

**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 : **YES**

 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

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#### 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 literature 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, UCL 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.

## SINF2M - Teaching profile

### Learning outcomes

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

- increasingly complex computer science systems
- increasingly 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:

UCL 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 via a major:

- security networks;
- programming systems;
- software engineering;
- artificial intelligence .

#### 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

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The programme consists of four parts:

- a common curriculum, mainly the graduation project (36 credits).
- a final specialisation, required (30 credits).
- one or more majors allowing for specialisation in a field of computer science (20-54 credits).
- elective courses (0-54 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).

*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.*

[> Core courses for the Master's degree in computer science engineering](#) [ en-prog-2020-sinf2m-tronc\_commun ]

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Liste au choix de finalités SINF2M

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[> Professional Focus](#) [ en-prog-2020-sinf2m-lsinf220s ]

[> List of electives](#) [ en-prog-2020-sinf2m-options ]

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Options en sciences informatiques

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[> Major in Artificial Intelligence: big data, optimization and algorithms](#) [ en-prog-2020-sinf2m-lsinf223o ]

[> Major in Software Engineering and Programming Systems](#) [ en-prog-2020-sinf2m-lsinf224o ]

[> Major in Security and Networking](#) [ en-prog-2020-sinf2m-lsinf225o ]

[> Data science and Applied Mathematics](#) [ en-prog-2020-sinf2m-lsinf226o ]

Major in business creation and management

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[> Major: Business risks and opportunities](#) [ en-prog-2020-sinf2m-lsinf230o ]

[> Interfaculty major in small and medium sized business creation](#) [ en-prog-2020-sinf2m-lsinf227o ]

Cours aux choix accessibles aux étudiants du master en sciences informatiques

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[> Elective courses: transversal skills and contacts with industry](#) [ en-prog-2020-sinf2m-lsinf922o ]

[> Elective courses available for Master students in Computer Science](#) [ en-prog-2020-sinf2m-lsinf923o ]

Preparatory Module (only for students who qualify for the course via complementary coursework)

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[> Master \[120\] in Computer Science](#) [ en-prog-2020-sinf2m-module\_complementaire ]

## SINF2M Detailed programme

### Programme by subject

#### CORE COURSES

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

							Year	
							1	2
○ LINGI2261	<a href="#">Artificial intelligence</a>	Yves Deville	30h+30h	5 Credits	q2	x	x	
<b>○ Final thesis (28 credits)</b>								
○ LSINF2990	<a href="#">Graduation project/End of studies project</a>			28 Credits		x	x	
<b>○ Religion courses for students in exact sciences (2 credits)</b>								
<i>The students select one course between:</i>								
<i>The student shall select</i>								
⊗ LTECO2100	<a href="#">Sociétés, cultures, religions : Biblical readings</a>	Hans Ausloos	15h	2 Credits	q1	x	x	
⊗ LTECO2300	<a href="#">Societies, cultures, religions : Ethical questions</a>	Marcela Lobo Bustamante	15h	2 Credits	q1	x	x	
⊗ LTECO2200	<a href="#">Societies-cultures-religions : Human Questions</a>	Régis Burnet Dominique Martens	15h	2 Credits	q1 or q2	x	x	
<b>○ Human Sciences</b>								
○ LFS2210	<a href="#">Organisation and human resources</a>	John Cultiaux Eline Jammaers	30h	3 Credits	q2	x	x	
<b>○ Computer science seminars</b>								
<i>Students may choose 3 credits among</i>								
<i>The student shall select 3 credits from amongst</i>								
⊗ LINGI2349	<a href="#">Networking and security seminar</a>	Etienne Riviere Ramin Sadre	30h	3 Credits	q1	x	x	
⊗ LINGI2359	<a href="#">Software engineering and programming systems seminar</a>	Axel Legay	30h	3 Credits	q1	x	x	
⊗ LINGI2369	<a href="#">Artificial intelligence and machine learning seminar</a>	Pierre Dupont Siegfried Nijssen	30h	3 Credits	q1	x	x	

**PROFESSIONAL FOCUS [30.0]**

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

Students must take all final specialisation courses.

