UCLouvain

DATI2M

2019 - 2020

Master [120] in Data Science: Information Technology

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In english
Dissertation/Graduation Project : **YES** - Internship : **optional**
Main study domain : **Sciences**
Organized by: **Ecole Polytechnique de Louvain (EPL)**
Programme acronym: **dati2m** - Francophone Certification Framework: 7

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DATI2M - Introduction

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Introduction

Introduction

The digital transformation of society has led to explosive growth in the volume of data available. Most of the players in society now place great importance on using this data to help make objective decisions and develop their disciplinary focus. These specific needs have resulted in the emergence of **new data-oriented careers.**

The engineering master's in data science offers a course in **scientific methods and technology tools** for answering social or scientific questions based on **the processing of frequently massive data sets** ("big data"). This discipline usually requires a structured model of the problem in question to be combined with statistics and mathematics to deliver a rigorous, quantitative, operational solution to the question posed. Computer infrastructure and complex calculation algorithms thus complement scientific methods in structuring and processing the data.

The **fields of application** of data science are extremely varied: political and security decision-making, real-time online advertising, e-commerce, processing network data, processing financial and industrial production data, biomedical research based on omics or imaging data.

Your futur job

Your degree in data science prepares you for the posts of data scientist, data analyst, data and analytics manager or data engineer and equips you to take on responsibilities in these areas.

Your programme

The data science programme draws on four common foundations:

- Data structures and data processing algorithms.
- Theories of learning, data mining and viewing multidimensional data.
- Statistical inference and modelling.
- Applications.

DATI2M - Teaching profile

Learning outcomes

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

1. Démontrer la maîtrise d'un solide corpus de connaissances en sciences des données, lui permettant de résoudre les problèmes qui relèvent de sa discipline

1.1. Les structures de données et algorithmes pour l'analyse de données
1.2. Les théories de l'apprentissage, la fouille de données et la visualisation de données de grande dimension
1.3. L'inférence statistique, la modélisation et l'informatique statistique. L'étudiant dans l'orientation technologies de l'information se spécialise via des cours obligatoires ou au choix
1.4. Les aspects industriels et entrepreneuriaux de la science des données. L'étudiant dans l'orientation en technologies de l'information se spécialise via une option
1.5. Les systèmes informatiques, y compris le calcul distribué, le calcul embarqué, les réseaux et la sécurité
1.6. Les méthodes numériques et l'optimisation, y compris la programmation par contraintes, la recherche opérationnelle, l'identification et les mathématiques appliquées

2. Organiser et de mener à son terme une démarche de développement d'un système d'exploitation des données répondant aux besoins généralement complexes d'un client.

2.1. Analyser le problème à résoudre ou les besoins fonctionnels à rencontrer et formuler le cahier des charges correspondant.
2.2. Formaliser et modéliser le problème et concevoir une ou plusieurs solutions techniques originales répondant à ce cahier des charges.
2.3. Evaluer, justifier et classer les solutions au regard de l'ensemble des critères figurant dans le cahier de charges : efficacité, faisabilité, qualité, pertinence et sécurité.
2.4. Implémenter, tester et valider la solution retenue et en interpréter les résultats.
2.5. Formuler des recommandations pour améliorer le caractère opérationnel de la solution.

3. Organiser et de mener à son terme un travail de recherche pour appréhender une problématique inédite liée à l'exploitation de données selon une méthodologie ou dans un environnement nouveau.

3.1. Se documenter et résumer l'état des connaissances actuelles dans le domaine considéré.
3.2. Proposer une modélisation et/ou un dispositif expérimental permettant de simuler et de tester des hypothèses relatives au problème étudié.
3.3. Mettre en forme un rapport de synthèse visant à décrire la méthodologie avec rigueur et expliciter les potentialités d'innovation théoriques et/ou techniques résultant de ce travail de recherche.

