UCLouvain

DATS2M

2019 - 2020

Master [120] in Data Science : Statistic

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: **Faculté des sciences (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 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 profil

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 futur job

Your diploma of Master's degree in data sciences, 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 program of Master's degree in Science of the Data of the UCL, 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 École Polytechnique of Leuven (EPL) proposes at the UCL a second orientation in the Master's degree in data sciences, which complements the four common pillars with a training more specialized in "Information technologies" 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...

DATS2M - Teaching profile

Learning outcomes

Acquire robust methodological bases in analysis and data processing and apply them in varied domains such as human sciences, engineering, marketing, finance, insurance, or scientific research.

After completing the training, the student will master the fundamental concepts in statistics, algorithmic, data mining, and machine learning that are necessary for the job of «data scientist». He will develop skills in communication and will be capable of analyzing a complex problem, of collaborating in a research project. According to the objectives aimed by the student, several elective modules are proposed: applied data, dated sciences in linguistics, algorithmic and computing, statistics and sampling, dated sciences applied to management.

On successful completion of this programme, each student is able to :

1.

Demonstrate the control of a robust corpus of knowledge in data sciences, allowing him(her) to solve the problems which are a matter of his(her) discipline

1.1

The structures of data and algorithms for the analysis of data.

1.2

The theories of the learning, the data mining and the visualization of large-dimension data.

1.3

The statistical inference, the modelling and statistical computing. The student in the orientation information technologies specializes via compulsory or electives courses.

1.4

The industrial and entrepreneurial aspects of data sciences.

1.5

The computer systems, including parallel computing, the networks and the safety(security).

1.6

Numerical methods and optimization, constrained optimization included, operational research, identification and applied mathematics.

2.

Organize and to lead to its term an initiative of development of a data operating system, fulfilling to complex needs of a customer.

2.1

Analyze the problem or solving the functional needs and to formulate the corresponding specifications.

2.2

Formalize and model the problem and design one or several original technical solutions answering these specifications.

2.3

Estimate, justify and classify the solutions with regard to all the criteria appearing in technical specifications: efficiency, feasibility, quality, relevance and security.

2.4

Implement, test and validate the selected solution and interpret the results.

2.5

Formulate recommendations to improve the operational features of the solution.

3.

Organize and lead to his term a research work to comprehend an unsolved problem bound to the exploitation of data according to a new methodology or in a new environment.

3.1

Document and summarize the state of the current knowledge in the considered domain.

3.2

Propose a modelling and/or an experimental plan allowing to simulate and to test hypotheses relative to the studied problem.

3.3

Shape a summary report to describe the methodology with rigor and clarify the theoretical and\or technical potentialities of innovation resulting from this research work.

4.

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.

Programme structure

The program of 120 credits of the Master's degree in data science, statistical orientation, consists of:

- A common core syllabus from 52 to 95 credits including courses of
    - statistical modelling,
    - Machine learning and data mining,
    - Computational statistics, structuring of data and algorithmic for data sciences,
    - Philosophy (elective course),
    - Modules to complete if needed, the skills of the student in IT, statistics and mathematics.
- A specialized orientation of 30 credits, including the master thesis and a specific course in the orientation.
- credits for proposed elective courses.
- Maximum 10 credits for courses that are not included in the program, to be made approved by the program committee of the master.

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.

For a programme-type, and regardless of the focus, options/or elective courses selected, this master will carry a minimum of 120 credits divided over two annual units, corresponding to 60 credits each.

> Tronc commun *[en-prog-2019-dats2m-ldats200t.html]*

> Professional Focus *[en-prog-2019-dats2m-ldats200s]*

Options courses

> Data in action *[en-prog-2019-dats2m-ldats210o.html]*
> Algorithme, informatique, optimisation, recherche opérationnelle *[en-prog-2019-dats2m-ldats220o.html]*
> Data sciences en linguistique et Text Mining *[en-prog-2019-dats2m-ldats211o.html]*
> Data Sciences appliquées à la gestion *[en-prog-2019-dats2m-ldats250o.html]*
> Stage *[en-prog-2019-dats2m-ldats240o.html]*

