

**SINF2M**

2014 - 2015

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 : **NO**Activities on other sites : **NO**Organized by: **Ecole Polytechnique de Louvain (EPL)**Programme code: **sinf2m** - European Qualifications Framework (EQF): 7**Table of contents**

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## SINF2M - Introduction

### Introduction

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#### Introduction

The program tries to maintain a **balance between soft skills and scientific/technical skills, between striving for excellence and pragmatism**. It offers :

- an approach based basic **concepts** in computer science which remain valid beyond the rapidly changing technology ;
- a program **entirely in English** to improve your skills both in written and spoken technical English ;
- **exchange programs** and dual degrees in Belgium, Europe and worldwide .

#### Your profile

You

- aspire to **imagine, design, implement and deploy** the computer applications that will shape our future;
- have a bachelor degree with a specialization in computer science;
- want to improve your **theoretical knowledge** and develop your **practical skills** in disciplines such as artificial intelligence, computer networks, information security, software engineering and programming systems;
- would like to build up **soft skills** such as foreign languages, management of resources, team work and communication, work discipline and ethics.

#### Your future job

We train

- **scientists** who can understand and analyze the complex requirements to be met by a software system in its environment;
- **professionals** who will design computer systems which encounter customer needs;
- **innovators** who master a broad range of technologies and their continuous evolution;
- **specialists** able to implement software solutions with a particular attention to quality of the product and of its development process.

#### Your programme

The training includes

- a **mandatory part**, to acquire the skills necessary to model, design complex applications, which completes the required training to all university computer scientists;
- at least one **option** that you choose, to acquire advanced skills in a field of interest: software engineering and programming systems , artificial intelligence, networking and security ;
- **elective courses** that allow you to focus your training to your interests , whether computer science or any other discipline (management, entrepreneurship , foreign languages ...); as the UCL is a wide university , many opportunities are offered;
- an **master's thesis**, half the workload of the last year , offers the possibility of treating a subject in depth and its magnitude is a true introduction to life as a computer scientist; the subject of this work is chosen in consultation between you, the program committee and possibly an industry.

## SINF2M - Teaching profile

### Learning outcomes

#### Training based on research

The UCL is a place for teaching and research. The research conducted in the field of Computer Science within the ICTEAM Institute is internationally recognized. Through the options of the Master's program, students benefit from this cutting-edge knowledge in the fields of

- Artificial Intelligence,
- Networking and Security
- or Software Engineering and Systems Programming.

Beyond the mere acquisition of knowledge, training is based on a **deep understanding of concepts, reflection and abstraction**. These skills enable graduates to adapt quickly to the demands of employers. Furthermore, these studies can be extended to research activities and lead to a PhD.

#### Concepts to their application

The adaptability of graduates is further enhanced by the importance attributed to the application of concepts in the curriculum. **It is inconceivable to master concepts at a theoretical level and not to be able to apply them while facing a practical problem.** Therefore, the program contains many projects, assignments, a master's thesis and the possibility to perform an internship.

#### International perspective

English is the language most widely used in business and in particular in the technical field. The **Master's program is taught in English**. It enables non English native students to acquire good skills both oral and written in this language. Furthermore, teaching in English enables to welcome and host foreign students in good conditions, while allowing them to be immersed in a French environment. It also expands the possibilities for exchange programs and joint degrees with well-known universities.

Offering a master's program in English is definitely a position with an **international outlook**.

#### Regarding learning outcomes ...

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

**demonstrate mastery of a solid body of knowledge in computer science, enabling him to solve problems within its discipline**

The master's program develops **advanced skills** in the computer science field. Various areas are addressed in the core curriculum and the student then **specialized through an option**:

- Networks and distributed systems;
- Programming languages;
- Software engineering;
- Artificial Intelligence.

**organize and carry out every step of the software development process, meeting the generally complex needs of a customer**

1. **analyze** the problem or functional requirements, to meet and formulate the corresponding **specification**.
2. **model** the problem and **design** one or more original technical solutions that meet these specifications.
3. **assess and classify** solutions in terms of the criteria expressed in the specifications: effectiveness, feasibility, quality, ergonomics and safety to the environment.
4. implement and test the solution.
5. make **recommendations** to improve the **operational features** of the solution.

**organize and carry out research to understand a new problem within its discipline**

1. **document** and summarize the **state of the art** in this field.
2. propose a **modeling** and/or an **experimental device** to simulate and test assumptions about the problem.
3. deliver a **summary report** to explain the theoretical and/or technical **potential innovation** resulting from this research

**contribute in a team, to plan and bring a project to completion, taking into account the objectives, resources and other constraints**

1. set and explain the **objectives of a project** (involving performance indicators) in the light of the challenges and constraints that characterize the project environment.
2. **engage collectively** on a work plan, timeline and roles of each team member.