Year

1 2

**Content:****Computer science courses**

○ LINGI2132	<a href="#">Languages and translators</a>	<a href="#">Nicolas Laurent</a>	30h+30h	6 Credits	q2	x	x
○ LINGI2172	<a href="#">Databases</a>	<a href="#">Siegfried Nijssen</a>	30h+30h	6 Credits	q2	x	x
○ LINGI2241	<a href="#">Architecture and performance of computer systems</a>	<a href="#">Ramin Sadre</a>	30h+30h	6 Credits	q1	x	x
○ LINGI2262	<a href="#">Machine Learning :classification and evaluation</a>	<a href="#">Pierre Dupont</a>	30h+30h	6 Credits	q2	x	x
○ LINGI2255	<a href="#">Software engineering project</a>	<a href="#">Axel Legay</a>	30h+30h	6 Credits	q1	x	x

**OPTIONS**

Students must complete their programme with major and or elective courses. They may select 54 credits from among the following courses:

## Options en sciences informatiques

- > [Major in Artificial Intelligence: big data, optimization and algorithms](#) [ en-prog-2020-sinf2m-lsinf223o ]
- > [Major in Software Engineering and Programming Systems](#) [ en-prog-2020-sinf2m-lsinf224o ]
- > [Major in Security and Networking](#) [ en-prog-2020-sinf2m-lsinf225o ]
- > [Data science and Applied Mathematics](#) [ en-prog-2020-sinf2m-lsinf226o ]

## Major in business creation and management

- > [Major: Business risks and opportunities](#) [ en-prog-2020-sinf2m-lsinf230o ]
- > [Interfaculty major in small and medium sized business creation](#) [ en-prog-2020-sinf2m-lsinf227o ]

## Cours aux choix accessibles aux étudiants du master en sciences informatiques

- > [Elective courses: transversal skills and contacts with industry](#) [ en-prog-2020-sinf2m-lsinf922o ]
- > [Elective courses available for Master students in Computer Science](#) [ en-prog-2020-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.

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

The student shall select  
From 20 to 30 credits

Year

1 2

## o Content:

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

○ LINGI2266	<a href="#">Advanced Algorithms for Optimization</a>	<a href="#">Pierre Schaus</a>	30h+15h	5 Credits	q1 △	x	x
○ LINGI2263	<a href="#">Computational Linguistics</a>	<a href="#">Pierre Dupont</a> <a href="#">Pierre Dupont</a> (compensates <a href="#">Cédric Fairon</a> )	30h+15h	5 Credits	q1	x	x
○ LINGI2364	<a href="#">Mining Patterns in Data</a>	<a href="#">Siegfried Nijssen</a>	30h+15h	5 Credits	q2	x	x
○ LINGI2365	<a href="#">Constraint programming</a>	<a href="#">Pierre Schaus</a> <a href="#">Pierre Schaus</a> (compensates <a href="#">Yves Deville</a> )	30h+15h	5 Credits	q2	x	x

### ⊗ Elective courses in Artificial Intelligence

The student select 10 credits among

⊗ LELEC2870	<a href="#">Machine learning : regression, deep networks and dimensionality reduction</a>	<a href="#">John Lee</a> <a href="#">Michel Verleysen</a>	30h+30h	5 Credits	q1	x	x
⊗ LELEC2885	<a href="#">Image processing and computer vision</a>	<a href="#">Christophe De Vleeschouwer</a> (coord.) <a href="#">Laurent Jacques</a>	30h+30h	5 Credits	q1	x	x
⊗ LGBIO2010	<a href="#">Bioinformatics</a>	<a href="#">Pierre Dupont</a>	30h+30h	5 Credits	q1	x	x
⊗ LINGI2145	<a href="#">Cloud Computing</a>	<a href="#">Etienne Riviere</a>	30h+15h	5 Credits	q1	x	x
⊗ LINMA1691	<a href="#">Discrete mathematics - Graph theory and algorithms</a>	<a href="#">Vincent Blondel</a> <a href="#">Jean-Charles Delvenne</a>	30h +22.5h	5 Credits	q1	x	x
⊗ LINMA1702	<a href="#">Optimization models and methods I</a>	<a href="#">François Glineur</a>	30h +22.5h	5 Credits	q2	x	x
⊗ LINMA2450	<a href="#">Combinatorial optimization</a>	<a href="#">Jean-Charles Delvenne</a> <a href="#">Julien Hendrickx</a>	30h +22.5h	5 Credits	q1	x	x
⊗ LINMA2472	<a href="#">Algorithms in data science</a>	<a href="#">Jean-Charles Delvenne</a> (coord.) <a href="#">Gautier Krings</a> (compensates <a href="#">Vincent Blondel</a> )	30h +22.5h	5 Credits	q1	x	x
⊗ LSINF2275	<a href="#">Data mining &amp; decision making</a>	<a href="#">Marco Saerens</a>	30h+15h	5 Credits	q2	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.

