

**At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In English**Dissertation/Graduation Project : **YES** - Internship : **optional**Activities in English: **YES** - Activities in other languages : **optional**Activities on other sites : **NO**Main study domain : **Sciences**Organized by: **Louvain School of Engineering (EPL)**Programme acronym: **DATI2M** - Francophone Certification Framework: 7**Table of contents**

|  |    |
|--|----|
| Introduction .....                                   | 2  |
| Teaching profile .....                               | 3  |
| Learning outcomes .....                              | 3  |
| Programme structure .....                            | 4  |
| Programme .....                                      | 4  |
| Detailed programme by subject .....                  | 4  |
| Supplementary classes .....                          | 16 |
| Course prerequisites .....                           | 18 |
| The programme's courses and learning outcomes .....  | 18 |
| Information .....                                    | 19 |
| Access Requirements .....                            | 19 |
| Teaching method .....                                | 22 |
| Evaluation .....                                     | 22 |
| Mobility and/or Internationalisation outlook .....   | 22 |
| Possible trainings at the end of the programme ..... | 22 |
| Contacts .....                                       | 23 |

## DATI2M - Introduction

### Introduction

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#### 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 master's in data science: Information Technology 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.

A computer infrastructure and complex calculation algorithms also complement these scientific methods to enable the structuring and processing of data.

Finally, cybersecurity has become an essential element in a data-centric world: it will be a question of understanding and being able to manage the risks associated with the data itself, but also of being able to protect stored data and circulate it securely.

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

#### Your profile

You have completed a bachelor's or master's degree in which you have acquired solid skills and a taste for the three basic building blocks of data science: mathematics, statistics and computer science, as well as a curiosity for the application areas of these disciplines.

You have a good command of technical English and are able to follow lectures, read scientific literature, write reports and express yourself orally in this language. You have the general skills and personal qualities necessary for a scientific master's degree, such as autonomy, critical thinking, rigour, self-learning and the ability to research and process information.

An additional teaching block (of maximum 60 credits) may be offered to students who lack some of these skills.

#### Your future job

Your degree in data science prepares you for the posts of « data scientist », « data analyst », « security analyst », « data and analytics manager », « data engineer », « security engineer », or « security architect ».

#### Your programme

The master's programme: Data Science : Information Technology at UCLouvain is based on a common core that provides a technical foundation in the fields of learning theory, databases, and linear statistical models.

This common core is completed by the choice of a focus on data analysis or a focus on cybersecurity.

The data analysis focus offers a range of algorithmic and statistical methods for data mining, learning, and visualization of large data sets.

The cybersecurity focus is structured around five pillars: cryptography, privacy, and hardware, software and system security, as well as an introduction to information theory.

These pillars are completed by majors and elective courses that allow students to deepen their knowledge of algorithmic, computer science, statistical, application or entrepreneurial aspects.

#### Your parcours

You will primarily develop strong, in-depth, cross-disciplinary skills to be able to address a broad spectrum of data science and cybersecurity problems and to carry out projects or develop research in the field.

Your programme will offer you opportunities to explore, through projects, internships or applied courses, the extremely varied fields of application of data science.

## DATI2M - Teaching profile

### Learning outcomes

Acquérir de solides bases méthodologiques en analyse, traitement et sécurité des données et les appliquer dans des domaines variés tel que sciences humaines, ingénierie, marketing, finance, assurance ou sciences du vivant...

Les étudiants acquerront des connaissances et développeront des compétences nécessaires pour :

- devenir des spécialistes en analyse de données – finalité Analyse de données (AD) (éventail d'algorithmes et de méthodes statistiques, pour la fouille de données, l'apprentissage et la visualisation de grands ensembles de données électronique, production mécanique, automatique et robotique) ou des spécialistes en cybersécurité – finalité Cybersécurité (CS) (cryptographie, sécurité hardware, software et des systèmes informatiques, "privacy", introduction à la théorie de l'information)
- communiquer efficacement
- analyser un problème complexe
- collaborer à un projet de recherche.

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 (finalité AD) ou sécurité des données (finalité CS), 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 La sécurité des données dans ses aspects logiciels, matériel ou cryptographiques.
- 1.6 Les systèmes informatiques, y compris le calcul distribué, le calcul embarqué, les réseaux et la sécurité (cours optionnels).
- 1.7 Les méthodes numériques et l'optimisation, y compris la programmation par contraintes, la recherche opérationnelle, l'identification et les mathématiques appliquées (cours optionnels)

2. Organiser et de mener à son terme une démarche de développement d'un système d'exploitation et sécurité de 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 et la sécurité des 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 et sécurité 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'utilisateur : questionner, écouter et comprendre toutes les dimensions de sa demande et pas seulement les 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

The 120-credit Master in Data Science programme consists of the following items.

**A common curriculum of 46 credits, including a final thesis and teaching units in:**

- Databases
- Machine Learning
- Statistics
- A seminar
- Professional integration work.

**One focus of 30 credits will be taken among a choice of two:**

- The data analytics focus offers a range of algorithmic and statistical methods for data mining, learning, and visualization of large data sets.
- The cybersecurity focus is structured around 5 pillars: cryptography, hardware, software and system security, and privacy, as well as an introduction to information theory.

**Elective courses and/or options are chosen so as to reach at least 120 credits.**

To the 120-credit programme may be added an additional preparatory module for students who do not have all the prerequisites for the Master. These teaching units will be selected with the study advisor.

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.