3. operate in a **multidisciplinary environment**, together with colleagues carrying **different perspectives**, thus managing disagreements or conflicts.
4. **make decisions as a team** when choices are to be made, whether on technical solutions or work organization

**communicate, both orally and in writing to carry out the projects entrusted to him in his work environment, and improve its foreign language skills (e.g. French and English)**

1. clearly identify the needs of the **customer** or user: **ask questions, listen and understand** all aspects of the request and **not just the technical aspects**.
2. argue and convince, adapting the **language to suit the potential audience**: technicians, colleagues, clients, superiors.
3. use and interpret **graphics and diagrams** as an efficient communication medium to present results or to structure information.
4. read, analyze and **use technical documents** (standards, diagrams, user's guides, specifications ...).
5. **prepare written documents taking** into account the **contextual requirements** and social conventions in this field.
6. make **persuasive oral presentations** using modern communication techniques

**demonstrate both rigor, openness, critical thinking and ethics in his work.**

1. apply the **standards** in their discipline (terminology, units of measurement, standards of quality and safety ...).
2. find solutions that go **beyond purely technical issues**, integrating sustainable development issues and the ethical dimension of a project.
3. demonstrate **critical thinking** regarding a technical solution to verify its robustness and minimize its risks in relation to the context of its implementation.
4. **self-assess and individually develop knowledge** to remain competent in his field.

## Programme structure

The Master in Computer Science programme includes:

- core courses, mainly the master's thesis (38 ECTS credits);
- focus, mandatory courses (30 ECTS credits);
- one or more options to specialize in one computer science domain (20 to 52 ECTS credits),
- some optional courses (0 to 52 ECTS credits).

A master's thesis is conducted during the last year. On the other hand, as long as it suits his/her educational project and the prerequisites are respected, courses can be placed at will by the student in the first or second year. This is particularly true in the case of a student carrying out part of his studies abroad. Consequently, the years to which activities are assigned in the detailed programme are only indicative.

In addition, the student with a coherent project has the potential to open widely his training to non-technical disciplines through elective courses.

*Whatever the focus or the options chosen, the programme of this master shall totalize 120 credits, spread over two years of studies each of 60 credits.*

[> Tronc commun du master en sciences informatiques.](#) [ en-prog-2014-sinf2m-lsinf220t.html ]

[> Professional focus](#) [ en-prog-2014-sinf2m-lsinf220s ]

Options courses

- > [Options en sciences informatiques](#) [ en-prog-2014-sinf2m-lsinf901r.html ]
  - > [Artificial Intelligence](#) [ en-prog-2014-sinf2m-lsinf223o.html ]
  - > [Option en ingénierie logicielle et systèmes de programmation / Software Engineering and programming Systems](#) [ en-prog-2014-sinf2m-lsinf224o.html ]
  - > [Networking and Security](#) [ en-prog-2014-sinf2m-lsinf225o.html ]
  - > [Option en informatique et mathématiques appliquées](#) [ en-prog-2014-sinf2m-lsinf226o.html ]
  - > [Business risks and opportunities](#) [ en-prog-2014-sinf2m-lsinf230o.html ]
  - > [Option interfacultaire en création de petites et moyennes entreprises](#) [ en-prog-2014-sinf2m-lsinf227o.html ]
- > [Cours au choix en sciences informatiques](#) [ en-prog-2014-sinf2m-lsinf221o.html ]

## SINF2M Detailed programme

### Programme by subject

#### CORE COURSES

○ Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊖ Periodic courses not taught during 2014-2015

‡ Two years course

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

							Year	
							1	2
○ LSINF2990	Graduation project/End of studies project	N.		28 Credits			x	
<b>○ Cours de polyvalence en sciences humaines</b>								
○ LLSMG2004	Human Resources Management	Alain Eraly (compensates Evelyne L&eacute;onard), Evelyne Léonard	30h	5 Credits	1q		x	x

#### ○ Computing seminars

The student shall select 3 credits from amongst

The student shall select 3 credits from amongst

⊗ LINGI2359	Software engineering seminar	Kim Mens	30h	3 Credits	2q		x	
⊗ LINGI2349	Network and communication seminar	Gildas Avoine, Olivier Bonaventure (compensates Gildas Avoine), Olivier Bonaventure	30h	3 Credits	1q		x	
⊗ LINGI2369	Artificial intelligence seminar	Yves Deville, Pierre Schaus (compensates Yves Deville)	30h	3 Credits	2q		x	
⊗ LINGI2379	Machine learning seminar	Yves Deville (compensates Pierre Dupont), Yves Deville (compensates Michel Verleysen), Pierre Dupont (coord.), Michel Verleysen	30h	3 Credits	2q		x	

#### ○ Religion courses for student in exact sciences

The student shall select 2 credits from amongst

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	Philippe Cochinaux	15h	2 Credits	1q		x	x

**PROFESSIONAL FOCUS [30.0]**

○ Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊖ Periodic courses not taught during 2014-2015

