**UCLouvain**

SINF2M

2023 - 2024

Master [120] in Computer Science

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: **SINF2M** - Francophone Certification Framework: 7

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## SINF2M - Introduction

## Introduction

### Introduction

This Master's degree programme tries to strike **a balance between "soft skills" and scientific and technical knowledge, between excellence in research and the pragmatism of field work.** It offers:

- an approach to computer science based on fundamental **concepts** that keep up with the rapid pace of technological progress;
- a programme taught **entirely in English** in order to improve students' language skills, especially in technical English (both written and spoken);
- **exchange programmes** and dual degrees in Belgium, Europe and across the world.

### Your profile

You would like to

- **Imagine, design, and implement** computer science systems that will shape the future;
- continue your education beyond the Bachelor's degree with a major in computer sciences (or the equivalent);
- improve your **theoretical knowledge** and develop your technical expertise in fields like artificial intelligence, computer networks, information security, software engineering and programming systems;
- improve your **interdisciplinary knowledge** in areas such as foreign languages, resource management, teamwork, autonomy and ethics.

### Your future job

We train

- **scientists** who know how to investigate a sharp problematic using scientific litterature in the field;
- **professionals** who will design computer systems that meet users' needs;
- **innovators** who can master a wide range of constantly evolving technologies;
- **specialists** capable of implementing software solutions with particular attention paid to product quality and its development process.

### Your programme

This Master's degree programme consists of

- **required coursework** that seeks to give students the necessary skills to model and design complex applications (which is an indispensable part of the education of all university-trained computer scientists);
- **a major** selected by students that allows them to gain cutting edge knowledge in a field of their interest: software engineering and programming systems, artificial intelligence and big data, networks and security;
- **elective courses** that allow students to explore their interests whether it be computer science or another discipline (management, business creation, languages). As a comprehensive university, UCLouvain has numerous courses of study;
- a **graduation project** that makes up half of the programme during the last year. It offers students the possibility to study a subject in-depth and thanks to its size, introduces students to the professional life of a computer scientist or researcher; the topic of this project is selected in consultation with the programme supervisors and possibly a company.

<div style="border">

**SINF2M -  Teaching profile**

</div>

## Learning outcomes

**The computer science developers and designers of tomorrow face two major challenges:**

- increasingly complex computer science systems
- ncreasingly varied areas of application

**In order to meet these challenges, future diploma holders should**

- master real computer science technologies but also keep up with their constant progress
- innovate by integrating in computer systems elements linked to artificial intelligence, software engineering, and security networks
- work as part of multidisciplinary teams that take into account non-technical issues, be open to social sciences and the humanities to help with this task.

**This programme is based on research:**

UCLouvain is a research university. The computer science research conducted at the institute ICTEAM is internationally recognised. Through the major courses offered in this Master's degree programme, students will be able to take advantage of cutting edge knowledge. In addition to providing fundamental knowledge, this programme is based on the in-depth understanding of concepts and the ability to think abstractly. These tools allow students to quickly adapt to the needs of companies. Moreover, this research may be continued through projects carried out at the doctoral level.

**Applying concepts:**

The application of concepts is a key part of this Master's degree programme. It is inconceivable that students can master theoretical concepts but not know how to apply them to a concrete problem. Thus, the programme includes a number of projects and studies, a large-scale graduation project and the possibility of completing an internship in a company.

**International openness:**

English is de facto the most used language in companies and those in the technical field in particular. This Master's degree programme is thus taught in English, which gives our students good speaking and writing skills. By offering a Master's degree in English, this programme demonstrates its international openness. The use of English allows the programme to welcome international students while at the same time immersing them in a French-speaking environment. It also increases the possibility of exchanges and dual diplomas with other (non-Belgian) universities.

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

**1.demonstrate mastery of a solid body of knowledge in computer science allowing them to solve problems raised in their field of study**

This Master's degree programme aims to provide students with advanced knowledge. A diversity of subjects are offered in the common curriculum and students specialise vria a major:

- security networks
- programming systems
- software engineering
- artificial intelligence
- Data Science and Applied Mathematics
- Business issues

**2.organise and carry out the development of a computer system that meets the complex demands of a client**

2.1.Analyse a problem to solve or the functional needs to be met and formulate a corresponding specifications note.
2.2.Model a problem and design one or more technical solutions in line with the specifications note.
2.3.Evaluate and classify the solutions in light of all the criteria included in the specifications note: efficiency, feasibility, quality, ergonomics and environmental security.
2.4. Implement and test the chosen solution.
2.5.Come up with recommendations to improve the operational nature of the solution.

**3.organise and carry out a study to understand a new problem in the field**

3.1. Document and summarize the existing body of knowledge in the area under consideration
3.2. Propose a model and/or an experimental device in order to simulate or test a hypotheses relating to the phenomenon being studied
3.3. Write a cumulative report that explains the potential of the theoretical or technical innovations resulting from the research project

**4. contribute as part of a team to the planning and completion of a project while taking into account its objectives, allocated resources, and constraints**

4.1. Frame and explain the project's objectives (in terms of performance indicators) while taking into account its issues and constraints
4.2. Collaborate on a work schedule, deadlines and roles
4.3. Work in a multidisciplinary environment with peers holding different points of view; manage any resulting disagreement or conflicts
4.4. Make team decisions and assume the consequences of these decisions (whether they are about technical solutions or the division of labour to complete a project)

**5. communicate effectively (orally or in writing) with the goal of carrying out assigned projects in the workplace (in English in particular)**

5.1. Identify the needs of the client or the user: question, listen and understand all aspects of their request and not just the technical aspects.
5.2. Present your arguments and adapt to the language of your interlocutors: technicians, colleagues, clients, superiors
5.3. Communicate through graphics and diagrams: interpret a diagram, present project results, structure information
5.4. Read and analyse different technical documents (rules, plans, specification notes)
5.5. Draft documents that take into account contextual requirements and social conventions
5.6. Make a convincing oral presentation using modern communication techniques.