## DATI2M Programme

## Detailed programme by subject

### CORE COURSES [46.0]

- 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
- ⊗ 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   |
| ● LDATI2990 | <b>Master thesis</b><br><i>The graduation project can be written and presented in French or English, in consultation with the supervisor. It may be accessible to exchange students by prior agreement between the supervisors and/or the two universities.</i> | <span style="color: red;">⊗</span> [q1+q2] [25 Credits] <span style="color: blue;">⊕</span><br><i>&gt; French-friendly</i> | x x |

Year

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|             |  |                  |   |   |   |
|-------------|--|------------------|---|---|---|
| ○ LEPL2020  | <b>Professional integration work</b><br><i>The modules of LEPL2020 course are organized over the two annual blocks of the master's degree. It is strongly recommended that students take them from year 1, but they will only be able to register for the course at the earliest the year in which they present their final graduation project.</i><br><br><i>Students who have other professional integration activities in their personal programme, or who can demonstrate an equivalent activity could be exempted from this course. This equivalence is at the discretion of the examination board. Another activity should then be chosen to reach the number of ECTS required for their graduation.</i> |                  | EN [q1+q2] [30h+15h] [2 Credits]<br>> French-friendly | x | x |
| ○ LINFO2172 | Databases  | Samuel Hiard     | EN [q2] [30h+30h] [6 Credits]<br>> French-friendly    | x | x |
| ○ LSTAT2120 | Linear models  | Christian Hafner | EN [q1] [30h+7.5h] [5 Credits]<br>> French-friendly   | x | x |
| ○ LINFO2262 | Machine Learning :classification and evaluation  | Pierre Dupont    | EN [q2] [30h+30h] [5 Credits]<br>> French-friendly    | x | x |

⌘ One course to choose from

|             |  |   |   |   |   |
|-------------|--|---|---|---|---|
| ⌘ LINFO2399 | Industrial seminar in computer science               | Yves Deville<br>Bernard Geubelle  | EN [q2] [30h] [3 Credits]<br>> French-friendly    | x | x |
| ⌘ LINFO2369 | Artificial intelligence and machine learning seminar | Siegfried Nijssen<br>Eric Piette  | EN [q1] [30h] [3 Credits]<br>> French-friendly    | x | x |
| ⌘ LINMA2120 | Applied mathematics seminar                          | Pierre-Antoine Absil<br>Gianluca Bianchin<br>Frédéric Crevecoeur<br>Jean-Charles Delvenne<br>François Glineur<br>Julien Hendrickx<br>Laurent Jacques<br>Raphaël Jungers<br>Estelle Massart (coord.)<br>Geovani Nunes<br>Grapiglia | EN [q1+q2] [30h] [3 Credits]<br>> French-friendly | x | x |
| ⌘ LSTAT2390 | Applied statistics workshops                         | Christian Ritter<br>Laura Symul   | EN [q1+q2] [15h] [3 Credits]<br>> French-friendly | x | x |

**LIST OF FOCUSES**

- > Professional Focus : Data Analytics [ en-prog-2024-dati2m-ldati210s ]
- > Professional Focus : Cybersecurity [ en-prog-2024-dati2m-ldati220s ]

**PROFESSIONAL FOCUS : DATA ANALYTICS [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
- 🚫 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

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o Content:

| ○ LDATA2010 | Information visualisation   | John Lee   | EN [q1] [30h+30h] [5 Credits] 🌐<br>> French-friendly   |  | X | X |
|-------------|---|--|--|--|---|---|
| ○ LINMA2472 | Algorithms in data science  | Jean-Charles Delvenne (coord.)<br>Benoît Legat (compensates Vincent Blondel) | EN [q1] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly |  | X | X |
| ○ LINFO2364 | Mining Patterns in Data   | Siegfried Nijssen  | EN [q2] [30h+15h] [5 Credits] 🌐<br>> French-friendly   |  | X | X |
| ○ LSTAT2130 | Introduction to Bayesian statistics                                       | Philippe Lambert   | EN [q2] [22.5h+7.5h] [5 Credits] 🌐                     |  | X | X |
| ○ LINFO2275 | Data mining & decision making   | Marco Saerens  | EN [q2] [30h+15h] [5 Credits] 🌐<br>> French-friendly   |  | X | X |
| ○ LELEC2870 | Machine learning : regression, deep networks and dimensionality reduction | John Lee<br>John Lee (compensates Michel Verleysen)<br>Michel Verleysen      | EN [q1] [30h+30h] [5 Credits] 🌐<br>> French-friendly   |  | X | X |

**PROFESSIONAL FOCUS : CYBERSECURITY [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
- 🚫 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

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o Content:

|             |  |                           |  |  |   |   |
|-------------|--|---------------------------|--|--|---|---|
| ○ LELEC2760 | Secure electronic circuits and systems | François-Xavier Standaert | EN [q2] [30h+30h] [5 Credits] 🌐<br>> French-friendly |  | X | X |
|-------------|--|---------------------------|--|--|---|---|

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|-------------|-------------------------------|--|--|------|---|---|
| ○ LELEC2770 | Privacy Enhancing technology  | Olivier Pereira<br>François-Xavier Standaert             | FR [q1] [30h+30h] [5 Credits]<br>> French-friendly | x    | x |   |
| ○ LINFO2347 | Computer system security      | Ramin Sadre  | FR [q2] [30h+15h] [5 Credits]<br>> French-friendly | x    | x |   |
| ○ LINFO2144 | Secured systems engineering   | Charles-Henry<br>Bertrand Van Ouytsel<br>Gaëtan Cassiers | FR [q2] [30h+15h] [5 Credits]<br>> French-friendly | x    | x |   |
| ○ LMAT2450  | Cryptography                  | Olivier Pereira  | FR [q1] [30h+15h] [5 Credits]<br>> French-friendly | x    | x |   |
| ○ LELEC2348 | Information theory and coding | Jérôme Louveaux<br>Benoît Macq<br>Olivier Pereira        | FR [q2] [30h+15h] [5 Credits]<br>> French-friendly | x    | x |   |

## OPTIONS

L'étudiant-e complète son programme pour arriver à min. 90 crédits disciplinaires (dispensés dans les Masters EPL ou sigle STAT, y compris le TFE) en ce non compris les éventuels compléments pris par certains étudiants qui manqueraient de base. Il n'est pas obligatoire de valider une option.

