## Block view of the study programme

### Block 1

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Hours</th>
<th>Exam Type</th>
<th>Or</th>
<th>Th</th>
<th>Pr</th>
<th>Au</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST0003-1</td>
<td>Linear control systems (english language) - Guillaume DRION</td>
<td>[6h Labo.]</td>
<td>Q1 30</td>
<td>30</td>
<td>+</td>
<td>5</td>
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<tr>
<td>INFO0062-1</td>
<td>Object-oriented programming (english language) - Bernard BOIGELOT</td>
<td>[20h Proj.]</td>
<td>Q2 30</td>
<td>24</td>
<td>+</td>
<td>5</td>
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<tr>
<td>ELEC0055-2</td>
<td>Element of power Electronics (english language) - Fabrice FREBEL</td>
<td></td>
<td>Q1 30</td>
<td>6</td>
<td>-</td>
<td>3</td>
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<tr>
<td></td>
<td>Corequisite: ELEC0431-2 - Electromagnetic energy conversion</td>
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<tr>
<td>INFO0064-2</td>
<td>Embedded systems (english language) - Bernard BOIGELOT</td>
<td></td>
<td>Q1 25</td>
<td>20</td>
<td>-</td>
<td>3</td>
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<tr>
<td>ELEN0017-1</td>
<td>Analysis and Design of Telecommunications Systems (english language) -</td>
<td>Marc VAN DROOGENBROECK</td>
<td>Q1 30</td>
<td>30</td>
<td>-</td>
<td>5</td>
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<tr>
<td>ELEN0037-1</td>
<td>Microelectronics and IC design (english language) - Michael KRAFT</td>
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<td>Q2 30</td>
<td>20</td>
<td>+</td>
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<tr>
<td>APRI0007-1</td>
<td>Major project in electronics (including fundamentals of project management)</td>
<td>(english language) - Marc BIRON, Bernard BOIGELOT, Guillaume DRION, Fabrice FREBEL, Christophe GEUZAINÉ - [80h Proj.]</td>
<td>TA 20</td>
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<td>Corequisite: ELEC0431-2 - Electromagnetic energy conversion</td>
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<tr>
<td></td>
<td>ELEC0052-2 - Analyse et conception des systèmes de mesures électriques</td>
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<td></td>
<td>ELEC0053-2 - Circuits électriques</td>
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<td></td>
<td>ELEC0055-2 - Element of power Electronics</td>
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<td>SYST0003-1 - Linear control systems</td>
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</tbody>
</table>

### Optional courses

Choose one of the following options:

**Electric power and energy systems 1**

Choose 25 crédits from the following:

- The subjects ELEC0431-2, ELEC0052-2 et ELEC0053-2 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.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ELEC0014-3</td>
<td>Introduction to electric power and energy systems (english language) -</td>
<td>Thierry VAN CUTSEM - [1d FW]</td>
<td>Q1 28</td>
<td>12</td>
<td>+</td>
<td>4</td>
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<td>ELEC0018-1</td>
<td>Energy Market (english language) - Damien ERNST</td>
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<td>Q2 45</td>
<td>15</td>
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<td>ELEC0029-2</td>
<td>Electric power systems analysis (english language) -</td>
<td>Thierry VAN CUTSEM - [25h Proj.]</td>
<td>Q2 16</td>
<td>4</td>
<td>+</td>
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<tr>
<td>ELEC0041-1</td>
<td>Modelling and design of electromagnetic systems (english language) -</td>
<td>Patrick DULAR, Christophe GEUZAINÉ</td>
<td>Q2 30</td>
<td>30</td>
<td>-</td>
<td>5</td>
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<tr>
<td>MATH0461-2</td>
<td>Introduction to numerical optimization (english language) -</td>
<td>Quentin LOUVEAUX - [25h Proj.]</td>
<td>Q1 30</td>
<td>20</td>
<td>+</td>
<td>5</td>
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<tr>
<td>ELEC0445-1</td>
<td>High Voltage Direct Current (HVDC) grids (english language) -</td>
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<td>Q2 16</td>
<td>12</td>
<td>-</td>
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</tbody>
</table>
Patricia ROUSSEAUX
Corequisite:
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.

Electronic systems and devices 1

Choose 25 credits from the following:

... The subjects ELEC0431-2, ELEC0052-2 et ELEC0053-2 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.

ELEN0004-1  
Semiconductor devices (english language) - Benoît VANDERHEYDEN
Q1 30 30 - 5

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

ELEN0078-2  
Acoustics and electroacoustics (english language) - JeanJacques EMBRECHTS - [8h Labo.]
Q2 30 22 [+ 5

INFO0012-3  
Computation structures (english language) - Pierre WOLPER - [50h Proj.]
Q1 30 25 [+ 5

Corequisite:
INFO2009-2 - Introduction à l'informatique
INFO0061-3 - Organisation des ordinateurs

SYST0020-1  
sys (english language) - Tristan GILET, N... - [4h Labo., 20h Proj.]
Q2 24 18 [+ 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.

Signal processing and control 1

Choose 25 crédits from the following:

... The subjects ELEC0431-2, ELEC0052-2 et ELEC0053-2 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.

