

## 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> - Jean-Claude GOLINVAL	30	30	-	5
MECA0446-1	<i>Continuum Mechanics</i> - Jean-Philippe PONTHOT	30	30	-	5
PHYS0055-1	<i>Introduction to Condensed Matter Physics</i> - Jean-Pierre GASPARD	30	30	-	5
ELEC0053-2	<i>Electric circuits</i> - Patricia ROUSSEAUX	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> - Jean-Philippe 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 (english)</i> - Quentin LOUVEAUX	30	30	-	5
SYST0003-1	<i>Linear control systems</i> - Eric BULLINGER, Rodolphe SEPULCHRE	30	30	-	5
INFO0939-1	<i>High performance scientific computing (english)</i> - 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 - Suppl : Véronique ROCHUS	-	20	-	2
PHYS0069-1	<i>Introduction to statistical physics</i> - Stéphane DORBOLO	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
SPAT0048-2	<i>Physics of the earth's atmosphere and environment</i> - Jean-Claude GÉRARD	30	30	-	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> - Laurent DREESEN	30	30	-	5
MECA0445-1	<i>Transfers of heat and matter</i> - Michel HOGGE	30	30	-	5
MECA0025-1	<i>Fluid Mechanics</i> - Eric DELHEZ	30	30	-	5
PHYS0211-3	<i>Quantum Mechanics</i> - Joseph CUGNON	30	30	-	5
MECA0012-5	<i>Mechanics of materials (english)</i> - Serge CESCOTTO	30	30	-	5
ELEN0076-1	<i>Electromagnetism</i> - Patricia ROUSSEAUX, Benoît VANDERHEYDEN	30	30	-	5

### Compulsory courses

INFO0061-2	<i>Computers and operating systems</i> - Bernard BOIGELOT	30	30	-	5
MECA0001-1	<i>Solid mechanics (english)</i> - Serge CESCOTTO	30	30	-	5

SYST0002-1	<i>Linear systems</i> - Rodolphe SEPULCHRE	30	30	-	5
MECA0445-1	<i>Transfers of heat and matter</i> - Michel HOGGE	30	30	-	5
MECA0025-1	<i>Fluid Mechanics</i> - Eric DELHEZ	30	30	-	5
MECA0012-5	<i>Mechanics of materials</i> (english) - Serge CESCOTTO	30	30	-	5
ELEN0076-1	<i>Electromagnetism</i> - Patricia ROUSSEAU, Benoît VANDERHEYDEN	30	30	-	5
MECA0036-1	<i>Finite Element Method</i> - Jean-Philippe 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) - Quentin LOUVEAUX	30	30	-	5
INFO0939-1	<i>High performance scientific computing</i> (english) - 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 - Suppl : Véronique ROCHUS	-	20	-	2
PHYS0069-1	<i>Introduction to statistical physics</i> - Stéphane DORBOLO	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> - Jean-Claude GOLINVAL	30	30	-	5
MECA0446-1	<i>Continuum Mechanics</i> - Jean-Philippe PONTHOT	30	30	-	5
PHYS0055-1	<i>Introduction to Condensed Matter Physics</i> - Jean-Pierre GASPARD	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> - Jean-Philippe 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) - Quentin LOUVEAUX	30	30	-	5
SYST0003-1	<i>Linear control systems</i> - Eric BULLINGER, Rodolphe SEPULCHRE	30	30	-	5
INFO0939-1	<i>High performance scientific computing</i> (english) - 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 - Suppl : Véronique ROCHUS	-	20	-	2
PHYS0069-1	<i>Introduction to statistical physics</i> - Stéphane DORBOLO	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
SPAT0048-2	<i>Physics of the earth's atmosphere and environment</i> - Jean-Claude GÉRARD	30	30	-	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> - Jean-Pierre GASPARD	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
PHYS0054-1	<i>Microscopic Structures (atoms, molecules, nuclei)</i> - Joseph CUGNON	30	30	-	5
PHYS0937-1	<i>Physical functional materials (English)</i> - Philippe GHOSEZ	20	10	-	2,5
PHYS0950-1	<i>Nanoparticles and low-dimensional systems (English)</i> - Jean-Yves RATY	20	10	-	2,5
[...]	Choose courses totalling 10 credits from the following lists "Electronic Physics", "Fluid Mechanics", "Space Sciences", "Mathematical, digital and multiphysical Methods".				

