

## Cycle view of the study programme

B1 Or Th Pr Au Cr

### Core curriculum compulsory course (B2 : 27Cr)

 SMEM0029-1 *Final thesis* - COLLÉGIALITÉ, Michaël DE BECKER B2 TA - - - 27

### Common core courses (B1 : 60Cr, B2 : 3Cr)

Choose, in agreement with the Jury, classes for a total of 63 credits from the lists given below, including at least one of the first two classes from five of the six lists: (B1 : 60Cr, B2 : 3Cr)

#### Space sciences : interdisciplinary courses

 SPAT0017-1 *Seminars on topical issues* (english language) - Bertrand BONFOND, Gaël BULDGEN, Guillaume MAHLER, Charles TROUPIN B1 TA - 30 - 3

 SPAT0035-1 *Space exploration* (english language) - Grégor RAUW B1 Q1 30 10 - 4

 SPAT0001-1 *Plasma physics* (english language) - Benoît HUBERT B1 Q2 25 5 - 4

 SPAT0018-1 *Ideas evolution in astronomy* - Yaël NAZÉ B1 Q1 14 6 - 2

 SPAT0036-1 *Celestial mechanics and space trajectories* (english language) - Grégor RAUW B1 Q1 25 10 - 4

 SPAT0040-1 *Fluid mechanics* (english language) - Pierre DAUBY B1 Q1 20 10 - 4

#### Cosmology, astroparticles and gravitational waves

 SPAT0021-1 *Introduction to astroparticles* (english language) - JeanRené CUDELL B1 Q2 30 - - 3

 SPAT0012-1 *General relativity* (english language) - Guillaume MAHLER B1 Q1 30 10 - 4

 SPAT0010-1 *Cosmology* (english language) - Guillaume MAHLER B1 Q2 15 5 - 3

##### Corequisite :

SPAT0012-1 - General relativity

 SPAT0160-1 *Particles ans astroparticles* (english language) - JeanRené CUDELL B1 Q2 20 10 - 4

##### Corequisite :

SPAT0162-1 - Quantum field theory

 SPAT0260-1 *Particles and gravitation* (english language) - N... B1 Q2 10 5 - 2

##### Corequisite :

SPAT0162-1 - Quantum field theory

 SPAT0162-1 *Quantum field theory* (english language) - JeanRené CUDELL B1 Q1 20 10 - 4

##### Corequisite :

SPAT0012-1 - General relativity

 PHYS2012-1 *Relativistic quantum mechanics and relativistic statistics* - Peter SCHLAGHECK B1 Q1 20 5 - 3

 SPAT0084-1 *Theory of gravitational waves* (english language) - Maxime FAYS B1 Q1 20 10 - 4

##### Corequisite :

SPAT0012-1 - General relativity

#### Astrophysics

 SPAT0033-1 *Astrophysics* (english language) - Michaël DE BECKER B1 Q1 35 10 - 5

 SPAT0044-1 *Stellar structure and evolution I* (english language) - MarcAntoine DUPRET B1 Q1 35 - - 3

 SPAT0005-1 *Stellar stability and asteroseismology* (english language) - MarcAntoine DUPRET B1 Q2 30 10 - 4

##### Corequisite :

SPAT0044-1 - Stellar structure and evolution I

 SPAT0006-1 *Stellar atmospheres* (english language) - Grégor RAUW B1 Q2 20 10 - 3

 SPAT0007-2 *Variable stars* (english language) - Grégor RAUW B1 Q1 20 10 - 3

 SPAT0008-1 *Interstellar medium* (english language) - Michaël DE BECKER, Valérie VAN GROOTEL B1 Q1 30 10 - 4