Dans la rubrique "Options et cours au choix en connaissances socioéconomiques", l'étudiant-e valide une des deux options ou choisit obligatoirement au minimum 3 crédits parmi les cours au choix ou les cours de l'option en enjeux de l'entreprise.

### Majors in Data Science: Information technology

- > Major in computer systems [ en-prog-2024-dati2m-ldati220o ]
- > Major in numerical methods and optimisation [ en-prog-2024-dati2m-ldati221o ]
- > Elective technical courses [ en-prog-2024-dati2m-ldati237o ]

### Options et cours au choix en connaissances socio-économiques

- > Business risks and opportunities [ en-prog-2024-dati2m-ldati231o ]
- > Major in Interdisciplinary Program in Entrepreneurship - INEO [ en-prog-2024-dati2m-ldati232o ]
- > Cours au choix en connaissances socio-économiques [ en-prog-2024-dati2m-ldati200o ]

### Others elective courses

- > Others elective courses [ en-prog-2024-dati2m-ldati223o ]

## MAJORS IN DATA SCIENCE: INFORMATION TECHNOLOGY



### MAJOR IN COMPUTER SYSTEMS

- 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...)

## o Content:

## o Compulsory courses :

|             |  |                 |  |   |   |
|-------------|--|-----------------|--|---|---|
| o LINFO2145 | Cloud Computing                                  | Etienne Riviere | EN [q1] [30h+15h] [5 Credits] <br>> French-friendly | X | X |
| o LINFO2241 | Architecture and performance of computer systems | Tom Barbette    | EN [q1] [30h+30h] [6 Credits] <br>> French-friendly | X | X |

## o Elective courses

|             |  |                                |  |   |   |
|-------------|--|--------------------------------|--|---|---|
| ⊗ LINFO2347 | Computer system security                 | Ramin Sadre                    | EN [q2] [30h+15h] [5 Credits] <br>> French-friendly | X | X |
| ⊗ LINFO2143 | Concurrent systems : models and analysis | Charles Pecheur                | EN [q1] [30h+15h] [5 Credits] <br>> French-friendly | X | X |
| ⊗ LINFO2349 | Networking and security seminar          | Etienne Riviere<br>Ramin Sadre | EN [q1] [30h] [3 Credits] <br>> French-friendly     | X | X |
| ⊗ LINFO2146 | Mobile and Embedded Computing            | Ramin Sadre                    | EN [q2] [30h+15h] [5 Credits] <br>> French-friendly | X | X |
| ⊗ LINFO2355 | Multicore programming                    | Etienne Riviere                | EN [q2] [30h+15h] [5 Credits] <br>> French-friendly | X | X |



## MAJOR IN NUMERICAL METHODS AND OPTIMISATION

- 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 student who wishes to validate this option chooses 15 credits among:

Year

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### o Content:

#### o Compulsory courses

|             |                                    |  |  |   |   |
|-------------|------------------------------------|--|--|---|---|
| ● LINMA2471 | Optimization models and methods II | François Glineur<br>Geovani Nunes<br>Grapiglia | EN [q1] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ● LINMA2380 | Matrix computations                | Raphaël Jungers                                | EN [q1] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly | X | X |

#### o One course between

|             |                                      |  |  |   |   |
|-------------|--------------------------------------|--|--|---|---|
| ⊗ LINFO2266 | Advanced Algorithms for Optimization | Pierre Schaus                                  | EN [q1] [30h+15h] [5 Credits] 🌐<br>> French-friendly   | X | X |
| ⊗ LINMA2450 | Combinatorial optimization           | Julien Hendrickx<br>Geovani Nunes<br>Grapiglia | EN [q1] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly | X | X |

#### ⊗ Elective courses

|             |  |   |   |   |   |
|-------------|--|---|---|---|---|
| ⊗ LINMA2470 | Stochastic modelling   | Philippe Chevalier<br>Mehdi Madani<br>(compensates<br>Philippe Chevalier)   | EN [q2] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly    | X | X |
| ⊗ LINMA2491 | Operational Research   | Quentin Lété  | EN [q2] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly    | X | X |
| ⊗ LINMA2171 | Numerical Analysis : Approximation, Interpolation, Integration | Pierre-Antoine Absil  | EN [q1] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly    | X | X |
| ⊗ LINMA2875 | System Identification  | Gianluca Bianchin   | EN [q2] [30h+30h] [5 Credits] 🌐<br>> French-friendly      | X | X |
| ⊗ LINFO2365 | Constraint programming   | Pierre Schaus   | EN [q2] [30h+15h] [5 Credits] 🌐<br>> French-friendly      | X | X |
| ⊗ LINMA2460 | Optimization : Nonlinear programming                           | Geovani Nunes<br>Grapiglia  | EN [q2] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly    | X | X |
| ⊗ LINMA2120 | Applied mathematics seminar                                    | Pierre-Antoine Absil<br>Gianluca Bianchin<br>Frédéric Crevecoeur<br>Jean-Charles Delvenne<br>François Glineur<br>Julien Hendrickx<br>Laurent Jacques<br>Raphaël Jungers<br>Estelle Massart (coord.)<br>Geovani Nunes<br>Grapiglia | EN [q1+q2] [30h] [3 Credits] 🌐<br>> French-friendly       | X | X |
| ⊗ LINMA2360 | Project in mathematical engineering                            | Pierre-Antoine Absil<br>Laurent Jacques   | EN [q1+q2] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly | X | X |

