

#### Cycle view of the study programme

B1 Or Th Pr Au Cr

#### Compulsory courses (B1 : 4Cr, B2 : 18Cr)

MATH0112-1	<i>Preparation for the final thesis</i> - COLLÉGIALITÉ	B1	Q2	-	-	-	4
<i>Notice</i> : this course can be taken either in block 1 or block 2.							
SMEM0012-1	<i>Final thesis</i> - COLLÉGIALITÉ	B2	TA	-	-	-	18

#### Optional courses (B1 : 56Cr, B2 : 42Cr)

In agreement with the Jury, choose courses not already taken for a total of 68 credits from the lists below, a minimum of 44 credits from the Mathematical list to be acquired throughout the cycle: (B1 : 56Cr, B2 : 12Cr)

##### Mathematics

- [...] at least 44 credits from the courses of Mathematics
- [...] the remainder of the courses not chosen from the 'Mathematics' list

##### Other disciplines

- [...] maximum 12 credits from the courses of other disciplines (B1)
- Notice* : compatibility of the timetable with the courses in the Mathematics list cannot be guaranteed.
- [...] the remainder of the courses not chosen from the 'Other subjects' list

##### Other courses

- [...] a maximum of 10 credits in the curriculum of the University of Liège or another institution (B1)
- [...] The course programme at the University of Liège or another institution

#### Choose one focus from the following : (B2 : 1Nbr)

##### Research Focus (B2 : 30Cr)

In agreement with the Jury, choose complementary courses not already selected for a total of 30 credits from the study programmes of the ULiège. (B2 : 30Cr)

- [...] courses for a total of 30 credits

##### Teaching focus (B2 : 30Cr)

AESS0246-1	<i>Analysis of scholastic institutions and key-players, educational policies</i> - Dominique LAFONTAINE - Suppl : MarieThérèse DELHOUNE	B2	Q1	15	-	-	1
AESS0248-1	<i>Elements of sociology of education</i> - JeanFrançois GUILLAUME	B2	Q2	10	-	-	1
AESS0140-1	<i>Professional ethics and training to neutrality and citizenship</i> - Anne HERLA	B2	Q2	25	-	-	2
AESS0202-1	<i>General didactics: course and exercises ; observation placements ; reflexive practices</i> - Annick FAGNANT - [10h Internship]	B2	TA	30	10	[+]	4
AESS0004-1	<i>Media education</i> - Jérémy HAMERS	B2	Q1	15	-	-	1
AESS0249-1	<i>Interdisciplinary seminar</i> - Annick FAGNANT	B2	Q1	15	-	-	1
AESS0143-1	<i>Educational Psychology of adolescents and young adults</i> - Annick FAGNANT, Christelle GOFFIN	B2	Q1	15	-	-	2
AESS0339-1	<i>Understand and manage the diversity of public schools</i> - Ariane BAYE	B2	Q2	10	15	-	3
AESS1214-1	<i>Special didactics in mathematics : course and exercises (1st part)</i> - Kevin BALHAN, Pierre MATHONET	B2	TA	40	-	-	3
AESS1215-1	<i>Special didactics in mathematics : placements (1st part)</i> - Observation placements - Kevin BALHAN, Pierre MATHONET -	B2	TA	-	-	[+]	3

	[10h Internship]								
	- <i>Teaching placements</i> - Kevin BALHAN, Pierre MATHONET - [20h Internship]	-	-	[+]					
	- <i>Reflexive practical work</i> - Kevin BALHAN, Pierre MATHONET	-	5	-					
AESS2214-1	<i>Special didactics in mathematics : course and exercises (2nd part)</i> - Kevin BALHAN, Pierre MATHONET	B2	TA	35	-	-			<b>4</b>
AESS2215-1	<i>Special didactics in mathematics : placements (2nd part)</i>	B2	TA						<b>5</b>
	- <i>Teaching placements</i> - Kevin BALHAN, Pierre MATHONET - [20h Internship]	-	-	[+]					
	- <i>Reflexive practical work</i> - Kevin BALHAN, Pierre MATHONET	-	5	-					
	- <i>Extra-scholar teaching activities</i> - Kevin BALHAN, Pierre MATHONET	-	10	-					

#### Professional focus in finance and management (B2 : 30Cr)

Only accessible to students who have chosen this focus before the academic year 2019-2020.

