

SINF2M

2016 - 2017

Master [120] in Computer Science

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In englishDissertation/Graduation Project : **YES** - Internship : **optional**Activities in other languages : **YES**Activities on other sites : **NO**Main study domain : **Sciences**Organized by: **Ecole Polytechnique de Louvain (EPL)**Programme code: **sinf2m** - Francophone Certification Framework: 7**Table of contents**

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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 understand and analyse the complex requirements that a computer system must meet;
- 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, 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.

The future diploma holder in computer science will acquire the knowledge and skills to become

- scientists who know how to understand and analyse the complex requirements that a computer system must meet;
- professionals who will design computer systems that meet users' needs;
- specialists capable of implementing software solutions with particular attention paid to product quality and its development process;
- innovators who can master a wide range of constantly evolving technologies.

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 consists of 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 Francophone 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

The programme consists of four parts:

- a common curriculum, mainly the graduation project (38 credits).
- a final specialisation, required (30 credits).
- one or more majors allowing for specialisation in a field of computer science (20-52 credits).
- elective courses (0-52 credits).

The graduation project is normally carried out in the last year. However, students may, depending on their training, conduct this project 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-2016-sinf2m-lsinf220t.html]

> [Professional focus](#) [en-prog-2016-sinf2m-lsinf220s]

Options courses

- > [Majors in computer science](#) [en-prog-2016-sinf2m-lsinf901r.html]
 - > [Major in Artificial Intelligence: big data, optimization and algorithms](#) [en-prog-2016-sinf2m-lsinf223o.html]
 - > [Major in Software Engineering and Programming Systems](#) [en-prog-2016-sinf2m-lsinf224o.html]
 - > [Major in Security and Networking](#) [en-prog-2016-sinf2m-lsinf225o.html]
 - > [Data science and Applied Mathematics](#) [en-prog-2016-sinf2m-lsinf226o.html]
- > [Major in business creation and management](#) [en-prog-2016-sinf2m-lsinf910r.html]
 - > [Major: Business risks and opportunities](#) [en-prog-2016-sinf2m-lsinf230o.html]
 - > [Interfaculty major in small and medium sized business creation](#) [en-prog-2016-sinf2m-lsinf227o.html]

> [Elective courses in computer science](#) [en-prog-2016-sinf2m-lsinf911r.html]
 > [Elective courses](#) [en-prog-2016-sinf2m-lsinf233o.html]

SINF2M Detailed programme

Programme by subject

CORE COURSES

- Mandatory
 △ Courses not taught during 2016-2017
 ⊕ Periodic courses taught during 2016-2017
 ✘ Optional
 ⊖ Periodic courses not taught during 2016-2017
 ■ Activity with requisites

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

							Year	
							1	2
○ LSINF2990	Graduation project/End of studies project	Vanessa.Maons (coord.)		28 Credits				x

○ Versatility courses in human sciences

○ LLSMG2004	Human Resources Management	Evelyne.Leonard Anne.Rousseau	30h+10h	5 Credits	2q	x	x
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○ Computer science seminars

Students may select 3 credits from the following courses:
 The student shall select 3 credits from amongst

✘ LINGI2349	Networking and security seminar	Olivier.Bonaventure	30h+0h	3 Credits	1q		x
✘ LINGI2359	Software engineering and programming systems seminar	Kim.Mens	30h+0h	3 Credits	1q		x
✘ LINGI2369	Artificial intelligence and machine learning seminar	Pierre.Dupont Pierre.Schaus	30h+0h	3 Credits	1q		x

○ Religion courses for students in natural sciences (2 credits)

The student shall select

✘ LTECO2100	Questions of religious sciences: Biblical readings	Hans.Ausloos	15h	2 Credits	1q	x	x
✘ LTECO2200	Questions of religious sciences: reflections about Christian faith	Dominique.Martens	15h	2 Credits	2q	x	x
✘ LTECO2300	Questions of religious sciences: questions about ethics	Marcela.Lobo	15h	2 Credits	1q	x	x

PROFESSIONAL FOCUS [30.0]

● Mandatory

△ Courses not taught during 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ 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