**ELECTIVE TECHNICAL 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

**o Content:****⊗ Statistics**

|             |   |                                      |   |   |   |
|-------------|---|--------------------------------------|---|---|---|
| ⊗ LSTAT2200 | Survey and Sampling                                       | Séverine Guisset<br>Christian Ritter | (FR) [q2] [15h+5h] [4 Credits] 🌐                      | X | X |
| ⊗ LSTAT2380 | Statistical consulting                                    | Christian Ritter                     | (EN) [q1+q2] [30h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LSTAT2390 | Applied statistics workshops                              | Christian Ritter<br>Laura Symul      | (EN) [q1+q2] [15h] [3 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LSTAT2150 | Nonparametric statistics: smoothings methods              | Rainer von Sachs                     | (EN) [q1] [15h+5h] [4 Credits] 🌐                      | X | X |
| ⊗ LSTAT2450 | Statistical learning. Estimation, selection and inference | Eugen Pircalabelu                    | (EN) [q1] [30h+7.5h] [5 Credits] 🌐                    | X | X |

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

|             |  |   |  |   |   |
|-------------|--|---|--|---|---|
| ⊗ LELEC2885 | Image processing and computer vision                 | Christophe De<br>Vleeschouwer (coord.)<br>Laurent Jacques | (EN) [q1] [30h+30h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LGBIO2010 | Bioinformatics                                       | Vincent Branders<br>(compensates<br>Pierre Dupont)        | (EN) [q1] [30h+30h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LINFO2263 | Computational Linguistics                            | Pierre Dupont   | (EN) [q1] [30h+15h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LELEC2348 | Information theory and coding                        | Jérôme Louveaux<br>Benoît Macq<br>Olivier Pereira         | (EN) [q2] [30h+15h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LINFO2369 | Artificial intelligence and machine learning seminar | Siegfried Nijssen<br>Eric Piette                          | (EN) [q1] [30h] [3 Credits] 🌐<br>> French-friendly     | X | X |
| ⊗ LINFO2381 | Health Informatics                                   | Sébastien Jodogne   | (EN) [q2] [30h+30h] [5 Credits] 🌐<br>> French-friendly | X | X |

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

|             |   |  |  |   |   |
|-------------|---|--|--|---|---|
| ⊗ LINFO2345 | Languages and algorithms for distributed Applications | Peter Van Roy                                    | (EN) [q1] [30h+15h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LELEC2770 | Privacy Enhancing technology                          | Olivier Pereira<br>François-<br>Xavier Standaert | (EN) [q1] [30h+30h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LINFO1361 | Artificial intelligence                               | Eric Piette (compensates<br>Yves Deville)        | (FR) [q2] [30h+30h] [5 Credits] 🌐                      | X | X |

## OPTIONS ET COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES [3.0]

### BUSINESS RISKS AND OPPORTUNITIES

- 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

#### ○ Content:

| Course ID  | Course Title                                      | Instructor                         | Language                     | Duration          | Credits | Open to incoming exchange students | Year 1 | Year 2 |
|------------|---|------------------------------------|------------------------------|-------------------|---------|------------------------------------|--------|--------|
| ● LEPL2211 | <a href="#">Business issues introduction</a>      | Benoît Gailly                      | EN [q2] [30h] [3 Credits]    | > French-friendly |         | 🌐                                  | X      | X      |
| ● LEPL2212 | <a href="#">Financial performance indicators</a>  | Anne-Catherine Provost             | EN [q2] [30h+5h] [4 Credits] | > French-friendly |         | 🌐                                  | X      | X      |
| ● LEPL2214 | <a href="#">Law, Regulation and Legal Context</a> | Vincent Cassiers<br>Werner Derycke | FR [q1] [30h+5h] [4 Credits] |                   |         | 🌐                                  | X      | X      |

#### ○ One course between

From 3 to 5 credit(s)

|             |   |                                   |                           |                   |  |   |   |   |
|-------------|---|-----------------------------------|---------------------------|-------------------|--|---|---|---|
| ⊗ LEPL2210  | <a href="#">Ethics and ICT</a>                            | Axel Gosseries<br>Olivier Pereira | EN [q2] [30h] [3 Credits] | > French-friendly |  | 🌐 | X | X |
| ⊗ LLSMS2280 | <a href="#">Business Ethics and Compliance Management</a> | Carlos Desmet                     | EN [q1] [30h] [5 Credits] |                   |  | 🌐 | X | X |

#### ⊗ Cours en marketing

|             |   |                  |                               |  |  |   |   |   |
|-------------|---|------------------|-------------------------------|--|--|---|---|---|
| ⊗ MGEST1108 | <a href="#">Marketing</a>                   | Nadia Sinigaglia | FR [q2] [45h+20h] [6 Credits] |  |  | 🌐 | X | X |
| ⊗ MLSMM2136 | <a href="#">Trends in Digital Marketing</a> | Ingrid Poncin    | FR [q2] [30h] [5 Credits]     |  |  | 🌐 |   | X |
| ⊗ MLSMM2134 | <a href="#">e-Consumer Behavior</a>         | Karine Charry    | FR [q2] [30h] [5 Credits]     |  |  | 🌐 |   | X |

