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 65 credits of the compulsory courses (including the master thesis), choose one option for 25 credits and 30 credits from one of the two professional foci.

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

**Compulsory courses (B1 : 35Cr, B2 : 30Cr)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST0003-1</td>
<td>Linear control systems (anglais) - Guillaume DRION - [6h Labo.]</td>
<td>B1 Q1</td>
<td>30</td>
<td>30 [+ 5]</td>
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<tr>
<td>INFO0062-1</td>
<td>Object-oriented programming (anglais) - Bernard BOIGELOT - [20h Proj.]</td>
<td>B1 Q2</td>
<td>30</td>
<td>24 [+ 5]</td>
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<tr>
<td>ELEC0055-2</td>
<td>Electronic control systems (anglais) - Fabrice FREBEL</td>
<td>B1 Q1</td>
<td>30</td>
<td>6 [- 3]</td>
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<td></td>
<td>Corequis : ELEC0431-2 - Electromagnetic energy conversion</td>
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<tr>
<td>INFO0064-2</td>
<td>Embedded systems (anglais) - Bernard BOIGELOT</td>
<td>B1 Q1</td>
<td>25</td>
<td>20 [- 3]</td>
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<tr>
<td>ELEN0017-1</td>
<td>Analysis and Design of Telecommunications Systems (anglais) - Marc VAN DROOGENBROECK</td>
<td>B1 Q1</td>
<td>30</td>
<td>30 [- 5]</td>
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<tr>
<td>ELEN0037-1</td>
<td>Microelectronics and IC design (anglais) - Michael KRAFT - [40h Proj.]</td>
<td>B1 Q2</td>
<td>30</td>
<td>20 [+ 5]</td>
</tr>
<tr>
<td>APRI0007-1</td>
<td>Major project in electronics (including fundamentals of project management) (anglais) - Marc BIRON, Bernard BOIGELOT, Guillaume DRION, Fabrice FREBEL, Christophe GEUZAIN - [80h Proj.]</td>
<td>B1 TA</td>
<td>20</td>
<td>[+ 9]</td>
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<td>Corequis : INFO0064-2 - Embedded systems</td>
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<td>SYST0003-1 - Linear control systems</td>
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<td>ELEC0055-2 - Electronic control systems</td>
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<td>ELEC0053-2 - Circuits électriques</td>
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<td></td>
<td>ELEC0052-2 - Analyse et conception des systèmes de mesures électriques</td>
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<td></td>
<td>ELEC0431-2 - Electromagnetic energy conversion</td>
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<tr>
<td>ATFE0014-1</td>
<td>Master thesis (anglais) - COLLÉGIALITÉ, Marc VAN DROOGENBROECK - [750h Proj.]</td>
<td>B2 TA</td>
<td>-</td>
<td>[+] 25</td>
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</tbody>
</table>

**Optional courses (B1 : 25Cr, B2 : 30Cr)**

Choose one of the following options : (B1 : 25Cr)

**Signal processing and control 1 (B1 : 25Cr)**

Choose 25 crédits from the following : (B1 : 25Cr)

- Introduction to audio and video techniques (anglais) - JeanJacques EMBRECHTS - [8h Labo.]
  - Corequis : ELEN0071-1 - Digital Signal Processing

- Information and coding theory (anglais) - Louis WEHENKEL - [30h Proj.]

- Digital Signal Processing (anglais) - Jacques VERLY - [40h Proj.]

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Responsable de l'information : Monique Marcourt, Direction générale à l'Enseignement et à la Formation
Date de validité des données : 17/05/2017 - Page 1 / 6
INFO0012-3  Computation structures (anglais) - Pierre WOLPER - [50h Proj.]  B1  Q1  30  25  [+]  5
MATH0461-2  Introduction to numerical optimization (anglais) - Quentin LOUVEAUX - [25h Proj.]

[...]  Remark : students who would have taken some of these courses previously in their program must replace them by other courses from the faculty of engineering; this choice must be approved by the President of the cycle's Jury.

Electronic systems and devices 1 (B1 : 25Cr)

Choose 25 credits from the following : (B1 : 25Cr)

ELEN0004-1  Semiconductor devices (anglais) - Benoît VANDERHEYDEN  B1  Q1  30  30  -  5
ELEN0038-1  Microsystems (anglais) - Michael KRAFT - [20h Labo., 40h Proj.]  B1  Q2  30  5  [+]  5
ELEN0074-1  Sensors, microsensors and instrumentation (anglais) - Philippe VANDERBEMDEN - [20h Labo.]
ELEN0078-2  Acoustics and electroacoustics (anglais) - JeanJacques EMBRECHTS - [8h Labo.]