○ Computer courses

○ LINGI2132	Languages and translators	Pierre.Schaus	30h+30h	6 Credits	2q	x	x
○ LINGI2172	Databases	Siegfried.Nijssen	30h+30h	6 Credits	2q	x	x
○ LINGI2241	Architecture and performance of computer systems	Ramin.Sadre	30h+30h	6 Credits	1q	x	x
○ LINGI2261	Artificial intelligence: representation and reasoning	Yves.Deville	30h+30h	6 Credits	1q	x	x
○ LINGI2255	Software engineering project	Kim.Mens	30h+30h	6 Credits	1q	x	x

OPTIONS

Students must complete their programme with major and or elective courses. They may select 52 credits from among the following courses:

Majors in computer science

- > Major in Artificial Intelligence: big data, optimization and algorithms [en-prog-2016-sinf2m-lsinf223o]
- > Major in Software Engineering and Programming Systems [en-prog-2016-sinf2m-lsinf224o]
- > Major in Security and Networking [en-prog-2016-sinf2m-lsinf225o]
- > Data science and Applied Mathematics [en-prog-2016-sinf2m-lsinf226o]

Major in business creation and management

- > Major: Business risks and opportunities [en-prog-2016-sinf2m-lsinf230o]
- > Interfaculty major in small and medium sized business creation [en-prog-2016-sinf2m-lsinf227o]

Elective courses in computer science

- > Elective courses [en-prog-2016-sinf2m-lsinf233o]

MAJORS IN COMPUTER SCIENCE

Students must choose one or more of the following majors.

MAJOR IN ARTIFICIAL INTELLIGENCE: BIG DATA, OPTIMIZATION AND ALGORITHMS

Students choosing to major in Artificial Intelligence must 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,
- 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 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ Activity with requisites

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

The student shall select

De 20 à 30 credits parmi

Year

1 2

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

● LINGI2262	Machine Learning :classification and evaluation	Pierre.Dupont	30h+30h	5 Credits	2q	x	x
● LINGI2263	Computational Linguistics	Pierre.Dupont Cedrick.Fairon	30h+15h	5 Credits	1q	x	x
● LINGI2266	Advanced Algorithms for Optimization	Pierre.Schaus	30h+15h	5 Credits	1q	x	x
● LINGI2365	Constraint programming	Yves.Deville Christophe.Lecoutre (compensates Yves Deville)	30h+15h	5 Credits	2q	x	x

Elective courses in Artificial Intelligence

The student can select 10 credits between:

						Year	
						1	2
⊗ LELEC2870	Machine Learning : regression, dimensionality reduction and data visualization	John.Lee (compensates Michel Verleysen) Michel.Verleysen	30h+30h	5 Credits	1q	x	x
⊗ LELEC2885	Image processing and computer vision	Christophe.Devleeschouwer Laurent.Jacques	30h+30h	5 Credits	1q	x	x
⊗ LGBIO2010	Bioinformatics	Pierre.Dupont Michel.Ghislain	30h+30h	5 Credits	2q	x	x
⊗ LINMA1691	Discrete mathematics - Graph theory and algorithms	Vincent.Blondel Jean-Charles.Delvenne	30h +22.5h	5 Credits	1q	x	x
⊗ LINMA1702	Applied mathematics : Optimization I	Francois.Glineur	30h +22.5h	5 Credits	2q	x	x
○ LINGI2145	Cloud Computing	Damien.Leroy	30h+15h	5 Credits	1q	x	x
⊗ LINMA2450	Combinatorial optimization	Jean-Charles.Delvenne Julien.Hendrickx	30h +22.5h	5 Credits	1q	x	x
○ LINMA2472	Algorithms in data science	Vincent.Blondel (coord.) Jean-Charles.Delvenne Gautier.Krings (compensates Vincent Blondel)	30h +22.5h	5 Credits	1q	x	x
⊗ LSINF2275	Data mining & decision making	Marco.Saerens	30h+15h	5 Credits	2q	x	x

MAJOR IN SOFTWARE ENGINEERING AND PROGRAMMING SYSTEMS

Students selecting the major "Software engineering and programming systems" must 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 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ Activity with requisites

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

*The student shall select
De 20 à 30 credits parmi*

Year

1 2

● Required courses in software engineering and programming systems

● LINGI2143	Concurrent systems : models and analysis	Charles.Pecheur	30h+15h	5 Credits	1q	X	X
● LINGI2251	Software Quality Assurance	Charles.Pecheur	30h+15h	5 Credits	2q	X	X
● LINGI2252	Software Maintenance and Evolution	Kim.Mens	30h+15h	5 Credits	1q	X	X
● LSINF2345	Distributed application design	Peter.Vanroy	30h+15h	5 Credits	2q	X	X

