



INFO2M

2023 - 2024

INFO2M - Introduction

Introduction

Introduction

This Master's degree programme strikes a balance between "soft skills" and scientific/technical skills as well as between high quality research and practical field work. It offers

- the study of computer science based on fundamental concepts, the value of which goes beyond rapidly evolving technology;
- a programme taught entirely in English to improve students' language skills (technical written and spoken English);
- exchange programs and dual degrees in Belgium, Europe and throughout the world.

As with the Bachelor's degree in civil engineering, this programme seeks to train well-rounded engineers by offering majors in related disciplines such as applied math, or electronics and communication.

Your profile

You would like to

- **imagine, design and implement** computer systems that will shape the future;
- **focus on computer science and engineering** after having studied science and technology (math, mechanics, electricity, chemistry, etc.) as an undergraduate student;
- improve your **theoretical knowledge** and develop technical skills;
- increase your **interdisciplinary knowledge** in areas such as foreign languages, resource management, teamwork, autonomy and ethics;
- expand your training to include management and small and medium sized business creation;
- take advantage of a programme taught entirely in **English**.

Your future job

We train

- **scientists** who know how to investigate a sharp problematic using scientific literature in the field;
- **professionals** who will design information systems that correspond to user needs;
- **innovators** who can master a wide range of technology and record its progress;
- **specialists** capable of implementing software solutions with particular attention to product quality and the development process.

Your programme

This Master's degree consists of:

- a **compulsory part** providing the knowledge necessary to model and design complex applications
- a major of your choice that allows you to acquire cutting edge knowledge in an area of interest
- at the heart of computer sciences: **artificial intelligence, computer networks, cryptography and information security, software engineering, and system programming;**
- at the frontier with other engineering sciences: **communication networks, applied mathematics and data science, biomedical engineering, and bioinformatics**

INFO2M - Teaching profile

Learning outcomes

Designers and developers of tomorrow's computer systems are confronted with two major challenges:

- computer systems that are increasingly complex
- areas of application that are increasingly varied

To meet these challenges, the future Master's degree holder in computer science must:

- master current computer science technologies but also manage and ascertain their progress,
- innovate by integrating elements linked to artificial intelligence, software engineering and security networks into computer systems,
- work as a member of an multidisciplinary team and act as an interface between the development team and other participants involved in the scientific or technical issues of the project.

The future computer science engineer will acquire the skills and knowledge necessary to become:

- a professional engineer capable of integrating several scientific and technical disciplines in the area of information technology
- an individual with field experience, capable of putting his/her knowledge into practice and use ever evolving high performance tools (both in research and technology)
- a specialist having acquired cutting edge knowledge in his/her field of study, for example artificial intelligence, security networks, software engineering and programming systems
- a manager who manages team projects

Polytechnic and multidisciplinary, the training offered by the Louvain School of Engineering (EPL) emphasises a combination of theory and practice open to computer science in all its dimensions (analysis, design, development, implementation, maintenance, research and innovation) including those pertaining to ethics.

International possibilities:

English is the most widely used language in companies particularly those in the technical sector. This Master's degree programme is thus taught in English and provides its participants with the opportunity to acquire solid oral and written English language skills. Offering a Master's degree in English, is proof of our international status. The use of English allows us to welcome international students all the while allowing these students to be immersed in a francophone environment. It also includes exchange programs and dual diplomas with foreign universities.

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

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

1.1. Confronted with a computer science problem, diploma holders **can identify concepts, algorithms, and applicable data structures** to find a solution and can break the problem down into its component parts in order to formulate computer-based problem solving methods.

1.2. Confronted with a problem in their field of study, diploma holders can **choose the proper problem solving tools** (for example, development environment, programming language, software and software packages) that will allow them to find the correct software solution to the problem in question.

1.3. Confronted with the results obtained through reasoning as well as the use of tools and concepts, diploma holders are able to step back and ascertain the relevance and the quality of their results. To do so, diploma holders develop tests and relevant checks to **ensure they have developed quality solutions**.