INFO0012-3  Computation structures (anglais) - Pierre WOLPER - [50h Proj.]
Corequis :
INFO0061-3 - Organisation des ordinateurs
INFO2009-2 - Introduction à l'informatique

[...]  Remark : students who would have taken some of these courses previously in their program must replace them by other courses from the faculty of engineering; this choice must be approved by the President of the cycle's Jury.

Electric power and energy systems 1 (B1 : 25Cr)

Choose 25 credits from the following :

ELEC0014-3  Introduction to electric power and energy systems (anglais) - Thierry VAN CUTSEM - [1j T. t.]  B1  Q1  28  12  [+]  4
ELEC0018-1  Energy market (anglais) - Damien ERNST  B1  Q2  45  15  -  5
ELEC0029-2  Electric power systems analysis (anglais) - Thierry VAN CUTSEM - [25h Proj.]
ELEC0041-1  Modelling and design of electromagnetic systems (anglais) - Patrick DULAR, Christophe GEUZAINE
MATH0461-2  Introduction to numerical optimization (anglais) - Quentin LOUVEAUX - [25h Proj.]
ELEC0445-1  High Voltage Direct Current (HVDC) grids (anglais) - Patricia ROUSSEAUX
Corequis :
ELEC0014-3 - Introduction to electric power and energy systems

[...]  Remark : students who would have taken some of these courses previously in their program must replace them by other courses from the faculty of engineering; this choice must be approved by the President of the cycle's Jury.

Choose one of the following foci : (B2 : 30Cr)
Professional focus in Electrical Engineering (B2 : 30Cr)

Carry on the option begun (B2 : 15Cr)

Carry on the option chosen in Bloc 1 (Signal processing and control, Electronic systems and devices, or Electric power and energy systems) for at least 15 ECTS (if no internship is made) or 10 ECTS (if an internship is made), by complementing the compulsory Bloc 2 course from this option with additional courses from the same option.

Thematic optional courses

Signal processing and control 2 (B2 : 15Cr)

Compulsory course

ELEN0062-1 *Introduction to machine learning* (anglais) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]

Optional courses

Choose 10 credits from the following list : (B2 : 10Cr)

- ELEN0016-2 *Computer vision* (anglais) - Marc VAN DROOGENBROECK - [50h Proj.]
  B2 Q1 30 10 [+] 5

- ELEN0019-2 *Audio signal processing : principles and experiments* (anglais) - JeanJacques EMBRECHTS - [24h Labo., 30h Proj.]
  B2 Q1 5 - [+] 5

  **Prérequis :**
  ELEN0002-2 - Introduction to audio and video techniques

- ELEN0072-1 *Statistical signal processing* (anglais) - Jacques VERLY - [40h Proj.]
  B2 Q1 45 15 [+ ] 5

  **Prérequis :**
  ELEN0071-1 - Digital Signal Processing

- ELEN0074-1 *Sensors, microsensors and instrumentation* (anglais) - Philippe VANDERBEMDEN - [20h Labo.]
  B2 Q2 30 - [+ ] 5

- INFO0948-2 *Introduction to intelligent robotics* (anglais) - Renaud DETRY, Louis WEHENKEL - [80h Proj.]
  B2 Q2 30 4 [+ ] 5

- MATH0462-1 *Discrete optimization* (anglais) - Quentin LOUVEAUX - [25h Proj.]
  B2 Q1 30 20 [+ ] 5

- INFO0939-1 *High performance scientific computing* (anglais) - Christophe GEUZAINE - [20h Proj.]
  B2 Q1 30 15 [+ ] 5

- GBIO0008-2 *Medical imaging* (anglais) - Christophe PHILLIPS - [8h Labo., 1j T. t.]
  B2 Q2 33 12 [+ ] 5

[...]

Remark : students who would have taken some of these courses previously in their program must replace them by other courses from the faculty of engineering; this choice must be approved by the President of the cycle's Jury.