#### Fluid Mechanics

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

#### "Mechanics of Fluids" list

MECA0471-1	<i>Finite volumes and fluid dynamics</i> - Jean-André ESSERS	30	30	-	5
MECA0137-1	<i>Non-Newtonian Fluid Mechanics</i> - - Suppl : Benoît DEBBAUT, Jean-Marie MARCHAL	30	30	-	5
AERO0001-1	<i>Aerodynamics, 30h Th, 30h Exc</i> - Jean-André ESSERS	30	30	-	5
MECA0083-2	<i>Fluid-Structure Interaction</i> - 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	30	15	-	5
MECA0055-1	<i>Numerical methods applied to the environment</i> - Jean-Marie BECKERS	30	30	-	5
MECA0053-3	<i>Geophysical fluid dynamics</i> - Jean-Marie BECKERS	30	30	-	5
GBIO0014-2	<i>Network hemodynamics with deformable walls</i> - Thomas DESAIVE	15	15	-	3

[...] Choose courses totalling 10 credits from the following lists "Electronic Physics", "Fluid Mechanics", "Space Sciences", "Mathematical, digital and multiphysical Methods".

#### Solid Mechanics

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

#### "Mechanics of Solids" list

MECA0023-1	<i>Inelastic behavior of solids</i> - Jean-Philippe PONTHOT	30	30	-	5
MECA0027-1	<i>Structure Optimization</i> - Claude FLEURY	30	30	-	5
MECA0058-1	<i>Fracture mechanics, damage and fatigue</i> - Ludovic NOELS	30	30	-	5
MECA0470-1	<i>Alternative numerical methods in continuum mechanics</i> - Ludovic NOELS	30	30	-	5
MECA0033-1	<i>Heat and Material Transfer Modelling</i> - Michel HOGGE	30	30	-	5
MECA0083-2	<i>Fluid-Structure Interaction</i> - Grigorios DIMITRIADIS	30	30	-	5
MECA0464-1	<i>Large deformation of solids</i> - Jean-Philippe PONTHOT	30	30	-	5
MECA0029-1	<i>Mechanical Vibrations</i> - Jean-Claude GOLINVAL	30	30	-	5
MECA0463-1	<i>Mechanics of composite materials</i> - N...	30	30	-	5
GBIO0012-1	<i>Biomechanics</i> - Liesbet GERIS	30	30	-	5

[...] Choose courses totalling 10 credits from the following lists "Electronic Physics", "Fluid Mechanics", "Space Sciences", "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	-	5
ASTR0004-2	<i>Astrophysics and Space Techniques</i> - Jean SURDEJ - [5d Peda. Tr.]	30	15	[+]	5
AERO0024-1	<i>Astrodynamic</i> - Gaëtan KERSCHEN	30	30	-	5
AERO0018-3	<i>Space Experiment Development</i> - Pierre ROCHUS	30	30	-	5
ELEN0008-1	<i>Principles of analog and digital telecommunications systems</i> - Marc VAN DROOGENBROECK	30	30	-	5
SPAT0012-1	<i>General relativity I</i> - N... - Suppl : Yves DE ROP	60	-	-	5

SPAT0031-1	<i>Spatial systems for terrestrial observation</i> - Christian BARBIER	30	-	-	<b>3</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> - Jean-René CUDELL, 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 courses totalling 10 credits from the following lists "Electronic Physics", "Fluid Mechanics", "Space Sciences", "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> - Jean-Marie 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>3</b>
SPAT0036-1	<i>Celestial mechanics and space trajectories</i> - Grégor RAUW	20	10	-	<b>3</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</i> - Eric BULLINGER, Rodolphe SEPULCHRE	30	30	-	<b>5</b>
PHYS0048-1	<i>Coherent and Incoherent Optics</i> - Serge HABRAKEN	30	30	-	<b>5</b>
SPAT0048-2	<i>Physics of the earth's atmosphere and environment</i> - Jean-Claude GÉRARD	30	30	-	<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.