⊞ Two years course

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

Year

1 2

**○ Cours d'informatique**

○ LINGI2132	<a href="#">Languages and translators</a>	<a href="#">Pierre Schaus</a>	30h+30h	6 Credits	2q	x	
○ LINGI2172	<a href="#">Databases</a>	<a href="#">Bernard Lambeau</a>	30h+30h	6 Credits	2q	x	
○ LINGI2261	<a href="#">Artificial intelligence: representation and reasoning</a>	<a href="#">Yves Deville</a>	30h+30h	6 Credits	1q	x	
○ LSINF2255	<a href="#">Software Development Project</a>	<a href="#">Kim Mens</a>	15h+45h	6 Credits	1q	x	
○ LINGI1341	<a href="#">Computer networks: information transfer</a>	<a href="#">Olivier Bonaventure</a>	30h+30h	6 Credits	1q	x	

**OPTIONS**

L'étudiant complète son programme avec des options et/ou des cours au choix. Il sélectionne 52 crédits parmi

## Options en sciences informatiques

- > [Artificial Intelligence](#) [ en-prog-2014-sinf2m-lsinf223o ]
- > [Option en ingénierie logicielle et systèmes de programmation / Software Engineering and programming Systems](#) [ en-prog-2014-sinf2m-lsinf224o ]
- > [Networking and Security](#) [ en-prog-2014-sinf2m-lsinf225o ]
- > [Option en informatique et mathématiques appliquées](#) [ en-prog-2014-sinf2m-lsinf226o ]
- > [Business risks and opportunities](#) [ en-prog-2014-sinf2m-lsinf230o ]
- > [Option interfacultaire en création de petites et moyennes entreprises](#) [ en-prog-2014-sinf2m-lsinf227o ]
- > [Cours au choix en sciences informatiques](#) [ en-prog-2014-sinf2m-lsinf221o ]

**OPTIONS EN SCIENCES INFORMATIQUES**

L'étudiant doit choisir une ou plusieurs options parmi les suivantes.

**ARTIFICIAL INTELLIGENCE**

Students completing successfully this option will be able to

- identify and implement a class of methods and techniques to design software able to solve complex problems which, if solved by a human beings, would require "intelligence" ;
- select and apply wisely methods and techniques related to artificial intelligence such as automated reasoning, heuristic search, acquisition and knowledge representation, machine learning, and constraint satisfaction problems ;
- identify types of applications where these methods and tools can be applied; master some of these applications and their specific techniques - for example, robotics, computer vision, planning, data mining, natural language processing and bioinformatics ;
- formalize and structure body of complex knowledge using a systematic and rigorous approach to develop quality "intelligent" systems.

● Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊖ Periodic courses not taught during 2014-2015

‡ Two years course

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

**○ Compulsory courses in Artificial intelligence**

○ LINGI2262	<a href="#">Machine Learning :classification and evaluation</a>	<a href="#">Pierre Dupont</a>	30h+30h	5 Credits	2q	x	x
○ LINGI2263	<a href="#">Computational Linguistics</a>	<a href="#">Pierre Dupont, Cédric Fairon</a>	30h+15h	5 Credits	1q	x	x
○ LINGI2266	<a href="#">Advanced Algorithms for Optimization</a>	<a href="#">Pierre Schaus</a>	30h+15h	5 Credits	1q	x	x
○ LINGI2365	<a href="#">Constraint programming</a>	<a href="#">Yves Deville</a>	30h+15h	5 Credits	2q	x	x

**⊗ Elective courses in Artificial Intelligence**

The student can select 10 credits amongst

⊗ LSINF2275	<a href="#">Data mining &amp; decision making</a>	<a href="#">Marco Saerens</a>	30h+30h	5 Credits	2q	x	x
⊗ LELEC2885	<a href="#">Image processing and computer vision</a>	<a href="#">Christophe De Vleeschouwer (coord.), Laurent Jacques (compensates Christophe De Vleeschouwer), Benoît Macq</a>	30h+30h	5 Credits	1q	x	x
⊗ LGBIO2010	<a href="#">Bioinformatics</a>	<a href="#">Pierre Dupont, Michel Ghislain</a>	30h+30h	5 Credits	2q	x	x

						Year	
						1	2
⊗ LINMA1702	Applied mathematics : Optimization I	Vincent Blondel, François Glineur (compensates Vincent Blondel), François Glineur (coord.)	30h +22.5h	5 Credits	2q	x	x
⊗ LINMA1691	Discrete mathematics - Graph theory and algorithms	Vincent Blondel, Jean-Charles Delvenne (compensates Vincent Blondel)	30h +22.5h	5 Credits	1q	x	x
⊗ LINMA2111	Discrete mathematics II : Algorithms and complexity	Vincent Blondel, Jean-Charles Delvenne (compensates Vincent Blondel)	30h +22.5h	5 Credits	2q	x	x
⊗ LSTAT2320	Design of experiment.	Patrick Bogaert, Bernadette Govaerts	22.5h +7.5h	5 Credits	2q	x	x
⊗ LELEC2870	Machine Learning : regression, dimensionality reduction and data visualization	John Lee (compensates Michel Verleysen), Michel Verleysen	30h+30h	5 Credits	1q	x	x
⊗ LINMA2450	Combinatorial optimization	Jean-Charles Delvenne	30h +22.5h	5 Credits	1q	x	x
⊗ LINGI2264	Automated reasoning	N.	30h+15h	5 Credits	1q Δ	x	x



