

**Vue cycle du programme des cours**

B1 Or Th Pr Au Cr

If one or several of the mandatory courses have already been credited when entering the Master of Data science program, they can be replaced by a corresponding amount of credits chosen among the elective courses.

**Compulsory courses (B1 : 10Cr, B2 : 35Cr)**

DATS0001-1	<i>Foundations of data science</i> (anglais) - Gilles LOUPPE - [60h Proj.]	B1	Q1	30	-	[+]	5
PROJ0021-1	<i>Data science project</i> (anglais) - Christophe DEBRUYNE, Maxime FAYS, Pierre GEURTS, Gilles LOUPPE - [120h Proj.]	B1	Q2	5	-	[+]	5
<b>Corequis :</b>							
INFO0902-1 - Structures des données et algorithmes							
DROI1357-1	<i>European law, (big) data and artificial intelligence applications seminar</i> (anglais) - - Suppl : Ljupcho GROZDANOVSKI	B2	Q1	24	-	-	5
GEST3162-1	<i>Principles of management</i> (anglais) - François PICHAULT, Willem STANDAERT - [25h Proj.]	B2	Q1	30	-	[+]	5
ATFE9009-1	<i>Master thesis</i> (anglais) - Pierre GEURTS - [750h Proj.]	B2	TA	-	-	[+]	25
[...]	Students who have already acquired the skills and knowledge of GEST3162 (or equivalent) will replace it by a course of their choice of 5 ECTS						

**Elective courses (B1 : 40Cr, B2 : 25Cr)**

**Single focus (B1 : 30Cr)**

**Professional focus in data science (B1 : 30Cr)**

ELEN0062-1	<i>Introduction to machine learning</i> (anglais) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]	B1	Q1	30	5	[+]	5
<b>Corequis :</b>							
INFO8006-1 - Introduction to artificial intelligence							
INFO8010-1	<i>Deep learning</i> (anglais) - Gilles LOUPPE - [60h Proj.]	B1	Q2	30	-	[+]	5
INFO9014-1	<i>Knowledge representation and reasoning</i> (anglais) - Christophe DEBRUYNE - [45h Proj.]	B1	Q2	24	20	[+]	5
INFO9016-1	<i>Advanced Databases</i> (anglais) - Christophe DEBRUYNE - [20h Proj.]	B1	Q2	24	20	[+]	5
<b>Corequis :</b>							
INFO0009-2 - Bases de données (organisation générale)							
MATH0461-2	<i>Introduction to numerical optimization</i> (anglais) - Quentin LOUVEAUX - [25h Proj.]	B1	Q1	30	20	[+]	5
MATH2021-1	<i>High-dimensional statistics</i> (anglais) - Gentiane HAESBROECK - [30h Proj.]	B1	Q1	30	15	[+]	5

In agreement with the Jury, choose a total of 20 credits for Block 1 and 25 credits for Block 2 in the following list, among those that have not already been credited before. (B1 : 20Cr, B2 : 25Cr)

**Data Science foundation courses**

The following courses (INFO0009-2, INFO8006-1 and INFO0902-1) 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 bachelor of computer science, or unless the corresponding knowledge and skills have been acquired previously.

INFO0009-2	<i>Bases de données (organisation générale)</i> - Christophe DEBRUYNE - [25h Proj.]	B1	Q2	26	26	[+]	5
INFO8006-1	<i>Introduction to artificial intelligence</i> (anglais) - Gilles LOUPPE - [45h Proj.]	B1	Q1	25	20	[+]	5
INFO0902-1	<i>Structures des données et algorithmes</i> - Pierre GEURTS - [40h Proj.]	B1	Q2	26	20	[+]	5
ELEN0016-2	<i>Computer vision</i> (anglais) - Marc VAN DROOGENBROECK - [50h	-	Q1	30	10	[+]	5

