

Cycle view of the study programme

B1 Or Th Pr Au Cr

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.

Focus courses (B2 : 30Cr)

Choose one of the following four options: (B2 : 15Cr)

Electronics and materials (B2 : 15Cr)

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)

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|------------|--|----|----|----|---|-----|---|
| ELEN0069-1 | <i>Nanoelectronics / Optoelectronics</i> (english language) - Benoît VANDERHEYDEN - [40h Proj.] | B2 | Q2 | 30 | - | [+] | 5 |
| ELEN0047-1 | <i>Superconductivity</i> (english language) - Philippe VANDERBEMDEN - [15h Labo.] | B2 | Q1 | 30 | - | [+] | 5 |
| ELEN0446-1 | <i>Physics of electrical insulating materials</i> (english language) - Philippe VANDERBEMDEN - [15h Labo.] | B2 | Q1 | 15 | - | [+] | 3 |
| CHIM0664-2 | <i>Electrochemical energy conversion and storage, partim 1</i> (english language) - Nathalie JOB | B2 | Q1 | 15 | - | - | 2 |

Fluids (B2 : 15Cr)

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|------------|---|----|----|----|----|---|---|
| PHYS3133-1 | <i>Complex fluids and non-Newtonian flows</i> (english language) - Vincent TERRAPON | B2 | Q1 | 26 | 26 | - | 5 |
| PHYS0961-1 | <i>Irreversibility, instabilities and chaos</i> (english language) - Pierre DAUBY | B2 | Q1 | 30 | 30 | - | 5 |
| OCEA0071-1 | <i>Geophysical fluid dynamics - part 1</i> (english language) - JeanMarie BECKERS | B2 | Q2 | 30 | 15 | - | 5 |

Solids (B2 : 15Cr)

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|------------|---|----|----|----|----|-----|---|
| MECA0464-1 | <i>Large deformation of solids</i> (english language) - Romain BOMAN, JeanPhilippe PONTHOT - [60h Proj.] | B2 | Q1 | 26 | 26 | [+] | 5 |
| MECA0058-1 | <i>Fracture mechanics, damage and fatigue</i> (english language) - Ludovic NOELS - [75h Proj.] | B2 | Q1 | 30 | 10 | [+] | 5 |
| MECA0516-1 | <i>Mechanical properties of biological and bioinspired materials</i> (english language) - Davide RUFFONI - [4h Labo.] | B2 | Q1 | 26 | 22 | [+] | 5 |

Mathematical and numerical methods (B2 : 15Cr)

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|------------|--|----|----|----|---|-----|---|
| MECA0470-1 | <i>New methods in computational mechanics and physics</i> (english language) - Maarten ARNST, Eric BÉCHET, Ludovic NOELS - [40h Proj.] | B2 | Q2 | 20 | - | [+] | 5 |
| INFO8010-1 | <i>Deep learning</i> (english language) - Gilles LOUPPE - [60h Proj.] | B2 | Q2 | 30 | - | [+] | 5 |

Choose 5 credits among the following two courses: (B2 : 5Cr)

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|------------|--|----|----|----|----|-----|---|
| MECA0027-1 | <i>Structural and multidisciplinary optimization</i> (english language) - Pierre DUYSINX, Patricia TOSSINGS - Suppl : Michaël BRUYNEEL - [18h Proj.] | B2 | Q1 | 30 | 12 | [+] | 5 |
| MATH0461-2 | <i>Introduction to numerical optimization</i> (english language) - Quentin LOUVEAUX - [25h Proj.] | B2 | Q1 | 30 | 20 | [+] | 5 |

Choose 15 credits among : (B2 : 15Cr)