Electronic systems and devices 2 (B2 : 15Cr)

Compulsory course

ELEN0062-1 *Introduction to machine learning* (anglais) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]

Optional courses

Choose 10 credits from the following list : (B2 : 10Cr)

- ELEC0017-1 *Electromagnetic Compatibility* (anglais) - Véronique BEAUVOIS, Christophe GEUZAINE - [30h Proj.]
  B2 TA 20 10 [+ ] 5

- ELEC0041-1 *Modelling and design of electromagnetic systems* (anglais) - Patrick DULAR, Christophe GEUZAINE
  B2 Q2 30 30 - 5
### Electric power and energy systems 2

**Compulsory course**

**MECA0450-3**  *Renewable energies* (anglais) - Pierre Dewallef - [24h Proj., 1j T. t.]

**Optional courses**

Choose 10 credits from the following list: (B2 : 10Cr)

- **ELEC0436-1**  *Electric Energy Management Systems* (anglais) - Patricia Rousseaux - [12h Labo., 20h Proj.]
  \[\textbf{Prérequis : ELEC0029-2 - Electric power systems analysis}\]

- **ELEC0047-1**  *Electric power systems dynamics, control and stability* (anglais) - Thierry Van Cutsem - [25h Proj.]
  \[\textbf{Prérequis : ELEC0029-2 - Electric power systems analysis}\]

- **ELEN0062-1**  *Introduction to microtechnology* (anglais) - Tristan Gilet - [8h Labo., 22h Proj.]

- **MECA0009-2**  *Microgrids* (anglais) - Bertrand Cornélusse

### General optional courses (B2 : 15Cr)

Choose 15 credits from the list below: (B2 : 15Cr)

- **Remarque** : the course units ASTG0019-1 and ASTG0026-1 are mutually exclusive.

- **ASTG0019-1**  *Internship (distinct from master's thesis)* (anglais) - Christophe Geuzaine - [40j T. t.]

- **ASTG0026-1**  *Internship (linked to master's thesis)* (anglais) - Collégialité, Christophe Geuzaine - [80j T. t.]

- **INGE0012-1**  *Scientific research in engineering and its impact on innovation* (anglais) - Rodolphe Sepuchre
One course to choose from the ULg courses programme; this choice must have the approval of the cycle's jury President

Choose 15 credits from: (B2 : 15Cr)

The remaining credits can then be chosen amongst all the courses listed in the other Thematic optional courses, the internship, (regardless of the option). This choice must be approved by the President of the cycle's Jury. Students who have already taken one or more optional courses found in the list cannot take them again.

or amongst the courses that have not been taken in Bloc 1. This choice must be approved by the President of the cycle's Jury. Students who have already taken one or more optional courses found in the list cannot take them again.

**Professional focus in sustainable automotive engineering (B2 : 30Cr)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Semestre</th>
<th>ECTS</th>
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</thead>
<tbody>
<tr>
<td>PROJ0013-1</td>
<td><em>Innovation project in automotive engineering</em> (anglais)</td>
<td></td>
<td>B2 Q1</td>
<td>20</td>
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<td></td>
<td>Olivier BRULS, Georges DE PELSEMAEKER, Grigoris DIMITRIADIS, Pierre DUYSINX, Vincent LEMORT - [80h Proj., 1j T. t.]</td>
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<td>Corequis:</td>
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<td>MECA0492-2 - Vehicle dynamics</td>
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<td>MECA0497-2 - Vehicle performance</td>
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<td>MECA0492-2</td>
<td><em>Vehicle dynamics</em> (anglais) - Pierre DUYSINX</td>
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<td>B2 Q1</td>
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<td>Corequis:</td>
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<td>MECA0496-2 - Materials for automotive applications</td>
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<td>MECA0494-3 - Vehicle components I</td>
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<td>MECA0493-2 - Vehicle aerodynamics</td>
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<td>MECA0493-2</td>
<td><em>Vehicle aerodynamics</em> (anglais) - Grigoris DIMITRIADIS</td>
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<td>B2 Q1</td>
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<td>Corequis:</td>
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<td>MECA0492-2 - Vehicle aerodynamics</td>
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<td>MECA0494-3</td>
<td><em>Vehicle components I</em> (anglais) - Olivier BRULS, Pierre DUYSINX</td>
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<td>B2 Q1</td>
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<td>Corequis:</td>
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<td>MECA0496-2 - Materials for automotive applications</td>
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<td>MECA0493-2 - Vehicle aerodynamics</td>
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<td>B2 Q1</td>
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<td>MECA0494-3 - Vehicle components I</td>
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<td>MECA0492-2 - Vehicle dynamics</td>
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<tr>
<td>MECA0497-2</td>
<td><em>Vehicle performance</em> (anglais) - Mustapha BELHABIB, Pierre DUYSINX - [1j T. t.]</td>
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<td>B2 Q1</td>
<td>25</td>
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<td></td>
<td>Corequis:</td>
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<td>MECA0501-1 - Thermal and Electrical Management of vehicles</td>
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<td>MECA0500-2 - Hybrid electric and fuel cell vehicles</td>
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<td>MECA0499-2 - Electric traction motors</td>
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<td>MECA0498-2 - Internal combustion engines</td>
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<tr>
<td>MECA0498-2</td>
<td><em>Internal combustion engines</em> (anglais) - Philippe NGENDAKUMANA</td>
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<td>B2 Q1</td>
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<td>Corequis:</td>
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<tr>
<td>MECA0499-2</td>
<td><em>Electric traction motors</em> (anglais) - Johan GYSELINCK</td>
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<td>B2 Q1</td>
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<td>Corequis:</td>
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Responsable de l'information : Monique Marcourt, Direction générale à l'Enseignement et à la Formation
Date de validité des données : 17/05/2017 - Page 5 / 6
MECA0500-2 - Hybrid electric and fuel cell vehicles
MECA0498-2 - Internal combustion engines
MECA0497-2 - Vehicle performance