## OPTION EN INGÉNIERIE LOGICIELLE ET SYSTÈMES DE PROGRAMMATION / SOFTWARE ENGINEERING AND PROGRAMMING SYSTEMS

Students completing successfully this option will be able to

- explain the problems encountered in the conduct of large software projects, as well as the critical impact of the choice of solutions throughout their lifecycle (design, validation, documentation, communication and management involving large teams as well as costs and deadlines) ;
- select and apply methods and tools of software engineering to develop complex software systems that meet strict criteria of quality: reliability, adaptability, scalability, performance, security, usability ... ;
- model the products and processes required to obtain such systems and analyze these models ;
- develop and implement programs of analysis, conversion and optimization of computer systems ;
- use properly and wisely different paradigms and programming languages, in particular with regard to functional, object-oriented and concurrent programming ;
- be awarded of challenges of different models of concurrent and distributed programming and select the appropriate template ;
- define a new language (syntax and semantics) suitable to a specific context.

○ Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊙ Periodic courses not taught during 2014-2015

‡ Two years course

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

### ○ Compulsory courses in Software Engineering and Programming Systems

○ LSINF2224	<a href="#">Programming methods</a>	<a href="#">Charles Pecheur</a>	30h+15h	5 Credits	2q	x	x
○ LINGI2252	<a href="#">Software Engineering : Measures and Maintenance</a>	<a href="#">Kim Mens</a>	30h+15h	5 Credits	1q	x	x
○ LSINF2345	<a href="#">Languages and algorithms for distributed applications</a>	<a href="#">Peter Van Roy</a>	30h+15h	5 Credits	2q	x	x
○ LINGI2251	<a href="#">Software engineering: development methods</a>	<a href="#">Charles Pecheur</a>	30h+30h	5 Credits	2q	x	x

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

*The student can select 10 credits amongst*

⊗ LSINF2335	<a href="#">Programming paradigms : theory, practice and applications</a>	<a href="#">Kim Mens</a>	30h+15h	5 Credits	2q	x	x
⊗ LSINF2382	<a href="#">Computer supported collaborative work</a>	<a href="#">Jean Vanderdonckt</a>	30h+15h	5 Credits	2q	x	x
⊗ LINGI2143	<a href="#">Concurrent systems : models and analysis</a>	<a href="#">Charles Pecheur</a>	30h+15h	5 Credits	1q	x	x
⊗ LINGI2264	<a href="#">Automated reasoning</a>	N.	30h+15h	5 Credits	1q △	x	x
⊗ LINGI2365	<a href="#">Constraint programming</a>	<a href="#">Yves Deville</a>	30h+15h	5 Credits	2q	x	x
⊗ LINMA2111	<a href="#">Discrete mathematics II : Algorithms and complexity</a>	<a href="#">Vincent Blondel, Jean-Charles Delvenne (compensates Vincent Blondel)</a>	30h +22.5h	5 Credits	2q	x	x
⊗ LINGI2355	<a href="#">Software requirements &amp; architecture</a>	N.	30h+15h	5 Credits	2q △	x	x
⊗ LINGI2339	<a href="#">Abstract interpretation</a>	<a href="#">Baudouin Le Charlier</a>	30h+15h	5 Credits	1q ⊙	x	x
⊗ LINGI2347	<a href="#">Computer system security</a>	<a href="#">Gildas Avoine, Marco Canini (compensates Gildas Avoine)</a>	30h+15h	5 Credits	2q	x	x

## NETWORKING AND SECURITY

This option may not be validated with the options "Cryptography and information security" or "Communication networks". Students are nonetheless allowed to select elective courses in these options.

Students completing successfully this option will be able to

- explain the processes and protocols used in computer networks ;
- design, configure and manage computer networks taking into account the application needs ;
- identify the main categories of distributed and parallel applications, the problems occurring with these application and propose solutions ;
- implement distributed applications selecting appropriate tools and techniques ;
- be awarded and explain the main features of distributed systems: parallelism, synchronization, communication, fault and threat models ;
- select and use suitable technics, algorithms and languages to design, model and analyze distributed applications ;
- implement and use efficiently techniques (cryptography, protocols, ...) to secure networks and distributed applications.

● Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊖ Periodic courses not taught during 2014-2015

⊞ Two years course

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

### ● Compulsory courses in Networking and Security

● LINGI2142	<a href="#">Computer networks: configuration and management</a>	<a href="#">Olivier Bonaventure</a>	30h+30h	5 Credits	2q	x	x
● LINGI2143	<a href="#">Concurrent systems : models and analysis</a>	<a href="#">Charles Pecheur</a>	30h+15h	5 Credits	1q	x	x
● LINGI2145	<a href="#">Cloud Computing</a>	<a href="#">Marco Canini</a>	30h+15h	5 Credits	1q	x	x
● LINGI2347	<a href="#">Computer system security</a>	<a href="#">Gildas Avoine, Marco Canini (compensates Gildas Avoine)</a>	30h+15h	5 Credits	2q	x	x

### ⊗ Elective courses in Networking and Security

*The student can select 10 credits amongst*

⊗ LINGI2315	<a href="#">Design of Embedded and real-time systems</a>	<a href="#">Jean-Didier Legat</a>	30h+30h	5 Credits	2q	x	x
⊗ LINGI2348	<a href="#">Information theory and coding</a>	<a href="#">Jérôme Louveaux, Benoît Macq (coord.), Olivier Pereira</a>	30h+15h	5 Credits	2q	x	x
⊗ LSINF2345	<a href="#">Languages and algorithms for distributed applications</a>	<a href="#">Peter Van Roy</a>	30h+15h	5 Credits	2q	x	x
⊗ LMAT2450	<a href="#">Cryptography</a>	<a href="#">Olivier Pereira</a>	30h+15h	5 Credits	1q	x	x
⊗ LINMA2470	<a href="#">Discrete stochastic models</a>	<a href="#">Philippe Chevalier</a>	30h +22.5h	5 Credits	2q	x	x
⊗ LINGI2144	<a href="#">Secured systems engineering</a>	<a href="#">Gildas Avoine</a>	30h+15h	5 Credits	1q	x	x
⊗ LINGI2146	<a href="#">Mobile and Embedded Computing</a>	<a href="#">Ramin Sadre</a>	30h+30h	6 Credits	2q	x	x

**OPTION EN INFORMATIQUE ET MATHÉMATIQUES APPLIQUÉES**

Students completing successfully this option will be able to

- apprehend engineering fields requiring a synergy between applied mathematics and computer science, such as algorithms, scientific computing, modeling of computer systems, optimization, machine learning and data mining ;
- apply wisely methods and techniques within advanced algorithms such as optimization methods, constraint programming, algorithmic graph, numerical or algorithmic analysis and design of algorithms ;
- identify and implement models and techniques relevant to statistics, machine learning and data mining; understand classes of applications such as the treatment of noisy data, pattern recognition or automatic information extraction in large data collections.

○ Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊙ Periodic courses not taught during 2014-2015

‡ Two years course

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

**○ Compulsory courses in computing and applied mathematics**

○ LINMA2710	Numerical algorithms	Paul Van Dooren	30h +22.5h	5 Credits	2q	x	x
○ LINMA2111	Discrete mathematics II : Algorithms and complexity	Vincent Blondel, Jean-Charles Delvenne (compensates Vincent Blondel)	30h +22.5h	5 Credits	2q	x	x
○ LINMA1702	Applied mathematics : Optimization I	Vincent Blondel, François Glineur (compensates Vincent Blondel), François Glineur (coord.)	30h +22.5h	5 Credits	2q	x	x
○ LINGI2365	Constraint programming	Yves Deville	30h+15h	5 Credits	2q	x	x

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

The student can select 10 credits amongst

⊗ LINMA1170	Numerical analysis	Pierre-Antoine Absil, Paul Van Dooren (coord.)	30h +22.5h	5 Credits	1q	x	x
⊗ LINMA1691	Discrete mathematics - Graph theory and algorithms	Vincent Blondel, Jean-Charles Delvenne (compensates Vincent Blondel)	30h +22.5h	5 Credits	1q	x	x
⊗ LINMA2450	Combinatorial optimization	Jean-Charles Delvenne	30h +22.5h	5 Credits	1q	x	x
⊗ LINMA2470	Discrete stochastic models	Philippe Chevalier	30h +22.5h	5 Credits	2q	x	x
⊗ LINMA2471	Optimization models and methods	François Glineur	30h +22.5h	5 Credits	1q	x	x
⊗ LMAT2450	Cryptography	Olivier Pereira	30h+15h	5 Credits	1q	x	x
⊗ LINGI2262	Machine Learning :classification and evaluation	Pierre Dupont	30h+30h	5 Credits	2q	x	x
⊗ LINGE1222	Multivariate Statistical Analysis	Johan Segers	30h+15h	4 Credits	2q	x	x
⊗ LSTAT2020	Statistical computing	Céline Bugli	20h+20h	6 Credits	1q	x	x
⊗ LSINF2275	Data mining & decision making	Marco Saerens	30h+30h	5 Credits	2q	x	x
⊗ LSINF2224	Programming methods	Charles Pecheur	30h+15h	5 Credits	2q	x	x
⊗ LINGI2339	Abstract interpretation	Baudouin Le Charlier	30h+15h	5 Credits	1q ⊙	x	x
⊗ LINGI2348	Information theory and coding	Jérôme Louveaux, Benoît Macq (coord.), Olivier Pereira	30h+15h	5 Credits	2q	x	x
⊗ LINGI2143	Concurrent systems : models and analysis	Charles Pecheur	30h+15h	5 Credits	1q	x	x

						Year	
						1	2
⊗ LMECA2300	Advanced Numerical Methods	Christophe Craeye, Jonathan Lambrechts, Vincent Legat, Vincent Legat (compensates Jean-François Remacle), Jean-François Remacle	30h+30h	5 Credits	2q	x	x
⊗ LMECA2170	Numerical Geometry	Vincent Legat, Vincent Legat (compensates Jean-François Remacle), Jean-François Remacle	30h+30h	5 Credits	1q	x	x

**BUSINESS RISKS AND OPPORTUNITIES**

This option is not open to students who selected the option "launching of small and medium-sized companies".

