

## Vue bloc du programme des cours

Or Th Pr Au Cr

### Bloc 1

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

DATS0001-1	<i>Foundations of data science</i> (anglais) - Gilles LOUPPE - [60h Proj.]	Q1	30	-	[+]	5
PROJ0021-1	<i>Data science project</i> (anglais) - Christophe DEBRUYNE, Maxime FAYS, Pierre GEURTS, Gilles LOUPPE - [120h Proj.]	Q2	5	-	[+]	5
	<b>Corequis :</b> INFO0902-1 - Structures des données et algorithmes					

#### Elective courses

##### Single focus

##### Professional focus in data science

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

In agreement with the Jury, choose a total of 20 credits for Block 1 in the following list, among those that have not already been credited before.

##### Data Science foundation courses

The following courses (INFO0009-2, INFO8006-2 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.]	Q2	26	26	[+]	5
INFO8006-1	<i>Introduction to artificial intelligence</i> (anglais) - Gilles LOUPPE - [45h Proj.]	Q1	25	20	[+]	5
INFO0902-1	<i>Structures des données et algorithmes</i> - Pierre GEURTS - [40h Proj.]	Q2	26	20	[+]	5
ELEN0016-2	<i>Computer vision</i> (anglais) - Marc VAN DROOGENBROECK - [50h Proj.]	Q1	30	10	[+]	5
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)	Q2				5
	- <i>Algorithmics</i> - Laurent MATHY - [40h Proj.]		14	14	[+]	
	- <i>Software patterns</i> - Laurent MATHY - [30h Proj.]		10	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 HAMBUECKERS	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.] <b>Corequis :</b> ELEN0062-1 - Introduction to machine learning	Q2	17	-	[+]	5

[...] 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

## Bloc 2

### Compulsory courses

DROI1357-1	<i>European law, (big) data and artificial intelligence applications seminar</i> (anglais) - - Suppl : Ljupcho GROZDANOVSKI	Q1	24	-	-	5
------------	---	----	----	---	---	---

GEST3162-1	<i>Principles of management</i> (anglais) - François PICHULT, Willem STANDAERT - [25h Proj.]	Q1	30	-	[+]	5
ATFE9009-1	<i>Master thesis</i> (anglais) - Pierre GEURTS - [750h Proj.]	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

In agreement with the Jury, choose a total of 25 credits for Block 2 in the following list, among those that have not already been credited before.

#### Data Science foundation courses

The following courses (INFO0009-2, INFO8006-2 and INFO902-1) 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.

ELEN0016-2	<i>Computer vision</i> (anglais) - Marc VAN DROOGENBROECK - [50h Proj.]	Q1	30	10	[+]	5
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				5
			14	14	[+]	
			10	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]	Q1	10	-	[+]	2
	<b>Corequis :</b> OCEA0089-1 - Introduction to marine ecosystems modelling					
OCEA0089-1	<i>Introduction to marine ecosystems modelling</i> (anglais) - Marilaure GRÉGOIRE	Q1	15	15	-	3
	<b>Corequis :</b> BIOL0021-1 - Biologie des systèmes					
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 HAMBUECKERS	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.] <b>Corequis :</b> ELEN0062-1 - Introduction to machine learning	Q2	17	-	[+]	5

#### Optional company internships

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

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

#### Bloc d'aménagement du programme de l'année

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

**Students who are admitted to this master without having acquired equivalent courses must add them to the programme of their first year.**

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

MATH0002-4	<i>Analyse mathématique 1, Théorie et applications</i> - Eric DELHEZ	Q1	22	22	-	5
MATH0013-1	<i>Algèbre</i> - Eric DELHEZ	Q1	26	26	-	4
MATH0062-1	<i>Éléments du calcul des probabilités</i> - Pierre SACRÉ - [25h Proj.]	Q2	15	10	[+]	3
MATH0487-2	<i>Éléments de statistiques</i> - Pierre SACRÉ - [25h Proj.]	Q1	15	10	[+]	3
MATH0488-1	<i>Éléments de processus stochastiques</i> - Maarten ARNST, Vincent DENOËL, Pierre GEURTS - [30h Proj.]	Q2	10	10	[+]	2
INFO2009-2	<i>Introduction à l'informatique</i> - Bernard BOIGELOT	Q1	24	14	-	4
MATH0006-3	<i>Introduction to numerical analysis</i> (anglais) - Quentin LOUVEAUX	Q1	20	20	-	4
MECA0003-2	<i>Mécanique rationnelle</i> - Eric DELHEZ	Q1	20	30	-	4
SYST0002-2	<i>Introduction aux signaux et systèmes</i> - Guillaume DRION - [15h Proj.]	Q1	26	26	[+]	5

2. Additional courses in computer science :

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

3. A level B2 in English