DATS2M Detailled programme

Programme by subject

CORE COURSES

- O Mandatory
- △ Courses not taught during 2019-2020
- ⊕ Periodic courses taught during 2019-2020
- ⊠ Optional
- ⊘ Periodic courses not taught during 2019-2020
- Activity with requisites

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

						Year 1	Year 2
O *Statistical modelling*							
O LSTAT2120	Linear models	Christian Hafner	30h+7.5h	5 Credits	1q	x	
O LSTAT2130	Introduction to Bayesian statistics	Philippe Lambert	15h+5h	4 Credits	2q	x	
O LSTAT2150	Nonparametric statistics: smoothings methods	Rainer von Sachs	15h+5h	4 Credits	1q	x	x
O Cours au choix							
At least 2 courses among the 5 following.							
⊠ LSTAT2100	Discrete data analysis.	Anouar El Ghouch	30h+7.5h	5 Credits	2q	x	
⊠ LSTAT2170	Times series	Rainer von Sachs	22.5h +7.5h	5 Credits	2q	x	x
⊠ LSTAT2180	Resampling methods with applications	Eugen Pircalabelu	15h+5h	4 Credits	1q	x	x
⊠ LSTAT2210	Advenced linear models	Lieven Desmet (compensates Catherine Legrand) Catherine Legrand	15h+5h	4 Credits	1q	x	x
⊠ LSTAT2400	High-dimensional statistics: Theory and practice	Eugen Pircalabelu	15h	3 Credits	2q		x
O *Machine learning and Data mining*							
O LSTAT2110	Data Analysis	Johan Segers	30h+7.5h	5 Credits	1q	x	
O Cours au choix							
Choose at least 2 courses among the 3 following.							
⊠ LELEC2870	Machine Learning : regression, dimensionality reduction and data visualization	John Lee (compensates Michel Verleysen) Michel Verleysen	30h+30h	5 Credits	1q	x	x
⊠ LINGI2262	Machine Learning :classification and evaluation	Pierre Dupont	30h+30h	5 Credits	2q		x
⊠ LSINF2275	Data mining & decision making	Marco Saerens	30h+15h	5 Credits	2q	x	x
O *Statistical computing, data structures and algorithms for data analysis*							
O LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	15h+15h	3 Credits	1q	x	
O LSTAT2030	Statistique et data sciences avec R: Programmation avancée	Anouar El Ghouch	15h+15h	3 Credits	2q	x	
O LSTAT2360	Seminar in data management: basic	Céline Bugli	15h+10h	5 Credits	1q	x	x
O LINGI2172	Databases	Siegfried Nijssen	30h+30h	6 Credits	2q		x

						Year 1	Year 2

⊠ Cours au choix

⊠ LSTAT2370	Data Management II : SAS ADVANCED PROGRAMMING	Christophe Kabacinski	15h+10h	6 Credits	2q		x
⊠ LINMA2472	Algorithms in data science	Vincent Blondel Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel)	30h +22.5h	5 Credits	1q		x

⊠ *Philosophie*

Maximum one course among:

⊠ LSC2001	Introduction to contemporary philosophy	François Kammerer (compensates Peter Verdée)	30h	2 Credits	2q	x	x
⊠ LSC2220	Philosophy of science	Alexandre Guay	30h	2 Credits	2q	x	x
⊠ LFILO2003E	Ethics in the Sciences and technics (sem)	Charles Pence	15h+15h	2 Credits	2q	x	x

○ *Activités de base*

The student chooses, for a maximum of 10 credits, the courses in the list below for which it did not acquire equivalent skills in its previous formation. This choice is discussed with the advisor of the master and next approved by the restricted jury.

⊠ Mathématique - Analyse et algèbre linéaire

Each of the following three modules of two courses allows acquiring similar skills:

⊠ Module 1

○ LINFO1111	Analysis	Abdou Kouider Ben-Naoum	45h +37.5h	7 Credits	1q	x	
○ LINFO1112	Algebra	Christophe Craeye Thomas Peters	30h+30h	5 Credits	2q	x	

⊠ Module 2

○ LINGE1114	Mathematics I: analysis	Pascal Lambrechts Jean Van Schaftingen Vincent Wertz	30h+30h	5 Credits	1q	x	
○ LINGE1121	Mathematics II: algebra and matrix calculus	Tom Claeys	30h+30h	5 Credits	2q	x	

