

## First Year

### Bringing up to date

Choose an upgrading course among the following :

ELEN0040-1	<i>Digital Electronics</i> - Jacques DESTINÉ	30	30	-	5
ELEN0070-1	<i>Signal Processing</i> - Jacques VERLY	30	30	-	5
ELEN0075-1	<i>Analog Electronics</i> - Benoît VANDERHEYDEN	30	30	-	5
INFO0062-1	<i>Object-Oriented Programming</i> - Bernard BOIGELOT	30	30	-	5
MECA0155-1	<i>Dynamics of Mechanical Systems</i> - JeanClaude GOLINVAL	30	30	-	5
MECA0446-1	<i>Continuum Mechanics</i> - JeanPhilippe PONTHOT	30	30	-	5
PHYS0055-1	<i>Introduction to Condensed Matter Physics</i> - Matthieu VERSTRAETE	30	30	-	5
ELEC0053-2	<i>Electric circuits</i> - Patricia ROUSSEAU	30	30	-	5

### Common core courses

Choose courses totaling 52 credits from the list below. The course not followed in the 1st year must be followed in the 2nd year :

MECA0036-1	<i>Finite Element Method</i> (english language) - JeanPhilippe PONTHOT	30	30	-	5
MATH0024-1	<i>Further Study of Digital Analysis (Equations with Partial Derivatives)</i> - Jean André ESSERS	30	30	-	5
MATH0461-1	<i>Introduction to numerical optimization</i> (english language) - Quentin LOUVEAUX	30	30	-	5
SYST0003-1	<i>Linear control systems</i> (english language) - Eric BULLINGER	30	30	-	5
INFO0939-1	<i>High performance scientific computing</i> (english language) - Christophe GEUZAINÉ	30	30	-	5
MATH0471-1	<i>Multiphysic scientific computating project : development of a partial differential equation solver</i> - Jean André ESSERS, Christophe GEUZAINÉ	-	20	-	2
PHYS0069-1	<i>Introduction to statistical physics</i> - Nicolas VANDEWALLE	30	30	-	5
CHIM0202-3	<i>Physical chemistry</i> - Edwin DE PAUW, Bernard LEYH	30	30	-	5
PHYS0048-1	<i>Coherent and Incoherent Optics</i> - Serge HABRAKEN	30	30	-	5
SPAT0048-4	<i>Physics of the earth's atmosphere and environment</i> - JeanClaude GÉRARD, Denis GRODENT	45	15	-	5
PHYS0961-1	<i>Irreversibility, instabilities and chaos</i> - Pierre DAUBY	30	30	-	5
ELEN0074-1	<i>Sensors, microsensors and instrumentation</i> - Philippe VANDERBEMDEN	30	30	-	5

### Compulsory courses

[...] A general course to be chosen from the University's programmes of courses ; this choice must be approved by the cycle's President of the Jury

### Students studying for the Bachelors in Civil Engineering who have not chosen the appropriate option :

- \* must take all the so-called "prerequisite" courses hereafter, if they were not taken during the 1st cycle. These courses must be taken during the 1st year of the masters and some 1st-year compulsory courses must be rolled over to the 2nd year.
- \* must subsequently reduce the number of courses they choose to take in the 2nd year of the masters. If all the "prerequisite" courses must be taken, it will be impossible for them to choose which courses they take.
- \* cannot choose the professional "management" focus.

The program adapted by these students has to receive the preliminary agreement of the Jury.