MECA0500-2  *Hybrid electric and fuel cell vehicles* (anglais) - Pierre DUYSSINX, Nathalie JOB
Corequis :
MECA0501-1 - Thermal and Electrical Management of vehicles
MECA0499-2 - Electric traction motors
MECA0498-2 - Internal combustion engines
MECA0497-2 - Vehicle performance

MECA0501-1  *Thermal and Electrical Management of vehicles* (anglais) - Vincent LEMORT
Corequis :
MECA0500-2 - Hybrid electric and fuel cell vehicles
MECA0499-2 - Electric traction motors
MECA0498-2 - Internal combustion engines
MECA0497-2 - Vehicle performance

**Research focus (B2 : 30Cr)**
À destination des étudiants qui ont suivi cette finalité en 2015-2016.

**Priority courses**

**ELEC0431-2**  *Electromagnetic energy conversion* (anglais) - Christophe GEUZAIN - [15h Labo.]
B1 Q2 30 15 [+ 5

**ELEC0052-2**  *Analyse et conception des systèmes de mesures électriques* - Philippe VANDERBEMDEN - [24h Labo.]
B1 Q1 30 6 [+ 5

**ELEC0053-2**  *Circuits électriques* - Patricia ROUSSEAUX
B1 Q2 30 30 - 5

**Crédits supplémentaires Master en Ingénieur Civil Electricien**

**Optional courses (B0 : 60Cr)**
The individual program of each transfer student will be established by the jury on the basis of his/her background.
If some of the prerequisite are not met, this program will contain up to 60 additional credits mainly taken from the list below. Students who do not speak French will never be committed to take subjects/courses that are only taught in French.
(B0 : 60Cr)

**ELEC0431-2**  *Electromagnetic energy conversion* (anglais) - Christophe GEUZAIN - [15h Labo.]
B0 Q2 30 15 [+ 5

**ELEC0052-2**  *Analyse et conception des systèmes de mesures électriques* - Philippe VANDERBEMDEN - [24h Labo.]
B0 Q1 30 6 [+ 5

**ELEC0053-2**  *Circuits électriques* - Patricia ROUSSEAUX
B0 Q2 30 30 - 5

**ELEN0040-1**  *Digital electronics* (anglais) - Michael KRAFT
B0 Q2 30 30 - 5

**ELEN0076-1**  *Electromagnétisme* - Patricia ROUSSEAUX, Benoît VANDERHEYDEN
B0 Q1 30 30 - 5

**ELEN0008-1**  *Principes des télécommunications analogiques et numériques* - Marc VAN DROGOENBROECK
B0 Q2 30 30 - 5

**ELEN0075-3**  *Electronique analogique* - Benoît VANDERHEYDEN - [16h Labo.]
B0 Q2 30 24 [+ 5

**ELEN0070-2**  *Signal processing* (anglais) - Jacques VERLY - [40h Proj.]
B0 Q2 45 15 [+ 5

[… Choisir maximum 20 crédits pour compléter le cursus

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Date de validité des données : 17/05/2017 - Page 6 / 6