

**Vue cycle du programme des cours**

B1 Or Th Pr Au Cr

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)**

|            |  |    |    |    |    |   |     |  |           |
|------------|--|----|----|----|----|---|-----|--|-----------|
| SYST0003-2 | <i>Linear control systems</i> (anglais)<br>- Partim A - Guillaume DRION<br>- Partim B - Guillaume DRION  | B1 | Q1 |    |    |   |     |  | <b>3</b>  |
|            |  |    | 26 | 6  | -  |   |     |  |           |
|            |  |    | 4  | -  | -  |   |     |  |           |
| INFO0064-2 | <i>Embedded systems</i> (anglais) - Bernard BOIGELOT   | B1 | Q1 | 25 | 20 | - |     |  | <b>3</b>  |
| ELEC0055-2 | <i>Element of power Electronics , Partim A</i> (anglais) - Fabrice FREBEL<br><b>Corequis :</b><br>ELEC0431-2 - Electromagnetic energy conversion   | B1 | Q1 | 30 | 6  | - |     |  | <b>3</b>  |
| APRI0007-1 | <i>Major project in electronics (including fundamentals of project management)</i> (anglais) - Marc BIRON, Bernard BOIGELOT, Guillaume DRION, Fabrice FREBEL - [80h Proj.]<br><b>Corequis :</b><br>SYST0003-2 - Linear control systems<br>ELEC0055-2 - Element of power Electronics<br>ELEC0053-2 - Circuits électriques<br>ELEC0052-2 - Analyse et conception des systèmes de mesures électriques<br>ELEC0431-2 - Electromagnetic energy conversion | B1 | TA | 20 | -  |   | [+] |  | <b>11</b> |
| GEST3162-1 | <i>Principles of management</i> (anglais) - Michael GHILISSEN, François PICHHAULT  | B2 | Q1 | 25 | 25 | - |     |  | <b>5</b>  |
| ATFE0014-1 | <i>Master thesis</i> (anglais) - COLLÉGIALITÉ, Bertrand CORNÉLUSSE - [750h Proj.]  | B2 | TA | -  | -  |   | [+] |  | <b>25</b> |

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

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

**Professional focus in Electrical Engineering (B2 : 30Cr)**

*Remarque :* Only for students who have begun this focus before 2018-2019

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

|            |  |    |    |    |    |   |     |  |          |
|------------|--|----|----|----|----|---|-----|--|----------|
| ELEC0014-3 | <i>Introduction to electric power and energy systems</i> (anglais) - Thierry VAN CUTSEM - [1j T. t.]   | B1 | Q1 | 28 | 12 |   | [+] |  | <b>4</b> |
| ELEC0018-1 | <i>Energy market</i> (anglais) - Damien ERNST  | B1 | Q2 | 39 | 13 | - |     |  | <b>5</b> |
| ELEC0029-2 | <i>Electric power systems analysis</i> (anglais) - Thierry VAN CUTSEM - [25h Proj.]  | B1 | Q2 | 23 | 4  |   | [+] |  | <b>3</b> |
| ELEC0041-1 | <i>Modelling and design of electromagnetic systems</i> (anglais) - Christophe GEUZAINÉ   | B1 | Q2 | 26 | 26 | - |     |  | <b>5</b> |
| ELEC0445-1 | <i>High Voltage Direct Current (HVDC) grids</i> (anglais) - Patricia ROUSSEAU<br><b>Corequis :</b><br>ELEC0014-3 - Introduction to electric power and energy systems | B1 | Q2 | 16 | 12 | - |     |  | <b>3</b> |
| ELEN0445-1 | <i>Microgrids</i> (anglais) - Bertrand CORNÉLUSSE<br><b>Corequis :</b><br>ELEC0014-3 - Introduction to electric power and energy systems                             | B1 | Q1 | 18 | 18 | - |     |  | <b>5</b> |

MECA0450-3 *Renewable energies* (anglais) - Pierre DEWALLEF - [24h Proj., 1j T. t.] B2 Q1 24 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.

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

ELEN0004-1 *Semiconductor devices* (anglais) - Benoît VANDERHEYDEN B1 Q1 26 26 - 5

ELEN0037-1 *Microelectronics and IC design* (anglais) - JeanMichel REDOUTÉ - [40h Proj.] B1 Q2 30 20 [+] 5

ELEN0074-1 *Sensors, microsensors and instrumentation* (anglais) - Philippe VANDERBEMDEN - [20h Labo.] B1 Q2 30 - [+] 5

SYST0020-1 *Introduction to microsystems and microtechnology* (anglais) - Tristan GILET, JeanMichel REDOUTÉ - [4h Labo., 20h Proj.] B1 Q2 24 18 [+] 5

ELEN0017-1 *Analysis and Design of Telecommunications Systems* (anglais) - Marc VAN DROOGENBROECK B1 Q1 26 26 - 5

