# 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 65 credits of the compulsory courses (including the master thesis), choose 30 credits from one of the three professional foci and take 25 credits of optional courses.

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

### Compulsory Courses (B1 : 40Cr, B2 : 25Cr)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Language</th>
<th>Credits</th>
<th>Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO0085-1</td>
<td>Compilers (english language)</td>
<td>English</td>
<td>5</td>
<td>75</td>
<td>[+] 5</td>
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<tr>
<td></td>
<td><em>Corequisite:</em> INFO0016-1 - Introduction to the theory of computation</td>
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<tr>
<td></td>
<td>INFO0012-2 - Computation structures</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>INFO00940-1 - Operating systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEN0062-1</td>
<td>Introduction to machine learning (english language)</td>
<td>English</td>
<td>5</td>
<td>40</td>
<td>[+] 5</td>
</tr>
<tr>
<td>INFO0016-1</td>
<td>Introduction to the theory of computation (english language)</td>
<td>English</td>
<td>5</td>
<td>26</td>
<td>[+] 5</td>
</tr>
<tr>
<td>INFO0940-1</td>
<td>Operating systems (english language)</td>
<td>English</td>
<td>5</td>
<td>30</td>
<td>[+] 5</td>
</tr>
<tr>
<td>PROJ0010-1</td>
<td>Software project engineering and management (english language)</td>
<td>English</td>
<td>10</td>
<td>10</td>
<td>[+] 5</td>
</tr>
<tr>
<td>GEST3162-1</td>
<td>Principles of management</td>
<td>English</td>
<td>5</td>
<td>30</td>
<td>[+] 5</td>
</tr>
<tr>
<td>PROJ0010-1</td>
<td>Information and coding theory</td>
<td>English</td>
<td>5</td>
<td>30</td>
<td>[+] 5</td>
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<tr>
<td>ATFE0015-1</td>
<td>Master thesis (english language)</td>
<td>English</td>
<td>25</td>
<td>750</td>
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</table>

### Optional courses (B1 : 20Cr, B2 : 35Cr)

Students will choose one of the focus below and will carry it on during the second bloc (B1 : 15Cr, B2 : 15Cr)

**Professional focus on "Computer systems security" (B1 : 15Cr, B2 : 15Cr)**

### Compulsory Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Language</th>
<th>Credits</th>
<th>Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO0031-1</td>
<td>Network Engineering (english language)</td>
<td>English</td>
<td>5</td>
<td>30</td>
<td>[+] 5</td>
</tr>
<tr>
<td></td>
<td><em>Corequisite:</em> INFO0010-4 - Introduction to computer networking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO0045-3</td>
<td>Introduction to computer security (english language)</td>
<td>English</td>
<td>5</td>
<td>30</td>
<td>[+] 5</td>
</tr>
</tbody>
</table>
Students choosing this focus shall select, in addition to 10 credits of compulsory courses, 45 credits of elective courses inside or outside the focus. However, for his/her whole master program (block 1 and block 2), a total of 20 credits of options must be taken inside the focus. The regulation allows students to choose elective courses during the block of their choice, in accordance with the prerequisites and co-requisites. Students must also be attentive to schedule constraints. (B1 : 5Cr, B2 : 15Cr)

INFO0064-2  *Embedded systems* (english language) - Bernard BOIGELOT
- Q1 25 20 - 3

INFO2055-1  *Embedded systems project* (english language) - Bernard BOIGELOT - [60h Proj.]
Corequisite: INFO0064-2 - Embedded systems
- Q2 - - [+] 2

INFO2051-1  *Object-oriented programming on mobile devices* (english language) - Laurent MATHY - [90h Proj.]
- Q1 15 10 [+] 5

INFO0056-1  *Securing Networks* (english language) - Guy LEDUC - [12h Labo., 30h Proj.] (Even years)
Corequisite: INFO0010-4 - Introduction to computer networking
INFO0045-3 - Introduction to computer security
- Q2 30 - [+] 5

INFO0939-1  *High performance scientific computing* (english language) - Christophe GEUZAIN - [20h Proj.]
- Q1 30 15 [+] 5