4. Contribuer en équipe à la conduite d'un projet d'exploitation de données et le mener à son terme en tenant compte des objectifs, des ressources allouées et des contraintes qui le caractérisent.

4.1. Cadrer et expliciter les objectifs d'un projet (en y associant des indicateurs de performance) compte tenu des enjeux et des contraintes qui caractérisent l'environnement du projet.
4.2. S'engager collectivement sur un plan de travail, un échéancier et des rôles à tenir.
4.3. Fonctionner dans un environnement pluridisciplinaire, conjointement avec d'autres acteurs porteurs de différents points de vue : gérer des points de désaccord ou des conflits.
4.4. Prendre des décisions en équipe lorsqu'il y a des choix à faire : que ce soit sur les solutions techniques ou sur l'organisation du travail pour faire aboutir le projet.

5. Communiquer efficacement oralement et par écrit en vue de mener à bien les projets qui lui sont confiés dans son environnement de travail (en particulier en anglais).

5.1. Identifier clairement les besoins du « client » ou de l'usager : questionner, écouter et comprendre toutes les dimensions de sa demande et pas seulement ses aspects techniques.
5.2. Argumenter et convaincre en s'adaptant au langage de ses interlocuteurs : techniciens, collègues, clients, supérieurs hiérarchiques.
5.3. Communiquer sous forme graphique et schématique ; interpréter un schéma, présenter les résultats d'un travail, structurer des informations.
5.4. Lire, analyser et exploiter des documents techniques (diagrammes, manuels, cahiers de charge…).
5.5. Rédiger des documents écrits en tenant compte des exigences contextuelles et des conventions sociales en la matière.
5.6. Faire un exposé oral convaincant en utilisant les techniques modernes de communication.

6. Faire preuve à la fois de rigueur, d'ouverture, d'esprit critique et d'éthique dans son travail.

6.1. Appliquer les normes en vigueur dans les disciplines de la science des données (terminologie, mesures de qualité, …).
6.2. Trouver des solutions qui vont au-delà des enjeux strictement techniques, en intégrant les enjeux de dimension éthique d'un projet (y compris la confidentialité des données et la protection de la vie privée) et de développement durable
6.3. Faire preuve d'esprit critique vis-à-vis d'une solution technique pour en vérifier la robustesse et minimiser les risques qu'elle présente au regard du contexte de sa mise en Œuvre.
6.4. S'autoévaluer et développer de manière autonome les connaissances nécessaires pour rester compétent dans son domaine.

Programme structure

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-dati2m-ldati220t.html]*

> Professional Focus   *[en-prog-2019-dati2m-ldati200s]*

Options courses

> Majors in Data Science: Information technology   *[en-prog-2019-dati2m-ldati105g.html]*
  > Option en computer systems   *[en-prog-2019-dati2m-ldati220o.html]*
  > Option en numerical methods and optimization   *[en-prog-2019-dati2m-ldati221o.html]*
  > Major in Cryptography and information security   *[en-prog-2019-dati2m-lmap234o.html]*
> Majors in business creation and management   *[en-prog-2019-dati2m-ldati104g.html]*
  > Major in small and medium sized business creation   *[en-prog-2019-dati2m-lfsa221o.html]*
  > Major Business risks and opportunities   *[en-prog-2019-dati2m-lfsa220o.html]*
> Elective courses   *[en-prog-2019-dati2m-ldati103g.html]*
  > Elective courses available for Master students in Data Sciences Engineering   *[en-prog-2019-dati2m-ldati223o.html]*
  > Elective courses: transversal skills and contacts with industry   *[en-prog-2019-dati2m-lgbio955o.html]*

DATI2M Detailed programme

Programme by subject

CORE COURSES

○ 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 2

○ *Data structures and algorithms for data analysis*

						Year 1	Year 2
○ LINGI2172	Databases	Siegfried Nijssen	30h+30h	6 Credits	2q	x	x
○ LINMA2472	Algorithms in data science	Vincent Blondel Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel)	30h +22.5h	5 Credits	1q	x	x
○ LDATA2010	Information visualisation	John Lee	30h+30h	5 Credits	1q	x	x