### Compulsory prerequisites

PHYS2026-1	<i>Physics 4 : Microscopic physics (partime a : waves optics, partime b : introduction to nuclear physics)</i> - Ngoc Duy NGUYEN	30	30	-	5
MECA0445-1	<i>Heat transfer</i> - Michel HOGGE	30	30	-	5
MECA0025-1	<i>Fluid Mechanics</i> - Eric DELHEZ	30	30	-	5
PHYS0211-3	<i>Quantum Mechanics</i> - John MARTIN	30	30	-	5
MECA0012-5	<i>Solid mechanics</i> - Laurent DUCHENE	30	30	-	5
ELEN0076-1	<i>Electromagnetism</i> - Patricia ROUSSEAU, Benoît VANDERHEYDEN	30	30	-	5

### Compulsory courses

INFO0061-3	<i>Computers organization</i> - Bernard BOIGELOT	25	20	-	5
MECA0001-1	<i>Mechanics of materials</i> - JeanPierre JASPART	30	30	-	5

SYST0002-1	<i>Linear systems</i> - Rodolphe SEPULCHRE	30	30	-	5
MECA0445-1	<i>Heat transfer</i> - Michel HOGGE	30	30	-	5
MECA0025-1	<i>Fluid Mechanics</i> - Eric DELHEZ	30	30	-	5
MECA0012-5	<i>Solid mechanics</i> - Laurent DUCHENE	30	30	-	5
ELEN0076-1	<i>Electromagnetism</i> - Patricia ROUSSEAU, Benoît VANDERHEYDEN	30	30	-	5
MECA0036-1	<i>Finite Element Method</i> (english language) - JeanPhilippe PONTHOT	30	30	-	5
MATH0024-1	<i>Further Study of Digital Analysis (Equations with Partial Derivatives)</i> - Jean André ESSERS	30	30	-	5
MATH0461-1	<i>Introduction to numerical optimization</i> (english language) - Quentin LOUVEAUX	30	30	-	5
INFO0939-1	<i>High performance scientific computing</i> (english language) - Christophe GEUZAINÉ	30	30	-	5
MATH0471-1	<i>Multiphysic scientific computing project : development of a partial differential equation solver</i> - Jean André ESSERS, Christophe GEUZAINÉ	-	20	-	2
PHYS0069-1	<i>Introduction to statistical physics</i> - Nicolas VANDEWALLE	30	30	-	5
CHIM0202-3	<i>Physical chemistry</i> - Edwin DE PAUW, Bernard LEYH	30	30	-	5
[...]	Non-technical training courses (to be chosen among courses on offer at the university ; the selection must meet with the approval of the president of the jury)				

#### Optional courses

Choose one of the following courses :

ELEN0040-1	<i>Digital Electronics</i> - Jacques DESTINÉ	30	30	-	5
ELEN0070-1	<i>Signal Processing</i> - Jacques VERLY	30	30	-	5
ELEN0075-1	<i>Analog Electronics</i> - Benoît VANDERHEYDEN	30	30	-	5
INFO0062-1	<i>Object-Oriented Programming</i> - Bernard BOIGELOT	30	30	-	5
MECA0155-1	<i>Dynamics of Mechanical Systems</i> - JeanClaude GOLINVAL	30	30	-	5
MECA0446-1	<i>Continuum Mechanics</i> - JeanPhilippe PONTHOT	30	30	-	5
PHYS0055-1	<i>Introduction to Condensed Matter Physics</i> - Matthieu VERSTRAETE	30	30	-	5

#### Second Year

##### Compulsory courses

ATFE0016-1	<i>Final Work (including an introduction to methodology and research)</i> - COLLÉGIALITÉ	-	-	-	25
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##### Common core courses

Choose the course that was not taken in the first year of the Master's degree among the following :