⊠ Module 3

○ LMAT1101	Mathematics 1	Pedro Dos Santos Santana Forte Vaz	30h+20h	4 Credits	1q	x	x
○ LMAT1102	Mathematics 2	Julien Federinov (compensates Augusto Ponce) Augusto Ponce	30h+30h	4 Credits	2q	x	x

⊠ Probabilités et Statistique

Each of the following four modules of two courses allows acquiring similar skills:

⊠ Module 1

○ LSTAT2012	Probabilités: Concepts de base pour l'analyse statistique	Eugen Pircalabelu	15h+15h	3 Credits	1q	x	
○ LSTAT2013	Concepts de base en statistique inférentielle	Eugen Pircalabelu	15h+15h	3 Credits	1q	x	

⊠ Module 2

○ LBIR1212	Probabilities and statistics (I)	Patrick Bogaert	30h+15h	4 Credits	1q	x	
○ LBIR1315	Probability and statistics II	Patrick Bogaert	22.5h +22.5h	3 Credits	1q	x	

⊠ Module 3

						Year 1	Year 2
○ LINGE1113	Probability	Aurélie Bertrand (compensates Johan Segers) Johan Segers	30h+15h	4 Credits	2q	x	
○ LINGE1214	Further Statistics	Christian Hafner	30h+15h	4 Credits	1q	x	

⊠ Module 4

○ LMAT1271	Calculation of probability and statistical analysis	Mickaël De Backer (compensates Rainer von Sachs) Rainer von Sachs	30h+30h	6 Credits	2q	x	

⊠ Programmation et informatique

The student must acquire the skills bound to these three courses:

⊠ LINFO1101	Introduction à la programmation	Kim Mens Siegfried Nijssen Charles Pecheur	30h+30h	5 Credits	1q	x	
⊠ LEPL1402	Informatique 2	Ramin Sadre Pierre Schaus	30h+30h	5 Credits	1q	x	
⊠ LINFO1225	Conception orientée objet et gestion de données	Kim Mens	30h+30h	5 Credits	2q	x	

PROFESSIONAL FOCUS [30.0]

○ Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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

○ *Contenu:*

						Year 1	Year 2
○ LDATS2840	Master thesis in data analytics			20 Credits	1 ou 2q		x
○ LSTAT2350	Data Mining	Tim Verdonck	15h+15h	5 Credits	2q	x	

○ Optionnal course

Choose 1 course among the 2 following.

⊠ LDATA2010	Information visualisation	John Lee	30h+30h	5 Credits	1q		x
⊠ LINGI2364	Mining Patterns in Data	Siegfried Nijssen	30h+15h	5 Credits	2q		x

OPTIONS

The student completes his program with elective courses reported in the list below. With the agreement of the restricted jury, the student can also complete his program by other courses that he would consider relevant and taught at the UCL.

> Data in action *[en-prog-2019-dats2m-ldats210o]*
> Algorithme, informatique, optimisation, recherche opérationnelle *[en-prog-2019-dats2m-ldats220o]*
> Data sciences en linguistique et Text Mining *[en-prog-2019-dats2m-ldats211o]*
> Data Sciences appliquées à la gestion *[en-prog-2019-dats2m-ldats250o]*
> Stage *[en-prog-2019-dats2m-ldats240o]*

DATA IN ACTION

O Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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

O Contenu:

						Year 1	Year 2
⊠ LDATS2310	Data science for insurance and finance	Donatien Hainaut	15h	3 Credits	1q		x
⊠ LSTAT2200	Survey and Sampling	Marie-Paule Kestemont	15h+5h	4 Credits	2q	x	x
⊠ LSTAT2320	Design of experiment.	Patrick Bogaert Bernadette Govaerts	22.5h +7.5h	5 Credits	2q	x	x
⊠ LSTAT2340	Statistical Analyses of ¿omics Data	Céline Bugli Bernadette Govaerts	15h	3 Credits	2q		x
⊠ LSTAT2380	Statistical consulting	Christian Ritter	30h	5 Credits	1 + 2q		x
⊠ LSTAT2390	Applied statistics workshops	Catherine Legrand Christian Ritter	15h	3 Credits	1 + 2q		x

