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 50 credits of the compulsory courses (including the master thesis), choose one of the three professional foci (30 credits), choose three courses in the list of transversal methodology courses (for 15 credits), and choose optional courses for 25 credits.

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 : 20Cr, B2 : 30Cr)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST0003-2</td>
<td>Linear control systems (english language)</td>
<td>B1 Q1 3</td>
</tr>
<tr>
<td></td>
<td>Theory - Guillaume DRION</td>
<td>26 6 -</td>
</tr>
<tr>
<td></td>
<td>Control system design - Guillaume DRION</td>
<td>4 - -</td>
</tr>
<tr>
<td>INFO0064-2</td>
<td>Embedded systems (english language) - Bernard BOIGELOT</td>
<td>B1 Q1 25 20</td>
</tr>
<tr>
<td></td>
<td>Corequisite : APRI0007-1 - Major project in electrical engineering</td>
<td>- 3</td>
</tr>
<tr>
<td>ELEC0055-2</td>
<td>Element of power Electronics , Part A (english language) - Fabrice FREBEL</td>
<td>B1 Q1 30 6</td>
</tr>
<tr>
<td></td>
<td>Corequisite : ELEC0431-2 - Electromagnetic energy conversion</td>
<td>- 3</td>
</tr>
<tr>
<td>APRI0007-1</td>
<td>Major project in electrical engineering (english language) - Marc BIRON,</td>
<td>B1 TA 20</td>
</tr>
<tr>
<td></td>
<td>Bernard BOIGELOT, Guillaume DRION, JeanMichel REDOUTÉ - [300h Proj.]</td>
<td>- 5</td>
</tr>
<tr>
<td></td>
<td>Corequisite : SYST0003-2 - Linear control systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELEC0055-2 - Element of power Electronics</td>
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<tr>
<td></td>
<td>ELEC0053-2 - Circuits électriques</td>
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<tr>
<td></td>
<td>ELEC0052-2 - Mesures électriques : fondements et applications</td>
<td></td>
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<tr>
<td></td>
<td>ELEC0431-2 - Electromagnetic energy conversion</td>
<td></td>
</tr>
<tr>
<td>GEST3162-1</td>
<td>Principles of management (english language) - François PICHAUD, Willem</td>
<td>B2 Q1 30</td>
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<tr>
<td></td>
<td>STANDAERT - [25h Proj.]</td>
<td>- 5</td>
</tr>
<tr>
<td>ATFE0014-1</td>
<td>Master Thesis (english language) - COLLÉGIALITÉ, Bertrand CORNÉLUSSE -</td>
<td>B2 TA</td>
</tr>
<tr>
<td></td>
<td>[750h Proj.]</td>
<td>- 25</td>
</tr>
</tbody>
</table>

Elective courses (B1 : 40Cr, B2 : 30Cr)

Choose one of the three following foci: (B1 : 25Cr, B2 : 5Cr)

Professional focus : Electronic systems and devices (B1 : 25Cr, B2 : 5Cr)

[...] 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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEN0004-1</td>
<td>Semiconductor devices (english language) - Benoît VANDERHEYDEN</td>
<td>B1 Q1 26 26</td>
</tr>
<tr>
<td>ELEN0037-1</td>
<td>Microelectronics and IC design (english language) - JeanMichel REDOUTÉ -</td>
<td>B1 Q2 30 20</td>
</tr>
<tr>
<td></td>
<td>[40h Proj.]</td>
<td>- 5</td>
</tr>
<tr>
<td>ELEN0074-1</td>
<td>Sensors, microsensors and instrumentation (english language) - Philippe</td>
<td>B1 Q2 30 20</td>
</tr>
<tr>
<td></td>
<td>VANDERBEMDEN - [20h Labo.]</td>
<td>- 5</td>
</tr>
<tr>
<td>SYST0020-1</td>
<td>Introduction to microsystems and microtechnology (english language) -</td>
<td>B1 Q2 24 18</td>
</tr>
<tr>
<td></td>
<td>Tristan GILET, JeanMichel REDOUTÉ - [4h Labo., 20h Proj.]</td>
<td>- 5</td>
</tr>
<tr>
<td>ELEN0017-1</td>
<td>Analysis and Design of Telecommunications Systems (english language) -</td>
<td>B1 Q1 26 26</td>
</tr>
<tr>
<td></td>
<td>Marc VAN DROOGENBROECK</td>
<td>- 5</td>
</tr>
<tr>
<td>GBIO0029-1</td>
<td>Bioelectronics (english language) - JeanMichel REDOUTÉ - [20h</td>
<td>B2 Q1 30 15</td>
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<td>- 5</td>
</tr>
</tbody>
</table>
Professional focus: Smart Grids (B1 : 25Cr, B2 : 5Cr)

[...]

