UCLouvain

SINF2M

2024 - 2025

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.

SINF2M - Teaching profile

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)

				Year 1	2
LINFO2992	Graduation project/End of studies project *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
LEPL2020	Professional integration work *The modules of LEPL2020 course are organized over the two annual blocks of the master's degree. It is strongly recommended that students take them from year 1, but they will only be able to register for the course at the earliest the year in which they present their final graduation project.* *Students who have other professional integration activities in their personal programme, or who can demonstrate an equivalent activity could be exempted from this course. This equivalence is at the discretion of the examination board. Another activity should then be chosen to reach the number of ECTS required for their graduation.*		EN [q1+q2] [30h+15h] [2 Credits] Δ *> French-friendly*	x	x

Computer science seminars

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

LINFO2349	Networking and security seminar	Etienne Riviere Ramin Sadre	EN [q1] [30h] [3 Credits] *> French-friendly*		x
LINFO2350	[redacted]	[redacted]	EN [q2] [30h] [3 Credits] *> French-friendly*	[redacted]	[redacted]

[redacted]

[redacted]

x

[redacted] EN *> French-friendly*

[redacted]

PROFESSIONAL FOCUS [30.0]

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year
1 2

Content:

Computer science courses

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
Optional
Not offered in 2024-2025
Not offered in 2024-2025 but offered the following year
Offered in 2024-2025 but not the following year
Not offered in 2024-2025 or the following year
Activity with requisites
Open to incoming exchange students
Not open to incoming exchange students
[FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

From 20 to 30credit(s)

Year
1 2

Content:

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

LINFO2263	Computational Linguistics	

Year
1 2

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;

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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.

O Mandatory
Optional
△ Not offered in 2024-2025
⊘ Not offered in 2024-2025 but offered the following year
⊕ Offered in 2024-2025 but not the following year
△ ⊕ Not offered in 2024-2025 or the following year

Year
1 2

⭘ Mandatory
⛌ Optional
△

		Year 1	Year 2

⊠ 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 Canan Kocabasoglu Hillmer (compensates 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
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- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Content:

Required courses

				Year 1	Year 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 Marine Falize	FR [q1] [30h+15h] [5 Credits]	x	
LINEO2003	Plan d'affaires et étapes-clefs de la création d'entreprise *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	

COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES

- Mandatory
- Optional
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- Not offered in 2024-2025 but offered the following year
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- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students

				Year 1	2
⊠ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [30h] [3 Credits]	x	x
⊠ LESPA2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [45h] [5 Credits]	x	x
⊠ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.)	NL [q1 or q2] [30h] [3 Credits]	x	x
⊠ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.) Dag Houdmont	NL [q1 or q2] [30h] [3 Credits]	x	x

⊠ Group dynamics

⊠ 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 Thomas Pardoen (compensates Benoît Raucent)	FR [q2] [15h+30h] [3 Credits]	x	x

⊠ Autres UEs hors-EPL

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

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	Maxime Parmentier (compensates Yves Deville)	FR [q2] [30h+30h] [5 Credits]

SINF2M - Information

Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the higher education landscape and the academic organisation of courses.

General and specific admission requirements for this programme must be satisfied at the time of enrolling at the university.

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

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

SUMMARY

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 (Louvain-la-Neuve)		Direct access	
Bachelor in Computer Science (Charleroi)		Direct access	
Bachelor in Economics and Management Bachelor in Mathematics Bachelor in Engineering : Architecture	Minor in Computer Sciences	Access with additional training	maximum 60 additional credits integrated into their Master's degree programme 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 de gestion - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation informatique industrielle - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation réseaux et télécommunications - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation sécurité des systèmes - crédits supplémentaires entre 30 et 60 BA en informatique et systèmes, orientation technologie de l'informatique - crédits supplémentaires entre 30 et 60 BA en informatique, orientation développement d'applications - crédits supplémentaires entre 30 et 60 BA en informatique, orientation informatique industrielle - crédits supplémentaires entre 30 et 60 BA en informatique, orientation réseaux et télécommunications - crédits supplémentaires entre 30 et 60 BA en informatique, orientation sécurité des systèmes - crédits supplémentaires entre 30 et 60 BA en informatique, orientation technologies de l'informatique - crédits supplémentaires entre 30 et 60	Les enseignements supplémentaires éventuels peuvent être consultés dans le module complémentaire.	Type court

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
"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

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