This option is not available in English.

The purpose of this option is to familiarize the engineer student with the basic principles of business management.

● Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊖ Periodic courses not taught during 2014-2015

⊞ Two years course

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	<a href="#">Elements of law for industry and research</a>	<a href="#">Fernand De Visscher, Werner Derijcke, Bénédicte Inghels</a>	30h	3 Credits	1q	x	x
⊗ LFSA2230	<a href="#">Introduction to management and to business economics</a>	<a href="#">Benoît Gailly</a>	30h+15h	4 Credits	2q	x	x
⊗ LFSA1290	<a href="#">Introduction to financial and accounting management</a>	<a href="#">Thomas Lambert (compensates Gerrit Sarens), Gerrit Sarens</a>	30h+15h	4 Credits	2q	x	x
⊗ LFSA2202	<a href="#">Ethics and ICT</a>	<a href="#">Maxime Lambrecht, Olivier Pereira</a>	30h	3 Credits	2q	x	x
⊗ LFSA2245	<a href="#">Environment and Business</a>	<a href="#">Thierry Bréchet</a>	30h	3 Credits	1q	x	x
⊗ LFSA2210	<a href="#">Organisation and human resources</a>	<a href="#">John Cultiaux</a>	30h	3 Credits	1q	x	x

**⊗ Alternative to the "Business risks and opportunities" for computer science students**

Computer science students who have already followed various courses of this discipline during their Bachelor's curriculum can select between 16 and 20 credits in the program "mineure en gestion pour les sciences informatiques" <http://www.uclouvain.be/xprog-2013-min-lgesc100i>

## OPTION INTERFACULTAIRE EN CRÉATION DE PETITES ET MOYENNES ENTREPRISES

This option is not open to students who selected the option "Business risks and opportunities".

This option is not available in English.

The purpose of this option is to familiarize the engineer student with the specificities of SMEs, entrepreneurship and creation to develop the skills, knowledge and tools needed to create business. Access is restricted to a limited number of students; selection is performed on the basis of a motivation letter and individual interviews.

Application should be submitted before the beginning of the academic year of Master1 at:

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

Selected students will perform their master's thesis in the domain of business creation.

● Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊖ Periodic courses not taught during 2014-2015

‡ Two years course

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

De 20 à 25 credits parmi

Year

1 2

### ● Compulsory courses

● LCPME2001	<a href="#">Entrepreneurship Theory (in French)</a>	<a href="#">Frank Janssen</a>	30h+20h	5 Credits	1q	x	
● LCPME2003	<a href="#">Business plan of the creation of a company (in French)</a>	<a href="#">Frank Janssen</a>	30h+15h	5 Credits	2q		x
● LCPME2002	<a href="#">Managerial, legal and economic aspects of the creation of a company (in French)</a>	<a href="#">Régis Coeurderoy, Yves De Cordt</a>	30h+15h	5 Credits	1q	x	x
● LCPME2004	<a href="#">Advanced seminar on Entrepreneurship (in French)</a>	<a href="#">Frank Janssen</a>	30h+15h	5 Credits	2q	x	x

### ⊗ Prerequisite CPME course

Students who have not taken a management course within their former curriculum shall include LCPME2000 in their current curriculum.

● LCPME2000	<a href="#">Venture creation financement and management I</a>	<a href="#">Régis Coeurderoy, Olivier Giacomini, Paul Vanzeveren</a>	30h+15h	5 Credits	1 + 2q	x	
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**COURS AU CHOIX EN SCIENCES INFORMATIQUES**

● Mandatory

△ Courses not taught during 2014-2015

⊕ Periodic courses taught during 2014-2015

⊗ Optional

⊖ Periodic courses not taught during 2014-2015

‡ Two years course

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

						Year	
						1	2
⊗ LFSA2351A	Group dynamics	Piotr Sobieski (coord.)	15h+30h	3 Credits	1q	x	x
⊗ LFSA2351B	Group dynamics	Piotr Sobieski (coord.)	15h+30h	3 Credits	2q	x	x
⊗ LFSA2202	Ethics and ICT	Maxime Lambrecht, Olivier Pereira	30h	3 Credits	2q	x	x
⊗ LINGI2325	Graphic systems and applications	N.	30h+15h	5 Credits	2q △	x	x

**⊗ Company training periods (10 credits)**

Students may include in their curriculum a company training period worth 10 credits. However, if this activity is related to their final thesis, they shall choose the 5-credit LFSA 2996 course.