MECA0036-1	<i>Finite Element Method</i> (english language) - JeanPhilippe PONTHOT	30	30	-	5
MATH0024-1	<i>Further Study of Digital Analysis (Equations with Partial Derivatives)</i> - Jean André ESSERS	30	30	-	5
MATH0461-1	<i>Introduction to numerical optimization</i> (english language) - Quentin LOUVEAUX	30	30	-	5
SYST0003-1	<i>Linear control systems</i> (english language) - Eric BULLINGER	30	30	-	5
INFO0939-1	<i>High performance scientific computing</i> (english language) - Christophe GEUZAINÉ	30	30	-	5
MATH0471-1	<i>Multiphysic scientific computing project : development of a partial differential equation solver</i> - Jean André ESSERS, Christophe GEUZAINÉ	-	20	-	2
PHYS0069-1	<i>Introduction to statistical physics</i> - Nicolas VANDEWALLE	30	30	-	5
CHIM0202-3	<i>Physical chemistry</i> - Edwin DE PAUW, Bernard LEYH	30	30	-	5
PHYS0048-1	<i>Coherent and Incoherent Optics</i> - Serge HABRAKEN	30	30	-	5
SPAT0048-4	<i>Physics of the earth's atmosphere and environment</i> - JeanClaude GÉRARD, Denis GRODENT	45	15	-	5
PHYS0961-1	<i>Irreversibility, instabilities and chaos</i> - Pierre DAUBY	30	30	-	5
ELEN0074-1	<i>Sensors, microsensors and instrumentation</i> - Philippe VANDERBEMDEN	30	30	-	5

#### Optional courses

Choose one module from :

##### Electronic physics

[...] Choose courses totalling 20 ECTS from the following :  
"Electronic physics" list

ELEN0004-1	<i>The physics of semiconductor devices</i> - Benoît VANDERHEYDEN	30	30	-	5
ELEN0047-1	<i>Superconductivity</i> - Philippe VANDERBEMDEN	30	30	-	5
ELEN0038-1	<i>Microsystems</i> - Jacques DESTINÉ	30	30	-	5
PHYS0046-2	<i>Quantum physics and applications to Condensed Matter</i> - Philippe GHOSEZ, Matthieu VERSTRAETE - Suppl : Julien VARIGNON	30	30	-	5
ELEN0069-1	<i>Nanoelectronics / Optoelectronics</i> - Benoît VANDERHEYDEN	30	30	-	5
PHYS0236-2	<i>Lasers in physics and applications</i> - Serge HABRAKEN	30	30	-	5
PHYS3003-1	<i>Functional Materials : theory and modeling</i> (english language) - Philippe GHOSEZ - Suppl : Julien VARIGNON	20	10	-	2,5
PHYS3004-1	<i>Nanomaterials : theory and modeling</i> (english language) - JeanYves RATY	20	10	-	2,5
[...]	Choose one placement or courses totaling 10 ECTS from the following lists : "Physical Electronics", "Fluid Mechanics", "Solid Mechanics", "Space Science" and "Mathematical, digital and multiphysical methods".				

#### Fluid Mechanics

[...] Choose courses totalling 20 ECTS from the following :

##### "Mechanics of Fluids" list

PHYS0090-1	<i>Complex fluids and non-Newtonian flows</i> (english language) - Vincent TERRAPON	30	30	-	5
MECA0471-1	<i>Finite volumes and fluid dynamics</i> - Jean André ESSERS	30	30	-	5
AERO0001-1	<i>Aerodynamics</i> - Jean André ESSERS, Vincent TERRAPON	30	30	-	5
AERO0016-1	<i>Fluid-structure interaction &amp; aeroelasticity</i> (english language) - Grigorios DIMITRIADIS	30	30	-	5
MECA0032-1	<i>Flow in Turbomachines</i> - Olivier LÉONARD	30	30	-	5
ESHY0070-1	<i>Dynamics of lower atmospherical layers and air-sea interactions</i> - Louis FRANÇOIS, François RONDAY	30	15	-	5
MECA0055-1	<i>Numerical methods applied to the environment</i> - JeanMarie BECKERS	30	30	-	5
MECA0053-3	<i>Geophysical fluid dynamics</i> - JeanMarie BECKERS	30	30	-	5
GBIO0014-2	<i>Modeling of physiological systems and clinical applications</i> - Thomas DESAIVE	30	30	-	5
MECA0008-1	<i>Microfluidics</i> (english language) - Tristan GILET	30	30	-	5
AERO0004-1	<i>Turbulent Flow</i> (english language) - Vincent TERRAPON	30	30	-	5
GBIO0022-1	<i>Biomimetism</i> (english language) - Liesbet GERIS, Tristan GILET	30	30	-	5

[...] Choose one placement or courses totaling 10 ECTS from the following lists :  
"Physical Electronics", "Fluid Mechanics", "Solid Mechanics", "Space Science" and  
"Mathematical, digital and multiphysical methods".