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

The student shall select  
From 20 to 30 credits

Year

1 2

**o Content:****o Required courses in software engineering and programming systems**

○ LINGI2143	Concurrent systems : models and analysis	Charles Pecheur	30h+15h	5 Credits	q1	x	x
○ LINGI2251	Software Quality Assurance	Charles Pecheur	30h+15h	5 Credits	q2	x	x
○ LINGI2252	Software Maintenance and Evolution	Kim Mens	30h+15h	5 Credits	q1	x	x
○ LSINF2345	Languages and algorithms for distributed Applications	Peter Van Roy	30h+15h	5 Credits	q1	x	x

**⊗ Elective courses in Software Engineering and Programming Systems**

The student can select 10 credits among

⊗ LINGI2145	Cloud Computing	Etienne Riviere	30h+15h	5 Credits	q1	x	x
⊗ LINGI2347	Computer system security	Ramin Sadre	30h+15h	5 Credits	q2	x	x
⊗ LINGI2355	Multicore programming	Etienne Riviere	30h+15h	5 Credits	q2	x	x
⊗ LINGI2364	Mining Patterns in Data	Siegfried Nijssen	30h+15h	5 Credits	q2	x	x
⊗ LINGI2365	Constraint programming	Pierre Schaus Pierre Schaus (compensates Yves Deville)	30h+15h	5 Credits	q2	x	x
⊗ LSINF2335	Programming paradigms	Kim Mens	30h+15h	5 Credits	q2	x	x
⊗ LSINF2382	Computer supported collaborative work	Jean Vanderdonck	30h+15h	5 Credits	q1	x	x



**MAJOR IN SECURITY AND NETWORKING****Students completing the major "Security and Networking" will be able to:**

- Understand and explain different devices and protocols used in computer networking;
- Design, configure and manage computer networks while taking into account application needs;
- Identify large scale distributed and parallel applications, the problems occurring with these applications and propose solutions;
- Carry out distributed applications by implementing the appropriate techniques;
- Understand the characteristics of distributed systems: parallelism, synchronisation, communication, error and threat models;
- Use appropriate techniques, algorithms and languages to design, model and analyse distributed applications;
- Understand and implement mechanisms (cryptography, protocols) to secure networks and distributed systems.

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

The student shall select

From 20 to 30 credits

Year

1 2

**o Content:****o Required courses in Networking and Security**

○ LINGI2142	Computer networks: configuration and management	Olivier Bonaventure	30h+30h	5 Credits	q1	x	x
○ LINGI2145	Cloud Computing	Etienne Riviere	30h+15h	5 Credits	q1	x	x
○ LINGI2146	Mobile and Embedded Computing	Ramin Sadre	30h+15h	5 Credits	q2	x	x
○ LINGI2347	Computer system security	Ramin Sadre	30h+15h	5 Credits	q2	x	x

**⊗ Elective courses in Networking and Security**

The student can select 10 credits amongst

⊗ LINGI2143	Concurrent systems : models and analysis	Charles Pecheur	30h+15h	5 Credits	q1	x	x
⊗ LINGI2144	Secured systems engineering	Axel Legay	30h+15h	5 Credits	q2	x	x
⊗ LINGI2315	Design of Embedded and real-time systems	Jean-Didier Legat	30h+30h	5 Credits	q2	x	x
⊗ LINGI2348	Information theory and coding	Jérôme Louveaux Benoît Macq Olivier Pereira	30h+15h	5 Credits	q2	x	x
⊗ LINMA2470	Stochastic modelling	Philippe Chevalier	30h +22.5h	5 Credits	q2	x	x
⊗ LMAT2450	Cryptography	Olivier Pereira	30h+15h	5 Credits	q1	x	x
⊗ LSINF2345	Languages and algorithms for distributed Applications	Peter Van Roy	30h+15h	5 Credits	q1	x	x
⊗ LINGI2355	Multicore programming	Etienne Riviere	30h+15h	5 Credits	q2	x	x
⊗ LELEC2770	Privacy Enhancing technology	Olivier Pereira (coord.) François-Xavier Standaert	30h+30h	5 Credits	q1	x	x