**6. Demonstrate rigor, openness and critical thinking as well as a sense of ethics in your work**

6.1. Rigorously apply the standards of your discipline (terminology, measurement units, quality standards and security)
6.2. Find solutions that go beyond strictly technical issues by considering sustainable development and the socio-economic ethics of a project
6.3. Demonstrate critical awareness of a technical solution in order to verify its robustness and minimize the risks that may occur during implementation.
6.4. Evaluate oneself and independently develop necessary skills to remain knowledgeable in the field.

## Programme structure

The programme consists of four parts:

- a common curriculum, mainly the graduation project (30 credits).
- a final specialisation, required (30 credits).
- one or more majors allowing for specialisation in a field of computer science (20-40 credits).
- elective courses (20-40 credits).

The graduation project is normally carried out in the last year. However, students may, depending on their training, conduct other courses in either the first or second year so long as they have completed the prerequisite courses. This is especially the case for students who have completed a portion of their studies abroad. The yearly allocation of course activities found in the detailed programme description is for information purposes only.

In general, this Master's degree will consist of a minimum of 120 credits spread over two years with 60 credits taken per year (regardless of the focus, major or elective courses selected).

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## SINF2M Programme

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## Detailed programme by subject

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### *CORE COURSES [30.0]*

O Mandatory
⊗ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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 LINFO2992 | Graduation project/End of studies project<br>*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.* | | | EN [q1+q2] [] [25 Credits] ⊕ | x | x |
| O LEPL2020 | Professional integration work<br>*Les modules du cours LEPL2020 sont organisés sur les deux blocs annuels du master. Il est fortement recommandé à l'étudiant. e de les suivre dès le bloc annuel 1, mais il.elle ne pourra inscrire le cours qu'au plus tôt l'année où il.elle présente son travail de fin d'études.* | Myriam Banaï<br>Francesco Contino (coord.)<br>Delphine Ducarme<br>Jean-Pierre Raskin | EN [q1+q2] [30h+15h] [2 Credits] ⊕<br>> *French-friendly* | x | x |

## O Computer science seminars

*Students may choose 3 credits among*
*The student shall select 3 credits from amongst*

| | | | | | 1 | 2 |
|---|---|---|---|---|---|---|
| ✕ LINFO2349 | Networking and security seminar | Etienne Riviere<br>Ramin Sadre | EN [q1] [30h] [3 Credits] ⊕<br>> *French-friendly* | | x |
| ✕ LINFO2359 | Software engineering and programming systems seminar | Axel Legay | EN [q1] [30h] [3 Credits] ⊕<br>> *French-friendly* | | x |
| ✕ LINFO2369 | Artificial intelligence and machine learning seminar | Sébastien Jodogne<br>Siegfried Nijssen | EN [q1] [30h] [3 Credits] ⊕<br>> *French-friendly* | | x |

## PROFESSIONAL FOCUS [30.0]

○ Mandatory
⊠ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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:*

○ **Computer science courses**

| | | | | | 1 | 2 |
|---|---|---|---|---|---|---|
| ○ LINFO2132 | Languages and translators | Ramin Sadre | EN [q2] [30h+30h] [6 Credits] 🌐 > *French-friendly* | | x | x |
| ○ LINFO2172 | Databases | Siegfried Nijssen | EN [q2] [30h+30h] [6 Credits] 🌐 > *French-friendly* | | x | x |
| ○ LINFO2241 | Architecture and performance of computer systems | Tom Barbette | EN [q1] [30h+30h] [6 Credits] 🌐 > *French-friendly* | | x | x |
| ○ LINFO2262 | Machine Learning :classification and evaluation | Pierre Dupont | EN [q2] [30h+30h] [6 Credits] 🌐 > *French-friendly* | | x | x |
| ○ LINFO2255 | Software engineering project | Axel Legay | EN [q1] [30h+30h] [6 Credits] 🌐 > *French-friendly* | | x | x |

## OPTIONS

The student completes his program with options and/or elective courses. He/she selects 60 credits from the following sections. In the section "Options and elective courses in socio-economic knowledge", the student validates one of the two options or chooses at least 3 credits from among the elective courses or the courses of the option in business issues.

Options en sciences informatiques

> Major in Artificial Intelligence: big data, optimization and algorithms   [ en-prog-2023-sinf2m-lsinf223o ]
> Major in Software Engineering and Programming Systems   [ en-prog-2023-sinf2m-lsinf224o ]
> Option in Data science and Applied Mathematics   [ en-prog-2023-sinf2m-lsinf226o ]
> Option en Cybersecurity   [ en-prog-2023-sinf2m-linfo309o ]
> Option Networks and systems   [ en-prog-2023-sinf2m-linfo319o ]
> Option en Informatique médicale   [ en-prog-2023-sinf2m-linfo329o ]
> Cours au choix disciplinaires   [ en-prog-2023-sinf2m-linfo237o ]

Options et cours au choix en connaissances socio-économiques

> Business risks and opportunities   [ en-prog-2023-sinf2m-linfo233o ]
> Major in Interdisciplinary Program in Entrepreneurship - INEO   [ en-prog-2023-sinf2m-linfo232o ]
> Cours au choix en connaissances socio-économiques   [ en-prog-2023-sinf2m-linfo200o ]

Others Elective courses

> Others elective courses   [ en-prog-2023-sinf2m-lsinf923o ]

*OPTIONS EN SCIENCES INFORMATIQUES*

## *MAJOR IN ARTIFICIAL INTELLIGENCE: BIG DATA, OPTIMIZATION AND ALGORITHMS*

**Students completing the major in Artificial Intelligence: big data, optimization and algorithms will be able to:**

- Identify and implement methods and techniques that allow software to solve complex problems that when solved by humans require "intelligence",
- Understand and put to good use methods and techniques relating to artificial intelligence such as automatic reasoning, research and heuristics, acquisition and representation of knowledge, automatic learning, problems associated with overcoming constraints,
- Identify applications and its methods and tools; understand a particular category of applications and its related techniques, for example robotics, computer vision, planning, data mining, computational linguistics and bioinformatics, big data processing,
- Formalise and structure a body of complex knowledge and use a systematic and rigorous approach to develop quality "intelligence" systems.