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.

ELEC0018-1 Energy market (english language) - Damien ERNST
B1 Q1 39 13 - 5

ELEC0041-1 Modelling and design of electromagnetic systems (english language) - Suppl : Ruth VAZQUEZ SABARIEGO
B1 Q2 26 26 - 5

ELEN0445-1 Microgrids (english language) - Bertrand CORNELUSSE - [24h Proj., 1d FW]
B2 Q1 18 18 [+ 5

MECA0450-3 Renewable energies (english language) - Pierre DEWALLEF - [24h Proj., 1d FW]
B1 Q2 24 12 [+ 5

ELEC0447-1 Analysis of electric power and energy systems (english language)
- Bertrand CORNELUSSE, Louis WEHENKEL
Corequisite :
ELEC0053-2 - Circuits électriques
B1 Q1 26 26 - 5

ELEC0448-1 Planning and operation of electric power and energy systems
(english language) - Bertrand CORNELUSSE, Damien ERNST, Louis WEHENKEL
Corequisite :
ELEC0447-1 - Analysis of electric power and energy systems
MATH0461-2 - Introduction to numerical optimization
B1 Q2 26 26 - 5

Professional focus: Signal processing and intelligent robotics (B1 : 25Cr, B2 : 5Cr)

Notice : only accessible to students already registered for this focus.

[...]

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.

SYST0017-1 Advanced topics in systems and control (english language) - Guillaume DRION
B1 Q1 26 26 - 5

ELEN0060-2 Information and coding theory (english language) -
Louis WEHENKEL - [30h Proj.]
B1 Q2 30 15 [+ 5

INFO0948-2 Introduction to intelligent robotics (english language)
- Pierre SACRÉ - [80h Proj.]
B1 Q2 30 4 [+ 5

INFO8003-1 Optimal decision making for complex problems (english language)
- Damien ERNST - [45h Proj.]
B1 Q2 25 10 [+ 5

INFO8010-1 Deep learning (english language) - Gilles LOUPPE - [55h Proj.]
Corequisite :
ELEN0062-1 - Introduction to machine learning
B1 Q2 25 10 [+ 5

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

Professional focus: Neuromorphic engineering (B1 : 25Cr, B2 : 5Cr)

[...]

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.

SYST0017-1 Advanced topics in systems and control (english language) - Guillaume DRION
B1 Q1 26 26 - 5

INFO0948-2 Introduction to intelligent robotics (english language)
- Pierre SACRÉ - [80h Proj.]
B1 Q2 30 4 [+ 5

GNEU0001-1 Principles of Neuroengineering (english language)
B1 Q1 26 - [+ 5
GNEU0002-1  Brain Inspired Computing (english language) - Alessio FRANCI - [20h Proj.]  B1  Q2  25  20  [+]  5
GNEU0003-1  Neuromorphic Signal Processing (english language) - Alessio FRANCI - [20h Proj.]  B1  Q2  25  20  [+]  5
ELEN0016-2  Computer vision (english language) - Marc VAN DROOGENBROECK - [50h Proj.]  B2  Q1  30  10  [+]  5

**Professional focus : Electric power and energy systems (B1 : 25Cr, B2 : 5Cr)**

*Notice* : only accessible to students already registered for this focus.

Choose three among the following transversal courses that can be spread over the 2 blocks (B1 : 15Cr)

**Transversal courses**

ELEN0060-2  Information and coding theory (english language) - Louis WEHENKEL - [30h Proj.]  -  Q2  30  15  [+]  5
INFO0803-1  Optimal decision making for complex problems (english language) - Damien ERNST - [45h Proj.]  -  Q2  25  10  [+]  5
ELEN0062-1  Introduction to machine learning (english language) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]  B1  Q1  30  5  [+]  5
INFO0062-1  Object-oriented programming (english language) - Bernard BOIGELOT, Louis WEHENKEL - [20h Proj.]  B1  Q2  25  20  [+]  5
INFO0939-1  High performance scientific computing (english language) - Suppl : David COLIGNON - [20h Proj.]  B1  Q1  30  15  [+]  5
MATH0461-2  Introduction to numerical optimization (english language) - Quentin LOUVEAUX - [25h Proj. ]  B1  Q1  30  20  [+]  5
MATH0462-1  Discrete optimization (english language) - Quentin LOUVEAUX - [25h Proj.]  B1  Q2  30  20  [+]  5