**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

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

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

*From 20 to 30 credits*

Year

1 2

**o Content:****o Required courses in Computing and Applied Mathematics**

○ LINMA2472	Algorithms in data science	Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel)	30h +22.5h	5 Credits	q1	x	x
○ LINMA2710	Scientific computing	Pierre-Antoine Absil (coord.) Karl Meerbergen (compensates Anthony Papavasiliou)	30h +22.5h	5 Credits	q2	x	x
○ LINGI2364	Mining Patterns in Data	Siegfried Nijssen	30h+15h	5 Credits	q2	x	x
○ LSINF2275	Data mining & decision making	Marco Saerens	30h+15h	5 Credits	q2	x	x

**⊗ Elective courses in computing and applied mathematics**

*The student can select 10 credits amongst*

⊗ LELEC2870	Machine learning : regression, deep networks and dimensionality reduction	John Lee Michel Verleysen	30h+30h	5 Credits	q1	x	x
⊗ LINGI2266	Advanced Algorithms for Optimization	Pierre Schaus	30h+15h	5 Credits	q1 △	x	x
⊗ LINGI2348	Information theory and coding	Jérôme Louveaux Benoît Macq Olivier Pereira	30h+15h	5 Credits	q2	x	x
⊗ LINGI2365	Constraint programming	Pierre Schaus Pierre Schaus (compensates Yves Deville)	30h+15h	5 Credits	q2	x	x
⊗ LINMA2450	Combinatorial optimization	Jean-Charles Delvenne Julien Hendrickx	30h +22.5h	5 Credits	q1	x	x
⊗ LINMA2470	Stochastic modelling	Philippe Chevalier	30h +22.5h	5 Credits	q2	x	x
⊗ LINMA2471	Optimization models and methods II	François Glineur	30h +22.5h	5 Credits	q1	x	x
⊗ LMAT2450	Cryptography	Olivier Pereira	30h+15h	5 Credits	q1	x	x
⊗ LMECA2170	Numerical Geometry	Vincent Legat Jean-François Remacle	30h+30h	5 Credits	q1	x	x

**MAJOR IN BUSINESS CREATION AND MANAGEMENT****MAJOR: BUSINESS RISKS AND OPPORTUNITIES**

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

*This major is not available in English and may not be taken at the same time as the major "Interdisciplinary program in entrepreneurship - CPME"*  
*From 17 to 20 credits*

Year

1 2

**o Content:**

○ LFSA1290	<a href="#">Introduction to financial and accounting management</a>	<a href="#">Philippe Grégoire</a>	30h+15h	4 Credits	q2	x	x
○ LFSA2140	<a href="#">Elements of law for industry and research</a>	<a href="#">Vincent Cassiers</a> <a href="#">Werner Derijcke</a> <a href="#">Bénédicte Inghels</a>	30h	3 Credits	q1	x	x
○ LFSA2210	<a href="#">Organisation and human resources</a>	<a href="#">John Cultiaux</a> <a href="#">Eline Jammaers</a>	30h	3 Credits	q2	x	x
○ LFSA2230	<a href="#">Introduction to management and to business economics</a>	<a href="#">Benoît Gailly</a>	30h+15h	4 Credits	q2	x	x
○ LFSA2245	<a href="#">Environment and business</a>	<a href="#">Jean-Pierre Tack</a>	30h	3 Credits	q1	x	x

**o One course between**

From 3 to 5 credits

⊗ LFSA2202	<a href="#">Ethics and ICT</a>	<a href="#">Axel Gosseries</a> <a href="#">Olivier Pereira</a>	30h	3 Credits	q2	x	x
⊗ LLSMS2280	<a href="#">Business Ethics and Compliance Management</a>	<a href="#">Carlos Desmet</a>	30h	5 Credits	q1	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.*

## INTERFACULTY MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

In keeping with most of the EPL Masters' degrees, the goal of this major is to familiarize the student with the specifics of entrepreneurship and business development in order to develop the necessary abilities, knowledge and tools to create a business. It is a truly interdisciplinary initiative where students from different faculties are brought together in cross-disciplinary teams to create an entrepreneurial project.