2. organise and **develop a computer system** that meets the complex needs of a client

2.1. Before working on a solution, **graduates explore and analyse all aspects of a problem** using the documentation at their disposal

- 3.1. Confronted with a new computer problem, graduates will **explore** the area in question and obtain the necessary information to **complete a situational analysis** using the various resources at their disposal (library, Internet, researchers, industry experts)
- 3.2. In the graduation project (possibly paired with a company internship) on a new problem, graduates **construct a model** of the underlying phenomenon from a computer science perspective. On the basis of this model, **graduates formulate and test different computer devices capable of solving the problem in question** (for example, computerised processing of an image by a scanner to facilitate medical diagnosis)
- 3.3. Once in possession of the experimental results, graduates summarise their conclusions in a report, where they also discuss **how key variables influenced the behaviour of the phenomenon being studied**. Based on their results, graduates will make recommendations about how to **develop and implement innovative technical solutions** for the problems in question.
4. Participate in a group project
- 4.1. As a member of a team project, graduates will collaborate to study a problem and its context with the goal of itemising its different parts, issues and constraints. They will then collaborate **to draft a specifications note reiterating the key elements of the project framework**: problem and solution, objectives and performance indicators, risks, deadlines, resource limits, etc.
- 4.2. Once the project framework is defined, graduates **collaborate on a plan of action**. The team agrees to work collectively on a work schedule, the intermediary steps, the division of labour and project deadlines.
- 4.3. Team members share their knowledge and skills **to solve problems collectively** that are raised over the course of the project whether they are technical or not. Graduates are able to step back when necessary to overcome team difficulties or conflicts:
- 4.4. Mindful of the commitments made during the course of the project, graduates alert their teammates about decisions that need to be made in the event of a problem. Through steering committee meetings, graduates **make the necessary decisions** to organise or reorganise project objectives.
5. Communicate effectively orally and in writing with the goal of carrying out projects (in particular in English)
- 5.1. Faced with a computer development project, graduates are able to identify and question the relevant actors. **Through their exchanges with those involved in the project, graduates assess the project environment and relevant issues**, which requires them to specify their needs, expectations and limits in a specifications note while keeping in mind system functionalities as well as the conditions for use (interfaces with other applications, maintenance, progress, etc.)
- 5.2. By communicating, **graduates take into account the fact that their interlocutors have not necessarily mastered the language of computers** and do not have the same idea of the issues and solutions envisaged by computer science.
- 5.3. In certain critical phases of a project, there are collective choices to be made. To facilitate decision making, the graduate must **be capable of providing his/her interlocutors with a summary of the situation and its issues**. To this end, he/she is capable of communicating necessary information by using schemas or graphs of the computer system.
- 5.4. Graduates know how to use reference materials or computer language or software manuals in both English and French. They **understand technical reports written in English**.
- 5.5. During the development of a computer application, graduates **can ensure the tracking and documentation in a concise and precise language**: specifications note, software structures and their related data, operating modes. Graduates are also capable of drafting summary reports that describe their design and technology choices.
6. Demonstrate autonomy, rigor, openness, critical thinking as well as a sense of ethics when doing your job
- 6.1. In their fields of study, students **master the technical vocabulary and usage standards** that allow them to easily understand a scientific article or technical document or to communicate with specialists in their field.
- 6.2. Graduates will take into account the socio-economic aspects of a project in the specifications note, in particular the compatibility between technological progress and ethical standards
- 6.3. Regarding the development of an application that meets an industrial challenge or provides an important service (for example ambulance management), **graduates will ensure the robustness and feasibility** of the application for its users.
- 6.4. Confronted with a new problem, **graduates autonomously acquire and use information and computer tools that they need to solve the problem** even if they have not explicitly learned about them during their coursework.

Programme structure

The Master's degree programme consists of four parts:

- Core curriculum, focused on the graduation project (35 credits)
- Required final specialisation, mandatory training (30 credits)
- One or more majors allowing you to specialize in a field of computer science (20 to 55 credits)
- Elective courses (0 to 55 credits)

The graduation project is normally completed in the last annual block. Regarding required and elective courses, students may (depending on their major) take these courses in the 1st or 2nd year as long as they have completed the course prerequisites. This is particularly the case for students who completed part of their education abroad. The yearly distribution of activities as outlined in the detailed programme is subject to change.




Furthermore, students have the opportunity to broaden their education by enrolling in non-technical elective courses if they have a clear objective in mind.

INFO2M Programme

**MAJORS FOR THE MASTER'S DEGREE IN COMPUTER SCIENCE AND
ENGINEERING**

Students have to choose one or several options among:

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

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



MAJOR IN SOFTWARE ENGINEERING AND PROGRAMMING SYSTEMS

Student completing the major in Software Engineering and Programming Systems will be able to: Understand and explain problems pertaining to large scale software projects as well as the critical impact of their solutions throughout the duration of the project (construction scope, validation, documentation, communication and large scale project management as well as expense limits and deadlines). Choose and apply engineering methods and tools related to complex software systems to meet strict quality control criteria: reliability, adaptability, upgradeability, performance, security, usability), Model products and processes necessary to obtain such systems and analyse the models in question, Design and create programmes to analyse, convert and optimise computer performance, Put to good use different programming language paradigms, in particular those that deal with competing functional and object oriented programmes, Understand the issues associated with different competing programming models and use the appropriate model, Define a new language (syntax and semantics) appropriate to a specific context.