⊗ Elective courses in Software Engineering and Programming Systems

The student can select 10 credits amongst

● LINGI2145	Cloud Computing	Damien.Leroy	30h+15h	5 Credits	1q	X	X
● LINGI2347	Computer system security	Ramin.Sadre	30h+15h	5 Credits	2q	X	X
● LINGI2355	Advanced questions in software engineering	Siegfried.Nijssen	30h+15h	5 Credits	2q	X	X
● LINGI2365	Constraint programming	Yves.Deville Christophe.Lecoutre (compensates Yves Deville)	30h+15h	5 Credits	2q	X	X
● LSINF2224	Programming methods		30h+15h	5 Credits	2q △	X	X
● LSINF2335	Programming paradigms	Kim.Mens	30h+15h	5 Credits	2q	X	X
● LSINF2382	Computer supported collaborative work	Jean.Vanderdonckt	30h+15h	5 Credits	2q	X	X

MAJOR IN SECURITY AND NETWORKING

This major may not be validated at the same time as the majors in "Cryptography and information security" and "Communication networks." However, students are allowed to select elective courses from these majors.

Students enrolling in the major "Security and Networking" must 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 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ Activity with requisites

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

The student shall select

De 20 à 30 credits parmi

Year

1 2

○ Required courses in Networking and Security

○ LINGI2142	Computer networks: configuration and management	Olivier.Bonaventure	30h+30h	5 Credits	2q	x	x
○ LINGI2145	Cloud Computing	Damien.Leroy	30h+15h	5 Credits	1q	x	x
○ LINGI2146	Mobile and Embedded Computing	Ramin.Sadre	30h+15h	5 Credits	2q	x	x
○ LINGI2347	Computer system security	Ramin.Sadre	30h+15h	5 Credits	2q	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	1q	x	x
⊗ LINGI2144	Secured systems engineering	Gildas.Avoine	30h+15h	5 Credits	1q	x	x
⊗ LINGI2315	Design of Embedded and real-time systems	Jean-Didier.Legat	30h+30h	5 Credits	2q	x	x
⊗ LINGI2348	Information theory and coding	Jerome.Louveaux Jerome.Louveaux (compensates Olivier Pereira) Benoit.Macq (coord.) Olivier.Pereira	30h+15h	5 Credits	2q	x	x
⊗ LINMA2470	Stochastic modelling	Philippe.Chevalier	30h +22.5h	5 Credits	2q	x	x
⊗ LMAT2450	Cryptography	Francois.Koeune (compensates Olivier Pereira) Olivier.Pereira Thomas.Peters (compensates Olivier Pereira) Francois-Xavier.Standaert (compensates Olivier Pereira)	30h+15h	5 Credits	1q	x	x
⊗ LSINF2345	Distributed application design	Peter.Vanroy	30h+15h	5 Credits	2q	x	x

DATA SCIENCE AND APPLIED MATHEMATICS

Students choosing the major "Computing 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 methods and techniques used in advanced algorithms such as optimisation methods, constraint programming, graph algorithms, numerical algorithms, or analysis and design of algorithms;
- 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 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ 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

De 20 à 30 credits parmi

Year

1 2

○ Required courses in Computing and Applied Mathematics

○ LINGI2262	Machine Learning :classification and evaluation	Pierre.Dupont	30h+30h	5 Credits	2q	x	x
○ LINMA2472	Algorithms in data science	Vincent.Blondel (coord.) Jean-Charles.Delvenne Gautier.Krings (compensates Vincent Blondel)	30h +22.5h	5 Credits	1q	x	x
○ LINMA2710	Scientific computing	Pa.Absil (coord.) Anthony.Papavasiliou	30h +22.5h	5 Credits	2q	x	x
○ LSINF2275	Data mining & decision making	Marco.Saerens	30h+15h	5 Credits	2q	x	x