ELEN0078-2 *Acoustics and electroacoustics* (anglais) - JeanJacques EMBRECHTS - [8h Labo.] B2 Q1 30 22 [+] 5

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

ELEN0002-2 *Introduction to audio and video techniques* (anglais) - JeanJacques EMBRECHTS - [8h Labo.] B1 Q1 30 22 [+] 5

##### Corequis :

ELEN0071-1 - Applied digital signal processing

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

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

INFO8010-1 *Deep learning* (anglais) - Gilles LOUPPE - [45h Proj.] B1 Q2 30 5 [+] 5

##### Corequis :

ELEN0062-1 - Introduction to machine learning

MATH0461-2 - Introduction to numerical optimization

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

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

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Choose three among the following transversal courses (B1 : 15Cr)

#### Transversal courses

|            |   |    |    |    |    |     |   |
|------------|---|----|----|----|----|-----|---|
| ELEN0062-1 | <i>Introduction to machine learning</i> (anglais) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.] | B1 | Q1 | 30 | 5  | [+] | 5 |
| INFO0062-1 | <i>Object-oriented programming</i> (anglais) - Bernard BOIGELOT - [20h Proj.]                   | B1 | Q2 | 25 | 20 | [+] | 5 |
| INFO0939-1 | <i>High performance scientific computing</i> (anglais) - Christophe GEUZAINÉ - [20h Proj.]      | B1 | Q1 | 30 | 15 | [+] | 5 |
| MATH0461-2 | <i>Introduction to numerical optimization</i> (anglais) - Quentin LOUVEAUX - [25h Proj.]        | B1 | Q1 | 30 | 20 | [+] | 5 |
| MATH0462-1 | <i>Discrete optimization</i> (anglais) - Quentin LOUVEAUX - [25h Proj.]                         | B1 | Q1 | 30 | 20 | [+] | 5 |

#### Fundamentals of Electrical Engineering

[...] The subjects ELEC0431-2, ELEC0052-2 and 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.

|            |  |    |    |    |    |     |   |
|------------|--|----|----|----|----|-----|---|
| ELEC0431-2 | <i>Electromagnetic energy conversion</i> (anglais) - Christophe GEUZAINÉ - [15h Labo.]                 | B1 | Q2 | 30 | 15 | [+] | 5 |
| ELEC0052-2 | <i>Analyse et conception des systèmes de mesures électriques</i> - Philippe VANDERBEMDEN - [24h Labo.] | B1 | Q1 | 30 | 6  | [+] | 5 |
| ELEC0053-2 | <i>Circuits électriques</i> - Bertrand CORNÉLUSSE  | B1 | Q2 | 26 | 26 | -   | 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)

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

|            |   |    |    |   |   |     |    |
|------------|---|----|----|---|---|-----|----|
| ASTG0019-1 | <i>Internship (distinct from master's thesis)</i> (anglais) - Christophe GEUZAINÉ - [40j T. t.]           | B2 | TA | - | - | [+] | 10 |
| ASTG0026-1 | <i>Internship (linked to master's thesis)</i> (anglais) - COLLÉGIALITÉ, Christophe GEUZAINÉ - [80j T. t.] | B2 | TA | - | - | [+] | 2  |

#### Electric power and energy systems

|  |   |    |    |    |    |     |   |
|--|---|----|----|----|----|-----|---|
| ELEC0436-1   | <i>Electric Energy Management Systems</i> (anglais) - Patricia ROUSSEAU - Suppl : Louis WEHENKEL - [12h Labo., 20h Proj.] | B2 | Q1 | 20 | 16 | [+] | 5 |
| <b>Prérequis :</b><br>ELEC0029-2 - Electric power systems analysis |   |    |    |    |    |     |   |
| ELEC0047-1   | <i>Electric power systems dynamics, control and stability</i> (anglais) - Thierry VAN CUTSEM - [25h Proj.]                | B2 | Q1 | 30 | 8  | [+] | 5 |
| <b>Prérequis :</b><br>ELEC0029-2 - Electric power systems analysis |   |    |    |    |    |     |   |
| CHIM0664-1   | <i>Electrochemical energy conversion and storage</i> (anglais) - Nathalie JOB - [15h Labo.]                               | B2 | Q1 | 15 | -  | [+] | 3 |