O Mandatory
⊗ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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...)

*From 20 to 30credit(s)*

Year 1 2

## o *Content:*

### o Required courses in Artificial Intelligence: big data, optimization and algortihms

| | | | | | |
|---|---|---|---|---|---|
| O LINFO2263 | Computational Linguistics | Pierre Dupont | EN [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| O LINFO2266 | Advanced Algorithms for Optimization | Pierre Schaus | EN [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| O LINFO2365 | Constraint programming | Pierre Schaus | EN [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| O LINFO2364 | Mining Patterns in Data | Siegfried Nijssen | EN [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |

### ⊗ Elective courses in Artificial Itelligence
*The student select 10 credits among*

| | | | | | |
|---|---|---|---|---|---|
| ⊗ LELEC2870 | Machine learning : regression, deep networks and dimensionality reduction | John Lee John Lee (compensates Michel Verleysen) Michel Verleysen | EN [q1] [30h+30h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⊗ LELEC2885 | Image processing and computer vision | Christophe De Vleeschouwer (coord.) Laurent Jacques | EN [q1] [30h+30h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⊗ LGBIO2010 | Bioinformatics | Vincent Branders (compensates Pierre Dupont) | EN [q1] [30h+30h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⊗ LINFO2145 | Cloud Computing | Etienne Riviere | EN [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⊗ LINMA1691 | Discrete mathematics - Graph theory and algorithms | Vincent Blondel Jean-Charles Delvenne | FR [q1] [30h+22.5h] [5 Credits] ⊕ | x | x |
| ⊗ LINMA1702 | Optimization models and methods I | François Glineur | FR [q2] [30h+22.5h] [5 Credits] ⊕ | x | x |
| ⊗ LINMA2450 | Combinatorial optimization | Julien Hendrickx Geovani Nunes Grapiglia | EN [q1] [30h+22.5h] [5 Credits] ⊕ > *French-friendly* | x | x |

| | | | | | Year | |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| ⌘ LINMA2472 | Algorithms in data science | Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel) | EN [q1] [30h+22.5h] [5 Credits] ⊕ *> French-friendly* | | x | x |
| ⌘ LINFO2275 | Data mining & decision making | Marco Saerens | EN [q2] [30h+15h] [5 Credits] ⊕ *> French-friendly* | | x | x |
| ⌘ LINFO2381 | Health Informatics | Sébastien Jodogne | EN [q2] [30h+30h] [5 Credits] ⊕ *> French-friendly* | | x | x |

## *MAJOR IN SOFTWARE ENGINEERING AND PROGRAMMING SYSTEMS*

**Students completing the major "Software engineering and programming systems" will be able to:**

- Understand and explain problems that come up during large scale software projects as well as the long-term critical impact that their choice of solutions may have (construction dimensions as well as validation, documentation, communication and management of a project involving large teams as well as costs and deadlines),
- Select and apply methods and tools of software engineering to develop complex software systems and meet strict quality standards: reliability, adaptability, scalability, performance, security, usefulness,
- Model the products and processes necessary to obtain such systems and analyse these models,
- Develop and implement analytical programmes focused on conversion and optimisation as well as computer representations,
- Put to good use different programming paradigms and languages, in particular those that deal with functional, object-oriented and competing programmes,
- Understand the issues associated with different and competing programming models and use the appropriate model,
- Define a new language (syntax and semantics) suitable to a specific context.

      O Mandatory
      ✿ Optional
      △ Not offered in 2023-2024
      ⊘ Not offered in 2023-2024 but offered the following year
      ⊕ Offered in 2023-2024 but not the following year
      △ ⊕ Not offered in 2023-2024 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...)

*From 20 to 30credit(s)*

Year

| | 1 | 2 |

### o *Content:*

#### o **Required courses in software engineering and programming systems**

| | | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|---|
| O | LINFO2143 | Concurrent systems : models and analysis | Charles Pecheur | EN | [q1] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| O | LINFO2251 | Software Quality Assurance | Charles Pecheur | EN | [q2] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| O | LINFO2252 | Software Maintenance and Evolution | Kim Mens | EN | [q1] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| O | LINFO2345 | Languages and algorithms for distributed Applications | Peter Van Roy | EN | [q1] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |

#### ✿ **Elective courses in Software Engineering and Programming Systems**
*The student can select 10 credits among*

| | | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|---|
| ✿ | LINFO2145 | Cloud Computing | Etienne Riviere | EN | [q1] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| ✿ | LINFO2347 | Computer system security | 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 |
| ✿ | LINFO2364 | Mining Patterns in Data | Siegfried Nijssen | EN | [q2] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| ✿ | LINFO2365 | Constraint programming | Pierre Schaus | EN | [q2] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| ✿ | LINFO2335 | Programming paradigms | Kim Mens | EN | [q2] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| ✿ | LINFO2381 | Health Informatics | Sébastien Jodogne | EN | [q2] [30h+30h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |
| ✿ | LINFO2382 | Computer supported collaborative work | Jean Vanderdonckt | EN | [q1] [30h+15h] [5 Credits] ⊕ <br> *> French-friendly* | x | x |

## *OPTION IN DATA SCIENCE AND APPLIED MATHEMATICS*

**Students completing the major "Data science and Applied Mathematics" must be able to:**

- Understand engineering fields requiring synergy between applied mathematics and computer science such as algorithms, scientific calculations, modelling computer systems, optimisation, machine learning or data mining;
- Understand and put to good use algorithms and techniques used in data science;
- Identify and implement models and techniques relating to statistics, machine learning and data mining;
- Learn classes of applications such as the treatment of noisy data, pattern recognition or automatic extraction in large data collections.

⬡ Mandatory
⽊ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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...)

