

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In French

Dissertation/Graduation Project : **YES** - Internship : **optional**

Activities in English: **YES** - Activities in other languages : **NO**

Activities on other sites : **optional**

Main study domain : **Sciences**

Organized by: **Faculty of Science (SC)**

Programme acronym: **DATS2M** - Francophone Certification Framework: 7

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DATS2M - Introduction

Introduction

Introduction

The digitalization is at the origin of the considerable increase of available data. From then on, most of the actors of the society rely on an analysis of these data to objectify their decision-making and develop their disciplinary axes. From these specific needs, we attend to the emergence of new jobs oriented to "data".

The Master's degree in Data Science proposes a training in scientific methods and technological tools to answer societal or scientific questions by processing data that are often massive ("Big Data"). This discipline requires associating a model structured by the problem of interest, with computer sciences, statistics and mathematics to bring a rigorous, quantitative and operational solution to the asked question. An IT infrastructure and algorithms of complex calculations also complement these scientific methods to allow the data structuring and processing.

The fields of application of data sciences are extremely varied: the political and security decision taking, the real time on-line advertising, the e-commerce, the data processing of network, the processing of financial data or industrial production, the biomedical research based on o-mics data or of imaging.

Your profile

You hold an undergraduate diploma or a Master's degree and you have acquired solid skills and the taste for the three pillars of the sciences of the data: the mathematics, the statistics and the computing as well as a curiosity for the fields of application of these disciplines.

You master technical English and are capable of attending class, reading scientific documents, to draft reports and to express you orally in this language. You have general skills and necessary personal qualities to approach a diploma of scientific Master's degree such as of the autonomy, a critical mind, the rigor, a capacity of auto-apprenticeship and to look for or to deal with the information.

A block of additional courses (of maximum 60 credits) is proposed to students having no all these skills.

Your future job

Your diploma of Master's degree in Data Science, statistical orientation, prepares you for positions of "data scientist", "data analyst", "data and analytics manager" or simply "statistician" and prepares to set of responsibility in these domains.

Your programme

The Master's degree in Data Science, declined in two orientations, leans on the following four common pillars:

- Statistical inference and modelling.
- Learning theory, Data mining and visualization of large-dimension data.
- The industrial aspects and the business of data sciences and data analytics.

The "Statistical" orientation offered by the LSBA (Louvain School in statistics, biostatistics and actuarial sciences) proposes, in complement to these four common pillars, a training more specialized in useful statistical methods for data sciences and a strong opening towards the implementation of tools in various fields of application, in management, finance and human sciences.

The Louvain School of Engineering (EPL) offers a second orientation, which complements the four common pillars with a [specialization in "Information technology" via two options in "Computer systems" and "Digital methods and optimization"](#).

Your parcours

You will develop firstly interdisciplinary fundamental skills, solid and deepened to be capable of approaching a wide spectrum of problems in data science. You will also be able to bring to a successful conclusion projects or of to develop research in the domain.

Your program will offer you opportunities to discover, via projects, internships or applied courses, extremely varied scopes of data sciences: political and security decision-making, the real time online advertising, the e-commerce, the data processing of network, the data processing financiers or of industrial production, the biomedical research based on -omics data or of imaging...

To contribute in team to the conduct of a project of data exploitation and to lead it to its term by taking into account objectives, assigned resources and constraints that characterize it.

4.1

To center and clarify the objectives of a project (by associating it performance indicators) considering the stakes and the constraints that characterize the environment of the project.

4.2

To be collectively committed on a work plan, a schedule and roles.

4.3

Work in a multidisciplinary environment, together with other actors having various points of view: manage points of disagreement or conflicts.

4.4

To make decisions in team when there are choices: whether it is on the technical solutions or on the organization of the work to run the project successfully.

5.

Communicate effectively orally and in writing to bring to a successful conclusion the projects which are entrusted to him (her) in his (her) working environment (in particular in English).

5.1

Identify clearly the needs for the "customer" or for the user: question, listen and understand all the dimensions of his request and not only the technical aspects.