The Interdisciplinary program in entrepreneurship (CPME) is spread over two years and is integrated into more than 20 Masters (8 faculties). The program includes a collective and interdisciplinary master thesis focused on an entrepreneurial project (start-up or spin-off) and realized in teams of 3 to 4 students from 3 to 4 different faculties. The access is reserved for a small number of students by a selection procedure. Additional information may be found at [www.uclouvain.be/cpme](http://www.uclouvain.be/cpme)

*This major is not available in English and may not be taken at the same time as the major "Business risks and opportunities".*

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

From 20 to 25 credits

Year

1 2

### ○ Content:

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

○ LCPME2001	<a href="#">Entrepreneurship Theory (in French)</a>	Frank Janssen	30h+20h	5 Credits	q1	x	
○ LCPME2002	<a href="#">Managerial, legal and economic aspects of the creation of a company (in French)</a>	Yves De Cordt Marine Falize	30h+15h	5 Credits	q1	x	x
○ LCPME2003	<a href="#">Business plan of the creation of a company (in French)</a> <i>Les séances du cours LCPME2003 sont réparties sur les deux blocs annuels du master. L'étudiant doit les suivre dès le bloc annuel 1, mais ne pourra inscrire le cours que dans son programme de bloc annuel 2.</i>	Frank Janssen	30h+15h	5 Credits	q2		x
○ LCPME2004	<a href="#">Advanced seminar on Entrepreneurship (in French)</a>	Frank Janssen	30h+15h	5 Credits	q2	x	x

#### ⊗ Prerequisite CPME courses

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

○ LCPME2000	<a href="#">Venture creation financement and management I</a>	Yves De Rongé Olivier Giacomin	30h+15h	5 Credits	q1	x	
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## COURS AUX CHOIX ACCESSIBLES AUX ÉTUDIANTS DU MASTER EN SCIENCES INFORMATIQUES

### ELECTIVE COURSES: TRANSVERSAL SKILLS AND CONTACTS WITH INDUSTRY

● Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

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

Year

1 2

#### o Content:

##### o Transversal skills and contacts with industry

The student chooses min 3 credits among the courses of the majors "business risks and opportunities", "small and medium sized business creation" and courses of professional integration activity specific to the program.

##### ⊗ Internship

⊗ LFSA2995	Company Internship	Jean-Pierre Raskin	30h	10 Credits	q1+q2	x	x
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##### ⊗ Professional integration activity specific to the program

⊗ LINGI2399	Industrial seminar in computer science	Yves Deville Bernard Geubelle	30h	3 Credits	q2	x	x
⊗ LINGI2402	Open Source Project			5 Credits	q1+q2	x	x

##### ⊗ Communication

Students may select max. 8 credits of languages courses or group dynamics :  
Maximum 8 credits

##### ⊗ 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.)	30h	3 Credits	q1+q2	x	x
⊗ LALLE2501	Professional development seminar-German	Caroline Klein (coord.)	30h	5 Credits	q1+q2	x	x
⊗ LESP2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	30h	3 Credits	q1	x	x
⊗ LESP2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	30h	5 Credits	q1	x	x
⊗ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.) Marie-Laurence Lambrecht	30h	3 Credits	q1 or q2	x	x
⊗ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.) Dag Houdmont	30h	3 Credits	q1 or q2	x	x

##### ⊗ Group dynamics

⊗ LEPL2351	Dynamique des groupes - Q1	Christine Jacqmot Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	q1	x	x
⊗ LEPL2352	Dynamique des groupes - Q2	Christine Jacqmot Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	q2	x	x

##### ⊗ Other non-disciplinary courses

The student may further select maximum 8 credits in other disciplines.



## ELECTIVE COURSES AVAILABLE FOR MASTER STUDENTS IN COMPUTER SCIENCE

● Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

Year

1 2

### Content:

⊗ LINGI2401	<a href="#">Open Source strategy for software development</a>	Lionel Dricot	30h+15h	5 Credits	q1	x	x
⊗ LINGI2402	<a href="#">Open Source Project</a>			5 Credits	q1+q2	x	x

## Course prerequisites

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

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

## SINF2M - Information

### Access Requirements

*In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail*  
*Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.*  
*The admission requirements must be met prior to enrolment in the University.*

#### SUMMARY

- > [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. The student is supposed to have at least a B2 level in the European Framework of Reference. A certificate is required for the holders of a non-Belgian degree, see [selection criteria](#) of the Access on the file.