Students may include in their curriculum a company training period worth 10 credits. However, if this activity is related to their final thesis, they shall choose the 5-credit FSA 2996 course.

⊗ LFSA2995	Company Internship	Claude Oestges	30h	10 Credits		x	x
⊗ LFSA2996	Company Internship	N.		5 Credits		x	x

**⊗ Advanced courses**

Students should note that any course appearing in the options of their Master -s, but not selected as such, remains a possible elective.

Students should note that any course appearing in the options of their Master -s, but not selected as such, remains a possible elective.

**⊗ Short term exchanges**

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

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

**⊗ General knowledge courses**

Students can also include in their curriculum any course given at UCL, KULeuven or Von Karman Institute subject to approval of the program committee.

Students can also include in their curriculum any course given at UCL or FIW / KULeuven subject to approval of the Diploma committee.

⊗ LMECA2645	Major technological hazards in industrial activity.	Denis Dochain, Alexis Dutrieux	30h	3 Credits	2q	x	x
⊗ LDROP2063	Environmental Law	Nicolas de Sadeleer, Damien Jans	30h	5 Credits	2q	x	x
⊗ LECGE1223	Production and Operations Management	Pierre Semal	30h	4 Credits	1q	x	x
⊗ LELEC2811	Instrumentation and sensors	David Bol, Laurent Francis	30h+30h	5 Credits	1q	x	x
⊗ LINMA2671	Automatic : Theory and implementation	Julien Hendrickx	30h+30h	5 Credits	1q	x	x
⊗ LMAPR2018	Rheometry and Polymer Processing	Christian Bailly, Evelyne Van Ruymbeke	30h +22.5h	5 Credits	2q	x	x
⊗ LMAPR2510	Mathematical ecology	Eric Deleersnijder, Emmanuel Hanert, Thierry Van Effelterre	30h +22.5h	5 Credits	2q	x	x
⊗ LMAPR2648	Sustainable treatment of industrial and domestic waste: Case studies	Spyridon Agathos, Damien Debecker, Olivier Françoisse, Patricia Luis Alconero, Olivier Noiset	30h+15h	5 Credits	1q	x	x
⊗ LPHY2150	Physique et dynamique de l'atmosphère et de l'océan I	Michel Crucifix, Thierry Fichet	45h+9h	6 Credits	1q	x	x

						Year	
						1	2
⌘ LPHY2153	Introduction à la physique du système climatique et à sa modélisation	Hugues Goosse (compensates Jean-Pascal van Ypersele de Strihou), Hugues Goosse, Jean-Pascal van Ypersele de Strihou	30h+15h	5 Credits	1q	x	x

### ⌘ Languages

Students may include in their electives any language course of the Institute of Modern Languages (ILV) for a maximum of 3 credits within the 120 basic credits of their Masters. Their attention is drawn to the following professional insertion seminars:

Students may include in their electives any language course of the Institute of Modern Languages (ILV) for a maximum of 3 credits within the 120 basic credits of their Master?s. Their attention is drawn to the following professional insertion seminars:

⌘ 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, Marie-Laurence Lambrecht	30h	3 Credits	1 ou 2q	x	x
⌘ 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	Professional development seminar - Spanish	Isabel Baeza Varela, Carmen Vallejo Villamor	30h	3 Credits	1 ou 2q	x	x
⌘ LESPA2601	Professional development seminar- Spanish	Paula Lorente Fernandez (coord.)	30h	5 Credits	1q	x	x



## 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 Louvain School of Engineering, 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 Louvain School of Engineering can impose to the student a volume of complementary courses. For some students, the Louvain School of Engineering may propose a one-year bridging programme giving access to the master.

- [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
<b>UCL Bachelors</b>			
<a href="#">Bachelor in Computer Science</a>		Direct access	
<a href="#">Bachelor in Economics and Management</a> <a href="#">Bachelor in Mathematics</a> <a href="#">Bachelor in Engineering : Architecture</a>	Minor in computer science	Access with additional training	If the student didn't yet succeed in equivalent courses, he must add to his program LINGI1101 - LINGI1122 - LINGI1123 - LINGI1271. Those courses may stand in for elective courses of the master program for a maximum of 15 credits.  If required the 5 last credits will be add to 120 basic credits of the program.
<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 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 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 School of Engineering can impose to the student a volume of complementary courses. For some students, the School of Engineering may propose a one-year bridging programme giving access to the master.