○ *Machine learning*

						Year 1	Year 2
○ LINGI2262	Machine Learning :classification and evaluation	Pierre Dupont	30h+30h	5 Credits	2q	x	x
○ LELEC2870	Machine Learning : regression, dimensionality reduction and data visualization	John Lee (compensates Michel Verleysen) Michel Verleysen	30h+30h	5 Credits	1q	x	x
○ LSINF2275	Data mining & decision making	Marco Saerens	30h+15h	5 Credits	2q	x	x
○ LINGI2364	Mining Patterns in Data	Siegfried Nijssen	30h+15h	5 Credits	2q	x	x
○ LINGI2261	Artificial intelligence: representation and reasoning	Yves Deville	30h+30h	6 Credits	1q	x	x

○ *Statistics*

						Year 1	Year 2
○ LSTAT2120	Linear models	Christian Hafner	30h+7.5h	5 Credits	1q	x	x
○ LSTAT2130	Introduction to Bayesian statistics	Philippe Lambert	15h+5h	4 Credits	2q	x	x

○ *Sciences religieuses*

Maximum un cours parmi

						Year 1	Year 2
⊗ LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	15h	2 Credits	1q	x	x
⊗ LTECO2200	Societies-cultures-religions : Human Questions	Régis Burnet Dominique Martens	15h	2 Credits	1 ou 2q	x	x
⊗ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	15h	2 Credits	1q	x	x

PROFESSIONAL FOCUS

○ 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...)

					Year 1	2

○ *Contenu:*

○ LDATI2990	Master thesis in data analytics				27 Credits		x

⌗ Seminar (3 credits)

The students choose one seminar between
De 3 à 3 CREDITS parmi

						Year 1	2
⌗ LINMA2120	Applied mathematics seminar	Pierre-Antoine Absil Frédéric Crevecoeur Jean-Charles Delvenne François Glineur Julien Hendrickx Laurent Jacques (coord.) Raphaël Jungers Yurii Nesterov Anthony Papavasiliou	30h	5 Credits	1 + 2q	x	x
⌗ LINGI2369	Artificial intelligence and machine learning seminar	Pierre Dupont Siegfried Nijssen	30h	3 Credits	1q	x	x
⌗ LINGI2399	Industrial seminar in computer science	Yves Deville Bernard Geubelle	30h	3 Credits	2q	x	x
⌗ LSTAT2390	Applied statistics workshops	Catherine Legrand Christian Ritter	15h	3 Credits	1 + 2q	x	x

OPTIONS

L'étudiant complète son programme pour arriver à min. 60 crédits techniques (dispensés dans les Masters EPL ou sigle STAT) en ce non compris le TFE et les éventuels compléments pris par certains étudiants qui manqueraient de base. Il n'est pas obligatoire de valider une option.

Majors in Data Science: Information technology

> Option en computer systems *[en-prog-2019-dati2m-ldati220o]*
> Option en numerical methods and optimization *[en-prog-2019-dati2m-ldati221o]*
> Major in Cryptography and information security *[en-prog-2019-dati2m-lmap234o]*

Majors in business creation and management

> Major in small and medium sized business creation *[en-prog-2019-dati2m-lfsa221o]*
> Major Business risks and opportunities *[en-prog-2019-dati2m-lfsa220o]*

Elective courses

> Elective courses available for Master students in Data Sciences Engineering *[en-prog-2019-dati2m-ldati223o]*
> Elective courses: transversal skills and contacts with industry *[en-prog-2019-dati2m-lgbio955o]*

OPTION EN COMPUTER SYSTEMS

⚪ 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...)