ALGORITHME, INFORMATIQUE, OPTIMISATION, RECHERCHE OPÉRATIONNELLE

O Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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

O Contenu:

⊠ Cours au choix

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

						Year 1	Year 2
⊠ LINFO1113	Algorithmique numérique	Loïc Quertenmont	30h+30h	6 Credits	1q	x	
⊠ LINFO1114	Mathématiques discrètes	Marco Saerens	30h+15h	5 Credits	2q	x	
⊠ LINFO1252	Systèmes informatiques		30h+30h	5 Credits	1q △	x	x
⊠ LINGI2266	Advanced Algorithms for Optimization	Pierre Schaus	30h+15h	5 Credits	1q	x	x
⊠ LINGI2145	Cloud Computing	Etienne Riviere	30h+15h	5 Credits	1q		x

DATA SCIENCES EN LINGUISTIQUE ET TEXT MINING

O Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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

Contenu:

					Year 1	Year 2
⊠ LINGI2263	Computational Linguistics	Pierre Dupont Cédrick Fairon	30h+15h	5 Credits	1q		x
⊠ LFIAL2620	Natural language processing	Cédrick Fairon Bernard Jacquemin (compensates Cédrick Fairon)	22.5h	5 Credits	1q	x	x
⊠ LFIAL2630	Introduction to automatic text processing	Cédrick Fairon	22.5h	5 Credits	2q	x	x

DATA SCIENCES APPLIQUÉES À LA GESTION

O Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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 to students to check that this choice is compatible with their schedule, before inscription.

Contenu:

					Year 1	Year 2
⊠ MLSMM2152	Nouvelles technologies et pratiques émergentes	Bart Jourquin	30h	5 Credits	1q	x	x
⊠ MLSMM2153	Web Mining	François Fouss Pascal Francq	30h	5 Credits	1q	x	x
⊠ MLSMM2156	Systèmes de recommandation	Felix Sommer	30h	5 Credits	2q	x	x
⊠ LLSMS2030	Supply Chain Management (in English)	Pierre Semal	30h	5 Credits	1q		x

STAGE

O Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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

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

Contenu:

					Year 1	Year 2
⊠ LDATS2940	Stage en science des données			10 Credits	1 ou 2q		x
⊠ LDATS2945	Stage en science des données en lien avec le mémoire			5 Credits	1 ou 2q		x

Course prerequisites

A document entitled (nb: not available for this programme dats2m) specifies the activities (course units - CU) with one or more pre-requisite(s) within the study programme, that is the CU whose learning outcomes must have been certified and for which the credits must have been granted by the jury before the student is authorised to sign up for that activity.

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

As the prerequisites are a requirement of enrolment, there are none within a year of a course.

The prerequisites are defined for the CUs for different years and therefore influence the order in which the student can enrol in the programme's CUs.

In addition, when the panel validates a student's individual programme at the beginning of the year, it ensures the consistency of the individual programme:

- It can change a prerequisite into a corequisite within a single year (to allow studies to be continued with an adequate annual load);
- It can require the student to combine enrolment in two separate CUs it considers necessary for educational purposes.

For more information, please consult regulation of studies and exams (https://uclouvain.be/fr/decouvrir/rgee.html).

The programme's courses and learning outcomes

For each UCLouvain training programme, a reference framework of learning outcomes specifies the competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme's reference framework of learning outcomes in the document *"In which teaching units are the competences and learning outcomes in the programme's reference framework developed and mastered by the student?"*

DATS2M - Information

Admission

General (https://uclouvain.be/en/study/inscriptions/admission-requirements-master-s-degree.html) and specific admission requirements for this program must be satisfied at the time of enrolling at the university.

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

SUMMARY

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor : Business Engineering Bachelor in Engineering Bachelor in Computer Science Bachelor in Mathematics Bachelor in Physics		Direct Access	
Other Bachelor	with Minor in Engineering Sciences: Computer Sciences (only available for reenrolment) or Minor in Statistics, Actuarial Sciences and Data Sciences.	Direct Access	In some cases, the UCLouvain Enrolment Office, after reviewing their online enrolment or re-enrolment application, will ask the students concerned to provide an enrolment authorisation from the faculty/ school.
Bachelor in Economics and Management Bachelor in Bioengineering		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	Based on application: accepted, conditional on further training, or refusal	
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		Based on application: accepted, conditional on further training, or refusal	
Bachelors of the Dutch speaking Community of Belgium			