#### Professional focus in computer (B2 : 30Cr)

Only accessible to students who have chosen this focus before the academic year 2019-2020.

#### Professional focus in Statistics (B2 : 30Cr)

Only accessible to students who have chosen this focus before the academic year 2019-2020.

### Mathematics

#### Mathematical analysis

MATH0074-1	<i>Theory of distributions</i> - Françoise BASTIN	-	Q2	25	15	-		<b>4</b>
MATH0257-2	<i>Complex analysis</i> - JeanPierre SCHNEIDERS	-	Q1	30	30	-		<b>6</b>
MATH0220-2	<i>Complements to complex analysis</i> - JeanPierre SCHNEIDERS - [20h Mon. WS] (Odd years)	-	Q2	30	10	[+]		<b>8</b>
	<b>Corequisite :</b> MATH0074-1 - Théorie des distributions							
MATH0463-1	<i>Functional analysis</i> - Céline ESSER - [20h Mon. WS] (Even years)	-	Q2	30	10	[+]		<b>8</b>
MATH0209-3	<i>Measure Theory</i> - Samuel NICOLAY - [20h Mon. WS] (Odd years)	-	Q1	30	10	[+]		<b>8</b>
MATH0061-1	<i>Complement of studies in the theory of measurement</i> - Samuel NICOLAY - [20h Mon. WS]	-	Q2	30	10	[+]		<b>8</b>
	<b>Prerequisite :</b> MATH0209-3 - Théorie de la mesure							
MATH0082-1	<i>Research problems in analysis (english language)</i> - Françoise BASTIN, Céline ESSER, Samuel NICOLAY, JeanPierre SCHNEIDERS - [20h Mon. WS]	-	TA	30	10	[+]		<b>10</b>

#### Discrete mathematics

MATH0075-1	<i>Discrete mathematics</i> - Emilie CHARLIER - Suppl : Manon STIPULANTI (Even years)	-	Q2	30	20	-		<b>8</b>
MATH0076-1	<i>Discrete mathematics project</i> - Emilie CHARLIER, Julien LEROY, Michel RIGO (Even years)	-	TA	-	-	-		<b>4</b>
	<b>Corequisite :</b> MATH0075-1 - Mathématiques discrètes							
MATH0083-1	<i>Ergodic theory</i> - Julien LEROY (Even years)	-	Q1	30	20	-		<b>8</b>
INFO0212-2	<i>Algorithmics and computability</i> - Emilie CHARLIER (Odd years)	-	Q1	30	20	-		<b>8</b>
MATH0470-1	<i>Combinatorics on words (english language)</i> - Julien LEROY (Odd years)	-	Q2	30	20	-		<b>8</b>
MATH0077-1	<i>Project on combinations</i> - Emilie CHARLIER, Julien LEROY, Michel RIGO (Odd years)	-	TA	-	-	-		<b>4</b>

**Corequisite :**

INFO0212-2 - Algorithmique et calculabilité

MATH0470-1 - Combinatorics on words

MATH0078-1 *Research problems in discrete mathematics* - Emilie CHARLIER, Julien LEROY, Michel RIGO - [20h Mon. WS] - TA 30 10 [+] **10**

**Probability and statistics**

STAT0725-2 *Bayesian statistics* - Philippe LAMBERT - [20h Mon. WS] (Even years) - Q2 30 10 [+] **8**

STAT0723-2 *Linear models* - Gentiane HAESBROECK - [20h Mon. WS] (Even years) - Q2 30 10 [+] **8**

MATH2021-1 *High-dimensional data analysis* (english language) - Gentiane HAESBROECK - [30h Proj.] - Q1 30 15 [+] **5**

**Corequisite :**

STAT0082-1 - Compléments de statistique multivariée

STAT0082-1 *Complement to multivariate statistics* - Gentiane HAESBROECK - [10h Mon. WS] - Q1 10 10 [+] **3**

**Corequisite :**

MATH2021-1 - High-dimensional data analysis

STAT0078-1 *Practice of statistical consultancy* - Marie ERNST - [20h Mon. WS] (Odd years) - Q2 20 - [+] **4**

**Corequisite :**

MATH2022-2 - Large sample analysis : theory and practice

GEST5006-1 *SAS Certification applied analytics* (english language) - Michael SCHYNS - [25h Mon. WS] - Q2 15 - [+] **4**