Min=16 credits parmi

Year
1 2

⚪ Contenu:

⚪ Cours obligatoires de l'option

⚪ LINGI2145	Cloud Computing	Etienne Riviere	30h+15h	5 Credits	1q	x	x
⚪ LINGI2241	Architecture and performance of computer systems	Ramin Sadre	30h+30h	6 Credits	1q	x	x

⚪ Cours au choix de l'option (15 credits)

⊗ LINGI2347	Computer system security	Ramin Sadre	30h+15h	5 Credits	2q	x	x
⊗ LINGI2143	Concurrent systems : models and analysis	Charles Pecheur	30h+15h	5 Credits	1q	x	x
⊗ LINGI2349	Networking and security seminar	Etienne Riviere Ramin Sadre (coord.)	30h	3 Credits	1q	x	x
⊗ LINGI2146	Mobile and Embedded Computing	Ramin Sadre	30h+15h	5 Credits	2q	x	x
⊗ LINGI2355	Multicore programming	Etienne Riviere	30h+15h	5 Credits	2q	x	x

OPTION EN NUMERICAL METHODS AND OPTIMIZATION

○ 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...)

Min=15 credits parmi

Year

						1	2

○ **Contenu:**

○ **Cours obligatoires de l'option**

○ LINMA2471	Optimization models and methods II	François Glineur	30h +22.5h	5 Credits	1q	x	x
○ LINMA2380	Matrix computations	Raphaël Jungers	30h +22.5h	5 Credits	1q	x	x

○ **Un cours parmi :**

✕ LINGI2266	Advanced Algorithms for Optimization	Pierre Schaus	30h+15h	5 Credits	1q	x	x
✕ LINMA2450	Combinatorial optimization	Jean-Charles Delvenne (coord.) Julien Hendrickx	30h +22.5h	5 Credits	1q	x	x

✕ **Cours au choix de l'option**

○ LINMA2470	Stochastic modelling	Philippe Chevalier Raphaël Jungers (compensates Philippe Chevalier)	30h +22.5h	5 Credits	2q	x	x
○ LINMA2491	Operational Research	El-Houssaine Aghezzaf (compensates Anthony Papavasiliou) Anthony Papavasiliou	30h +22.5h	5 Credits	2q	x	x
○ LINMA2171	Numerical Analysis : Approximation, Interpolation, Integration	Pierre-Antoine Absil	30h +22.5h	5 Credits	1q	x	x
○ LINMA2875	System Identification	Julien Hendrickx	30h+30h	5 Credits	2q	x	x
○ LINGI2365	Constraint programming	Yves Deville Pierre Schaus Pierre Schaus (compensates Yves Deville)	30h+15h	5 Credits	2q	x	x
○ LINMA2460	Optimization : Nonlinear programming	Yurii Nesterov	30h +22.5h	5 Credits	2q	x	x
○ LINMA2120	Applied mathematics seminar	Pierre-Antoine Absil Frédéric Crevecoeur Jean-Charles Delvenne François Glineur Julien Hendrickx Laurent Jacques (coord.) Raphaël Jungers Yurii Nesterov Anthony Papavasiliou	30h	5 Credits	1 + 2q	x	x

MAJOR IN CRYPTOGRAPHY AND INFORMATION SECURITY

As with the Master's degree engineering programmes in electricity, computer sciences and applied mathematics, this major provides students with the knowledge of fundamental algorithms and mathematics in order to better understand information security as well as the design and implementation of solutions for problems related to electronic circuits and information systems.

◉ 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 student shall select
De 15 à 30 CREDITS parmi

Year
1 2

◉ Contenu:

✖ Elective courses
In order to validate this option INFO and MAP students have to take at least 20 credits and the ELEC, DATE and DATI students have to take at least 15 credits among:

						Year 1	Year 2
✖ LELEC2760	Secure electronic circuits and systems	François-Xavier Standaert	30h+30h	5 Credits	2q	x	x
✖ LINGI2144	Secured systems engineering	Axel Legay	30h+15h	5 Credits	2q	x	x
✖ LINGI2347	Computer system security	Ramin Sadre	30h+15h	5 Credits	2q	x	x
✖ LINGI2348	Information theory and coding	Jérôme Louveaux Benoît Macq Olivier Pereira	30h+15h	5 Credits	2q	x	x
✖ LMAT2440	Number theory	Olivier Pereira Jean-Pierre Tignol	30h+15h	5 Credits	1q	x	x
✖ LMAT2450	Cryptography	Olivier Pereira	30h+15h	5 Credits	1q	x	x
✖ LELEC2770	Privacy Enhancing technology	Olivier Pereira (coord.) François-Xavier Standaert	30h+30h	5 Credits	1q	x	x

MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

○ 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...)

De 20 à 25 CREDITS parmi

Year
1 2

○ *Contenu:*

○ Required courses for the major in small and medium sized businesses

○ LCPME2001	Entrepreneurship Theory (in French)	Blanche Havenne (compensates Frank Janssen) Frank Janssen	30h+20h	5 Credits	1q	x	
○ LCPME2002	Managerial, legal and economic aspects of the creation of a company (in French)	Yves De Cordt Marine Falize	30h+15h	5 Credits	1q	x	x
○ LCPME2003	Business plan of the creation of a company (in French) *Les séances du cours LCPME2003 sont réparties sur les deux blocs annuels du master. L'étudiant doit les suivre dès le bloc annuel 1, mais ne pourra inscrire le cours que dans son programme de bloc annuel 2.*	Frank Janssen	30h+15h	5 Credits	2q		x
○ LCPME2004	Advanced seminar on Entrepreneurship (in French)	Frank Janssen	30h+15h	5 Credits	2q	x	x

❁ Prerequisite CPME courses

Student who have not taken management courses during their previous studies must enroll in LCPME2000.

○ LCPME2000	Venture creation financement and management I	Yves De Rongé Olivier Giacomin	30h+15h	5 Credits	1q	x	

MAJOR BUSINESS RISKS AND OPPORTUNITIES

○ 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...)

De 16 à 20 CREDITS parmi

Year
1 2

○ *Contenu:*

○ LFSA1290	Introduction to financial and accounting management	Philippe Grégoire	30h+15h	4 Credits	2q	x	x
○ LFSA2140	Elements of law for industry and research	Vincent Cassiers Werner Derijcke Bénédicte Inghels	30h	3 Credits	1q	x	x
○ LFSA2210	Organisation and human resources	John Cultiaux Eline Jammaers	30h	3 Credits	2q	x	x
○ LFSA2230	Introduction to management and to business economics	Benoît Gailly	30h+15h	4 Credits	2q	x	x
○ LFSA2245	Environment and business	Jean-Pierre Tack	30h	3 Credits	1q	x	x

○ One course between
De 3 à 5 CREDITS parmi

✷ LFSA2202	Ethics and ICT	Axel Gosseries Olivier Pereira	30h	3 Credits	2q	x	x
✷ LLSMS2280	Business Ethics and Compliance Management	Carlos Desmet	30h	5 Credits	1q	x	x

✷ Alternative to the major in business risks and opportunities for computer science students
Computer science students who have already taken courses in this field while pursuing their Bachelor's degree may choose between 16-20 credits from the courses offered in the management minor for computer sciences.

ELECTIVE COURSES AVAILABLE FOR MASTER STUDENTS IN DATA SCIENCES ENGINEERING

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 elective courses being recommended and available for Master students in Data Sciences Engineering are listed here above, in the majors and other lists of elective courses. However, a student can further suggest other courses that would be relevant for his.her personal curriculum, pending that this is compliant with the rules for setting up a personal Master program.