*This option is limited to students who have taken the INFO/MAP pairing or the SINF Bachelor's degree program with the equivalent of a minor in mathematics.*

*From 20 to 30credit(s)*

Year
**1 2**

### ⬡ *Content:*

#### ⬡ Required courses in Computing and Applied Mathematics

| | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|
| ⬡ LINMA2472 | Algorithms in data science | Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel) | [EN] [q1] [30h+22.5h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⬡ LINMA2710 | Scientific computing | Pierre-Antoine Absil Karl Meerbergen | [EN] [q2] [30h+22.5h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⬡ LINFO2275 | Data mining & decision making | Marco Saerens | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⬡ LINFO2364 | Mining Patterns in Data | Siegfried Nijssen | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |

#### ⽊ Elective courses in computing and applied mathematics
*The student can select 10 credits amongst*

| | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|
| ⽊ LELEC2870 | Machine learning : regression, deep networks and dimensionality reduction | John Lee John Lee (compensates Michel Verleysen) Michel Verleysen | [EN] [q1] [30h+30h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⽊ LINFO2266 | Advanced Algorithms for Optimization | Pierre Schaus | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⽊ LINGI2348 | Information theory and coding | Jérôme Louveaux Jérôme Louveaux (compensates Olivier Pereira) Benoît Macq | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⽊ LINFO2365 | Constraint programming | Pierre Schaus | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⽊ LINFO2381 | Health Informatics | Sébastien Jodogne | [EN] [q2] [30h+30h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⽊ LINMA2450 | Combinatorial optimization | Julien Hendrickx Geovani Nunes Grapiglia | [EN] [q1] [30h+22.5h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⽊ LINMA2470 | Stochastic modelling | Philippe Chevalier Mehdi Madani (compensates Philippe Chevalier) | [EN] [q2] [30h+22.5h] [5 Credits] ⊕ > *French-friendly* | x | x |

| | | | | Year | |
|---|---|---|---|:---:|:---:|
| | | | | **1** | **2** |
| ⚒ 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 |
| ⚒ LMAT2450 | Cryptography | Thomas Peters<br>(compensates<br>Olivier Pereira) | EN [q1] [30h+15h] [5 Credits] ⊕<br>> *French-friendly* | x | x |
| ⚒ LMECA2170 | Numerical Geometry | Vincent Legat<br>Jean-François Remacle | EN [q1] [30h+30h] [5 Credits] ⊕<br>> *French-friendly* | x | x |

## *OPTION EN CYBERSECURITY*

Students who have completed the "Cybersecurity and Information Technology" track should be able to:

• Understand areas of engineering that require synergy between computer security, networks, and systems, such as cryptography, data protection, application security, security architecture, or programming,

• Comprehend and appropriately apply methods and techniques related to cybersecurity, including prevention, detection, and response to cyber threats,

• Identify and implement security practices and standards to protect the infrastructure, systems, and data of organizations,

• Apply their knowledge to real-life scenarios through projects.

O Mandatory
⊗ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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...)

*Students shall select 20 to 30 credits among:*

|  |  |  |  |  | Year |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **1** | **2** |

## O *Content:*

*Students shall select 20 to 30 credits among:*

### O Required courses in Cybersecurity

| | | | | | 1 | 2 |
| --- | --- | --- | --- | --- | --- | --- |
| O LINFO2347 | Computer system security | Ramin Sadre | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| O LINFO2145 | Cloud Computing | Etienne Riviere | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| O LINFO2144 | Secured systems engineering | Axel Legay | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| O LELEC2770 | Privacy Enhancing technology | Thomas Peters (compensates Olivier Pereira) François-Xavier Standaert | [EN] [q1] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |

### O Elective courses in Cybersecurity

| | | | | | 1 | 2 |
| --- | --- | --- | --- | --- | --- | --- |
| ⊗ LINFO2143 | Concurrent systems : models and analysis | Charles Pecheur | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⊗ LMAT2450 | Cryptography | Thomas Peters (compensates Olivier Pereira) | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⊗ LINFO2142 | Computer networks: configuration and management | Olivier Bonaventure | [EN] [q1] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⊗ LINFO2146 | Mobile and Embedded Computing | Ramin Sadre | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⊗ LINFO2345 | Languages and algorithms for distributed Applications | Peter Van Roy | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⊗ LINGI2348 | Information theory and coding | Jérôme Louveaux Jérôme Louveaux (compensates Olivier Pereira) Benoît Macq | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⊗ LINFO2315 | Design of Embedded and real-time systems | Cristel Pelsser | [EN] [q2] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⊗ LINFO2381 | Health Informatics | Sébastien Jodogne | [EN] [q2] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |

## *OPTION NETWORKS AND SYSTEMS*

Students who have completed the "Networks and Systems" track should be able to:

- Understand and explain different devices and protocols used in computer and cellular networks;
- Design, configure and manage computer networks while taking into account application needs;
- Understand the operation of IoT and cellular networks;
- Explain the problems that affect cellular and IoT networks and develop solutions to cope with them;
- Understand how to optimise applications to efficiently use parallel cores;
- Understand, implement and use lock-free data structures;
- Understand the interactions between real-time operating systems and hardware;
- Design and implement applications running on embedded systems

> O Mandatory
> ⌧ Optional
> △ Not offered in 2023-2024
> ⊘ Not offered in 2023-2024 but offered the following year
> ⊕ Offered in 2023-2024 but not the following year
> △ ⊕ Not offered in 2023-2024 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...)