#### ⊗ Cours en Sourcing and Procurement

|             |  |  |                           |  |  |   |   |   |
|-------------|--|--|---------------------------|--|--|---|---|---|
| ⊗ LLSMS2036 | <a href="#">Supply Chain Procurement</a>           | Per Joakim Agrell<br>Antony Paulraj  | EN [q1] [30h] [5 Credits] |  |  | 🌐 | X | X |
| ⊗ LLSMS2038 | <a href="#">Procurement Organisation and Scope</a> | Constantin Blome<br>Canan Kocabasoglu<br>Hillmer (compensates<br>Constantin Blome) | EN [q1] [30h] [5 Credits] |  |  | 🌐 | X | X |
| ⊗ LLSMS2037 | <a href="#">Sourcing Strategy</a>                  | Constantin Blome<br>Michael Henke  | EN [q1] [30h] [5 Credits] |  |  | 🌐 | 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.

## MAJOR IN INTERDISCIPLINARY PROGRAM IN ENTREPRENEURSHIP - INEO

Commune à la plupart des masters de l'EPL, cette option a pour objectif de familiariser l'étudiant-e avec les spécificités de l'entrepreneuriat et de la création d'entreprise afin de développer chez lui les aptitudes, connaissances et outils nécessaires à la création d'entreprise.

Cette option rassemble des étudiants de différentes facultés en équipes interdisciplinaires afin de créer un projet entrepreneurial. La formation interdisciplinaire en entrepreneuriat (INEO) est une option qui s'étend sur 2 ans et s'intègre dans plus de 30 Masters de 9 facultés/écoles de l'UCLouvain. Le choix de l'option INEO implique la réalisation d'un mémoire interfacultaire (en équipe) portant sur un projet de création d'entreprise. L'accès à cette option, ainsi qu'à chacun des cours, est limité aux étudiant-es sélectionnés sur dossier. Toutes les informations sur <https://uclouvain.be/fr/etudier/ineo>.

L'étudiant.e qui choisit de valider cette option doit sélectionner au minimum 20 crédits et au maximum 25 crédits. Cette option n'est pas accessible en anglais et ne peut être prise simultanément avec l'option « Enjeux de l'entreprise ».

- 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

### o Content:

#### o Required courses

|             |  |                                |                                 |   |   |
|-------------|--|--------------------------------|---------------------------------|---|---|
| ○ LINEO2001 | Théorie de l'entrepreneuriat   | Frank Janssen                  | FR [q1] [30h+20h] [5 Credits] ⊕ | X |   |
| ○ LINEO2002 | Aspects juridiques, économiques et managériaux de la création d'entreprise   | Yves De Cordt<br>Marine Falize | FR [q1] [30h+15h] [5 Credits] ⊕ | X |   |
| ○ LINEO2003 | Plan d'affaires et étapes-clefs de la création d'entreprise<br><i>Les séances du cours LINEO2003 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.</i> | Frank Janssen                  | FR [q2] [30h+15h] [5 Credits] ⊕ |   | X |
| ○ LINEO2004 | Séminaire d'approfondissement en entrepreneuriat   | Frank Janssen                  | FR [q2] [30h+15h] [5 Credits] ⊕ | X |   |

#### ⊗ Prerequisite courses

Student who have not taken management courses during their previous studies must enroll in LINEO2021.

|             |                     |   |                                 |   |  |
|-------------|---------------------|---|---------------------------------|---|--|
| ○ LINEO2021 | Financer son projet | Philippe Grégoire<br>Olivier Vercruysse | FR [q2] [30h+15h] [5 Credits] ⊕ | X |  |
|-------------|---------------------|---|---------------------------------|---|--|

## COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES

- 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

### o Content:

|             |   |   |   | 1 | 2 |
|-------------|---|---|---|---|---|
| ⊗ LFSA2995  | <a href="#">Company Internship</a>  | Dimitri Lederer<br>Jean-Pierre Raskin   | (FR) [q1+q2] [30h] [10 Credits] 🌐                         | X | X |
| ⊗ LSTAT2380 | <a href="#">Statistical consulting</a>  | Christian Ritter  | EN [q1+q2] [30h] [5 Credits] 🌐<br>> French-friendly       | X | X |
| ⊗ LSTAT2390 | <a href="#">Applied statistics workshops</a>                                  | Christian Ritter<br>Laura Symul   | EN [q1+q2] [15h] [3 Credits] 🌐<br>> French-friendly       | X | X |
| ⊗ LINMA2360 | <a href="#">Project in mathematical engineering</a>                           | Pierre-Antoine Absil<br>Laurent Jacques   | EN [q1+q2] [30h+22.5h] [5 Credits] 🌐<br>> French-friendly | X | X |
| ⊗ LINMA2120 | <a href="#">Applied mathematics seminar</a>                                   | Pierre-Antoine Absil<br>Gianluca Bianchin<br>Frédéric Crevecoeur<br>Jean-Charles Delvenne<br>François Glineur<br>Julien Hendrickx<br>Laurent Jacques<br>Raphaël Jungers<br>Estelle Massart (coord.)<br>Geovani Nunes<br>Grapiglia | EN [q1+q2] [30h] [3 Credits] 🌐<br>> French-friendly       | X | X |
| ⊗ LACTU2170 | <a href="#">Financial valuation of actuarial liabilities</a>                  | Donatien Hainaut  | (FR) [q2] [45h+15h] [7 Credits] 🌐                         | X | X |
| ⊗ LACTU2030 | <a href="#">Life insurance actuarial science</a>                              | Donatien Hainaut  | (FR) [q1] [30h+7.5h] [5 Credits] 🌐                        | X | X |
| ⊗ LLSMS2034 | <a href="#">Supply Chain Planning</a>   | Marc Foret<br>(compensates<br>Mathieu Van Vyve)<br>Mathieu Van Vyve   | EN [q2] [30h] [5 Credits] 🌐                               | X | X |
| ⊗ LINFO2399 | <a href="#">Industrial seminar in computer science</a>                        | Yves Deville<br>Bernard Geubelle  | EN [q2] [30h] [3 Credits] 🌐<br>> French-friendly          | X | X |
| ⊗ LINFO2402 | <a href="#">Open Source Project</a>   |   | EN [q1+q2] [0h] [5 Credits] 🌐<br>> French-friendly        | X | X |
| ⊗ LEPL2021  | <a href="#">Innovation classes for transition and sustainable development</a> | Benoît Macq<br>Xavier Marichal<br>(compensates<br>Benoît Raucent)   | (FR) [q1] [30h+15h] [5 Credits] 🌐                         | X | X |