MATH2022-2 *Large sample analysis : theory and practice, General course* (english language) - Arnout VAN MESSEM - [10h Proj.] - Q2 24 12 [+] **8**

STAT0727-2 *Non-parametric statistics* - Amir ABOUBACAR - [20h Mon. WS] (Even years) - Q1 30 10 [+] **8**

MATH0079-1 *Stochastic process* - Céline ESSER - [20h Proj.] (Even years) - Q1 30 10 [+] **8**

ELEN0062-1 *Introduction to machine learning* (english language) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.] - Q1 30 5 [+] **8**

MATH0084-1 *Research problems in probability and statistics* (english language) - Amir ABOUBACAR, Céline ESSER, Gentiane HAESBROECK, Arnout VAN MESSEM - [20h Mon. WS] - TA 30 10 [+] **10**

**Other fields**

MATH0017-3 *Mathematical Logic and Set Theory* - Julien LEROY - [20h Mon. WS] - Q1 30 10 [+] **8**

MATH0212-2 *General topology* - Céline ESSER - [10h Mon. WS] - Q2 30 20 [+] **6**

MATH0465-1 *Algebraic Topology* - JeanPierre SCHNEIDERS - [20h Mon. WS] (Even years) - Q2 30 10 [+] **8**

MATH0464-1 *Differential geometry II* - Pierre MATHONET - Suppl : Naïm ZENAÏDI - [20h Mon. WS] (Even years) - Q1 30 10 [+] **8**

MATH0489-1 *Lie algebra* - Pierre MATHONET - [20h Mon. WS] (Odd years) - Q2 30 10 [+] **8**

MATH2250-1 *Galois theory* - Emilie CHARLIER - Suppl : Georges HANSOUL - Q2 30 30 - **6**

MATH2483-1 *History of mathematics* - Kevin BALHAN, Pierre MATHONET, Naïm ZENAÏDI - Q2 25 20 - **4**

**Other disciplines**

**Computer science**

INFO2009-2 *Introduction to computer science* - Bernard BOIGELOT - Q1 24 14 - **4**

INFO0061-4 *Computers organization* - Bernard BOIGELOT - Q2 15 15 - **3**

INFO0009-2 *Database (general organisation)* - Samuel HIARD - [25h Proj.] - Q2 26 26 [+] **6**