5.2

Argue and to convince by adapting itself to the language of his (her) interlocutors: technicians, colleagues, customers, managers.

5.3

Communicate under graphic and schematic shape; interpret a plan, present the results of a work, structure information.

5.4

Read, to analyze and to exploit technical documents (diagrams, textbooks, projects specifications).

5.5

Draft written documents by taking into account contextual requirements and social conventions on the subject.

5.6

Make a convincing oral presentation by using the modern techniques of communication.

6.

Show at the same time rigorous, open, critical mind and ethics in its work.

6.1

Apply existing standards in the disciplines of data sciences (terminology, quality measures).

6.2

Find solutions which go beyond the strictly technical issues, by integrating the stakes in ethical dimension of a project (including the data privacy and the protection of the private life) and of sustainable development.

6.3

Show critical mind towards a technical solution to verify the robustness and to minimize the risks that a solution presents with regard to its implementation.

6.4

Make a self-assessment and to develop in an autonomous way the necessary knowledge to remain competent in his (her) domain.

To the program of 120 credits, a module of additional teachings can be added for the student not possessing all the prerequisites of the Master's degree. This module is selected with the advisor of the program.

DATS2M Programme

Detailed programme by subject

CORE COURSES

- Mandatory
- ✘ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Year

1 2

● Statistical modelling

● LSTAT2120	Linear models	Christian Hafner	EN
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o **Statistical computing, data structures and algorithms for data analysis**



PROFESSIONAL FOCUS [30.0]

- Mandatory
- ✘ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
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- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

[Click on the course title to see detailed informations \(objectives, methods, evaluation...\)](#)







Year

1 2


○ Content:

○ LDATS2840	Master thesis in data analytics		FR [q1 or q2] [] [20 Credits] 🌐
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o Content:

⊗ LDATS2310	Deep learning for Insurance and Finance	Donatien Hainaut	EN [q2] [15h] [3 Credits]  > English-friendly		X
⊗ LSTAT2200	Survey and Sampling	Séverine Guisset Christian Ritter	EN [q2] [15h+5h] [4 Credits] 	X	X
⊗ LSTAT2320	Design of experiment.	Patrick Bogaert	EN [q2] [22.5h+7.5h] [5 Credits]  > English-friendly	X	X
⊗ LSTAT2340	Statistical Analyses of omics Data	Laura Symul	EN [q2] [15h+5h] [4 Credits] 		X
⊗ LSTAT2380	Statistical consulting	Christian Ritter	EN [q1+q2] [30h] [5 Credits]  > French-friendly		X
⊗ LSTAT2390	Applied statistics workshops	Christian Ritter Laura Symul	EN [q1+q2] [15h] [3 Credits]  > French-friendly		X

DATA SCIENCES EN LINGUISTIQUE ET TEXT MINING

- Mandatory
 - ⊗ Optional
 - △ Not offered in 2024-2025
 - ⊖ Not offered in 2024-2025 but offered the following year
 - ⊕ Offered in 2024-2025 but not the following year
 - △ ⊕ Not offered in 2024-2025 or the following year
 - Activity with requisites
 - 
-

o Content:

⊗ Cours au choix

Maximum one course among the two courses (As they are bachelor course, the amount of credits is reduced to 5)

⊗ LINFO1113	Numerical algorithmic	Sébastien Jodogne Estelle Massart	FR [q2] [30h+30h] [6 Credits]	X	
⊗ LINFO1114	Discrete Mathematics	Marco Saerens	FR [q1] [30h+15h] [5 Credits]	X	
⊗ LINFO1252	Informatic Systems	Etienne Riviere	FR [q1] [30h+30h] [5 Credits]	X	X
⊗ LINFO2266	Advanced Algorithms for Optimization	Pierre Schaus	FR [q1] [30h+15h] [5 Credits] > French-friendly	X	X
⊗ LINFO2145	Cloud Computing	Etienne Riviere	FR [q1] [30h+15h] [5 Credits] > French-friendly		X

STAGE

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
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- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