## OTHERS ELECTIVE COURSES

Les cours au choix recommandés et accessibles aux étudiant-es du master ingénieur en sciences des données ou du master en sciences des données sont listés ci-dessus, dans les options et autres listes de cours au choix. L'étudiant-e est également libre de proposer d'autres cours des programmes de Masters EPL qui seraient pertinentes à son parcours personnel, pour autant que cela respecte les règles de constitution de programme du Master. Ces cours doivent être approuvés par le jury restreint.

## OTHERS ELECTIVE 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
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- 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

## o Content:

The elective courses recommended and available for Master students in Data Science Engineering are listed here above and in the courses of EPL. 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 programme.

## ⊗ 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 (coord.)<br>Mélanie Mottin (compensates Caroline Klein) | DE [q1+q2] [30h] [3 Credits] 🌐    | X | X |
| ⊗ LALLE2501 | Professional development seminar-German                                   | Caroline Klein (coord.)<br>Mélanie Mottin (compensates Caroline Klein) | DE [q1+q2] [30h] [5 Credits] 🌐    | X | X |
| ⊗ LESPA2600 | Vocational Induction Seminar - Spanish (B2.2/C1)                          | Paula Lorente Fernandez (coord.)                                       | ES [q1] [30h] [3 Credits] 🌐       | X | X |
| ⊗ LESPA2601 | Vocational Induction Seminar - Spanish (B2.2/C1)                          | Paula Lorente Fernandez (coord.)                                       | ES [q1] [45h] [5 Credits] 🌐       | X | X |
| ⊗ LNEER2500 | Seminar of Entry to professional life in Dutch - Intermediate level       | Isabelle Demeulenaere (coord.)   | NL [q1 or q2] [30h] [3 Credits] 🌐 | X | X |
| ⊗ LNEER2600 | Seminar of entry to professional life in Dutch - Upper-Intermediate level | Isabelle Demeulenaere (coord.)<br>Dag Houdmont                         | NL [q1 or q2] [30h] [3 Credits] 🌐 | X | X |

## ⊗ Group dynamics

|            |                |   |                                 |   |   |
|------------|----------------|---|---------------------------------|---|---|
| ⊗ LEPL2351 | Become a tutor | Jean-Charles Delvenne (coord.)<br>Delphine Ducarme<br>Thomas Pardoën<br>Benoît Raucent                              | FR [q1] [15h+30h] [3 Credits] 🌐 | X | X |
| ⊗ LEPL2352 | Become a tutor | Jean-Charles Delvenne (coord.)<br>Delphine Ducarme<br>Thomas Pardoën<br>Thomas Pardoën (compensates Benoît Raucent) | FR [q2] [15h+30h] [3 Credits] 🌐 | X | X |

## ⊗ Autres UEs hors-EPL

L'étudiant-e peut choisir maximum 8 crédits de cours hors EPL, considérés comme non-disciplinaires par la commission de programme.



## Supplementary classes

**To access this Master, students must have a good command of certain subjects. If this is not the case, in the first annual block of their Masters programme, students must take supplementary classes chosen by the faculty to satisfy course prerequisites.**

To enter the Master in Data Science, Information Technology orientation, the student must have a minimum of previous skills in mathematics, computer science, algorithms and probability-statistics. If this is not the case, he/she must add additional courses to his/her Master's program. The content of this additional training is determined by the program commission. The skills to be mastered correspond to those of the following 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...)

### ⊗ Mathematics - Calculus and linear algebra

The student follows one of the following blocks:

#### ⊗ Module 1

|             |                          |  |                                   |
|-------------|--------------------------|--|-----------------------------------|
| ○ LINFO1111 | <a href="#">Analysis</a> | Pierre-Antoine Absil<br>François Glineur | FR [q1] [45h+37.5h] [7 Credits] 🌐 |
| ○ LINFO1112 | <a href="#">Algebra</a>  | Christophe Craeye<br>Enrico Vitale       | FR [q2] [30h+30h] [5 Credits] 🌐   |

#### ⊗ Module 2

|             |   |   |                                 |
|-------------|---|---|---------------------------------|
| ○ LINGE1114 | <a href="#">Mathematics I: analysis</a>                     | Heiner Olbermann                              | FR [q1] [30h+30h] [5 Credits] 🌐 |
| ○ LINGE1121 | <a href="#">Mathematics II: algebra and matrix calculus</a> | Cécile Coyette<br>(compensates<br>Tom Claeys) | FR [q2] [30h+30h] [5 Credits] 🌐 |