⊗ Elective courses in computing and applied mathematics

The student can select 10 credits amongst

○ LELEC2870	Machine Learning : regression, dimensionality reduction and data visualization	John.Lee (compensates Michel Verleysen) Michel.Verleysen	30h+30h	5 Credits	1q	x	x
○ LINGI2266	Advanced Algorithms for Optimization	Pierre.Schaus	30h+15h	5 Credits	1q	x	x
○ LINGI2348	Information theory and coding	Jerome.Louveaux Jerome.Louveaux (compensates Olivier Pereira) Benoit.Macq (coord.) Olivier.Pereira	30h+15h	5 Credits	2q	x	x
○ LINGI2365	Constraint programming	Yves.Deville Christophe.Lecoutre (compensates Yves Deville)	30h+15h	5 Credits	2q	x	x
○ LINMA2450	Combinatorial optimization	Jean-Charles.Delvenne Julien.Hendrickx	30h +22.5h	5 Credits	1q	x	x
○ LINMA2470	Stochastic modelling	Philippe.Chevalier	30h +22.5h	5 Credits	2q	x	x
○ LINMA2471	Optimization models and methods	Francois.Glineur	30h +22.5h	5 Credits	1q	x	x
○ LMAT2450	Cryptography	Francois.Koeune (compensates Olivier Pereira) Olivier.Pereira Thomas.Peters (compensates Olivier Pereira) Francois- Xavier.Standaert (compensates Olivier Pereira)	30h+15h	5 Credits	1q	x	x
○ LMECA2170	Numerical Geometry	Vincent.Legat Jean-Francois.Remacle	30h+30h	5 Credits	1q	x	x

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

This major is not open to students enrolled in the major in small and medium sized business creation.

This major is not offered in English.

The purpose of this major is to familiarise engineering students with the basic principles of business management.

● Mandatory

△ Courses not taught during 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ Activity with requisites

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

The student who chooses this option shall select

De 16 à 20 credits parmi

						Year	
						1	2
⊗ LFSA2140	Elements of law for industry and research	Fernand.Devisscher Werner.Derijcke Benedicte.Inghels	30h	3 Credits	1q	x	x
⊗ LFSA2230	Introduction to management and to business economics	Benoit.Gailly Vincent.Reuter (compensates Benoit Gailly)	30h+15h	4 Credits	2q	x	x
⊗ LFSA1290	Introduction to financial and accounting management	Andre.Nsabimana (compensates Gerrit Sarens) Gerrit.Sarens	30h+15h	4 Credits	2q	x	x
⊗ LFSA2202	Ethics and ICT	Axel.Gosseries Maxime.Lambrecht (compensates Olivier Pereira) Olivier.Pereira	30h	3 Credits	2q	x	x
⊗ LFSA2245	Environment and business	Thierry.Brechet	30h	3 Credits	1q	x	x
⊗ LFSA2210	Organisation and human resources	John.Cultiaux	30h	3 Credits	2q	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

This major is not open to students enrolled in the business risks and opportunities major.

This major is not offered in English.

The goal of this major is to familiarise the civil engineering student with the specifics of small and medium sized businesses, entrepreneurship, and business development in order to develop the necessary abilities, knowledge and tools to create a business. This major is reserved for a small number of students and selection is based on a written application and individual interview. The written application must be submitted before the start of the academic year for Master's 1.

Applications may be sent to:

Secrétariat CPME-Place des Doyens, 1
1348 Louvain-la-Neuve (tel. 010/47 84 59)

Selected students will replace their Master's thesis in the common core curriculum with a thesis related to business creation (the number of credits remaining the same).

● Mandatory

△ Courses not taught during 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ Activity with requisites

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

Further information about this major may be found at <http://www.uclouvain.be/cpme>. This major may not be taken at the same time as a major in management. Students in this major may choose 20-25 credits from the following courses:
De 20 à 25 crédits parmi

Year

1 2

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

● LCPME2001	Entrepreneurship Theory (in French)	Frank.Janssen	30h+20h	5 Credits	1q	x	
● LCPME2002	Managerial, legal and economic aspects of the creation of a company (in French)	Regis.Coeurderoy Yves.Decordt Marine.Falize (compensates Régis Coeurderoy)	30h+15h	5 Credits	1q	x	x
● LCPME2003	Business plan of the creation of a company (in French)	Frank.Janssen	30h+15h	5 Credits	2q		x
● LCPME2004	Advanced seminar on Entrepreneurship (in French)	Roxane.DeHoe (compensates Frank Janssen) Frank.Janssen	30h+15h	5 Credits	2q	x	x

⊗ Prerequisite CPME courses

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

● LCPME2000	Venture creation financement and management I	Olivier.Giacomin Paul.Vanzeveren	30h+15h	5 Credits	1q	x	
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ELECTIVE COURSES IN COMPUTER SCIENCE

The student has to complete his program with elective courses in order to reach 120 credits for the whole master.