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

[...] - 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

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|------------|---|----|----|----|----|-----|----------|
| PHYS3037-1 | <i>Nanofabrication : principles and techniques</i> (english language) - Ngoc Duy NGUYEN, Alejandro SILHANEK | B2 | Q2 | 25 | 15 | - | 5 |
| CHIM0664-1 | <i>Electrochemical energy conversion and storage</i> (english language) - <i>partim 1</i> - Nathalie JOB - <i>partim 2</i> - Nathalie JOB - [15h Labo.] | B2 | Q1 | 15 | - | - | 3 |
| CHIM0697-1 | <i>Heterogeneous catalysis</i> (english language) - Nathalie JOB - [10h Proj.] | B2 | Q1 | 20 | 20 | [+] | 5 |
| ELEC0041-1 | <i>Modelling and design of electromagnetic systems</i> (english language) - Christophe GEUZAINÉ (Odd years) | B2 | Q2 | 26 | 26 | - | 5 |
| PHYS0981-1 | <i>Quantum modelling of materials properties</i> (english language) - Philippe GHOSEZ | B2 | Q1 | 20 | 10 | - | 5 |

Fluids

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|------------|--|----|----|----|----|-----|----------|
| AERO0004-1 | <i>Turbulent Flows</i> (english language) - Vincent TERRAPON - [40h Proj.] | B2 | Q1 | 26 | 26 | [+] | 5 |
| AERO0001-1 | <i>Aerodynamics</i> (english language) - Thomas ANDRIANNE, Vincent TERRAPON - [2h Labo., 25h Proj.] | B2 | Q1 | 27 | 25 | [+] | 5 |
| AERO0033-1 | <i>Aerothermodynamics of high-speed flows</i> (english language) - Koen HILLEWAERT, Thierry MAGIN - [1d FW] Corequisite : AERO0001-1 - Aerodynamics | B2 | Q2 | 26 | 26 | [+] | 5 |
| GCIV2035-1 | <i>Fluvial hydrodynamics</i> - Pierre ARCHAMBEAU, Benjamin G. DEWALS - [30h Proj.] | B2 | Q2 | 26 | 26 | [+] | 5 |
| AERO0030-1 | <i>Computational fluid dynamics</i> (english language) - Vincent TERRAPON - [10h Labo.] | B2 | Q2 | 30 | 20 | [+] | 5 |

Solids

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|------------|---|----|----|----|----|-----|----------|
| MECA0029-1 | <i>Theory of vibration</i> (english language) - Loïc SALLES - [30h Proj.] | B2 | Q1 | 26 | 26 | [+] | 5 |
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Mathematical and numerical methods

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|------------|---|----|----|----|----|-----|----------|
| MECA0010-1 | <i>Uncertainty quantification and stochastic modelling</i> (english language) - Maarten ARNST - [28h Proj.] | B2 | Q1 | 16 | 16 | [+] | 5 |
| ELEN0062-1 | <i>Introduction to machine learning</i> (english language) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.] | B2 | Q1 | 30 | 5 | [+] | 5 |
| MECA0524-1 | <i>CAD & Geometric Algorithms</i> - Eric BÉCHET - [60h Proj.] | B2 | Q1 | 20 | 20 | [+] | 5 |

Experimental methods

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|------------|--|----|----|----|----|---|----------|
| BIOL0114-3 | <i>Electronic microscopies</i> - <i>Part A</i> - <i>Part B</i> | B2 | Q2 | 15 | - | - | 5 |
| | | | | 24 | 13 | - | |

Innovation and management

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|------------|---|----|----|---|---|-----|----------|
| PROJ0011-2 | <i>Personal student project</i> (english language) - Pierre DUYSINX, Liesbet GERIS, Grégoire LÉONARD - [150h Proj.] | B2 | TA | - | - | [+] | 5 |
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Internship

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| ASTG0025-1 | <i>Internship</i> (english language) - Tristan GILET | B2 | TA | - | - | - | 10 |
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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.