### ○ Probability and statistics

The student follows one of the following blocks:

#### ⊗ Module 1

|            |  |                 |                                     |
|------------|--|-----------------|-------------------------------------|
| ○ LBIR1315 | <a href="#">Probability and statistics II</a>    | Patrick Bogaert | FR [q1] [22.5h+22.5h] [3 Credits] 🌐 |
| ○ LBIR1212 | <a href="#">Probabilities and statistics (I)</a> | Patrick Bogaert | FR [q1] [30h+15h] [4 Credits] 🌐     |

#### ⊗ Module 2

|            |  |  |                                 |
|------------|--|--|---------------------------------|
| ○ LEPL1108 | <a href="#">Discrete mathematics and probability</a> | Jean-Charles Delvenne<br>Olivier Pereira | FR [q1] [30h+30h] [5 Credits] 🌐 |
| ○ LEPL1109 | <a href="#">Statistics and data sciences</a>         | Donatien Hainaut<br>Laurent Jacques      | FR [q1] [30h+30h] [5 Credits] 🌐 |



### ○ Programming and computer science

The student follows one of the following blocks:

|             |   |   |                                 |
|-------------|---|---|---------------------------------|
| ○ LINFO1101 | <a href="#">Introduction to programming</a>   | Kim Mens<br>Siegfried Nijssen<br>Charles Pecheur  | FR [q1] [30h+30h] [5 Credits] 🌐 |
| ○ LINFO1104 | <a href="#">Programming language concepts</a> | Peter Van Roy                                     | FR [q2] [30h+30h] [5 Credits] 🌐 |
| ○ LEPL1402  | <a href="#">Informatics 2</a>                 | Sébastien Jodogne<br>Ramin Sadre<br>Pierre Schaus | FR [q1] [30h+30h] [5 Credits] 🌐 |



**o Un cours parmi :**

|             |   |  |  |
|-------------|---|--|--|
| ⌘ LINMA2111 | Discrete mathematics II : Algorithms and complexity | Jean-Charles Delvenne<br>Jean-Charles Delvenne<br>(compensates<br>Vincent Blondel) | EB [q1] [30h+22.5h] [5 Credits] <br>> French-friendly |
| ⌘ LINFO1121 | Algorithms and data structures                      | Pierre Schaus  | EB [q1] [30h+30h] [5 Credits]                         |


**⌘ Computer systems:**

The student follows one of the following blocks:

|             |                    |                     |   |
|-------------|--------------------|---------------------|---|
| o LINFO1341 | Computer networks  | Olivier Bonaventure | EB [q2] [30h+30h] [5 Credits]  |
| o LINFO1252 | Informatic Systems | Etienne Riviere     | EB [q1] [30h+30h] [5 Credits]  |

**⌘ Numerical methods and optimisation:**

The student follows one of the following blocks:

|             |                                   |                  |   |
|-------------|-----------------------------------|------------------|---|
| o LINMA1702 | Optimization models and methods I | François Glineur | EB [q2] [30h+22.5h] [5 Credits]  |
|-------------|-----------------------------------|------------------|---|

**o Un cours parmi :**

|             |                       |                                      |   |
|-------------|-----------------------|--------------------------------------|---|
| ⌘ LEPL1104  | Numerical methods     | Vincent Legat                        | EB [q2] [30h+30h] [5 Credits]  |
| ⌘ LINFO1113 | Numerical algorithmic | Sébastien Jodogne<br>Estelle Massart | EB [q2] [30h+30h] [6 Credits]  |

**⌘ 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.

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## Course prerequisites

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There are no prerequisites between course units (CUs) for this programme, i.e. the programme activity (course unit, CU) whose learning outcomes are to be certified and the corresponding credits awarded by the jury before registration in another CU.

## The programme's courses and learning outcomes

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For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

## DATI2M - 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

This programme is taught in English with no prerequisite in French. A certificate is required for the holders of a non-Belgian degree, see selection criteria of the Access on the file.

#### University Bachelors

| Diploma   | Special Requirements  | Access                                      | Remarks   |
|---|---|---|---|
| <b>UCLouvain Bachelors</b>  |   |   |   |
| <a href="#">Bachelor in Computer Science</a> (Louvain-la-Neuve)     |   | Direct access                               |   |
| <a href="#">Bachelor in Computer Science</a> (Charleroi)            |   | Direct access                               |   |
| <a href="#">Bachelor in Engineering</a>                             |   | Direct access                               |   |
| Other Bachelor  | Have acquired skills equivalent to those of the <a href="#">minor in computer science</a> or the <a href="#">minor in applied mathematics</a> . | <a href="#">Access based on application</a> | Maximum 60 <a href="#">additional credits</a> integrated into their Masters's degree programme. |
| <b>Others Bachelors of the French speaking Community of Belgium</b> |   |   |   |
| Bachelor in Computer Sciences                                       |   | Direct access                               |   |
| Bachelor in Engineering Sciences                                    |   | Direct access                               |   |
| Other Bachelor  | Have acquired skills equivalent to those of the <a href="#">minor in computer science</a> or the <a href="#">minor in applied mathematics</a> . | <a href="#">Access based on application</a> | See "Personalized access"   |
| <b>Bachelors of the Dutch speaking Community of Belgium</b>         |   |   |   |
| Bachelor in Computer Sciences                                       |   | Direct access                               |   |
| Bachelor in Engineering Sciences                                    |   | Direct access                               |   |
| Other Bachelors   | Have acquired skills equivalent to those of the <a href="#">minor in computer science</a> or the <a href="#">minor in applied mathematics</a> . | <a href="#">Access based on application</a> | See "Personalized access"   |
| <b>Foreign Bachelors</b>  |   |   |   |