ELECTIVE COURSES

● Mandatory

△ Courses not taught during 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ Activity with requisites

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

						Year	
						1	2
⊗ LFSA2202	Ethics and ICT	Axel.Gosseries Maxime.Lambrecht (compensates Olivier Pereira) Olivier.Pereira	30h	3 Credits	2q	x	x
⊗ LFSA2351A	Group dynamics	Piotr.Sobieski (coord.) Vincent.Wertz (coord.)	15h+30h	3 Credits	1q	x	x
⊗ LFSA2351B	Group dynamics	Piotr.Sobieski (coord.) Vincent.Wertz (coord.)	15h+30h	3 Credits	2q	x	x
⊗ LINGI2399	Industrial seminar in computer science	Yves.Deville Bernard.Geubelle	30h+0h	2 Credits	2q	x	x

⊗ Languages

Students may select from any language course offered at the ILV for a maximum of 3 credits out of the 120 core credits needed for their Master's degree. Special attention is placed on the following seminars in professional development:

⊗ LALLE2500	Professional development seminar German	Caroline.Klein Ann.Rinder (coord.)	30h	3 Credits	1 + 2q	x	x
⊗ LALLE2501	Professional development seminar-German	Caroline.Klein Ann.Rinder (coord.)	30h	5 Credits	1 + 2q	x	x
⊗ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula.Lorente (coord.)	30h	3 Credits	1q	x	x
⊗ LESPA2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula.Lorente (coord.)	30h	5 Credits	1q	x	x
⊗ LNEER2500	Professional development seminar: Dutch - intermediate level	Isabelle.Demeulenaere (coord.) Mariken.Smit	30h	3 Credits	1 ou 2q	x	x
⊗ LNEER2600	Professional development seminar: Dutch - upper-intermediate level	Isabelle.Demeulenaere (coord.)	30h	3 Credits	1 ou 2q	x	x

⊗ Advanced courses

Students should note that any course offered as part of their major but not taken as such may be taken as an elective course.

⊗ Short-term exchanges (2 credits)

Students may include in their curriculum any BEST or ATHENS course subject to approval by the programme committee. These courses are worth 2 credits.

⊗ General knowledge courses

Students can also include in their curriculum any course given at UCL, KULeuven subject to approval of the Programme committee.

⊗ Company internships (10 credits)

Students enrolling in a 5 credit internship coupled with the graduation project (LFSA 2996) must round out their programme with a 5 credit course approved by the programme commission.

⊗ LFSA2995	Company Internship	Jean-Pierre.Raskin	30h	10 Credits	1 + 2q	x	x
⊗ LFSA2996	Company Internship			5 Credits	1 + 2q	x	x

Course prerequisites

A document entitled [en-prerequis-2016-sinf2m.pdf](#) specifies the activities (course units - CU) with one or more pre-requisite(s) within the study programme, that is the CU whose learning outcomes must have been certified and for which the credits must have been granted by the jury before the student is authorised to sign up for that activity.

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

As the prerequisites are a requirement of enrolment, there are none within a year of a course.

The prerequisites are defined for the CUs for different years and therefore influence the order in which the student can enrol in the programme's CUs.

In addition, when the panel validates a student's individual programme at the beginning of the year, it ensures the consistency of the individual programme:

- It can change a prerequisite into a corequisite within a single year (to allow studies to be continued with an adequate annual load);
- It can require the student to combine enrolment in two separate CUs it considers necessary for educational purposes.

For more information, please consult [regulation of studies and exams](#).

The programme's courses and learning outcomes

For each UCL 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?"

The document is available by clicking [this link](#) after being authenticated with UCL account.

SINF2M - Information

Admission

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

Any student who is not a bachelor in computer science must fill in an application for admission to the Louvain School of Engineering, stating his detailed curriculum (degree, list of courses followed and grades obtained, year per year). The jury, consulting with the relevant programme commission, decides on the eligibility of the candidate, and may propose a personalised programme to the student, designed to fill any gap in his formation. To this end, the jury can impose to the student up to 60 supplemental crédits.