#### Solid Mechanics

[...] Choose courses totalling 20 ECTS from the following :

##### "Mechanics of Solids" list

MECA0009-1	<i>Introduction to microtechnologies</i> (english language) - Tristan GILET	30	30	-	5
MECA0010-1	<i>Stochastic modelling in mechanics</i> (english language) - Maarten ARNST	30	30	-	5
GBIO0022-1	<i>Biomimetism</i> (english language) - Liesbet GERIS, Tristan GILET	30	30	-	5
MECA0023-1	<i>Inelastic behavior of solids</i> - JeanPhilippe PONTHOT	30	30	-	5
MECA0027-1	<i>Structural and multidisciplinary optimization</i> - Pierre DUYSINX, Patricia TOSSINGS	30	30	-	5
MECA0058-1	<i>Fracture mechanics, damage and fatigue</i> (english language) - Ludovic NOELS	30	30	-	5
MECA0470-1	<i>Alternative methods of modeling in continuum mechanics</i> - Maarten ARNST, Eric BÉCHET, Ludovic NOELS	20	40	-	5
MECA0033-1	<i>Heat and Material Transfer Modelling</i> - N...	30	30	-	5
AERO0016-1	<i>Fluid-structure interaction &amp; aeroelasticity</i> (english language) - Grigorios DIMITRIADIS	30	30	-	5
MECA0029-1	<i>Mechanical Vibrations</i> - JeanClaude GOLINVAL	30	30	-	5
MECA0502-1	<i>Mechanics of composites</i> (english language) - N... - Suppl : Michaël BRUYNEEL	30	30	-	5
GBIO0012-2	<i>Biomechanics</i> (english language) - Liesbet GERIS - [1d FW]	30	30	[+]	5
MECA0464-1	<i>Large deformation of solids</i> (english language) - JeanPhilippe PONTHOT	30	30	-	5

[...] Choose one placement or courses totaling 10 ECTS from the following lists :  
"Physical Electronics", "Fluid Mechanics", "Solid Mechanics", "Space Science" and  
"Mathematical, digital and multiphysical methods".

#### Space Sciences

[...] Choose courses totalling 20 ECTS from the following :

**"Spatial Sciences" list**

ELEN0017-1	<i>Analysis and Design of Telecommunications Systems</i> - Marc VAN DROOGENBROECK	30	30	-	<b>5</b>
ASTR0004-2	<i>Astrophysics and Space Techniques</i> - Jean SURDEJ - [5d Peda. Tr.]	30	15	[+]	<b>5</b>
AERO0024-1	<i>Aerodynamics</i> - Gaëtan KERSCHEN	30	30	-	<b>5</b>
AERO0018-3	<i>Space Experiment Development</i> - Pierre ROCHUS	30	30	-	<b>5</b>
ELEN0008-1	<i>Principles of analog and digital telecommunications systems</i> - Marc VAN DROOGENBROECK	30	30	-	<b>5</b>
SPAT0012-1	<i>General relativity</i> - Yves DE ROP	60	-	-	<b>5</b>
SPAT0032-2	<i>Teledetection</i> - Christian BARBIER	30	30	-	<b>5</b>
SPAT0039-1	<i>Spectroscopy in Astrophysics and Geophysics</i> - Jérôme LOICQ	20	10	-	<b>2,5</b>
SPAT0001-1	<i>Plasma Physics</i> - Hervé LAMY, Anne THOUL	25	5	-	<b>2,5</b>
SPAT0021-1	<i>Introduction to astroparticles</i> - Joseph CUGNON	20	10	-	<b>2,5</b>
SPAT0035-1	<i>Space exploration</i> - Grégor RAUW	30	10	-	<b>3</b>
SPAT0036-1	<i>Celestial mechanics and space trajectories</i> - Grégor RAUW	20	10	-	<b>2,5</b>