- Mandatory
- ✘ Optional
- △ Not offered in 2023-2024
- Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

Students shall select 20 to 30 credits among

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

OPTION EN CRYPTOGRAPHY AND INFORMATION SECURITY

This major is available only to students who majored or minored in Electricity during their Bachelor's degree programme. Students completing the major Communication Networks will be able to: Understand and use different devices and protocols used in fixed and

MAJOR IN BIOMEDICAL ENGINEERING

This major is available only to students who minored in biomedical engineering. The objective of the biomedical engineering major is to train engineers in scientific and technical fields related to biomedical engineering, as well as other biomedical engineering fields such as bioinformatics, artificial organs and rehabilitation and biomechanics. The School of Medicine provides an interdisciplinary curriculum where engineering and medicine meet.

programme. The challenges in the field of bioinformatics include biological modelling, and the School of Medicine provides an interdisciplinary curriculum where engineering and medicine meet.

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see details

Students shall select 20 to 30 credits among:

Year

1 2

Content:

Required courses in biomedical engineering

Course Code	Course Name	Credits	Language	Open to incoming exchange students	Not open to incoming exchange students	Year 1	Year 2
⊗ LGBIO2010	Bioinformatics	5	English	Yes	No	X	X
⊗ LGBIO2020	...	5	English	Yes	No		

OPTION NETWORKS AND SYSTEMS

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

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

○ Mandatory

⊗ Optional

△ Not offered in 2023-2024

⊙ Not offered in 2023-2024 but offered the following year

⊕ Offered in 2023-2024 but not the following year

△ ⊕ Not offered in 2023-2024 or the following year

■ Activity with requisites

🌐 Open to incoming exchange students

🚫 Not open to incoming exchange students

(FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

Students shall select 20 to 30 credits among:

Year

1 2

o Content:

o Required courses in Networks and systems

○ LINFO2142

Computer networks: configuration and management

Olivier Bonaventure

⌘ MLSMM2134	e-Consumer Behavior 🟡	
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MAJOR IN INTERDISCIPLINARY PROGRAM IN ENTREPRENEURSHIP - INEO

Commune à la plupart des masters de l'EPL, cette option a pour objectif de familiariser l'étudiant-e avec les spécificités de l'entrepreneuriat et de la création d'entreprise afin de développer chez lui les aptitudes, connaissances et outils nécessaires à la création d'entreprise.

Cette option rassemble des étudiants de différentes facultés en équipes interdisciplinaires afin de créer un projet entrepreneurial. La formation interdisciplinaire en entrepreneuriat (INEO) est une option qui s'étend sur 2 ans et s'intègre dans plus de 30 Masters de 9 facultés/écoles de l'UCLouvain. Le choix de l'option INEO implique la réalisation d'un mémoire interfacultaire (en équipe) portant sur un projet de création d'entreprise. L'accès à cette option, ainsi qu'à chacun des cours, est limité aux étudiant-es sélectionnés sur dossier. Toutes les informations sur <https://uclouvain.be/fr/etudier/ineo> (<https://uclouvain.be/fr/etudier/ineo>).

L'étudiant.e qui choisit de valider cette option doit sélectionner au minimum 20 crédits et au maximum 25 crédits. Cette option n'est pas accessible en anglais et ne peut être prise simultanément avec l'option « Enjeux de l'entreprise ».

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- ⊗ Open to incoming exchange students
- ⊗ Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

Content:

Required courses

○ LINEO2001

INFO2M - Information

Access Requirements

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

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

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

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

SUMMARY

- > [General access requirements](#)
- > [Specific access requirements](#)
- > [University Bachelors](#)
- > [Non university Bachelors](#)
- > [Holders of a 2nd cycle University degree](#)
- > [Access based on validation of professional experience](#)
- > [Access based on application](#)
- > [Admission and Enrolment Procedures for general registration](#)

Specific access requirements

This programme is taught in English with no prerequisite in French. A certificate is required for the holders of a non-Belgian degree, see selection criteria of the "access on the file".

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor in Engineering		Direct access	Students who have neither major nor minor in the field of their civil engineering Master's degree may have an adapted master programme.
Others Bachelors of the French speaking Community of Belgium			
Bachelor in Engineering		Direct access	Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil engineering master degree may have an adapted master programme.
Bachelors of the Dutch speaking Community of Belgium			
Bachelor in Engineering		Access with additional training	Students who have no specialisation in the field of their civil engineering master degree may have an adapted master programme with up to 60 additional credits.
Foreign Bachelors			
Bachelor in Engineering	Bachelor degree of Cluster Institution	Direct access	Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil engineering master degree may have an adapted master programme.