- [University Bachelors](#)
- [Non university Bachelors](#)
- [Holders of a 2nd cycle University degree](#)
- [Holders of a non-University 2nd cycle degree](#)
- [Adults taking up their university training](#)
- [Personalized access](#)

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCL Bachelors			
Bachelor in Computer Science		Direct access	
Bachelor in Economics and Management Bachelor in Mathematics Bachelor in Engineering : Architecture	Minor in computer science	Access with additional training	maximum 60 additional credits integrated into their Master's degree programme
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 with additional training	The student must fill in an application for admission to the School of Engineering, stating his detailed curriculum (degree, list of courses followed and grades obtained, year per year). The jury, consulting with the relevant programme commission, decides on the eligibility of the candidate, and can propose a personalised programme to the student, designed to fill any gap in his formation. To this end, the jury can impose to the student up to 15 supplemental credits.

Non university Bachelors

Diploma	Access	Remarks
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> Find out more about [links](#) to the university

The student must fill in an application for admission to the Louvain School of Engineering, stating his detailed curriculum (degree, list of courses followed and grades obtained, year per year). The Louvain School of Engineering, consulting with the relevant programme

commission, decides on the eligibility of the candidate, and can propose a personalised programme to the student, designed to fill any gap in his formation. To this end, the jury can impose to the student up to 60 supplemental credits.

> BA en sciences industrielles - type long	Accès au master moyennant ajout de maximum 60 crédits d'enseignements supplémentaires obligatoires au programme. Voir 'Module complémentaire'	Type long
> BA en informatique de gestion > BA en informatique et systèmes	Accès au master moyennant ajout de maximum 60 crédits d'enseignements supplémentaires obligatoires au programme. Voir 'Module complémentaire'	Type court
> Spécialisation en informatique médicale	Accès direct au master moyennant ajout éventuel de 15 crédits max	Type court

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Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
"Licencié en informatique"		Direct access	
Masters			
Master in computer science		Direct access	

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Holders of a non-University 2nd cycle degree

Diploma	Access	Remarks
> Find out more about links to the university		
> MA en sciences de l'ingénieur industriel finalités automatisations, électricité, électromécanique, électronique, informatique, mécanique > MA en sciences industrielles, finalités électronique, informatique	Accès direct au master moyennant ajout éventuel de 15 crédits max	Type long

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Adults taking up their university training

> 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.

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Personalized access

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

Students may submit an application for admission to the Louvain School of Engineering in which they list their detailed course curriculum (list of course work and marks year by year). The School in collaboration with the relevant programme commission will determine whether the student may be admitted and their decision will respect the programme rules. When necessary, they may suggest an individualised programme consisting of a part of the elective courses in the relevant Master's degree programme in civil engineering with the possible addition of a maximum of 15 supplemental credits.

The School in collaboration with the relevant programme commission will determine whether the student may be admitted and their decision will respect the programme rules. When necessary, the jury may suggest a programme in keeping with the student's previous course of study with the possible addition of a maximum of 15 supplemental credits.

Admission and Enrolment Procedures for general registration

Specific procedures :

Any student who does not hold a Bachelor's degree in computer science must fill out an application for admission for the Louvain School of Engineering, stating their detailed curriculum (degree, list of courses and grades awarded, year by year). The Louvain School of Engineering, consulting with the relevant programme commission, decides on the eligibility of the candidate and may propose a personalised programme for the student, designed to fill any gap in their training. To this end, the Louvain School of Engineering can require that the student take complementary courses. For some students, the Louvain School of Engineering may suggest a one-year bridge year giving access to the Master's degree programme.

Supplementary classes

To enrol for this Masters, the student must have a good command of certain subjects. If this is not the case, they must add preparatory modules to their Master's programme.

● Mandatory

△ Courses not taught during 2016-2017

⊕ Periodic courses taught during 2016-2017

⊗ Optional

⊖ Periodic courses not taught during 2016-2017

■ Activity with requisites

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

Courses for students coming from a short bachelor. These students will have to take at least 150 credits to obtain the master in computer science.