*Students shall select 20 to 30 credits among:*

|  |  |  |  |  | Year |  |
|---|---|---|---|---|---|---|
|  |  |  |  |  | **1** | **2** |

## o *Content:*

### o Required courses in Networks and systems

| | | | | | 1 | 2 |
|---|---|---|---|---|---|---|
| O LINFO2142 | Computer networks: configuration and management | Olivier Bonaventure | [EN] [q1] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| O LINFO2146 | Mobile and Embedded Computing | Ramin Sadre | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| O LINFO2315 | Design of Embedded and real-time systems | Cristel Pelsser | [EN] [q2] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| O LINFO2355 | Multicore programming | Etienne Riviere | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |

### o Elective courses in Networks and Systems

| | | | | | 1 | 2 |
|---|---|---|---|---|---|---|
| ⌧ LINFO2347 | Computer system security | Ramin Sadre | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⌧ LINFO2145 | Cloud Computing | Etienne Riviere | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⌧ LINFO2144 | Secured systems engineering | Axel Legay | [EN] [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⌧ LINFO2143 | Concurrent systems : models and analysis | Charles Pecheur | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⌧ LINFO2345 | Languages and algorithms for distributed Applications | Peter Van Roy | [EN] [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⌧ LINFO2381 | Health Informatics | Sébastien Jodogne | [EN] [q2] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |
| ⌧ LELEC2760 | Secure electronic circuits and systems | François-Xavier Standaert | [EN] [q2] [30h+30h] [5 Credits] ⊕ > *French-friendly* | | x | x |

## OPTION EN INFORMATIQUE MÉDICALE

Students completing the major in "Health informatics" will be able to:

- Identify and use methods and techniques that provide software-based solutions to complex problems encountered in hospitals, in bio-pharmaceutical environments, in life sciences, or in digital health.
- Take part in multidisciplinary projects bringing together medical, biological and engineering expertise to the benefit of patient health.
- Understand and put to good use the methods and techniques pertaining to medical informatics and bioinformatics, such as artificial intelligence, health interoperability, clinical knowledge structuring, applied statistics, information security, software quality, as well as the effective management and processing of large volumes of data.
- Understand specific categories of applications where these methods and techniques can be applied, such as diagnostic support, therapeutic assistance, hospital information systems, medical and biomedical imaging, smart devices, clinical trials, health data mining, as well as automated processing of the medical language.
- Formalize and structure a body of complex knowledge by using a systematic and rigorous approach to the development of high-quality medical and biomedical information systems.

- ⦿ Mandatory
- ⌘ Optional
- △ Not offered in 2023-2024
- ⊘ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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...)

*Students shall select 20 to 30 credits among:*

|  |  |  | Year |
| --- | --- | --- | --- |
|  |  |  | 1 2 |

### ⦿ *Content:*

#### ⦿ Cours obligatoires en Informatique médicale

| | | | | | |
| --- | --- | --- | --- | --- | --- |
| ⦿ LGBIO2050 | Medical Imaging | Greet Kerckhofs<br>John Lee<br>Benoît Macq<br>Frank Peeters | [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 |
| ⦿ LINFO2381 | Health Informatics | Sébastien Jodogne | [EN] [q2] [30h+30h] [5 Credits] ⊕<br>> *French-friendly* | x | x |
| ⦿ LSTAT2330 | Statistics in clinical trials. | Catherine Legrand<br>Annie Robert | [FR] [q2] [22.5h+7.5h] [5 Credits] ⊕ | x | x |

#### ⦿ Cours aux choix en Informatique médicale

| | | | | | |
| --- | --- | --- | --- | --- | --- |
| ⌘ LDATA2010 | Information visualisation | John Lee | [EN] [q1] [30h+30h] [5 Credits] ⊕<br>> *French-friendly* | x | x |
| ⌘ LELEC2770 | Privacy Enhancing technology | Thomas Peters<br>(compensates<br>Olivier Pereira)<br>François-<br>Xavier Standaert | [EN] [q1] [30h+30h] [5 Credits] ⊕<br>> *French-friendly* | x | x |
| ⌘ LEPL2210 | Ethics and ICT | Maxime Lambrecht<br>(compensates<br>Axel Gosseries)<br>Maxime Lambrecht<br>(compensates<br>Olivier Pereira) | [EN] [q2] [30h] [3 Credits] ⊕<br>> *French-friendly* | x | x |
| ⌘ LGBIO2020 | Bioinstrumentation | André Mouraux<br>Dounia Mulders<br>(compensates<br>Michel Verleysen) | [EN] [q2] [30h+30h] [5 Credits] ⊕<br>> *French-friendly* | x | x |
| ⌘ LGBIO2060 | Modelling of biological systems | Philippe Lefèvre | [EN] [q1] [30h+30h] [5 Credits] ⊕<br>> *French-friendly* | x | x |
| ⌘ LGBIO2072 | Mathematical models in neuroscience | Frédéric Crevecoeur | [EN] [q1] [30h+30h] [5 Credits] ⊕<br>> *French-friendly* | x | x |
| ⌘ LGBIO2110 | Introduction to Clinical Engineering | Benoit Delhaye<br>Philippe Lefèvre | [EN] [q2] [30h] [3 Credits] ⊕<br>> *French-friendly* | x | x |

| | | | | | Year |
|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| ⌘ LINFO2251 | Software Quality Assurance | Charles Pecheur | EN [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⌘ LINFO2263 | Computational Linguistics | Pierre Dupont | EN [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⌘ LINFO2347 | Computer system security | Ramin Sadre | EN [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⌘ LINFO2364 | Mining Patterns in Data | Siegfried Nijssen | EN [q2] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⌘ LINFO2401 | Open Source strategy for software development | Lionel Dricot | EN [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⌘ LINMA2472 | Algorithms in data science | Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel) | EN [q1] [30h+22.5h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⌘ LMAT2450 | Cryptography | Thomas Peters (compensates Olivier Pereira) | EN [q1] [30h+15h] [5 Credits] ⊕ > *French-friendly* | x | x |
| ⌘ WESP2123 | Principles of clinical trials | Diego Castanares Zapatero Philippe Lysy Annie Robert (coord.) Françoise Smets | EN [q1] [20h+10h] [4 Credits] ⊕ | x | x |
| ⌘ WFARM2177 | Biostatistics | Laure Elens | EN [q2] [20h+10h] [3 Credits] ⊕ | x | x |
| ⌘ WSBIM2122 | Omics data analysis | Laurent Gatto | EN [q1] [30h+10h] [3 Credits] ⊕ | x | x |

○ Mandatory
✼ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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:*

| ✼ LINFO2401 | Open Source strategy for software development | Lionel Dricot | EN [q1] [30h+15h] [5 Credits] 🌐 > *French-friendly* | x | x |
|---|---|---|---|---|---|
| ✼ LINFO2402 | Open Source Project | | EN [q1+q2] [0h] [5 Credits] 🌐 > *French-friendly* | x | x |

## OPTIONS ET COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES

## BUSINESS RISKS AND OPPORTUNITIES

○ Mandatory
✼ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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...)