1 internship maximum, chosen among the two following (optional):

o Content:




⊗ LDATS2940	Stage en science des données		FR [q1 or q2] [] [10 Credits]		X
⊗ LDATS2945	Stage en science des données en lien avec le mémoire		FR [q1 or q2] [] [5 Credits]		X

DATA SCIENCES APPLIQUÉES À LA GESTION

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

The following courses are taught on two-month periods and the first three ones are taught on the Campus of UCL Mons. Thus, we ask

				Year	
				1	2
⌘ MLSMM2153	Web Mining	François Fouss Corentin Vande Kerckhove	PK [q1] [30h] [5 Credits] 	x	x
⌘ MLSMM2156	Recommender Systems	Corentin Vande Kerckhove	EN [q2] [30h] [5 Credits] 	x	x
⌘ LLSMS2030	Supply Chain Management	Pierre Semal	EN [q1] [30h] [5 Credits] 		

The student is invited to meet the program advisor to decide which courses should be followed. The restricted jury must next approve his program.

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⊗ Mathématique - Analyse et algèbre linéaire

Each of the following three modules allows acquiring similar skills:

⊗ Module 1

○ LINFO1111	Analysis	Pierre-Antoine Absil François Glineur	[FR] [q1] [45h+37.5h] [7 Credits] 🌐
○ LINFO1112	Algebra	Christophe Craeye Enrico Vitale	[FR] [q2] [30h+30h] [5 Credits] 🌐

⊗ Module 2

○ LINGE1114		Heiner Olbermann	[FR] [q1] [30h+30h] [5 Credits] 🌐
○ LINGE1121	Mathematics II: algebra and matrix calculus	Cécile Coyette (compensates)	

Course prerequisites

The **table** below lists the activities (course units, or CUs) for which there are one or more prerequisites within the programme, i.e. the programme CU for which the learning outcomes must be certified and the corresponding credits awarded by the jury before registering for that CU.

These activities are also identified **in the detailed programme**: their title is followed by a yellow square.

Prerequisites and student's annual programme

As the prerequisite is for CU registration purposes only, there are no prerequisites within a programme year. Prerequisites are defined between CUs of different years and therefore influence the order in which the student will be able to register for the programme's CUs.

In addition, when the jury validates a student's individual programme at the beginning of the year, it ensures its coherence, meaning that it may:

- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.
- transform a prerequisite into a corequisite if the student is in the final year of a degree course.

For more information, please consult the [Academic Regulations and Procedures](#).

Prerequisites list

LDATS2940 "Stage en science des données" has prerequisite(s) LSTAT2020 ET LSTAT2110 ET LSTAT2120

- LSTAT2020 - [Statistical softwares and basic statistical programming](#)
 - LSTAT2110 - [Data Analysis](#)
 - LSTAT2120 - [Linear models](#)
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DATS2M - Information

Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the higher education landscape and the academic organisation of courses.

General and specific admission requirements for this programme must be satisfied at the time of enrolling at the university.

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.

SUMMARY

- > [General access requirements](#)
- > [Specific access requirements](#)
- > [University Bachelors](#)
- > [Non university Bachelors](#)
- > [Holders of a 2nd cycle University degree](#)
- > [Holders of a non-University 2nd cycle degree](#)
- > [Access based on validation of professional experience](#)
- > [Access based on application](#)
- > [Admission and Enrolment Procedures for general registration](#)

Specific access requirements

In addition to the access conditions described below, candidates will have to provide proof of a sufficient command of the French language (level B1 of the CEFR, Common European Framework of Reference for Languages).

Students who wish to be admitted on the basis of a dossier (see tables below) are invited to consult the [criteria for the evaluation of application](#).