	Proj.]								
ELEN0060-2	<i>Information and coding theory</i> (anglais) - Louis WEHENKEL - [30h Proj.]	-	Q2	30	15	[+]	5		
INFO0016-1	<i>Introduction to the theory of computation</i> (anglais) - Quentin LOUVEAUX	-	Q1	26	26	-	5		
INFO0027-2	<i>Programming techniques</i> (anglais) - <i>Algorithmics</i> - Laurent MATHY - [40h Proj.] - <i>Software patterns</i> - Laurent MATHY - [30h Proj.]	-	Q2	14	14	[+]	5	10	[+]
INFO0054-1	<i>Programmation fonctionnelle</i> - Christophe DEBRUYNE - [20h Proj.]	-	Q1	24	24	[+]	5		
INFO0939-1	<i>High performance scientific computing</i> (anglais) - Christophe GEUZAINÉ - [20h Proj.]	-	Q1	30	15	[+]	5		
INFO0948-2	<i>Introduction to intelligent robotics</i> (anglais) - Pierre SACRÉ - [80h Proj.]	-	Q2	30	4	[+]	5		
INFO2049-1	<i>Web and Text Analytics</i> (anglais) - Ashwin ITTOO	-	Q1	30	-	-	5		
INFO8003-1	<i>Optimal decision making for complex problems</i> (anglais) - Damien ERNST - [45h Proj.]	-	Q2	25	10	[+]	5		
INFO8004-1	<i>Advanced Machine learning</i> (anglais) - Pierre GEURTS, Gilles LOUPPE, Louis WEHENKEL - [20h Proj.]	-	Q2	25	-	[+]	5		
INFO9012-1	<i>Parallel Programming</i> (anglais) - Pascal FONTAINE	-	Q2	25	25	-	5		
INFO9015-1	<i>Logic for Computer Science</i> (anglais) - Pascal FONTAINE	-	Q1	24	20	-	5		
MATH0462-1	<i>Discrete optimization</i> (anglais) - Quentin LOUVEAUX - [25h Proj.]	-	Q2	30	20	[+]	5		
MATH2022-1	<i>Monte Carlo methods in statistics</i> (anglais) - Arnout VAN MESSEM - [40h Proj.]	-	Q2	24	12	[+]	5		
MQGE0002-3	<i>Computational Optimization</i> (anglais) - Bernard FORTZ	-	Q2	30	-	-	5		
BIOL0021-1	<i>Biologie des systèmes</i> - Patrick MEYER - [10h TD] <b>Corequis :</b> OCEA0089-1 - Introduction to marine ecosystems modelling	-	Q1	10	-	[+]	2		
OCEA0089-1	<i>Introduction to marine ecosystems modelling</i> (anglais) - Marilaure GRÉGOIRE <b>Corequis :</b> BIOL0021-1 - Biologie des systèmes	-	Q1	15	15	-	3		
GEOG0057-1	<i>Analyse spatiale</i> - François JONARD	-	Q2	30	30	-	5		
GEOG0059-1	<i>Infrastructures de données spatiales</i> - Roland BILLEN, JeanPaul KASPRZYK	-	Q1	30	30	-	5		
GEST0832-4	<i>Marchés financiers</i> - Georges HÜBNER	-	Q2	40	15	-	5		
FINA0063-1	<i>Advanced Statistical Methods in Finance</i> (anglais) - Julien HAMBUCKERS	-	Q1	30	-	-	5		
GEST3032-1	<i>eBusiness and eCommerce</i> (anglais) - Ashwin ITTOO	-	Q1	30	-	-	5		
GBIO0002-1	<i>Genetics and bioinformatics</i> (anglais) - Franck DEQUIEDT, Kristel VAN STEEN - [15h Proj.]	-	Q1	30	15	[+]	5		
GBIO0009-1	<i>Topics in bioinformatics</i> (anglais) - Kristel VAN STEEN - [35h Proj.]	-	Q1	25	15	[+]	5		
GBIO0030-1	<i>Computational approaches to statistical genetics</i> (anglais) - Kristel VAN STEEN - [35h Proj.]	-	Q2	25	15	[+]	5		
SPAT0263-1	<i>Machine Learning in Space Sciences</i> (anglais) - Maxime FAYS	-	Q1	30	15	-	5		
SPAT0264-1	<i>Machine Learning for Gravitational-wave Astronomy</i> (anglais) - Maxime FAYS	-	Q2	10	20	-	5		
INFO9023-1	<i>Machine Learning Systems Design</i> (anglais) - Thomas VRANCKEN - [17h Labo., 18h Proj.]	-	Q2	17	-	[+]	5		