SPAT0009-1	<i>High-energy astrophysics</i> (english language) - Grégor RAUW	B1	Q1	25	5	-	<b>3</b>
SPAT0011-1	<i>Extragalactic astrophysics</i> (english language) - Guillaume MAHLER, Dominique SLUSE <b>Corequisite :</b> SPAT0033-1 - Astrophysics	B1	Q2	20	10	-	<b>3</b>
SPAT0020-2	<i>Astrochemistry</i> (english language) - Michaël DE BECKER	B1	Q1	30	10	-	<b>4</b>
SPAT0045-1	<i>Stellar structure and evolution II</i> (english language) - MarcAntoine DUPRET <b>Corequisite :</b> SPAT0044-1 - Stellar structure and evolution I	B1	Q2	20	20	-	<b>3</b>
SPAT0069-1	<i>Radio astrophysics</i> (english language) - Michaël DE BECKER	B1	Q2	25	10	-	<b>4</b>
<b>Planetary science and planetary systems</b>							
SPAT0055-1	<i>Atmosphere of the Earth</i> (english language) - Denis GRODENT	B1	Q1	45	-	-	<b>4</b>
SPAT0063-1	<i>Introduction to exoplanetology</i> (english language) - Olivier ABSIL, Michaël GILLON <b>Corequisite :</b> SPAT0033-1 - Astrophysics	B1	Q2	20	10	-	<b>4</b>
SPAT0023-1	<i>Terrestrial magnetosphere and polar lights</i> (english language) - Benoît HUBERT	B1	Q2	30	10	-	<b>4</b>
SPAT0028-2	<i>Planetary magnetospheres and aurorae</i> (english language) - Bertrand BONFOND, Denis GRODENT	B1	Q2	30	15	-	<b>5</b>
SPAT0043-1	<i>The small bodies of the solar system</i> (english language) - Emmanuel JEHIN	B1	Q2	15	5	-	<b>3</b>
SPAT0048-5	<i>Earth's atmospheric and space environment</i> (english language) - <i>Space environment</i> - Denis GRODENT - <i>Applied space environment</i> - Denis GRODENT	B1	Q1	15	-	-	<b>3</b>
SPAT0056-1	<i>Planetary and exoplanetary atmospheres</i> (english language) - Denis GRODENT <b>Corequisite :</b> SPAT0055-1 - Atmosphere of the Earth	B1	Q2	20	10	-	<b>3</b>
GEOL0263-1	<i>Astrobiology</i> (english language) - Kristin BARTIK, Pierre CARDOL, Vinciane DEBAILLE, Michaël GILLON, Emmanuelle JAVAUX, Yannick LARA, Yaël NAZÉ, AnnCarine VANDAELE	B1	Q2	45	-	-	<b>5</b>
GEOG0670-1	<i>Active Tectonics and Seismology</i> (english language) - Clara BRERETON, HansBalder HAVENITH, Aurelia HUBERT - [2d FW]	B1	Q1	20	10	[+]	<b>5</b>
<b>Climate, environment and oceanography</b>							
SPAT0027-3	<i>Climate change and impacts</i> (english language) - Louis FRANÇOIS, Guy MUNHOVEN	B1	TA	30	30	-	<b>5</b>
OCEA0071-1	<i>Geophysical fluid dynamics - part 1</i> (english language) - JeanMarie BECKERS	B1	Q2	30	15	-	<b>6</b>
SPAT0024-2	<i>Meteorology</i> (english language) - <i>Part 1</i> - Louis FRANÇOIS - <i>Part 2</i> - Louis FRANÇOIS	B1	Q1	20	10	-	<b>6</b>
SPAT0025-1	<i>Climate and environmental modelling</i> (english language) - Louis FRANÇOIS, Guy MUNHOVEN	B1	Q2	30	15	-	<b>4</b>
SPAT0026-1	<i>Paleoenvironment and evolution of the Earth system</i> (english language) - Louis FRANÇOIS	B1	Q2	30	10	-	<b>4</b>
SPAT0032-2	<i>Remote sensing</i> (english language) - François JONARD	B1	Q1	20	20	-	<b>5</b>
GEOG0037-1	<i>Global Navigation Satellite Systems</i> - René WARNANT	B1	Q1	40	15	-	<b>5</b>