#### Electronic systems and devices

|  |  |    |    |    |    |     |   |
|--|--|----|----|----|----|-----|---|
| ELEC0017-1   | <i>Electromagnetic Compatibility</i> (anglais) - Véronique BEAUVOIS, Christophe GEUZAINÉ - [30h Proj.] | B2 | TA | 20 | 10 | [+] | 5 |
| ELEC0054-1   | <i>Application of electrical measurement systems</i> (anglais) - Philippe VANDERBEMDEN - [20h Labo.]   | B2 | Q1 | 30 | 10 | [+] | 5 |
| ELEN0069-1   | <i>Nanoelectronics / Optoelectronics</i> (anglais) - Benoît VANDERHEYDEN - [40h Proj.]                 | B2 | Q2 | 30 | -  | [+] | 5 |
| <b>Prérequis :</b><br>ELEN0004-1 - Semiconductor devices |  |    |    |    |    |     |   |
| GBIO0029-1   | <i>Bioelectronics</i> (anglais) - JeanMichel REDOUTÉ - [20h Labo., 20h                                 | B2 | Q1 | 30 | 15 | [+] | 5 |

|   |   |    |    |    |    |     |   |  |  |
|---|---|----|----|----|----|-----|---|--|--|
|   | Proj.]  |    |    |    |    |     |   |  |  |
| INFO0012-2  | <i>Computation structures</i> (anglais) - Pierre WOLPER - [40h Proj.]   | -  | Q1 | 26 | 26 | [+] | 5 |  |  |
| <b>Signal processing and intelligent robotics</b> |   |    |    |    |    |     |   |  |  |
| ELEN0019-2  | <i>Audio signal processing : principles and experiments</i> (anglais) - JeanJacques EMBRECHTS - [24h Labo., 30h Proj.]    | B2 | Q2 | 5  | -  | [+] | 5 |  |  |
|   | <b>Prérequis :</b><br>ELEN0002-2 - Introduction to audio and video techniques   |    |    |    |    |     |   |  |  |
| GBIO0008-2  | <i>Medical imaging</i> (anglais) - Christophe PHILLIPS - [8h Labo., 1j T. t.]   | B2 | Q2 | 33 | 12 | [+] | 5 |  |  |
| INFO8004-1  | <i>Advanced Machine learning</i> (anglais) - Pierre GEURTS, Gilles LOUPPE, Louis WEHENKEL - [45h Proj.]                   | B2 | Q2 | 30 | 5  | [+] | 5 |  |  |
| INFO8006-1  | <i>Introduction to artificial intelligence</i> (anglais) - Gilles LOUPPE - [45h Proj.]                                    | B2 | Q1 | 25 | 10 | [+] | 5 |  |  |
| <b>Other elective courses</b>                     |   |    |    |    |    |     |   |  |  |
| INGE0012-1  | <i>Scientific research in engineering and its impact on innovation</i> (anglais) - Rodolphe SEPULCHRE                     | B2 | Q2 | 26 | 26 | -   | 5 |  |  |
| [...]   | One course to choose from the ULiège courses programme ; this choice must have the approval of the cycle's jury President |    |    |    |    |     |   |  |  |

#### Priority courses

|            |  |    |    |    |    |     |   |  |  |
|------------|--|----|----|----|----|-----|---|--|--|
| ELEC0431-2 | <i>Electromagnetic energy conversion</i> (anglais) - Christophe GEUZAIN - [15h Labo.]                  | B1 | Q2 | 30 | 15 | [+] | 5 |  |  |
| ELEC0052-2 | <i>Analyse et conception des systèmes de mesures électriques</i> - Philippe VANDERBEMDEN - [24h Labo.] | B1 | Q1 | 30 | 6  | [+] | 5 |  |  |
| ELEC0053-2 | <i>Circuits électriques</i> - Bertrand CORNÉLUSSE  | B1 | Q2 | 26 | 26 | -   | 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 | <i>Electromagnetic energy conversion</i> (anglais) - Christophe GEUZAIN - [15h Labo.]                  | B0 | Q2 | 30 | 15 | [+] | 5 |  |  |
| ELEC0052-2 | <i>Analyse et conception des systèmes de mesures électriques</i> - Philippe VANDERBEMDEN - [24h Labo.] | B0 | Q1 | 30 | 6  | [+] | 5 |  |  |
| ELEC0053-2 | <i>Circuits électriques</i> - Bertrand CORNÉLUSSE  | B0 | Q2 | 26 | 26 | -   | 5 |  |  |
| ELEN0040-1 | <i>Electronique numérique</i> - JeanMichel REDOUTÉ   | B0 | Q2 | 26 | 26 | -   | 5 |  |  |
| ELEN0076-1 | <i>Electromagnétisme</i> - Patricia ROUSSEAUX, Benoît VANDERHEYDEN                                     | B0 | Q1 | 26 | 26 | -   | 5 |  |  |
| ELEN0008-1 | <i>Principes des télécommunications analogiques et numériques</i> - Marc VAN DROOGENBROECK             | B0 | Q2 | 26 | 26 | -   | 5 |  |  |
| ELEN0075-3 | <i>Electronique analogique</i> - Benoît VANDERHEYDEN - [16h Labo.]                                     | B0 | Q2 | 29 | 23 | [+] | 5 |  |  |
| [...]      | Choisir maximum 25 crédits pour compléter le cursus  |    |    |    |    |     |   |  |  |