ELEN0002-2  
Introduction to audio and video techniques (english language) - JeanJacques EMBRECHTS - [8h Labo.]
Q1 30 22 [+ 5

Corequisite:
ELEN0071-1 - Applied digital signal processing

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

ELEN0071-1  
Applied digital signal processing (english language) - [40h Proj.]
Q2 45 15 [+ 5

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

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

Block 2

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

GEST3162-1  *Principles of management* (english language) - Michael GILLESSEN, François PICHALOUI, Thierry PIRONET, Didier VAN CALLE  
Q1 25 25 - 5

ATFE0014-1  *Master Thesis* (english language) - COLLEGIATE, Marc VAN DROOGENBROECK - [750h Proj.]  
TA - - [+ ] 25

Optional courses

Single focus

**Professional focus in Electrical Engineering**

**Carry on the option begun**

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**

**Electric power and energy systems 2**

**Compulsory course**

MECA0450-3  *Renewable energies* (english language) - Pierre DEWALLEF - [24h Proj., 1d FW]  
Q1 24 12 [+ ] 5

**Optional courses**

Choose 10 credits from the following list:

- **ELEC0436-1**  *Electric Energy Management Systems* (english language) - Patricia ROUSSEAU - [12h Labo., 20h Proj.]  
  \[Prerequisite:\] ELEC0029-2 - Electric power systems analysis  
  Q1 20 16 [+ ] 5

- **ELEC0047-1**  *Electric power systems dynamics, control and stability* (english language) - Thierry VAN CUTSEM - [25h Proj.]  
  \[Prerequisite:\] ELEC0029-2 - Electric power systems analysis  
  Q1 30 8 [+ ] 5

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

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

- **ELEN0445-1**  *Microgrids* (english language) - Bertrand CORNELUSSE  
  \[Prerequisite:\] ELEC0014-3 - Introduction to electric power and energy systems  
  Q1 18 18 - 5

- **CHIM0664-1**  *Electrochemical energy conversion and storage* (english language) - Nathalie JOB - [15h Labo.]  
  Q1 15 - [+ ] 3

[...]

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**

**Compulsory course**

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

**Optional courses**
Choose 10 credits from the following list:

- **ELEC0017-1**  
  *Electromagnetic Compatibility* (english language) -  
  Véronique Beauvois, Christophe Geuzaine  
  [30h Proj.] 

- **ELEC0041-1**  
  *Modelling and design of electromagnetic systems* (english language) -  
  Patrick Dular, Christophe Geuzaine  
  [30h Proj.] 

- **ELEC0054-1**  
  *Application of electrical measurement systems* (english language) -  
  Philippe Vanderbemden  
  [20h Labo.] 

- **ELEN0069-1**  
  *Nanoelectronics / Optoelectronics* (english language) -  
  Benoît Vanderheyden  
  [40h Proj.] 
  **Prerequisite:**  
  ELEN0004-1 - *Semiconductor devices*

- **GBIO0029-1**  
  *Bioelectronics* (english language) - Michael Kraft  
  [20h Labo., 20h 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.

**Signal processing and control 2**

**Compulsory course**

- **ELEN0062-1**  
  *Introduction to machine learning* (english language) -  
  Pierre Geurts, Louis Wehenkel  
  [40h Proj.] 

**Optional courses**

Choose 10 credits from the following list:

- **ELEN0016-2**  
  *Computer vision* (english language) -  
  Marc Van Droogenbroeck  
  [50h Proj.] 

- **ELEN0019-2**  
  *Audio signal processing : principles and experiments* (english language) -  
  JeanJacques Ebrechts  
  [24h Labo., 30h Proj.] 
  **Prerequisite:**  
  ELEN0002-2 - *Introduction to audio and video techniques*

- **ELEN0074-1**  
  *Sensors, microsensors and instrumentation* (english language) -  
  Philippe Vanderbemden  
  [20h Labo.] 

- **INFO0012-3**  
  *Computation structures* (english language) -  
  Pierre Wolper  
  [50h Proj.] 

- **MATH0462-1**  
  *Discrete optimization* (english language) -  
  Quentin Louveaux  
  [25h Proj.] 

- **INFO0939-1**  
  *High performance scientific computing* (english language) -  
  Christophe Geuzaine  
  [20h Proj.] 

- **GBIO0008-2**  
  *Medical imaging* (english language) -  
  Christophe Phillips  
  [8h Labo., 1d FW] 

- **SYST0021-1**  
  (pas organisé en 2017-2018) *Optimal Control and Dynamic Programming* (english language) -  
  N...

  **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.

**General optional courses**

Choose 15 credits from the list below:

- **ASTG0019-1**  
  *Internship (distinct from master's thesis)* (english language) -  
  TA  
  [+]  
  10

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

- 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.

Bloc d'aménagement du programme de l'année

Additional ECTS Master in electrical engineering

Optional courses

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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Semester</th>
<th>Start</th>
<th>End</th>
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<tbody>
<tr>
<td>ELEC0431-2</td>
<td>Electromagnetic energy conversion (english language)</td>
<td>Christophe GEUZAINÉ</td>
<td>Q2</td>
<td>30</td>
<td>15 [+]</td>
<td>5</td>
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<tr>
<td>ELEC0052-2</td>
<td>Analysis and Design of Electrical Measuring Systems</td>
<td>Philippe VANDERBEMDEN</td>
<td>Q1</td>
<td>30</td>
<td>6</td>
<td>5</td>
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<tr>
<td>ELEC0053-2</td>
<td>Electric circuits</td>
<td>Patricia ROUSSEAUX</td>
<td>Q2</td>
<td>30</td>
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<tr>
<td>ELEN0040-1</td>
<td>Digital electronics</td>
<td>Michael KRAFT</td>
<td>Q2</td>
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<td>ELEN0076-1</td>
<td>Electromagnetism</td>
<td>Patricia ROUSSEAUX, Benoît VANDERHEYDEN</td>
<td>Q1</td>
<td>30</td>
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<tr>
<td>ELEN0008-1</td>
<td>Principles of analog and digital telecommunications systems</td>
<td>Marc VAN DROOGENBROECK</td>
<td>Q2</td>
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<td>ELEN0075-3</td>
<td>Analog Electronics</td>
<td>Benoît VANDERHEYDEN</td>
<td>Q2</td>
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Priority courses

<table>
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<tr>
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