Bachelor in Computer Sciences

[Access based on application](#)

See "Personalized access"

## 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   | Les enseignements supplémentaires éventuels peuvent être consultés dans le <a href="#">module complémentaire</a> . | Type court |
| 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            |  |            |

## Holders of a 2nd cycle University degree

| Diploma  | Special Requirements | Access        | Remarks  |
|--|----------------------|---------------|--|
| <b>"Licenciés"</b>   |                      |               |  |
| <b>Masters</b>   |                      |               |  |
| Master [120] ingénieur civil en science des données, orientation technologies de l'information - deuxième finalité |                      | Direct access | Au terme du master 120, chaque finalité du Master [120] ingénieur civil en science des données, orientation technologies de l'information peut être obtenue dans un nouveau programme de 30 crédits seulement. |

## Holders of a non-University 2nd cycle degree

### Access based on validation of professional experience

> It is possible, under certain conditions, to use one's personal and professional experience to enter a university course without having the required qualifications. However, validation of prior experience does not automatically apply to all courses. Find out more about [Validation of priori experience](#).

### Access based on application

Access based on application : access may be granted either directly or on the condition of completing additional courses of a maximum of 60 ECTS credits, or refused.

Admission on the basis of a submitted dossier may be granted either directly or on the condition of completing [additional coursework](#) of a maximum of 60 ECTS credits, or refused.

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

[Selection criteria are summarized here](#) (contact : [epl-admission@uclouvain.be](mailto:epl-admission@uclouvain.be)).

Pending the publication of the 2025-2026 study programme (expected in early March), [the selection criteria for 2025-2026](#) are now available

## Admission and Enrolment Procedures for general registration

## Teaching method

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### Active learning and soft skills

You will play an active role in your training. The teaching approach is a balanced mix of lectures, exercises, projects to be carried out alone or in groups. The teaching methods are varied. At certain times, you will be led to discover concepts or techniques independently, and the teaching staff is then seen as a resource made available to you to support your learning.

At other times, the pedagogy is more transmissive and provides you with the necessary keys to carry out subsequent tasks. An important place is reserved for non-technical skills (autonomy, organisational skills, time management, communication in different modes, etc.). In particular, through a pedagogy that emphasises project activities (including a large-scale project that puts groups of students in a semi-professional situation), the course develops a critical mind capable of designing, modelling, implementing and validating complex computer systems.

### Languages

The lingua franca of data science is mainly English. The use of English throughout the programme allows you to develop your command of this language, which will facilitate your professional integration. Course materials and supervision are in English. However, you can always ask questions or take the exam in French if you wish. In addition, the programme offers the possibility of attending extra language courses and participating in exchange programmes abroad.

### Interdisciplinarity

Like many academics, the data scientist will be required to manage projects and a team in the course of his or her career, and will have to take an interest in the complex socio-economic context in which data science is embedded. You will therefore be invited to open up your training to other disciplines via elective courses or certain options such as the option "interdisciplinary program in entrepreneurship".

## Evaluation

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***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".***

Each unit of the programme includes an oral or written examination, often supplemented by a project leading to a report which is part of the assessment. The optional internship and the master thesis each involve the writing of a document which is defended orally before a jury.

To compute the final grade, the marks obtained for the teaching units are weighted by their respective credits.

## Mobility and/or Internationalisation outlook

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Over the years, EPL has developed over a hundred partnerships with partners in more than 36 countries (EU and non-EU) to offer exchange programmes to its students. We also offer the possibility of obtaining Double degrees, Joint Degrees or Dual Masters in several fields. The EPL is currently participating in two Erasmus Mundus programmes: [FAME](#) and [STRAINS](#).

In addition to exchange programmes under the Erasmus+ programme, numerous agreements have been established with a wide range of universities through various partner networks such as:

- [TIME](#) network (Top Industrial Managers in Europe).
- [CLUSTER](#) network
- [Magalhães](#) network
- [Circle U](#). network through several networks and European University Alliance

So, there's no shortage of opportunities to gain an additional qualification and/or spend part of the year abroad during your two-year Master's degree! It's the perfect opportunity to discover or improve your knowledge of a foreign language, tackle subjects from a new angle and gain unique experience in Europe or the rest of the world.

If you would like more information, please visit the dedicated pages of the [EPL International Office](#) to discover all the destinations, testimonials from former students and all the procedures to follow to make these opportunities a success.

## Possible trainings at the end of the programme

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The master's degree in data science, information technology orientation can be followed, under certain conditions, by a PhD thesis.

## Contacts

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### Curriculum Management

#### Entity

Structure entity

SST/EPL/DACS

Denomination

(DACS)

Faculty

Louvain School of Engineering (EPL)

Sector

Sciences and Technology (SST)

Acronym

DACS

Postal address

Avenue Georges Lemaître 4-6 - bte L4.05.01

1348 Louvain-la-Neuve

Website

[www.uclouvain.be/epl](http://www.uclouvain.be/epl)

Academic supervisor: [Laurent Jacques](#)

Jury

- Président: [Claude Oestges](#)
- Secrétaire du Jury: [Siegfried Nijssen](#)

Useful Contact(s)

- Secrétariat: [Pascale Premereur](#)