● LBIR1203	Probabilities and statistics (I)	Patrick.Bogaert	30h+15h	4 Credits	1q
● LBIR1304	Probability and statistics (II)	Patrick.Bogaert	22.5h+22.5h	3 Credits	1q
● LINGI1101	Discrete mathematics: logical foundations of computing science	Peter.Vanroy	30h+30h	5 Credits	1q
● LINGI1122	Program conception methods	Charles.Pecheur	30h+30h	5 Credits	2q
● LINGI1123	Computability and complexity	Yves.Deville	30h+30h	5 Credits	2q
● LINGI1131	Computer language concepts	Peter.Vanroy	30h+30h	5 Credits	2q
● LINGI1341	Computer networks	Olivier.Bonaventure	30h+30h	5 Credits	1q
● LSINF1121	Algorithmics and data structures	Pierre.Schaus	30h+30h	5 Credits	1q
● LSINF1250	Mathematics for computer science	Marco.Saerens	30h+15h	7 Credits	1q

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 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.

Mobility and/or Internationalisation outlook

Outgoing Students

Since their creation, the Louvain School of Engineering (EPL) has participated in various exchange programmes in Europe and worldwide.

Students may first become interested in such exchanges at the end of their Bachelor's degree programme mainly through intensive courses offered as part of the ATHENS or BEST networks. These networks are also open to students in the Master's degree programme and provide an initial experience in international education.

In addition, in the context of the Erasmus and Mercator exchange programmes, students have the possibility of studying at a partner university typically for one year (two semesters) in the first year of the Master's degree programme or five months (first semester) in the second year of the Master's degree programme. As a result, the EPL is a member of different networks.

-In Belgium, the EPL maintains a privileged partnership with the Faculteit Ingenieurswetenschappen of the Katholieke Universiteit Leuven with which it has developed an exchange programme covering the first year of the Master's degree.

-At the European level, the EPL is especially involved in the CLUSTER network. This network guarantees quality both in terms of education and in terms of hosting exchange students. Moreover, the CLUSTER partners have signed an agreement to recognize the Bachelor degree programmes of their members. This agreement implies that all Bachelor degree holders from CLUSTER member institutions are subject to the same admission criteria to CLUSTER Master's degree programmes as local students.

-Outside of Europe, the EPL is a member of the Magalhaes network that joins together around fifteen European universities with the best science and technology universities in Latin America.

In addition to these network partnerships, the Louvain School of Engineering has signed a number of individual agreements with various universities in Europe, North America and elsewhere in the world. The list of these agreements can be found on UCL's International Relations Administration website.

Moreover, several dual degree programmes have also been set up.

Dual Master's degree agreements allow students to obtain engineering degrees from two universities after they have completed one year at UCL and the other at a host university. In computer science engineering, such agreements have been established with UPC (Barcelona, Spain) and Grenoble (France). Others are currently being negotiated.

Students are informed about the various exchange programmes at the start of the second year of their Bachelor's degree programme. It is recommended that they prepare for these exchanges well in advance, most notably at the linguistic level through courses at the university's Language Institute (ILV).

Beyond exchange programmes, students may participate in an internship in a research laboratory or in a company abroad.

More information about [exchange programmes](#) at EPL.

Incoming students

As part of the CLUSTER network, foreign students may benefit from exactly the same status and conditions as UCL students, which favours Erasmus exchanges for students coming from network member institutions.

The entire programme is offered in English and can be taken without prior knowledge of French, except for the majors in biomedical engineering, business management and small and medium sized business creation. All courses, except for a few rare exceptions, are given in English. For non-francophone students, alternatives to the courses in French will be proposed by the programme commission on a case-by-case basis according to the student's curriculum.

For more information about exchange programmes at EPL

Possible trainings at the end of the programme

-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

Curriculum Management

Entite de la structure INFO

Acronyme	INFO
Dénomination	Commission de programme - Sciences informatiques et ingénieur civil en informatique
Adresse	Place Sainte Barbe, 2 bte L5.02.01 1348 Louvain-la-Neuve Tél 010 47 31 50 - Fax 010 45 03 45
Secteur	Secteur des sciences et technologies (SST)
Faculté	Ecole Polytechnique de Louvain (EPL)
Commission de programme	Commission de programme - Sciences informatiques et ingénieur civil en informatique (INFO)

Academic Supervisor : [Charles PECHEUR](#)

Jury

Président du Jury : [Jean-Didier LEGAT](#)

Secrétaire du Jury :

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