Year
1 2

o *Contenu:*

⊗ **Statistics**

						Year	
⊗ LSTAT2200	Survey and Sampling	Marie-Paule Kestemont	15h+5h	4 Credits	2q	x	x
⊗ LSTAT2380	Statistical consulting	Christian Ritter	30h	5 Credits	1 + 2q	x	x
⊗ LSTAT2390	Applied statistics workshops	Catherine Legrand Christian Ritter	15h	3 Credits	1 + 2q	x	x
⊗ LSTAT2150	Nonparametric statistics: smoothings methods	Rainer von Sachs	15h+5h	4 Credits	1q	x	x

⊗ **Machine learning, vision and artificial intelligence**

						Year	
⊗ LELEC2885	Image processing and computer vision	Christophe De Vleeschouwer (coord.) Laurent Jacques	30h+30h	5 Credits	1q	x	x
⊗ LGBIO2010	Bioinformatics	Pierre Dupont	30h+30h	5 Credits	1q	x	x
⊗ LINGI2263	Computational Linguistics	Pierre Dupont Cédrick Fairon	30h+15h	5 Credits	1q	x	x
⊗ LINGI2348	Information theory and coding	Jérôme Louveaux Benoît Macq Olivier Pereira	30h+15h	5 Credits	2q	x	x
⊗ LINGI2369	Artificial intelligence and machine learning seminar	Pierre Dupont Siegfried Nijssen	30h	3 Credits	1q	x	x

⊗ **Data structures and algorithms for data analysis**

						Year	
⊗ LSINF2345	Languages and algorithms for distributed Applications	Peter Van Roy	30h+15h	5 Credits	1q	x	x
⊗ LELEC2770	Privacy Enhancing technology	Olivier Pereira (coord.) François-Xavier Standaert	30h+30h	5 Credits	1q	x	x

ELECTIVE COURSES: TRANSVERSAL SKILLS AND CONTACTS WITH INDUSTRY

⭘ 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 student selects between 3 and 22 credits (max 27 if the student selects the internship) in this list below or in the courses of the major "business risks and opportunities". An alternative is to select the Major in small and medium sized business creation.

Year
1 2

⭘ *Contenu:*

⭘ Transversal skills and contacts with industry
The student selects minimum 3 credits among the courses of the Majors "business risks and opportunities" and "small and medium sized business creation" and courses of professional integration activity specific to the program.

⌗ Internship

⌗ LFSA2995	Company Internship	Jean-Pierre Raskin	30h	10 Credits	1 + 2q	x	x

⌗ Communication
Max=8 CREDITS parmi

⌗ Languages
Students may select from any language course offered at the ILV. Special attention is placed on the following seminars in professional development:

⌗ LALLE2500	Professional development seminar German	Caroline Klein Ann Rinder (coord.)	30h	3 Credits	1 + 2q	x	x
⌗ LALLE2501	Professional development seminar-German	Caroline Klein Ann Rinder (coord.)	30h	5 Credits	1 + 2q	x	x
⌗ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.) Alicia Maria Tirado Fernandez (compensates Paula Lorente Fernandez)	30h	3 Credits	1q	x	x
⌗ LESPA2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.) Alicia Maria Tirado Fernandez (compensates Paula Lorente Fernandez)	30h	5 Credits	1q	x	x
⌗ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.) Marie-Laurence Lambrecht	30h	3 Credits	1 ou 2q	x	x
⌗ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.)	30h	3 Credits	1 ou 2q	x	x

⌗ Group dynamics

⌗ LEPL2351	Dynamique des groupes - Q1	Christine Jacqmot Benoît Raucent Vincent Wertz (coord.)	15h+30h	3 Credits	1q	x	x
⌗ LEPL2352	Dynamique des groupes - Q2	Christine Jacqmot Benoît Raucent Vincent Wertz (coord.)	15h+30h	3 Credits	2q	x	x

⌗ Other non-disciplinary courses
The student may further select maximum 8 credits in other disciplines.