*Les étudiant·es doivent réussir au moins 15 crédits pour valider l'option. Cette option ne peut être prise simultanément avec l'option « Formation interdisciplinaire en création d'entreprise - CPME ».*

| | | | | | Year | |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |

### ○ *Content:*

| ○ LEPL2211 | Business issues introduction | Benoît Gailly | EN [q2] [30h] [3 Credits] 🌐 > *French-friendly* | x | x |
|---|---|---|---|---|---|
| ○ LEPL2212 | Financial performance indicators | Anne-Catherine Provost | EN [q2] [30h+5h] [4 Credits] 🌐 > *French-friendly* | x | x |
| ○ LEPL2214 | Law, Regulation and Legal Context | Vincent Cassiers Werner Derycke | FR [q1] [30h+5h] [4 Credits] 🌐 | x | x |

### ○ One course between
*From 3 to 5credit(s)*

| ✼ LEPL2210 | Ethics and ICT | Maxime Lambrecht (compensates Axel Gosseries) Maxime Lambrecht (compensates Olivier Pereira) | EN [q2] [30h] [3 Credits] 🌐 > *French-friendly* | x | x |
|---|---|---|---|---|---|
| ✼ LLSMS2280 | Business Ethics and Compliance Management | Carlos Desmet | EN [q1] [30h] [5 Credits] 🌐 | x | x |

### ✼ Cours en marketing

| ✼ MGEST1108 | Marketing | Nadia Sinigaglia | EN [q2] [45h+20h] [6 Credits] 🌐 | x | x |
|---|---|---|---|---|---|
| ✼ MLSMM2136 | Trends in Digital Marketing 🟨 | Ingrid Poncin | EN [q2] [30h] [5 Credits] 🌐 | | x |

| | | | | Year | |
|---|---|---|---|---|---|
| | | | | 1 | 2 |
| ✿ MLSMM2134 | e-Consumer Behavior 🟨 | Nicolas Kervyn de Meerendré (compensates Karine Charry) | FR [q2] [30h] [5 Credits] ⊕ | | x |

## ✿ Cours en Sourcing and Procurement

| | | | | | |
|---|---|---|---|---|---|
| ✿ LLSMS2036 | Supply Chain Procurement | Per Joakim Agrell Antony Paulraj | EN [q1] [30h] [5 Credits] ⊕ | x | x |
| ✿ LLSMS2038 | Procurement Organisation and Scope | Constantin Blome | EN [q1] [30h] [5 Credits] ⊕ | x | x |
| ✿ LLSMS2037 | Sourcing Strategy | Constantin Blome 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'entreprenariat 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 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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:

#### ○ Required courses

| | | | | 1 | 2 |
|---|---|---|---|---|---|
| ○ 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>*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.* | 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.*

| | | | | 1 | 2 |
|---|---|---|---|---|---|
| ○ LINEO2021 | Financer son projet | Yves De Rongé<br>Philippe Grégoire<br>(compensates<br>Yves De Rongé) | FR [q2] [30h+15h] [5 Credits] ⊕ | x | |

## *COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES*

- ○ Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊘ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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 |
|---|---|---|---|---|---|---|
| ⊗ LFSA2995 | Company Internship | Dimitri Lederer<br>Jean-Pierre Raskin | FR [q1+q2] [30h] [10 Credits] 🌐 | | x | x |
| ⊗ LFSA2212 | Innovation classes | Benoît Macq<br>Jean-Pierre Raskin<br>Benoît Raucent | FR [q1] [30h+15h] [5 Credits] 🌐<br>> *French-friendly* | | x | x |
| ⊗ LINFO2399 | Industrial seminar in computer science | Yves Deville<br>Bernard Geubelle | EN [q2] [30h] [3 Credits] 🌐<br>> *French-friendly* | | x | x |
| ⊗ LINFO2402 | Open Source Project | | EN [q1+q2] [0h] [5 Credits] 🌐<br>> *French-friendly* | | x | x |

*OTHERS ELECTIVE COURSES*

## *OTHERS ELECTIVE COURSES*

- ○ Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊘ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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...)

**○ Content:**

*Les étudiant·e·s peuvent également inscrire à leur programme tout cours faisant partie des programmes d'autres masters de l'EPL moyennant l'approbation du jury restreint.*

⊗ **Languages**

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

|  |  |  |  |  | Year 1 | 2 |
|---|---|---|---|---|---|---|
| ⊗ LALLE2500 | Professional development seminar German | Caroline Klein (coord.) | DE [q1+q2] [30h] [3 Credits] 🌐 | | x | x |
| ⊗ LALLE2501 | Professional development seminar-German | Caroline Klein (coord.) | DE [q1+q2] [30h] [5 Credits] 🌐 | | x | x |
| ⊗ LESPA2600 | Vocational Induction Seminar - Spanish (B2.2/C1) | Paula Lorente<br>Fernandez (coord.) | ES [q1] [30h] [3 Credits] 🌐 | | x | x |
| ⊗ LESPA2601 | Vocational Induction Seminar - Spanish (B2.2/C1) | Paula Lorente<br>Fernandez (coord.) | ES [q1] [30h] [5 Credits] 🌐 | | x | x |

|  |  |  |  | Year |  |
| --- | --- | --- | --- | :-: | :-: |
|  |  |  |  | 1 | 2 |
| ⌗ 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.) Dag Houdmont | NL [q1 or q2] [30h] [3 Credits] ⊕ | x | x |

## ⌗ Group dynamics

|  |  |  |  | Year 1 | Year 2 |
| --- | --- | --- | --- | :-: | :-: |
| ⌗ LEPL2351 | Become a tutor | Jean-Charles Delvenne (coord.) Delphine Ducarme Thomas Pardoen Benoît Raucent | FR [q1] [15h+30h] [3 Credits] ⊕ | x | x |
| ⌗ LEPL2352 | Become a tutor | Jean-Charles Delvenne (coord.) Delphine Ducarme Thomas Pardoen Benoît Raucent | FR [q2] [15h+30h] [3 Credits] ⊕ | x | x |

## ⌗ Autres UEs hors-EPL

*L'étudiant·e peut choisir maximum 8 ects de cours hors EPL considérées comme non-disciplinaires par la commission de diplôme*

# Supplementary classes

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

O Mandatory
⊗ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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...)