INFO8002-1  *Large-scale data systems* (english language) - Gilles LOUPPE - [45h Proj.]
- Q1 25 10 [+] 5

INFO8012-1  *Digital Forensics* (english language) - [12h Labo., 30h Proj.] (Even years)
Corequisite: INFO0940-1 - Operating systems
INFO0085-1 - Compilers
INFO0010-4 - Introduction to computer networking
- Q2 30 - [+] 5

INFO8011-1  *Network infrastructures* (english language) - Benoît DONNET, Guy LEDUC, Laurent MATHY - [12h Labo., 30h Proj.] (Odd years)
Corequisite: INFO0010-4 - Introduction to computer networking
- Q1 30 - [+] 5

INFO8013-1  *Advanced Computer Security* (english language) - Benoît DONNET, Laurent MATHY - [20h Labo., 30h Proj.] (Odd years)
Corequisite: INFO0045-3 - Introduction to computer security
- Q2 20 - [+] 5

INFO9016-1  (pas organisé en 2021-2022) *Advanced Databases* (english language)
- Q2 24 20 - 5

### Professional focus on "Intelligent Systems" (B1 : 15Cr, B2 : 15Cr)

**Compulsory Courses**

INFO8010-1  *Deep learning* (english language) - Gilles LOUPPE - [55h Proj.]
- B1 Q2 25 10 [+] 5

SYST0003-1  *Linear control systems* (english language)
- Theory - Guillaume DRION
  - B1 Q1 26 6 -
- Control system design in time domain and frequency domain - Guillaume DRION - [6h Labo.]
  - 20 [+]

Students choosing this focus shall select, in addition to 10 credits of compulsory courses, 45 credits of elective courses inside or outside the focus. However, for his/her whole master program (block 1 and block 2), a total of 20 credits of options must be taken inside the focus. The regulation allows students to choose elective courses during the block of their choice, in accordance with the prerequisites and co-requisites. Students must also be attentive to schedule constraints. (B1 : 5Cr, B2 : 15Cr)

ELEN0016-2  *Computer vision* (english language) - Marc VAN DROGENBROECK - [50h Proj.]
- Q1 30 10 [+] 5
INFO0948-2  Introduction to intelligent robotics (english language) - Pierre SACRÉ - [80h Proj.]
INFO2049-1  Web and Text Analytics (english language) - Ashwin ITTOO
Corequisite : ELENO062-1 - Introduction to machine learning
GBIO0002-1  Genetics and bioinformatics (english language) - Franck DEQUEDT, Kristel VAN STEEN - [15h Proj.]
DROI1357-1  European law, (big) data and artificial intelligence applications seminar (english language) - -- Suppl : Ljupcho GROZANOYSKI
INFO8003-1  Optimal decision making for complex problems (english language) - Damien ERNST - [45h Proj.]
INFO8004-1  Advanced Machine learning (english language) - Pierre GEURTS, Gilles LOUPPE, Louis WEHENKEL - [45h Proj.]
INFO8006-1  Introduction to artificial intelligence (english language) - Gilles LOUPPE - [45h Proj.]
INFO9014-1  Knowledge representation and reasoning (english language) - Christophe DEBRUYNE
Corequisite : INFO9015-1 - Logic for Computer Science

Professional focus on “Management” (B1 : 15Cr, B2 : 15Cr)
Registration to this focus only with a file (contact : C. Puit)

Compulsory Courses
FINA0001-1  Financial statement analysis and financing an enterprise - Wouter TORSIN
FINA0017-1  General accounting (Evening classes) - Anne BILS, Wilfried NIESSEN
LOGI0010-1  Supply Chain Management (english language) - Yasemin ARDA
ERAS0011-1  Business Simulation (english language) - Anne CHANTEUX - [50h Mon. WS]
GRHO0001-4  Strategic Human Resources Management - François PICHAUT
DROI2003-2  Legal management of a company and its employees - Droit des sociétés - Frédéric DAERDEN, Laurent STAS DE RICHELIE, Droit fiscal - Isabelle RICHELIE - [5h Conf.]