#### University Bachelors

Diploma	Special Requirements	Access	Remarks
<b>UCLouvain Bachelors</b>			
(unknown URL)		Direct access	
(unknown URL)	Minor in computer science	Access with additional training	maximum 60 <a href="#">additional credits</a> integrated into their Master's degree programme
(unknown URL)			
(unknown URL)			
<b>Others Bachelors of the French speaking Community of Belgium</b>			
Bachelor in computer science		Direct access	
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
Bachelor in de informatica		Direct access	
<b>Foreign Bachelors</b>			
Bachelor in computer science		Access based on application	See "Personalized Access"

#### Non university Bachelors

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

Diploma	Access	Remarks
BA en informatique de gestion - EPS - 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 de gestion - HE - crédits supplémentaires entre 30 et 60		
BA en informatique et systèmes (informatique industrielle) - EPS - crédits supplémentaires entre 30 et 60		
BA en informatique et systèmes (informatique industrielle) - HE - crédits supplémentaires entre 30 et 60		
BA en informatique et systèmes (réseaux et télécommunications) - EPS - crédits supplémentaires entre 30 et 60		
BA en informatique et systèmes (réseaux et télécommunications) - HE - crédits supplémentaires entre 30 et 60		



BA en informatique et systèmes (sécurité des systèmes) - HE - crédits supplémentaires entre 30 et 60  
 BA en informatique et systèmes (sécurité des systèmes) - EPS - crédits supplémentaires entre 30 et 60  
 BA en informatique et systèmes (technologie de l'informatique) - EPS - crédits supplémentaires entre 30 et 60  
 BA en informatique et systèmes (technologie de l'informatique) - HE - crédits supplémentaires entre 30 et 60

## Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
<b>"Licenciés"</b>			
"Licencié en informatique"		-	
<b>Masters</b>			
Master in computer science		-	

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

### Access based on validation of professional experience

> See the website [Valorisation des acquis de l'expérience](#)

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

### Access based on application

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

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

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

### Admission and Enrolment Procedures for general registration

## Supplementary classes

**To access this Master, students must have a good command of certain subjects. If this is not the case, they must add supplementary classes at the beginning of their Master's programme in order to obtain the prerequisites for these studies.**

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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.

○ LBIR1212	<a href="#">Probabilities and statistics (I)</a>	<a href="#">Patrick Bogaert</a>	30h+15h	5 Credits	q1
○ LINFO1114	<a href="#">Mathématiques discrètes</a>	<a href="#">Marco Saerens</a>	30h+15h	5 Credits	q2
○ LINFO1104	<a href="#">Paradigmes de programmation et concurrence</a>	<a href="#">Peter Van Roy</a>	30h+30h	5 Credits	q2
○ LINFO1252	<a href="#">Systèmes informatiques</a>	<a href="#">Etienne Riviere</a>	30h+30h	5 Credits	q1
○ LINFO1341	<a href="#">Réseaux informatiques</a>	<a href="#">Olivier Bonaventure</a>	30h+30h	5 Credits	q2
○ LINFO1121	<a href="#">Algorithmique et structures de données</a>	<a href="#">Guillaume Derval (compensates Pierre Schaus)</a>	30h+30h	5 Credits	q1
○ LINFO1115	<a href="#">Reasoning about a highly connected world: graph theory, game theory and networks</a>	<a href="#">Peter Van Roy</a>	30h+30h	5 Credits	q2
○ LINFO1123	<a href="#">Calculabilité, logique et complexité</a>	<a href="#">Yves Deville</a>	30h+30h	5 Credits	q2
○ LEPL1509	<a href="#">Projet 4 (en informatique)</a>	<a href="#">Marc Lainez (compensates Yves Deville)</a>	30h+22.5h	5 Credits	q2

## Teaching method

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### 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

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***The evaluation methods comply with the regulations concerning studies and exams (<https://uclouvain.be/fr/decouvrir/rgee.html>). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".***

The learning activities are assessed according to the rules of the University (see exam regulations (<https://uclouvain.be/en-enseignement-reglements.html>)), 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 may 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.

## Possible trainings at the end of the programme

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-Accessible supplementary masters : not applicable.

-Accessible doctoral programmes:

The master in computer science engineering opens access to a Doctorate in Engineering (doctorat en sciences appliquées). In this context, doctoral students are enrolled in one of the thematic doctoral schools.

## Contacts

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### Curriculum Management

Entity

Structure entity

Denomination

Faculty

Sector

Acronym

Postal address

SST/EPL/INFO

([INFO](#))

Louvain School of Engineering ([EPL](#))

Sciences and Technology ([SST](#))

INFO

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Jury

- Jean-Didier Legat
- Charles Pecheur

Useful Contact(s)

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