[...] Choose one placement or courses totaling 10 ECTS from the following lists :  
"Physical Electronics", "Fluid Mechanics", "Solid Mechanics", "Space Science" and  
"Mathematical, digital and multiphysical methods".

At most, and in agreement with the Jury, 5 of these credits may be selected in the program of another Master of the University.

**"Mathematical, digital and multi-physical methods" list**

ELEN0071-1	<i>Digital Signal Processing</i> - Jacques VERLY	30	30	-	<b>5</b>
ELEN0060-1	<i>Information and Coding Theory</i> - Louis WEHENKEL	30	30	-	<b>5</b>
MECA0055-1	<i>Numerical methods applied to the environment</i> - JeanMarie BECKERS	30	30	-	<b>5</b>
MATH0462-1	<i>Discrete optimization</i> - Quentin LOUVEAUX	30	30	-	<b>5</b>
SYST0017-1	<i>Non linear systems</i> - Rodolphe SEPULCHRE	30	30	-	<b>5</b>
ELEC0041-1	<i>Modeling and design of electromagnetic systems</i> - Patrick DULAR, Christophe GEUZAINÉ	30	30	-	<b>5</b>
GBIO0011-1	<i>Biological systems modeling</i> - Pierre DAUBY, Rodolphe SEPULCHRE	30	30	-	<b>5</b>
MATH0049-1	<i>Morphological Characterization of Unordered Systems</i> - Silvia BLACHER	30	30	-	<b>5</b>
GBIO0013-1	<i>Transport phenomena in biology</i> - Dominique TOYE	30	30	-	<b>5</b>
SPAT0046-1	<i>Symmetries in Particle Astrophysics</i> - Floarea STANCU	30	-	-	<b>2,5</b>
SPAT0036-1	<i>Celestial mechanics and space trajectories</i> - Grégor RAUW	20	10	-	<b>2,5</b>
INFO2046-1	<i>Computational Geometry</i> - Eric BÉCHET	30	30	-	<b>5</b>
ASTG0025-1	<i>Internship or placement in a research centre</i> - COLLÉGIALITÉ	-	-	-	<b>10</b>

Notice : Students who have, in their BAC studies, already taken one or more option courses found in this list must not take them again.

**Compulsory courses**

ATFE0016-1	<i>Final Work (including an introduction to methodology and research)</i> - COLLÉGIALITÉ	-	-	-	<b>25</b>
PHYS0961-1	<i>Irreversibility, instabilities and chaos</i> - Pierre DAUBY	30	30	-	<b>5</b>

**Compulsory courses**

SYST0003-1	<i>Linear control systems (english language)</i> - Eric BULLINGER	30	30	-	<b>5</b>
PHYS0048-1	<i>Coherent and Incoherent Optics</i> - Serge HABRAKEN	30	30	-	<b>5</b>
SPAT0048-4	<i>Physics of the earth's atmosphere and environment</i> - JeanClaude GÉRARD, Denis GRODENT	45	15	-	<b>5</b>
ELEN0074-1	<i>Sensors, microsensors and instrumentation</i> - Philippe VANDERBEMDEN	30	30	-	<b>5</b>

**Optional courses**

[...] 2 courses to be chosen from the modules "Electronic Physics", "Fluid Mechanics",  
"Solid Mechanics" or "Spatial Sciences" of the regular programme of the 2nd Masters in  
Physical Civil Engineering

With the agreement of the president of the jury students can replace max. 10 credit of compulsory courses with courses in the regular program of the second year in the Master's degree.