Course prerequisites

A document entitled (nb: not available for this programme dati2m) 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?"*

DATI2M - 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

- > Specific Admission Requirements
- > University Bachelors
- > Non university Bachelors
- > Holders of a 2nd cycle University degree
- > Holders of a non-University 2nd cycle degree
- > Adults taking up their university training
- > Access on the file
- > Admission and Enrolment Procedures for general registration

Specific Admission Requirements

This programme is taught in English with no prerequisite in French. The student is supposed to have at least a B2 level in the European Framework of Reference. A certificate is required for the holders of a non-Belgian degree, see selection criteria of the personalized access.

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor in Computer Science		Direct Access	
Bachelor in Engineering		Direct Access	
Other Bachelor	"Minor in Computer Sciences" or "Minor in Engineering Sciences : Applied Mathematics"	Based on application: accepted, conditional on further training, or refusal	Maximum 60 additional credits integrated into their Masters's degree programme.
Others Bachelors of the French speaking Community of Belgium			
Bachelor in Computer Sciences		Direct Access	
Bachelor in Engineering Sciences		Direct Access	
Other Bachelor		Based on application: accepted, conditional on further training, or refusal	Students who have not taken the equivalent of a "Minor in Computer Sciences" or a "Minor in Engineering Sciences : Applied Mathematics" may have anadapted programme with up to 60 additional credits.
Bachelors of the Dutch speaking Community of Belgium			
Bachelor in Computer Sciences		Direct Access	
Bachelor in Engineering Sciences		Direct Access	
Other Bachelors		Based on application: accepted, conditional on further training, or refusal	See "Personalized access"
Foreign Bachelors			
Bachelor in Computer Sciences		Based on application: accepted, conditional on further training, or refusal	See "Personalized access"

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			

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.

The first step of the admission procedure requires to submit an application online : https://uclouvain.be/en/study/inscriptions/futurs-etudiants.html (https://uclouvain.be/en/study/inscriptions/futurs-etudiants.html)

Selection criteria are summarized here.

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.

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*

L'étudiant choisit un des modules suivants :

⊠ 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

O *Probabilités et statistique*

L'étudiant choisit un des modules suivants :

⊠ Module 1

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

⊠ Module 2

O LFSAB1105	Probability and statistics	Donatien Hainaut Rainer von Sachs	30h+30h	4 Credits	1q

O *Programmation et informatique*

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

O Un cours parmi :

⊠ LSINF1121	Algorithmics and data structures	Pierre Schaus	30h+30h	5 Credits	1q
⊠ LINMA2111	Discrete mathematics II : Algorithms and complexity	Vincent Blondel Jean-Charles Delvenne (coord.)	30h+22.5h	5 Credits	1q

❧ *Systèmes informatiques :*

○ LINFO1225	Conception orientée objet et gestion de données	Kim Mens	30h+30h	5 Credits	2q
○ LINGI1341	Computer networks	Olivier Bonaventure	30h+30h	5 Credits	1q

❧ *Méthodes numériques et optimisation :*

○ LINMA1702	Optimization models and methods I	François Glineur	30h+22.5h	5 Credits	2q

○ Un cours parmi :

○ LEPL1104	Méthodes numériques	Vincent Legat	30h+30h	5 Credits	2q
○ LINFO1113	Algorithmique numérique	Loïc Quertenmont	30h+30h	6 Credits	1q

❧ *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.

Evaluation

The evaluation methods comply with the <u>*regulations concerning studies and exams*</u> *(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".*

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/EPL/DATA
Denomination	<u>(DATA)</u> (https://uclouvain.be/repertoires/entites/data)
Faculty	Louvain School of Engineering <u>(EPL)</u> (https://uclouvain.be/ repertoires/entites/epl)
Sector	Sciences and Technology <u>(SST)</u> (https://uclouvain.be/repertoires/ entites/sst)
Acronym	DATA
Postal address	Rue Archimède 1 - bte L6.11.01
	1348 Louvain-la-Neuve

Academic supervisor: Jean-Charles Delvenne

Jury

- Jean-Didier Legat
- Siegfried Nijssen

Useful Contact(s)

- Pascale Premereur