**Corequis :**

ELEN0062-1 - Introduction to machine learning

**Optional company internships**

*Remarque :* the course units ASTG9008-1 et ASTG9009-1 are mutually exclusive.

ASTG9008-1	<i>Internship (coupled with Master thesis)</i> (anglais) - Pierre GEURTS - [80j T. t.]	B2	TA	-	-	[+]	<b>5</b>
ASTG9009-1	<i>Internship (independent of Master thesis)</i> - Pierre GEURTS - [40j T. t.]	B2	TA	-	-	[+]	<b>10</b>

[...] With the agreement of the President of the Jury, students may also choose up to 15 credits in the application area of their Master thesis in other programmes of the university

[...] With the agreement of the President of the Jury, students may also choose 5 credits in any other programme of the university or from the UNIC course catalog

## Crédits supplémentaires Master en science des données (120 ECTS)

**Optional courses (B0 : 56Cr)**

**Students who are admitted to this master without having acquired equivalent courses must add them to the programme of their first year. (B0 : 56Cr)**

1. Basic courses of a bachelor degree of science in engineering, including courses equivalent to :

MATH2007-1	<i>Mathématiques générales I</i> - Françoise BASTIN	B0	Q1	30	40	-	<b>6</b>
MATH0499-1	<i>Théorie des graphes</i> - Michel RIGO	B0	Q1	25	20	-	<b>4</b>
MATH0495-1	<i>Eléments du calcul des probabilités</i> - Laurent LOOSVELDT - [5h Proj.]	B0	Q1	26	26	[+]	<b>3</b>
MATH0487-2	<i>Eléments de statistiques</i> - Pierre SACRÉ - [25h Proj.]	B0	Q1	15	10	[+]	<b>3</b>
MATH1222-3	<i>Introduction aux processus stochastiques</i> - Céline ESSER, Pierre GEURTS - [10h TD]	B0	Q2	20	10	[+]	<b>5</b>
INFO0902-1	<i>Structures des données et algorithmes</i> - Pierre GEURTS - [40h Proj.]	B0	Q2	26	20	[+]	<b>5</b>
INFO0009-2	<i>Bases de données (organisation générale)</i> - Christophe DEBRUYNE - [25h Proj.]	B0	Q2	26	26	[+]	<b>5</b>
MATH0500-1	<i>Introduction à l'algorithmique numérique</i> - Quentin LOUVEAUX - [6h Labo., 45h Proj.]	B0	Q1	24	14	[+]	<b>5</b>
INFO0062-1	<i>Object-oriented programming</i> (anglais) - Bernard BOIGELOT - [20h Proj.]	B0	Q2	25	20	[+]	<b>5</b>
MATH2019-1	<i>Mathématiques pour l'informatique 1</i> - Emilie CHARLIER	B0	Q1	26	26	-	<b>5</b>
MATH2020-1	<i>Mathématiques pour l'informatique 2</i> - Emilie CHARLIER	B0	Q1	26	26	-	<b>5</b>
INFO8006-1	<i>Introduction to artificial intelligence</i> (anglais) - Gilles LOUPPE - [45h Proj.]	B0	Q1	25	20	[+]	<b>5</b>

Students must have a level B2 in English