*Courses for students coming from bachelor in "informatique de gestion" or "informatique et systèmes".These students will have to take at least 150 credits to obtain the master in computer science.*

| O LINFO1114 | Discrete Mathematics | Marco Saerens | [FR] [q1] [30h+15h] [5 Credits] ⊕ |

### O Cours alternatifs Probabilités et statistiques
*L'étudiant·e choisit un cours parmi:*

| ⊗ LBIR1212 | Probabilities and statistics (I) | Patrick Bogaert | [FR] [q1] [30h+15h] [5 Credits] ⊕ |
| ⊗ LSINC1211 | Probability and Statistics | | [FR] [q2] [30h+30h] [5 Credits] ⊗ |

### O Cours alternatifs Intelligence artificielle
*L'étudiant·e choisit un cours parmi:*

| ⊗ LINFO1361 | Artificial intelligence | Eric Piette (compensates Yves Deville) | [FR] [q2] [30h+30h] [5 Credits] ⊕ |
| ⊗ LSINC1361 | Artificial intelligence | | [FR] [q2] [30h+30h] [5 Credits] ⊗ |

### O Cours alternatifs Systèmes informatiques
*L'étudiant·e choisit un cours parmi:*

| ⊗ LINFO1252 | Informatic Systems | Etienne Riviere | [FR] [q1] [30h+30h] [5 Credits] ⊕ |
| ⊗ LSINC1252 | Informaticals Systems | Etienne Riviere | [FR] [q1] [30h+30h] [5 Credits] ⊗ |

### O Cours alternatifs Réseaux informatiques
*L'étudiant·e choisit un cours parmi:*

| ⊗ LINFO1341 | Computer networks | Olivier Bonaventure | [FR] [q2] [30h+30h] [5 Credits] ⊕ |
| ⊗ LSINC1341 | Computer networks | | [FR] [q2] [30h+30h] [5 Credits] ⊗ |

### O Cours alternatifs Algorithmique et structures de données
*L'étudiant·e choisit un cours parmi:*

| ⊗ LINFO1121 | Algorithms and data structures | Pierre Schaus | [FR] [q1] [30h+30h] [5 Credits] ⊕ |
| ⊗ LSINC1121 | Algorithms and data structure | | [FR] [q1] [30h+30h] [5 Credits] ⊗ |

### O Cours alternatifs Concepts des langages de programmation
*L'étudiant·e choisit un cours parmi:*

| ⊗ LINFO1104 | Programming language concepts | Peter Van Roy | [FR] [q2] [30h+30h] [5 Credits] ⊕ |
| ⊗ LSINC1104 | Programming Paradigms and Concurrency | Peter Van Roy | [FR] [q2] [30h+30h] [5 Credits] ⊗ |
| O LEPL1509 | Project 4 (in informatics) | Marc Lainez (compensates Yves Deville) | [FR] [q2] [30h+22.5h] [5 Credits] ⊕ |

**⊙ Cours alternatifs Calculabilité, logique et complexité**

*L'étudiant·e choisit un cours parmi:*

| | | | |
|---|---|---|---|
| ⊠ LINFO1123 | Calculability, Logic and Complexity | Yves Deville | FR [q2] [30h+30h] [5 Credits] ⊕ |
| ⊠ LSINC1123 | Calculability, Logic and Complexity | Yves Deville | FR [q2] [30h+30h] [5 Credits] ⊕ |

# Course prerequisites

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

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

**Prerequisites and student's annual programme**

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

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

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

For more information, please consult the Academic Regulations and Procedures.

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**# Prerequisities list**

**MLSMM2134**   "E-comportement du consommateur"  has prerequisite(s) MGEST1108

• MGEST1108  - Marketing

**MLSMM2136**   "Tendances en Digital Marketing"  has prerequisite(s) MGEST1108

• MGEST1108  - Marketing

# The programme's courses and learning outcomes

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.

<table>
<tr><td>**SINF2M -  Information**</td></tr>
</table>

## Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the hiher 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.**

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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. See selection criteria of the Access on the file.

### University Bachelors

| Diploma | Special Requirements | Access | Remarks |
|---|---|---|---|
| **UCLouvain Bachelors** | | | |
| Bachelor in Computer Science | | Direct access | |
| Bachelor in Economics and Management<br>Bachelor in Mathematics<br>Bachelor in Engineering : Architecture | Minor in Computer Sciences | Access with additional training | maximum 60 additional credits integrated into their Master's degree programme<br><br>If the UCLouvain Admissions Office considers the enrolment application sufficiently complete, it will submit the application to the faculty for a decision |
| **Others Bachelors of the French speaking Community of Belgium** | | | |
| Bachelor in computer science | | Direct access | |
| **Bachelors of the Dutch speaking Community of Belgium** | | | |
| Bachelor in de informatica | | Direct access | |
| **Foreign Bachelors** | | | |
| Bachelor in computer science | | Access based on application | See "Personalized Access" |

### Non university Bachelors

> Find out more about links to the university

| Diploma | Access | Remarks |
|---|---|---|
| BA en informatique, orientation développement d'applications - crédits supplémentaires entre 30 et 60 | Les enseignements supplémentaires éventuels | Type court |

| | |
|---|---|
| BA en informatique, orientation informatique industrielle - crédits supplémentaires entre 30 et 60 | peuvent être consultés dans le module complémentaire. |
| 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 |
|---|---|---|---|
| **"Licenciés"** | | | |
| "Licencié en informatique" | | - | |
| **Masters** | | | |
| Master in computer science | | - | |

## 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.

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).