Students choosing this focus shall select, in addition to 27 credits of compulsory courses, 28 credits of elective courses inside or outside the focus. One of the 3 language courses belonging to the focus must necessarily be chosen as an option in either block 1 or block 2, for 3 credits. The regulation allows students to choose elective courses during the block of their choice, in accordance with the prerequisites and co-requisites. Students must also be attentive to schedule constraints. (B2 : 3Cr)

LANG1936-1  Elementary Dutch I - Fanny NSITA
LANG1933-1  Elementary German I - Marie MATHIN
LANG1934-1  Elementary Spanish I - Alexis ALVAREZ BARBOSA

Choose remaining credits in the lists below : (B1 : 5Cr, B2 : 20Cr)

Optional courses outside the focus
Computer Science foundation courses
The following courses 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 of science in engineering, or unless the corresponding
knowledge and skills have been acquired previously.

INFO0902-1  Data structures and algorithms - Pierre GIURTS - [40h Proj.]  B1 Q2 26 20 [+] 5
INFO0010-4  Introduction to computer networking (english language) - 
Guy LEDUC - [12h Labo., 40h Proj.]  B1 Q1 35 2 [+] 5
INFO0012-2  Computation structures (english language) - Pascal FONTAINE, 
Laurent MATHY - [40h Proj.]  B1 Q1 26 26 [+] 5
INFO0062-1  Object-oriented programming (english language) - 
Bernard BOIGELOT - [20h Proj.]  B1 Q2 25 20 [+] 5
INFO0912-1  Parallel Programming (english language) - Pascal FONTAINE  B1 Q2 25 25 - 5

Computer systems security

INFO0031-1  Network Engineering (english language) - Benoît DONNET, 
Guy LEDUC - [12h Labo., 30h Proj.]  - Q2 30 - [+] 5
INFO0045-3  Introduction to computer security (english language) - 
Benoît DONNET - [10h Labo., 30h Proj.]  - Q1 30 6 [+] 5
Corequisite :
INFO0902-1 - Structures des données et algorithmes  
INFO0012-2 - Computation structures  
INFO0010-4 - Introduction to computer networking

INFO0056-1  Securing Networks (english language) - Guy LEDUC - [12h Labo., 
30h Proj.] (Even years)  - Q2 30 - [+] 5
Corequisite :
INFO0045-3 - Introduction to computer security  
INFO0010-4 - Introduction to computer networking

INFO0939-1  High performance scientific computing (english language) - 
Christophe GÉZAINE - [20h Proj.]  - Q1 30 15 [+] 5
INFO8002-1  Large-scale data systems (english language) - Gilles LOUPPE - [45h 
Proj.]  - Q1 25 10 [+] 5
INFO8012-1  Digital Forensics (english language) - [12h Labo., 30h Proj.] (Even years)  - Q2 30 - [+] 5
Prerequisite :
INFO0040-1 - Operating systems  
INFO0085-1 - Compilers  
INFO0010-4 - Introduction to computer networking

INFO8011-1  Network infrastructures (english language) - Benoît DONNET, 
Guy LEDUC, Laurent MATHY - [12h Labo., 30h Proj.] (Odd years)  - Q1 30 - [+] 5
Corequisite :
INFO0010-4 - Introduction to computer networking

INFO8013-1  Advanced Computer Security (english language) - Benoît DONNET, 
Laurent MATHY - [20h Labo., 30h Proj.] (Odd years)  - Q2 20 - [+] 5
Corequisite :
INFO00045-3 - Introduction to computer security

Intelligent Systems

INFO8010-1  Deep learning (english language) - Gilles LOUPPE - [55h Proj.]  - Q2 25 10 [+] 5
Corequisite :
ELEN0062-1 - Introduction to machine learning
ELEN0016-2  Computer vision (english language) - Marc VAN DROOGENBROECK - 
[50h Proj.]  - Q1 30 10 [+] 5
INFO9015-1  Logic for Computer Science (english language) - Pascal FONTAINE  - Q1 24 20 - 5
INFO0948-2  Introduction to intelligent robotics (english language) - Pierre SACRÉ - 
[80h Proj.]  - Q2 30 4 [+] 5
### Corequisite:
- ELEN0062-1 - Introduction to machine learning
- ELEN0016-2 - Computer vision