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor in Engineering		Direct access	
Bachelor : Business Engineering (Louvain-la-Neuve)		Direct access	
Bachelor : Business Engineering (Mons)		Direct access	
Bachelor : Business Engineering (Bruxelles Saint-Louis)		Direct access	
Bachelor : Business Engineering (French-English) (Bruxelles Saint-Louis)		Direct access	
Bachelor : Business Engineering (French-Dutch-English) (Bruxelles Saint-Louis)		Direct access	

		authorisation from the faculty/ school.
Bachelor in Economics and Management Bachelor in Bioengineering Bachelor in Management	Access with additional training	Straight access, but the program is completed with an additional training of maximum 10C
Other Bachelor	if no minor in computer sciences / statistics and data sciences Access based on application	

Others Bachelors of the French speaking Community of Belgium

Engineer in management Engineering, orientation « civil engineer » Computer sciences Mathematical sciences Physical sciences	Direct access	
Bachelor in economics or management Engineering orientation bio-engineering	Access with additional training	Straight access, but the program is completed with an additional training of maximum 10C
Other Bachelor	Access based on application	

Bachelors of the Dutch speaking Community of Belgium

Bachelor in de ingenieurswetenschappen Bachelor in de informatica Bachelor in de wiskunde Bachelor in de fysica Bachelor in de economische wetenschappen Bachelor in de bio-ingenieurswetenschappen	Access based on application	
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Foreign Bachelors

All degree	Access based on application	
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Non university Bachelors

> Find out more about [links](#) to the university

Diploma	Access	Remarks
BA en informatique de gestion - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation informatique industrielle - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation réseaux et télécommunications - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation sécurité des systèmes - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation technologie de l'informatique - crédits supplémentaires entre 30 et 60 BA en informatique, orientation développement d'applications - crédits supplémentaires entre 30 et 60 BA en informatique, orientation informatique industrielle - crédits supplémentaires entre 30 et 60 BA en informatique, orientation réseaux et télécommunications - crédits supplémentaires entre 30 et 60 BA en informatique, orientation sécurité des systèmes - crédits supplémentaires entre 30 et 60 BA en informatique, orientation technologies de l'informatique - crédits supplémentaires entre 30 et 60	Les enseignements supplémentaires éventuels peuvent être consultés dans le module complémentaire .	Type court

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			

Masters

Teaching method

By its professional vocation, the teaching is completed by numerous practical class having for objective the implementation of methods of analysis on real data. On the other hand, the student also has the possibility of including in his program, a company internship to develop the methodological aspects of the report there. Certain projects will also require working in multidisciplinary teams, what contributes to the development of a stimulating and friendly spirit of collaboration among the students of the program.

The majority of the courses distributed by the teachers are accompanied by an intranet site on the platform "moodle". These sites propose tools of e-learning and serve as forum to the students.

Certain specialized modules are taught by professors coming from the industry.

Finally, the program includes compulsory courses in English and in French. Thus, the student must be capable of attending class in both languages. The report can be made in English and the student can also individual ask to take his examinations in English. The choice of English aims at favoring international attraction of this training and at perfecting the skills of our own local students. Opportunities will be offered to students who do not know French and wish for a complete cycle in English.

Evaluation

The evaluation methods comply with the [regulations concerning studies and exams](#). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

Assessment methods are in accordance with the regulation of studies and examinations. More information about the modalities appropriate to every credit is available in their descriptive index card, in the column "Assessment mode of learning outcomes of students".

Every EU of the program contains an oral examination or a written examination often completed by a project completed by a report, taken into account in the assessment. The (optional) internship and the master thesis each involve the writing of a document being the object of an oral defense in front of a jury.

The total mark is an average of marks for each course, weighted by their respective credits.

If a student registered to an examination in January was not able to attend for duly justified reasons of force majeure, he can ask to the foreman of jury for the authorization to present the examination in June. The foreman of jury judges the relevance of the request and, if the professor of the course agrees, the student can retake the examination in June.

Mobility and/or Internationalisation outlook

The program of Master's degree in Data Science (statistical orientation) being new, no program of systematic exchange with foreign universities is set up.

The students who wish to gain an experience abroad within a company or an outside body during their program can:

- Do an internship in a private company (in Belgium or abroad).
- Prepare a master thesis in collaboration with a company (in Belgium or abroad).
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