Complete your programme with 25 credits chosen among any of the courses listed above (that are not already part of your programme) or in the list below (this choice must be approved by the President of the cycle's Jury). (B2 : 25Cr)

Remark : the courses ELEC0431-2, ELEC0052-2 et ELEC0053-2 (see the list "Fundamentals of Electrical Engineering" are corequisite to some compulsory courses of the master program. They must be taken prioriarily, unless they were already taken as part of the bachelor in engineering, or unless the corresponding knowledge and skills have been acquired previously.

Remark : the course units ASTG0019-1 et ASTG0026-1 are mutually exclusive.

**Smart grids**

ELEC0449-1  Practices and evolution of the electric power and energy industry (english language) - Bertrand CORNÉLUSSE, Damien ERNST, Louis WEHENKEL - [12h Proj. , 6d FW]  B2  TA  -  -  [+]-  5

**Prerequisite :**
ELEC0447-1 - Analysis of electric power and energy systems
ELEC0018-1 - Energy market
CHIM0664-1  Electrochemical energy conversion and storage (english language) - theory - Nathalie JOB - 15  - -  [+]
- lab - Nathalie JOB - [15h Labo.]  -  -  [-]
ENVT3065-1  Sustainability challenges (english language)  B2  Q1  3  - -
Electronic systems and devices

ELEN0447-1 High-frequency electronics (english language) - JeanMichel REDOUTÉ, Benoît VANDERHEYDEN - [10h Labo.]
B2 Q1 26 12 [+ 5
ELEC0017-1 Electromagnetic Compatibility (english language) - Véronique BEAUVOS, Christophe GEUZAINE - [30h Proj.]
B2 TA 20 10 [+ 5
ELEC0054-1 Advanced electrical measurement systems (english language) - Philippe VANDERBEMDEN - [20h Labo.]
B2 Q1 30 10 [+ 5
ELEN0069-1 Nanoelectronics / Optoelectronics (english language) - Benoît VANDERHEYDEN - [40h Proj.]
Corequisite :
ELEN0004-1 - Semiconductor devices

Neuromorphic engineering

GBIO0008-2 Medical imaging (english language) - Christophe PHILLIPS - [8h Labo., 1d FW]
B2 Q2 33 12 [+ 5
INFO8004-1 Advanced Machine learning (english language) - Pierre GEURTS, Gilles LOUPPE, Louis WEHENKEL - [45h Proj.]
B2 Q2 25 - [+ 5
INFO8006-1 Introduction to artificial intelligence (english language) - Gilles LOUPPE - [45h Proj.]
B2 Q1 25 20 [+ 5
INFO8010-1 Deep learning (english language) - Gilles LOUPPE - [55h Proj.]
B2 Q2 25 10 [+ 5

Other elective courses

INGE0012-1 Scientific research in engineering and its impact on innovation (english language) - Rodolphe SEPULCHRE
B2 Q2 26 26 - 5

Additional ECTS Master in electrical engineering

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 (english language) - - Suppl : François HENROTTE - [15h Labo.]
B1 Q2 30 15 [+ 5
ELEC0052-2 Mesures électriques : fondements et applications - Philippe VANDERBEMDEN - [24h Labo.]
B1 Q1 30 6 [+ 5
ELEC0053-2 Electric circuits - Bertrand CORNÉLUSSE
B1 Q1 26 26 - 5
ELEN0040-1 Digital electronics (english language) - JeanMichel REDOUTÉ
B0 Q2 26 26 - 5
<table>
<thead>
<tr>
<th>Module Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEN0076-1</td>
<td>Electromagnetism - Benoît Vanderheyden</td>
<td>5</td>
</tr>
<tr>
<td>ELEN0008-1</td>
<td>Principles of analog and digital telecommunications systems - Marc Van Droogenbroeck</td>
<td>5</td>
</tr>
<tr>
<td>ELEN0075-3</td>
<td>Analog Electronics - Benoît Vanderheyden - [16h Labo.]</td>
<td>5</td>
</tr>
</tbody>
</table>

Choose maximum 25 credits to complete the study programme