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Prerequisites</th>
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<tr>
<td>INFO2049-1</td>
<td>Web and Text Analytics (english language) - Ashwin ITTOO</td>
<td>Q1 30</td>
<td>-</td>
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<tr>
<td>GBIO0002-1</td>
<td>Genetics and bioinformatics (english language) - Franck DEQUIEDT,</td>
<td>Q1 30 15</td>
<td>Kristel VAN STEEN - [15h Proj.]</td>
<td>5</td>
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<tr>
<td>INFO8003-1</td>
<td>Optimal decision making for complex problems (english language) -</td>
<td>Q2 25 10</td>
<td>Damien ERNST - [45h Proj.]</td>
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<tr>
<td>INFO8004-1</td>
<td>Advanced Machine learning (english language) - Pierre GEURTS,</td>
<td>Q2 25</td>
<td>Gilles LOUPPE, Louis WEHENKEL - [45h Proj.]</td>
<td>5</td>
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<tr>
<td>INFO8006-1</td>
<td>Introduction to artificial intelligence (english language) -</td>
<td>Q1 25 20</td>
<td>Christophe DEBRUYNE</td>
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<tr>
<td>INFO9014-1</td>
<td>Knowledge representation and reasoning (english language) -</td>
<td>Q2 24 20</td>
<td>-</td>
<td>5</td>
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<tr>
<td>INFO9015-1</td>
<td>Logic for Computer Science (english language) - Pascal FONTAINE</td>
<td>Q1 24 20</td>
<td>-</td>
<td>5</td>
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<tr>
<td>INFO9016-1</td>
<td>(pas organisé en 2021-2022) Advanced Databases (english language) -</td>
<td>Q2 24 20</td>
<td>-</td>
<td>5</td>
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</tr>
<tr>
<td>INFO0064-2</td>
<td>Embedded systems (english language) - Bernard BOIGELOT</td>
<td>Q1 25 20</td>
<td>-</td>
<td>3</td>
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<tr>
<td>INFO2055-1</td>
<td>Embedded systems project (english language) - Bernard BOIGELOT</td>
<td>Q2 25</td>
<td>-</td>
<td>2</td>
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<tr>
<td>INFO9015-1</td>
<td>Logic for Computer Science (english language) - Pascal FONTAINE</td>
<td>Q1 24 20</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>GBIO0009-1</td>
<td>Topics in bioinformatics (english language) - Kristel VAN STEEN -</td>
<td>Q1 25 15</td>
<td>-</td>
<td>5</td>
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<tr>
<td>MATH0461-2</td>
<td>Introduction to numerical optimization (english language) -</td>
<td>Q1 30 20</td>
<td>-</td>
<td>5</td>
<td></td>
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<tr>
<td>MATH0462-1</td>
<td>Discrete optimization (english language) - Quentin LOUVEAUX -</td>
<td>Q2 30 20</td>
<td>-</td>
<td>5</td>
<td></td>
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<tr>
<td>GBIO0003-01</td>
<td>Computational approaches to statistical generics (english language) -</td>
<td>Q2 25 15</td>
<td>-</td>
<td>5</td>
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<tr>
<td>INGE0012-1</td>
<td>Scientific research in engineering and its impact on innovation (english language) -</td>
<td>Q2 26 26</td>
<td>-</td>
<td>5</td>
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</tr>
<tr>
<td>MECA0524-1</td>
<td>CAD &amp; Geometric Algorithms - Eric BÉCHET - [60h Proj.]</td>
<td>Q1 20 20</td>
<td>-</td>
<td>5</td>
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<tr>
<td>INFO0004-2</td>
<td>Object-oriented programming projects (english language) -</td>
<td>Q2 20</td>
<td>-</td>
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</table>