## Non university Bachelors

Diploma	Access	Remarks
> Find out more about <a href="#">links</a> 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 Louvain School of Engineering can impose to the student a volume of complementary courses. For some students, the School of Engineering may propose a one-year bridging programme giving access to the master.		
For certain categories of students (for example, students with a bachelor degree in computer science and management), the Louvain School of Engineering can impose an additional preparatory year before granting access to this master's programme.		
> BA en sciences industrielles - type long	Accès au master moyennant réussite d'une année préparatoire de max. 60 crédits	Type long
> BA en informatique de gestion > BA en informatique et systèmes	Accès au master moyennant réussite d'une année préparatoire de max. 60 crédits	Type court
> Spécialisation en informatique médicale	Accès direct au master moyennant ajout éventuel de 15 crédits max	Type court

## Holders of a 2nd cycle University degree

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

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

Diploma	Access	Remarks
> Find out more about <a href="#">links</a> 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

## 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.

## Personalized access

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

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## Admission and Enrolment Procedures for general registration

Specific procedures :

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 Louvain School of Engineering, 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 Louvain School of Engineering can impose to the student a volume of complementary courses. For some students, the Louvain School of Engineering may propose a one-year bridging programme giving access to the master.

## Teaching method

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### Active learning and soft skills

You will play an active role in your training. The pedagogical approach is a well-balanced mix of lectures, exercises, projects to be carried alone or in a group. The teaching methods vary. At times, you will be led to discover the concepts and techniques independently, the teaching team is then seen as a resource rather than your disposal to support your learning. At other times, teaching is more transmissive and provides the necessary keys to perform later practical tasks.

An important place is reserved for non-technical skills (autonomy, organizational skills, time management, communication, etc.). In particular, by putting an emphasis on project activities (including a large-scale project putting the students in a semi-professional situation), the pedagogical approach develops in the students a critical mind capable of designing, modelling, implementing, maintaining and validating complex computing systems.

### Foreign languages

Globalisation imposes on any society to open its doors towards foreign markets. Moreover, English is by far the most commonly used language in computer science. The use of English during the entire curriculum allows students to develop their mastery of the English language, which will ease their integration in foreign universities and companies. All course material and supervision are in English but the student can always ask questions or answer his exams in French if desired.

Moreover, the programme allows for attending language courses at the university's Language Institute ( [ILV](#) ) and for taking part in foreign exchange programmes.

### Interdisciplinarity

Computer scientist, especially with a master degree, will be brought during his career to project and team management, and he will be concerned by the complex socio-economic context in which computer applications belong. It's therefore suggested to open your training to other disciplines through elective courses or options such as the option in "management" or "creation of small and medium-sized enterprises."

## Evaluation

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

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

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### Outgoing students

The Louvain School of Engineering (EPL) participates since their inception in the various existing mobility programmes at the European as well as worldwide levels.

The students' interest in internationalisation and mobility is aroused as of the end of their bachelor programmes, notably through the existence of intensive study programmes such as the [ATHENS](#) or [BEST](#) networks. These networks are also accessible in the master programme and allow the students to get a first contact with international mobility.

In addition, in the context of the Erasmus and Mercator exchange programmes, students have the possibility of performing an extended stay of typically 5 months (first semester of the second master year) at a partner university. To this extent, the Louvain School of Engineering (EPL) participates in several networks.

- In Belgium, 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.
- At the European level, EPL was particularly involved in the [CLUSTER](#). CLUSTER provides a guarantee of quality, both in terms of education and in terms of hosting for exchange students. Moreover, the CLUSTER partners have signed a convention of mutual recognition of their bachelor programmes. This convention implies that all bachelors of the CLUSTER institutions benefit, in each institution of the network, of the same accessibility conditions to the masters as the local students.
- Outside of Europe, EPL is a partner of the [Magalhães](#) network which associates fifteen European universities with the best universities in science and technology of Latin America.

Alongside these network partnerships, the Louvain School of Engineering has also signed a number of individual agreements with various universities in Europe, in 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 master agreements have been set up and allow, after two years of master (one at UCL, the other in a host university), to obtain engineering degrees from both universities. In computer science engineering, such agreements have been established with UPC (Barcelona, Spain) and Grenoble (France). Others are currently being negotiated.

The students are informed about the various exchange programmes at the start of their second bachelor year. They are invited to prepare in time, especially at the linguistic level, through the courses of UCL's Language Institute (ILV).

Beyond exchange programmes, an internship may be conducted in a research laboratory or in an enterprise abroad.

More information about [mobility programmes](#) .

### Incoming students

In the context of the Cluster network, foreign students benefit at UCL from exactly the same status and conditions as local students, which facilitates Erasmus exchanges for students coming from institutes in this network.

The whole programme is offered in English and can be followed without prior knowledge of French, except for the options in biomedical engineering, management and creation of small and medium-sized enterprises. All courses, but a few exceptions, are given in English. For non-French-speaking 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.

More information about [mobility programmes](#) .

## 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 Managment

Entite de la structure INFO

Acronyme	<b>INFO</b>
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 ( <a href="#">SST</a> )
Faculté	Ecole Polytechnique de Louvain ( <a href="#">EPL</a> )
Commission de programme	Commission de programme - Sciences informatiques et ingénieur civil en informatique ( <a href="#">INFO</a> )

**Academic Supervisor** : [Kim MENS](#)

### Jury

Président du Jury : **Jean-Didier LEGAT**

Secrétaire du Jury : **Pierre SCHAUS**

### Usefull Contacts

Conseillère aux études : **Chantal PONCIN**