GEOG0038-1	<i>GNSS data processing</i> - René WARNANT <b>Corequisite :</b> GEOG0037-1 - Global Navigation Satellite Systems	B1	Q1	25	30	-	<b>5</b>
OCEA0045-1	<i>Statistical methods of analysis of oceanographic data</i> (english language) - N...	B1	Q1	20	10	-	<b>3</b>
OCEA0087-1	<i>Satellite oceanography</i> (english language) - Aida ALVERA AZCARATE	B1	Q1	15	15	-	<b>3</b>
OCEA0072-1	<i>Geophysical fluid dynamics - part 2</i> (english language) - JeanMarie BECKERS <b>Corequisite :</b> OCEA0071-1 - Geophysical fluid dynamics - part 1	B1	Q1	30	15	-	<b>5</b>
OCEA0081-1	<i>Numerical Methods in Geophysics - Part 2</i> (english language) - JeanMarie BECKERS	B1	Q1	15	30	-	<b>5</b>

**Instrumentation and methods for space sciences**

SPAT0068-1	<i>Astrophysical observations</i> (english language) - Emmanuel JEHIN - [5d FW]	B1	Q2	15	15	[+]	<b>6</b>
SPAT0002-1	<i>Statistical methods and data analysis</i> (english language) - Maxime FAYS, Guy MUNHOVEN, Dominique SLUSE	B1	Q1	20	30	-	<b>5</b>
PHYS0048-3	<i>Coherent and incoherent optics, Instrumental optics I</i> (english language) - Serge HABRAKEN	B1	Q1	20	15	-	<b>4</b>
PHYS0125-3	<i>Instrumental optics II</i> (english language) - Serge HABRAKEN <b>Corequisite :</b> PHYS0048-3 - Coherent and incoherent optics	B1	Q2	25	15	-	<b>4</b>
SPAT0067-1	<i>Adaptative optics for astronomy</i> (english language) - Olivier ABSIL, Gilles ORBAN DE XIVRY	B1	Q1	15	5	-	<b>2</b>
SPAT0085-1	<i>Analysis methods in gravitational-wave astronomy</i> (english language) - Maxime FAYS	B1	Q2	20	10	-	<b>4</b>
SPAT0086-1	<i>Advanced data analysis in python and introduction to machine learning</i> (english language) - Maxime FAYS, Guy MUNHOVEN, Dominique SLUSE	B1	Q2	15	25	-	<b>4</b>

[...] In agreement with the jury, chose a course that hasn't already been chosen worth 3 credits from the lists offered in Block 1

**Focus compulsory courses (B2 : 20Cr)**

SSTG0052-1	<i>Internship in industry or agency</i> (english language) - Michaël DE BECKER, Marc GEORGES	B2	TA	-	70	-	<b>5</b>
SPAT0072-1	<i>Seminars on space activities</i> (english language) - Marc GEORGES	B2	Q1	30	-	-	<b>5</b>
GEST3162-1	<i>Principles of management</i> (english language) - Michaël PARMENTIER, Willem STANDAERT - [25h Proj.]	B2	Q1	30	-	[+]	<b>5</b>
AERO0037-1	<i>Space optical instrumentation</i> (english language) - Denis GRODENT, Jerôme LOICQ - [1d FW]	B2	Q1	40	12	[+]	<b>5</b>

**Focus optional courses (B2 : 10Cr)**

In agreement with the jury, chose courses that haven't already been chosen for a total of 10 credits from the list below: (B2 : 10Cr)

SPAT0074-1	<i>Internship complement</i> (english language) - Michaël DE BECKER	B2	TA	-	40	-	<b>3</b>
ELEN0008-1	<i>Principles of analog and digital telecommunications systems</i> - Marc VAN DROOGENBROECK	B2	Q2	26	26	-	<b>5</b>
GEOG0037-1	<i>Global Navigation Satellite Systems</i> - René WARNANT	B2	Q1	40	15	-	<b>5</b>
SPAT0032-2	<i>Remote sensing</i> (english language) - François JONARD	B2	Q1	20	20	-	<b>5</b>

[...] this list can be extended to courses of interest in the space sector included in the curriculum of other master's degrees:

## **Bridging courses (max 15-60 credits) Master in space sciences (120 credits)**

### **Optional courses (B0 : 60Cr)**

The update course, worth a maximum of 60 credits, will be determined based on students' prior training. (B0 : 60Cr)

[...] Between 15 and 60 ECTS of courses