### Other optional courses

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Language</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>GBIO0002-1</td>
<td>Genetics and bioinformatics (english language) -</td>
<td>Q1 30 15</td>
<td>Kristel VAN STEEN - [15h Proj.]</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>MATH0462-1</td>
<td>Discrete optimization (english language) - Quentin LOUVEAUX -</td>
<td>Q2 30 20</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>GBIO0003-01</td>
<td>Computational approaches to statistical generics (english language) -</td>
<td>Q2 25 15</td>
<td>-</td>
<td>5</td>
<td></td>
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<tr>
<td>INGE0012-1</td>
<td>Scientific research in engineering and its impact on innovation (english language) -</td>
<td>Q2 26 26</td>
<td>-</td>
<td>5</td>
<td></td>
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<tr>
<td>MECA0524-1</td>
<td>CAD &amp; Geometric Algorithms - Eric BÉCHET - [60h Proj.]</td>
<td>Q1 20 20</td>
<td>-</td>
<td>5</td>
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<tr>
<td>INFO0004-2</td>
<td>Object-oriented programming projects (english language) -</td>
<td>Q2 20</td>
<td>-</td>
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Study programmes 2021-2022
Faculty of Applied Sciences
Master of Science (MSc) in Computer Science and Engineering

MATHY - [90h Proj.]
GBIO0031-1 Learning from genomic data (english language) - Kristel VAN STEEN - Q2 - - [+ 5
- [150h Proj.]

[...] With the agreement of the jury, choose 5 credits in any course programme of the University

Internships and projects (maximum 15 credits)
ASTG9005-1 Research Internship (english language) - Benoît DONNET - [300h Proj.] B2 TA - - [+ 10
ASTG0021-1 Technical company internship (english language) - Laurent MATHY - [300h Proj.] B2 TA - - [+ 10

Notice : the two company internships are mutually exclusive

PROJ0011-1 Personal student project (english language) - Bernard BOIGELO, COLLEGIALITÉ - [150h Proj.] - TA - - [+ 5

Additional ECTS Master of science in computer science and engineering

Compulsory Courses (B0 : 46Cr)

Students that are admitted to the master of science in Computer Science and Engineering without having obtained a degree of bachelor in engineering must add to their programme the following list of courses, to be taken in the first year of the master.

MATH0495-1 Elements for calculating probabilities - Céline ESSER - [5h Proj.] B0 Q1 15 15 [+ 3
MATH0006-3 Introduction to numerical analysis (english language) - Quentin LOUEVAUX B0 Q1 20 20 - 4
INFO0054-1 Functional programming - Christophe DEBRUYNE - [15h Proj.] B0 Q1 28 24 [+ 5
MATH0488-1 Elements of stochastic processes - Maarten ARNST, Vincent DENOËL, Pierre GEURTS - [30h Proj.] B0 Q2 10 10 [+ 2
INFO0030-3 Programming Projects - Benoît DONNET - [100h Proj.] B0 Q2 20 - - 5
ELEN0040-1 Digital electronics (english language) - JeanMichel REDOUTÉ B0 Q2 26 26 - 5
MATH0013-1 Algebra - Eric DELHEZ B0 Q1 26 26 - 5
MECA0003-2 Rational Mechanics - Eric DELHEZ B0 Q1 20 30 - 4
LANG6011-1 Remedial English for Computer Science (english language) - Adnan VESSEUR B0 Q2 3 27 - 3
DROI0724-1 Law and engineering - Roman AYDOGDU, Christine BIQUET, Vanessa FRANSSEN, Fabienne KÉFER, Pascale LECOCQ, Bernard VANBRABANT, Cécile VERCHEVAL B0 Q1 26 - - 2
GENV0002-1 Energy and sustainable development - Pierre DEWALLEF, Damien ERNST, Nathalie JOB, Sigrid REITER - [20h Proj.] B0 Q2 26 8 [+ 3
MATH0504-1 Applied mathematics - Benjamin DEWALS, Christophe GEUZAIN B0 Q1 26 26 - 5