-	For others institutions	Access based on application	See Personalized Access
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Non university Bachelors

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

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			

Masters		Direct access	
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Access based on validation of professional experience

> It is possible, under certain conditions, to use one's personal and professional experience to enter a university course without having the required qualifications. However, validation of prior experience does not automatically apply to all courses. Find out more about [Validation of priori experience](#).

Access based on application

Access based on application : access may be granted either directly or on the condition of completing additional courses of a maximum of 60 ECTS credits, or refused.

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

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

Admission and Enrolment Procedures for general registration

Teaching method

Active teaching strategies and non-technical skills

The teaching methods used in the Master's degree programme in civil engineering are consistent with those of the Bachelor's degree programme in engineering sciences: active learning, an equal mix of group work and individual work, and emphasis on the development of non-technical skills. In particular, our pedagogy prioritises projects (including a large scale project that puts student groups in a semi-professional situation).

Students will be exposed to various teaching methods: lectures, exercise sessions, problem solving sessions, case studies, industry or research internships, group work, individual work, seminars and conferences offered by the industrial sector. This variety of teaching techniques helps students to build their knowledge in an iterative and progressive manner while at the same time develop their autonomy as well as their organisation, time management and communication skills.

Use of Foreign Languages

Globalisation demands that all societies open up to foreign markets. In addition, the main language used in computer science is English. The use of English throughout the programme allows students to develop their mastery of this language, which will facilitate their integration into universities and foreign companies. Course materials as well as educational support are in English. However, students may express themselves in French during class or evaluations. Specifically, the Master's thesis or graduation project may be written and defended in English or French.

Furthermore, the programme foresees the possibility of taking language classes at the ILV and participating in study abroad programs.

Overall, the programme is taught in English with the exception of the biomedical engineering major and the majors in management and small and medium sized business creation.

Open to other disciplines

Students are encouraged to enlarge their training to include other engineering sciences and techniques, management as well as the humanities and social sciences. In fact, over the course of their careers, computer scientists must manage (team) projects and show

- Within Europe, the EPL participates in the [CLUSTER](#) network, which provides quality training and accommodations for exchange students. Furthermore, the members of the CLUSTER network have signed an agreement that mutually recognises their Bachelor's degree programmes. This agreement means that all the Bachelor degree holders in the CLUSTER network are automatically admitted to the Master's degree programme in member institutions.
- Outside of Europe, the EPL is a member of the [Magalhães](#) network that brings together 15 European universities with the best scientific and technological universities in Latin America.

In addition to these networks and partnerships, the EPL has signed a certain number of individual agreements with different universities in Europe, North America and elsewhere in the world. The list of these agreements is available at [UCLouvain's International Relations Administration website](https://uclouvain.be/en/discover/adri.html) (<https://uclouvain.be/en/discover/adri.html>).

Joint degree programmes have also been put into place.

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

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

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

Incoming students

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

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

More information about [mobility programmes](https://uclouvain.be/en/faculties/epl/mobilite-internationale.html) (<https://uclouvain.be/en/faculties/epl/mobilite-internationale.html>).

Possible trainings at the end of the programme

Doctoral programmes

The Master's degree in civil engineering and computer science may be followed by a doctoral degree programme in engineering sciences. Doctoral degrees are offered by thematic doctoral degree granting schools.

UCLouvain Master's degrees (about 60) are accessible to UCLouvain Master's degree holders

For example:

- Different Master's degree programmes in management (automatic admission based on written application).
- The [Master \[60\] in Information and Communication](#) at Louvain-la-Neuve or the [Master \[60\] in Information and Communication](#) at Mons

Contacts

Curriculum Management

Entity

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

Academic supervisor: [Pierre Schaus](https://uclouvain.be/repertoires/pierre.schaus) (<https://uclouvain.be/repertoires/pierre.schaus>)

Jury

- Secrétaire du Jury: [Cristel Pelsser](https://uclouvain.be/repertoires/cristel.pelsser) (<https://uclouvain.be/repertoires/cristel.pelsser>)
- Président du Jury: [Claude Oestges](https://uclouvain.be/repertoires/claude.oestges) (<https://uclouvain.be/repertoires/claude.oestges>)

Useful Contact(s)

- Secrétariat: [Vanessa Maons](https://uclouvain.be/repertoires/vanessa.maons) (<https://uclouvain.be/repertoires/vanessa.maons>)