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|------------|--|----|----|----|----|-----|---|
| MECA0036-2 | <i>Finite Element Method</i> (english language) - JeanPhilippe PONTHOT - [40h Proj.] | B2 | Q2 | 26 | 26 | [+] | 5 |
| ELEN0076-1 | <i>Electromagnetism</i> - Benoît VANDERHEYDEN | B2 | Q1 | 26 | 26 | - | 5 |
| MECA0025-3 | <i>Fluid Mechanics</i> - Eric DELHEZ - [30h Proj.] | B2 | Q2 | 26 | 26 | [+] | 5 |
| PHYS0211-3 | <i>Quantum mechanics</i> - John MARTIN | B2 | Q1 | 26 | 26 | - | 5 |

Compulsory courses from the core curriculum (B1 : 60Cr, B2 : 30Cr)

Applied physics

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| ELEN0004-1 | <i>Semiconductor devices</i> (english language) - Benoît VANDERHEYDEN Corequisite : ELEN0076-1 - Electromagnétisme | B1 | Q1 | 26 | 26 | - | 5 |
| CHIM9308-1 | <i>Physical chemistry</i> (english language) - Bernard LEYH Corequisite : PHYS0211-3 - Mécanique quantique | B1 | Q1 | 30 | 10 | - | 4 |
| CHIM0698-1 | <i>Introduction to the Physical Chemistry of Nanomaterials</i> (english language) - Cédric GOMMES | B1 | Q2 | 20 | 10 | - | 3 |
| MECA0008-1 | <i>Microfluidics</i> (english language) - Tristan GILET - [16h Labo., 14h Proj.] | B1 | Q2 | 22 | 8 | [+] | 5 |
| MECA0446-2 | <i>Continuum Mechanics</i> (english language) - JeanPhilippe PONTHOT - [50h Proj.] | B1 | Q2 | 26 | 26 | [+] | 5 |
| MECA0023-1 | <i>Advanced solid mechanics</i> (english language) - JeanPhilippe PONTHOT - [30h Proj.] Corequisite : MECA0036-2 - Finite Element Method | B1 | Q1 | 26 | 26 | [+] | 5 |

Mathematical and numerical methods

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|------------|--|----|----|----|----|-----|---|
| MATH0024-1 | <i>Modelling with partial differential equations</i> (english language) - Maarten ARNST, Romain BOMAN - [25h Proj.] Corequisite : MECA0025-3 - Mécanique des fluides | B1 | Q1 | 30 | 20 | [+] | 4 |
| INFO0939-1 | <i>High performance scientific computing</i> (english language) - Christophe GEUZAINÉ - [20h Proj.] | B1 | Q1 | 30 | 15 | [+] | 4 |
| MATH0471-3 | <i>Multiphysics integrated computational project</i> (english language) - - Romain BOMAN, Christophe GEUZAINÉ - [30h Proj.] - - Romain BOMAN, Christophe GEUZAINÉ - [40h Proj.] Corequisite : MATH0024-1 - Modelling with partial differential equations INFO0939-1 - High performance scientific computing MATH2015-1 - Perturbation methods | B1 | TA | 33 | - | [+] | 7 |
| MATH2015-1 | <i>Perturbation methods</i> (english language) - Vincent DENOËL | B1 | Q2 | 15 | 15 | - | 3 |
| SYST0022-1 | <i>Linear Systems Design</i> (english language) - Guillaume DRION, Pierre SACRÉ - [15h Proj.] | B1 | Q2 | 26 | 26 | [+] | 5 |

Experimental methods

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|------------|---|----|----|----|---|-----|---|
| ELEN0074-1 | <i>Sensors, microsensors and instrumentation</i> (english language) - Philippe VANDERBEMDEN - [20h Labo.] | B1 | Q2 | 30 | - | [+] | 5 |
| APRI0006-1 | <i>Personal experimental project</i> (english language) - Tristan GILET - [60h Proj.] | B1 | TA | 6 | 6 | [+] | 5 |

Innovation and management

GEST3162-1 *Principles of management* (english language) - Michaël PARMENTIER - B2 Q1 30 - [+] **5**
[25h Proj.]

Master's thesis

ATFE9007-1 *Master's thesis* - Benoît VANDERHEYDEN - [750h Proj.] B2 TA - - [+] **25**