Bachelor in de ingenieurswetenschappen Bachelor of Engineering Technology Bachelor in de informatica Bachelor in de wiskunde Bachelor in de fysica Bachelor in de economische wetenschappen Bachelor in de bio-ingenieurswetenschappen	Based on application: accepted, conditional on further training, or refusal	
Foreign Bachelors		
All degree	Based on application: accepted, conditional on further training, or refusal	

Non university Bachelors

> Find out more about links (https://uclouvain.be/fr/etudier/passerelles) to the university

Diploma	Access	Remarks
BA en informatique de gestion - EPS - crédits supplémentaires entre 30 et 60 BA en informatique de gestion - HE - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (informatique industrielle) - EPS - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (informatique industrielle) - HE - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (réseaux et télécommunications) - EPS - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (réseaux et télécommunications) - HE - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (sécurité des systèmes) - HE - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (sécurité des systèmes) - EPS - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (technologie de l'informatique) - EPS - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes (technologie de l'informatique) - HE - 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			
Master degree from the French community of Belgium: Civil engineer Computer sciences Engineer in management Actuarial sciences Mathematical sciences Statistics Biostatistics Physical sciences		Direct Access	Subject to the acceptance of the file by the jury, a student can be exempted from maximum 60 credits of activity and possibly realize the Master's degree in sciences of the data in a single year.
Other master degrees		Based on application: accepted, conditional on further training, or refusal	Subject to the acceptance of the file by the jury, a student can be exempted from maximum 60 credits of activity and possibly realize the Master's degree in sciences of the data in a single year

Holders of a non-University 2nd cycle degree

Adults taking up their university training

> See the website Valorisation des acquis de l'expérience (https://uclouvain.be/fr/etudier/vae)

It is possible to gain admission to all masters courses via the validation of professional experience procedure.

Access on the file

Reminder : all Masters (apart from Advanced Masters) are also accessible on file.

Foreign students who have succeeded an university education (minimum 3 years) with strong quantitative connotation and who have obtained at least 60% (or 12/20) of average for all successful university years in their home university, have the possibility to apply for admission to the master's program in Data Science (120 ECTS).

Admission and Enrolment Procedures for general registration

Supplementary classes

To enrol for this Masters, the student must have a good command of certain subjects. If this is not the case, they must add preparatory modules to their Master's programme.

To access to this Master's degree, the student has to master a minimum of preliminary skills in mathematics, programming, algorithmic and probability-statistics. If it is not the case, additional teachings must be added to his program. He can nevertheless include a maximum of 10 of these credits in the prerequisite module planned in the common-core syllabus of the Master's degree.

Students who do not have a B1 level in English (level obtained at UCLouvain) must take the LANGL1330 (https://uclouvain.be/en-cours-langl1330) English course. A dispensatory test is organized at the beginning of the academic year.

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

O Mandatory	⊠ Optional
△ Courses not taught during 2019-2020	⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020	Activity with requisites

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

⊠ *Mathématique - Analyse et algèbre linéaire*

Each of the following three modules allows acquiring similar skills:

⊠ Module 1

O LINFO1111	Analysis	Abdou Kouider Ben-Naoum	45h+37.5h	7 Credits	1q
O LINFO1112	Algebra	Christophe Craeye Thomas Peters	30h+30h	5 Credits	2q

⊠ Module 2

O LINGE1114	Mathematics I: analysis	Pascal Lambrechts Jean Van Schaftingen Vincent Wertz	30h+30h	5 Credits	1q
O LINGE1121	Mathematics II: algebra and matrix calculus	Tom Claeys	30h+30h	5 Credits	2q

⊠ Module 3

O LMAT1101	Mathematics 1	Pedro Dos Santos Santana Forte Vaz	30h+20h	4 Credits	1q
O LMAT1102	Mathematics 2	Julien Federinov (compensates Augusto Ponce) Augusto Ponce	30h+30h	4 Credits	2q

⊠ *Probabilités et Statistique*

Each of the following four modules allows acquiring similar skills:

⊠ Module 1

O LSTAT2012	Probabilités: Concepts de base pour l'analyse statistique	Eugen Pircalabelu	15h+15h	3 Credits	1q
O LSTAT2013	Concepts de base en statistique inférentielle	Eugen Pircalabelu	15h+15h	3 Credits	1q

⊠ Module 2

O LBIR1212	Probabilities and statistics (I)	Patrick Bogaert	30h+15h	4 Credits	1q
O LBIR1315	Probability and statistics II	Patrick Bogaert	22.5h+22.5h	3 Credits	1q

Module 3

LINGE1113	Probability	Aurélie Bertrand (compensates Johan Segers) Johan Segers	30h+15h	4 Credits	2q
LINGE1214	Further Statistics	Christian Hafner	30h+15h	4 Credits	1q

Module 4

LMAT1271	Calculation of probability and statistical analysis	Mickaël De Backer (compensates Rainer von Sachs) Rainer von Sachs	30h+30h	6 Credits	2q

Programmation et informatique

The student must acquire the skills related to these three courses:

LINFO1101	Introduction à la programmation	Kim Mens Siegfried Nijssen Charles Pecheur	30h+30h	5 Credits	1q
LEPL1402	Informatique 2	Ramin Sadre Pierre Schaus	30h+30h	5 Credits	1q
LINFO1225	Conception orientée objet et gestion de données	Kim Mens	30h+30h	5 Credits	2q

Other EU to be determined with the Study Advisor

Depending on his / her previous academic background, the student (in consultation with the study advisor) can add other UEs in order to acquire the necessary prerequisites for the program.

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 (https://uclouvain.be/fr/decouvrir/rgee.html). 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 science of the data (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).
- Participate to a program with a university that has a partnership with the UCL, for bilateral exchange of students.

The students wishing to participate in a program of international exchange are invited to get in touch with the person responsible for these within the Faculty of Science or with the person of contact within the School of statistics, biostatistics and actuarial sciences (LSBA).

Detailed Information on: https://uclouvain.be/fr/facultes/sc/programmes-d-echange-d-etudiants.html (https://uclouvain.be/fr/facultes/sc/programmes-d-echange-d-etudiants.html).

Possible trainings at the end of the programme

After having obtained the Master's degree in data sciences (statistical orientation) a student who has chosen adequate elective courses, can realize in one year a Master's degree in biostatistics, a Master's degree in statistics or a Master's degree in data sciences (orientation information technology). The interested student is invited to contact the program advisor of the envisaged Master's degrees.

Accessible Doctoral programs :

The Master's degree in data science (statistical orientation) allows to register for the doctoral program in statistics if the following conditions are fulfilled:

- The success of the master program with distinction,
- The availability of a supervisor or a co-supervisor at the School of statistics, biostatistics and actuarial sciences (LSBA) ready to guide the student in his work of thesis,
- The acceptance of the application by the Doctoral Commission of the Domain (CDD).

Certificates

The LSBA also proposes diverse programs of continuous training (certified or not), as the university certificate in statistics and data sciences which allows to follow 15 to 30 credits of courses according to the interest or professional needs for the participant.

The SMCS also propose complementary trainings (not certified) in statistics and statistical software. (https://uclouvain.be/fr/chercher/smcs (https://uclouvain.be/fr/chercher/smcs))

Contacts

Attention, you are currently reading an archived page: below contact informations were for program study 2019-2020 only. To get current contact informations please got to current program study site.

Curriculum Management

Entity

Structure entity	SST/SC/LSBA
Denomination	(LSBA) (https://uclouvain.be/repertoires/entites/lsba)
Faculty	Faculty of Science (SC) (https://uclouvain.be/repertoires/entites/sc)
Sector	Sciences and Technology (SST) (https://uclouvain.be/repertoires/entites/sst)
Acronym	LSBA
Postal address	Voie du Roman Pays 20 - bte L1.04.01 1348 Louvain-la-Neuve Tel: +32 (0) 10 47 43 14 - Fax: +32 (0) 10 47 30 32
Web site	https://uclouvain.be/fr/facultes/sc/lsba (https://uclouvain.be/fr/facultes/sc/lsba)

Academic supervisor: Donatien Hainaut

Jury

- Christian Hafner
- Rainer von Sachs

Useful Contact(s)

- Donatien Hainaut
- Sophie Malali

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