## Admission and Enrolment Procedures for general registration

# Teaching method

**Active learning and non-technical skills**

You will play an active role in your training. The pedagogical approach is a well-balanced mix of lectures, exercises, and projects to be carried out alone or in a group. The teaching methods vary. Sometimes, you will discover concepts and techniques independently. At these times, the teaching team acts as a resource in the learning process. At other times, the pedagogy focuses on transmitting the knowledge necessary to complete future tasks.

Special emphasis is placed on non-technical skills (autonomy, organisation, time management, different modes of communication, etc.) In particular, by emphasising project-based activities (including a large scale project that puts students in a semi-professional situation), this programme develops students' critical thinking skills, which allows them to design, model, implement, and validate complex computing systems.

**Languages**

The lingua franca of computer science is English. The use of English in the programme allows students to develop their mastery of this language, which facilitates their integration into professional life. All course material and course supervision are in English. However, students may always ask or respond to exam questions in French if desired.

Moreover, the programme allows students to attend language courses at the university's Language Institute (ILV) and to take part in exchange programmes.

**Interdisciplinary approach**

Over the course of their careers, computer scientists are expected to manage projects as well as teams and show interest in the complex socio-economic environment in which computer science belongs. It is therefore suggested that students learn about disciplines through elective courses or certain major courses such as the interfaculty major "small and medium sized business creation".

# Evaluation

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

The learning activities are assessed according to the rules of the University (see exam regulations), that is through written and oral exams, personal or group assignments, public presentation of projects and defence of the graduation thesis. For the courses given in English, questions will be expressed in English by the teacher, but the student may choose to answer in French. For the courses given in French, the questions will be expressed in French by the teacher, but the student man ask for help in translation and choose to answer in English.

Some activities such as projects during the semester under the supervision of the teaching staff and in collaboration with other students are not reorganized outside the period prescribed for the course. They are not re-evaluated at a later session.

Evaluation methods specific to each course are communicated to students by teachers at the beginning of the semester.

# Mobility and/or Internationalisation outlook

**Outgoing students**

Since its creation, the Louvain School of Engineering (EPL) has participated in diverse exchange programs that were put into place at the European level and beyond.

Students are informed about study abroad opportunities at the end of their Bachelor's degree programme, notably through intensive academic programmes like the BEST network. This network giives students an initial study abroad experience.

In addition, within the framework of the Erasmus/Mercator exchange programmes, students have the possibility of studying at a partner university for one year (two semesters) during the 1st year of the Master's degree programme or 5 months (first semester) in the 2nd year of the Master's degree programme. To this end, the EPL participates in different study abroad networks.

- In Belgium, the EPL has a partnership with the Faculteit Ingenieurswetenschappen de la Katholieke Universiteit Leuven.
- Within Europe, the EPL participates in the CLUSTER network, which provides quality training and accommodations for exchange students. Furthermore, the members of the CLUSTER network have signed an agreement that mutually recognises their Bachelor's degree programmes. This agreement means that all the Bachelor degree holders in the CLUSTER network are automatically admitted to the Master's degree programme in member institutions.
- Outside of Europe, the EPL is a member of the Magalhäes network that brings together 15 European universities with the best scientific and technological universities in Latin America.

In addition to these networks and partnerships, the EPL has signed a certain number of individual agreements with different universities in Europe, North America and elsewhere in the world. The list of these agreements is available at UCLouvain's International Relations Administration website.

Joint degree programmes have also been put into place.

- Dual Masters degrees allow students to receive a diploma from two universities at the end of their two year Master's degree programme (one year at UCLouvain and the other at a host university).

Students are informed about the different exchange programmes in the second year of their Bachelor's degree programme. They are encourage to prepare in advance, specifically their language skills through classes offered at the Institute for Living Languages (Institut des langues vivants) at UCLouvain.

Beyond exchange programmes, students may intern in a research laboratory or a foreign company.

**Incoming students**

Thanks to the CLUSTER network, foreign students have the same status as local UCLouvain students. UCLouvain favours students coming from institutions that participate in the Socrates exchange network.

Overall the Master's degree programme is taught in English and does not require previous knowledge of French with the exception of the majors in biomedical engineering, management and small and medium sized business creation (CPME). Except for rare cases, all courses are taught in English. For non-francophone students, substitute courses may take the place of courses taught in French. These courses are suggested by the programme commission on a case by case basis and are based on the student's course curriculum.

More information about mobility programmes.

## Possible trainings at the end of the programme

Accessible supplementary Master's degree programme: not applicable

Accessible Doctoral Programmes

The Master's degree in computer science may be followed by a doctoral programme in engineering sciences.

Most of the UCLouvain Master's degree programmes (generally 60) are open to UCLouvain Master's degree diploma holders. For example:

Different Master's degree programmes (60) in management (automatic admission based on written application): see this list

The Master's degree (60) in information and communication at Louvain-la-Neuve or the Master's degree (60) in information and communication at Mons.

## Contacts

### Curriculum Management

Entity

| | |
|---|---|
| Structure entity | SST/EPL/INFO |
| Denomination | (INFO) |
| Faculty | Louvain School of Engineering (EPL) |
| Sector | Sciences and Technology (SST) |
| Acronym | INFO |
| Postal address | Place Sainte Barbe 2 - bte L5.02.01 |
| | 1348 Louvain-la-Neuve |
| | Tel: +32 (0) 10 47 31 50  -  Fax: +32 (0) 10 45 03 45 |

Academic supervisor: Pierre Schaus

Jury

- Président du Jury: Claude Oestges
- Secrétaire du Jury: Cristel Pelsser

Useful Contact(s)

- Secrétariat: Vanessa Maons
- faculty secretariat: masters-epl-sinfo@uclouvain.be