>New methods in computational mechanics and physics</i> (anglais) - Maarten ARNST, Eric BÉCHET, Ludovic NOELS - [40h Proj.]	Q2	20	-	[+]	5
INFO8010-1	<i>Deep learning</i> (anglais) - Gilles LOUPPE - [60h Proj.]	Q2	30	-	[+]	5

Choose 5 credits among the following two courses:

MECA0027-1	<i>Structural and multidisciplinary optimization</i> (anglais) - Pierre DUYSINX, Patricia TOSSINGS - Suppl : Michaël BRUYNEEL - [18h Proj.]	Q1	30	12	[+]	5
MATH0461-2	<i>Introduction to numerical optimization</i> (anglais) - Quentin LOUVEAUX - [25h Proj.]	Q1	30	20	[+]	5

**Complementary elective courses**

Choose 15 credits among :

[...] - the courses listed above that are not yet part of your programme (such as courses from an option other than the one you chose),

- the courses listed below,

[...] - or, subject to the approval of the President of the Jury, up to 10 credits can be chosen from the entire list of courses taught at the University de Liège (other than the courses listed here) or from the UNIC course catalog.

#### Electronics and materials

PHYS3037-1	<i>Nanofabrication : principles and techniques</i> (anglais) - Ngoc Duy NGUYEN, Alejandro SILHANEK	Q2	25	15	-	5
CHIM0664-1	<i>Electrochemical energy conversion and storage</i> (anglais) - <i>partim théorique</i> - Nathalie JOB - <i>partim laboratoire</i> - Nathalie JOB - [15h Labo.]	Q1	15	-	-	3
CHIM0697-1	<i>Heterogeneous catalysis</i> (anglais) - Nathalie JOB - [10h Proj.]	Q1	20	20	[+]	5
ELEC0041-1	<i>Modelling and design of electromagnetic systems</i> (anglais) - Christophe GEUZAINÉ	Q2	26	26	-	5
PHYS0981-1	<i>Quantum modelling of materials properties</i> (anglais) - Philippe GHOSEZ, Matthieu VERSTRAETE	Q1	20	10	-	5

#### Fluids

AERO0004-1	<i>Turbulent Flows</i> (anglais) - Vincent TERRAPON - [40h Proj.]	Q1	26	26	[+]	5
AERO0001-1	<i>Aerodynamics</i> (anglais) - Thomas ANDRIANNE, Vincent TERRAPON - [2h Labo., 25h Proj.]	Q1	27	25	[+]	5
AERO0033-1	<i>Aerothermodynamics of high-speed flows</i> (anglais) - Grigorios DIMITRIADIS, Thierry MAGIN - [1j T. t.] <b>Corequis :</b> AERO0001-1 - Aerodynamics	Q2	26	26	[+]	5
GCIV2035-1	<i>Hydrodynamique fluviale</i> - Pierre ARCHAMBEAU, Benjamin DEWALS - [30h Proj.]	Q2	26	26	[+]	5
AERO0030-1	<i>Computational fluid dynamics</i> (anglais) - Vincent TERRAPON - [10h Labo.]	Q2	30	20	[+]	5

#### Solids

MECA0029-1	<i>Theory of vibration</i> (anglais) - Loïc SALLES - [30h Proj.]	Q1	26	26	[+]	5
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#### Mathematical and numerical methods

MECA0010-1	<i>Uncertainty quantification and stochastic modelling</i> (anglais) - Maarten ARNST - [28h Proj.]	Q1	16	16	[+]	5
ELEN0062-1	<i>Introduction to machine learning</i> (anglais) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]	Q1	30	5	[+]	5
MECA0524-1	<i>CAD &amp; Geometric Algorithms</i> - Eric BÉCHET - [60h Proj.]	Q1	20	20	[+]	5

#### Experimental methods

BIOL0114-3	<i>Microscopies électroniques</i> - <i>Partim A</i> - Philippe COMPÈRE - <i>Partim B</i> - Philippe COMPÈRE	Q2	15	-	-	5
			24	13	-	

#### Innovation and management

PROJ0011-2	<i>Personal student project</i> (anglais) - Pierre DUYSINX, Liesbet GERIS, Grégoire LÉONARD - [150h Proj.]	TA	-	-	[+]	5
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#### Internship

ASTG0025-1 *Internship* (anglais) - Tristan GILET TA - - - **10**

**Fundamentals of Engineering physics**

The subjects MECA0036-2, ELEN0076-1, MECA0025-3 and PHYS0211-3 are corequisite to certain compulsory courses of the master programme. They must be taken as a priority, unless they have already taken as part of the bachelor in engineering, or unless the corresponding knowledge and skills were acquired previously.

MECA0036-2 *Finite Element Method* (anglais) - JeanPhilippe PONTHOT - [40h Proj.] Q2 26 26 [+] **5**

ELEN0076-1 *Electromagnétisme* - Benoît VANDERHEYDEN Q1 26 26 - **5**

MECA0025-3 *Mécanique des fluides* - Eric DELHEZ - [30h Proj.] Q2 26 26 [+] **5**

PHYS0211-3 *Mécanique quantique* - John MARTIN Q1 26 26 - **5**

**Bloc d'aménagement du programme de l'année**