INFO0902-1	<i>Data structures and algorithms</i> - Pierre GEURTS - [40h Proj.]	-	Q2	26	20	[+]	<b>6</b>
INFO0027-2	<i>Programming techniques</i> (english language) - Laurent MATHY - [70h Proj.]	-	Q2	24	24	[+]	<b>6</b>
INFO0054-1	<i>Functional programming</i> - Pascal GRIBOMONT - [15h Proj.]	-	Q2	28	24	[+]	<b>6</b>
INFO0062-1	<i>Object-oriented programming</i> (english language) - Bernard BOIGELOT - [20h Proj.]	-	Q2	25	20	[+]	<b>5</b>
INFO0085-1	<i>Compilers</i> (english language) - Pascal FONTAINE - [75h Proj.]	-	Q2	25	-	[+]	<b>6</b>
MATH0462-1	<i>Discrete optimization</i> (english language) - Quentin LOUVEAUX - [25h Proj.]	-	Q2	30	20	[+]	<b>6</b>
ELEN0040-1	<i>Digital electronics</i> (english language) - JeanMichel REDOUTÉ	-	Q2	26	26	-	<b>6</b>
SYST0002-2	<i>Introduction to signals and systems</i> - Guillaume DRION - [15h Proj.]	-	Q1	26	26	[+]	<b>6</b>
INFO0049-1	<i>Knowledge representation</i> (english language) - Pascal GRIBOMONT - [50h Proj.]	-	Q2	28	4	[+]	<b>6</b>
<b>Astrophysics and astronomy</b>							
ASTR0204-2	<i>Astrophysics and geophysics</i> - MarcAntoine DUPRET	-	Q1	30	30	-	<b>8</b>
SPAT0012-1	<i>General relativity, Part 1: Introduction</i> - Yves DE ROP - Suppl : Andrea CAMPOLEONI	-	Q1	20	-	-	<b>2</b>
SPAT0012-2	<i>General relativity, Part 2: Mathematics methods</i> - Yves DE ROP <b>Corequisite :</b> SPAT0012-1 - Relativité générale	-	Q1	20	-	-	<b>3</b>
SPAT0012-3	<i>General relativity, Part 3: supplement</i> - Yves DE ROP - Suppl : Andrea CAMPOLEONI <b>Corequisite :</b> SPAT0012-2 - Relativité générale	-	Q2	20	-	-	<b>3</b>
SPAT0044-1	<i>Stellar structure and evolution I</i> (english language) - MarcAntoine DUPRET	-	Q1	35	-	-	<b>4</b>
SPAT0045-1	<i>Stellar structure and evolution II</i> (english language) - MarcAntoine DUPRET	-	Q2	20	20	-	<b>4</b>
<b>Finance and management</b>							
GEST0832-4	<i>Financial Markets</i> - Danielle SOUGNÉ	-	Q2	40	15	-	<b>5</b>
FINA0053-1	<i>Investments and Portfolio Management</i> (english language) - Georges HÜBNER <b>Corequisite :</b> GEST0832-4 - Marchés financiers	-	Q2	30	-	-	<b>5</b>
MQGE0001-6	<i>Operations Research</i> (english language) - Yves CRAMA	-	Q1	45	-	-	<b>5</b>
LOGI0010-1	<i>Supply Chain Management</i> (english language) - Yasemin ARDA <b>Corequisite :</b> MQGE0001-6 - Operations Research	-	Q2	45	-	-	<b>5</b>
MQGE0002-3	<i>Computational Optimization</i> (english language) - Yves CRAMA <b>Corequisite :</b> MQGE0001-6 - Operations Research	-	Q2	30	-	-	<b>5</b>
MQGE0007-1	<i>Financial Mathematics and Stochastic Calculus</i> (english language) - Célia PAQUAY <b>Corequisite :</b> GEST0832-4 - Marchés financiers	-	Q2	30	-	-	<b>5</b>
LOGI0012-1	<i>Logistics and Transportation</i> (english language) - Sabine LIMBOURG	-	Q2	30	-	-	<b>5</b>
LOGI0013-1	<i>Operation Planning</i> (english language) - Yasemin ARDA <b>Corequisite :</b> LOGI0010-1 - Supply Chain Management	-	Q2	30	-	-	<b>5</b>

### Master in mathematics (120 ECTS)

FINA0052-1	<i>Financial Derivatives</i> (english language) - Julien HAMBUCKERS <b>Corequisite :</b> GEST0832-4 - Marchés financiers	-	Q2	30	-	-	<b>5</b>
FINA0064-1	<i>Financial Risk Modeling</i> (english language) - Fabien BONIVER <b>Corequisite :</b> FINA0053-1 - Investments and Portfolio Management MQGE0007-1 - Financial Mathematics and Stochastic Calculus	-	Q1	30	-	-	<b>5</b>
FINA0051-1	<i>Banking and Insurance</i> (english language) - Fabien BONIVER, Georges HÜBNER <b>Corequisite :</b> GEST0832-4 - Marchés financiers	-	Q2	30	-	-	<b>5</b>

#### Physics

MECA0203-3	<i>Continuum Mechanics</i> - Pierre DAUBY - [20h Mon. WS]	-	Q1	30	10	[+]	<b>8</b>
PHYS0212-2	<i>Statistical physics</i> - Nicolas VANDEWALLE	-	Q2	30	30	-	<b>8</b>
PHYS0205-2	<i>Complement of physical statistics</i> - Nicolas VANDEWALLE - [20h Mon. WS]	-	Q2	30	10	[+]	<b>8</b>
PHYS3033-1	<i>Quantum physics I</i> - Thierry BASTIN	-	Q1	35	25	-	<b>8</b>
PHYS3034-1	<i>Quantum physics II</i> - Thierry BASTIN	-	Q2	20	10	-	<b>4</b>

#### English

LANG0082-1	<i>English 3</i> (english language) - Véronique DOPPAGNE, Ellen HARRY, ISLV	-	Q1	45	-	-	<b>4</b>
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### Additional ECTS Master in mathematics (120 ECTS)

[...] The update course, worth a maximum of 60 credits, will be determined based on students' prior training.