





## 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

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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

### Detailed programme by subject

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#### *CORE COURSES [35.0]*

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- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites

Optional

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**PROFESSIONAL FOCUS [30.0]**

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

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

Year

1 2

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

○ LINFO2132	Languages and translators	Ramin Sadre	EN [q2] [30h+30h] [6 Credits] 🌐 > French-friendly	X	X
○ LINFO2172	Databases		EN [q2] [30h+30h] [6 Credits] 🌐 > French-friendly	X	X
○ LINFO2241	Architecture and performance of computer systems	Tom Barbette	EN [q1] [30h+30h] [6 Credits] 🌐 > French-friendly	X	X
○ LINFO2255	Software engineering project	Benoît Duhoux	EN [q1] [30h+30h] [6 Credits] 🌐 > French-friendly	X	X
○ LINFO2262	Machine Learning :classification and evaluation	Pierre Dupont	EN [q2] [30h+30h] [6 Credits] 🌐 > French-friendly	X	X

**OPTIONS [52.0]**





## **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,

## ***MAJOR IN DATA SCIENCE AND APPLIED MATHEMATICS***

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This major is available only to students who majored or minored in Applied Mathematics during their bachelor's degree programme. Students completing the major Computing and Applied Mathematics will be able to: Understand both applied mathematics and computing including algorithms, scientific calculations, computer system modelling, optimisation, automated learning or data



## ***OPTION EN CRYPTOGRAPHY AND INFORMATION SECURITY***

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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 wireless networks, Design, configure and manage fixed and wireless networks while taking into account application needs (including multimedia), Understand and effectively use information coding techniques, Understand and design mobile wireless communication systems from start to finish.

## MAJOR IN BIOMEDICAL ENGINEERING

This major is available only to students who minored in biomedical engineering during their Bachelor's degree programme. The objective of the biomedical engineering major is to train engineers who are capable of meeting future technological challenges in the scientific and technical fields related to biomedical engineering. This major provides students with basic knowledge about bioinformatics as well as other biomedical engineering fields such as bioinstrumentation, biomaterials, medical imaging, mathematical modelling, artificial organs and rehabilitation and biomechanics. The collaboration between the Louvain School of Management and the School of Medicine provides an interdisciplinary curriculum where engineering is applied to the complex and varied biomedical field.

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

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

Students shall select 20 to 30 credits among:

Year

1 2

### o Content:

#### o Required courses in biomedical engineering

⊗ LGBIO2010	Bioinformatics	Vincent Branders (compensates Pierre Dupont)	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2020	Bioinstrumentation	André Mouraux Dounia Mulders (compensates Michel Verleysen)	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2030	Biomaterials	Sophie Demoustier Christine Dupont	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2040	Biomechanics	Greet Kerckhofs	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2050	Medical Imaging	Greet Kerckhofs John Lee Benoît Macq	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2060	Modelling of biological systems	Hari Teja Kalidindi (compensates Philippe Lefèvre) Laurent Opsomer (compensates Philippe Lefèvre)	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2072	Mathematical models in neuroscience	Frédéric Crevecoeur	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINFO2381	Health Informatics	Sébastien Jodogne	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

## OPTION EN CYBERSECURITY

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Students who have completed the "Cybersecurity and Information Technology" track should be able to:

- Understand areas of engineering that require synergy between computer security, networks, and systems, such as cryptography, data protection, application security, security architecture, or programming,
- Comprehend and appropriately apply methods and techniques related to cybersecurity, including prevention, detection, and response to cyber threats,
- Identify and implement security practices and standards to protect the infrastructure, systems, and data of organizations,
- Apply their knowledge to real-life scenarios through projects.

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

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

*Students shall select 20 to 30 credits among:*

Year

1 2

## OPTION NETWORKS AND SYSTEMS

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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 2024-2025

○ Not offered in 2024-2025 but offered the following year

⊕ Offered in 2024-2025 but not the following year

△ ⊕ Not offered in 2024-2025 or the following year

■ Activity with requisites

🌐 Open to incoming exchange students

🚫 Not open to incoming exchange students

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## OPTION EN INFORMATIQUE MÉDICALE

Students completing the major in "Health informatics" will be able to:

- Identify and use methods and techniques that provide software-based solutions to complex problems encountered in hospitals, in bio-pharmaceutical environments, in life sciences, or in digital health.
- Take part in multidisciplinary projects bringing together medical, biological and engineering expertise to the benefit of patient health.
- Understand and put to good use the methods and techniques pertaining to medical informatics and bioinformatics, such as artificial intelligence, health interoperability, clinical knowledge structuring, applied statistics, information security, software quality, as well as the effective management and processing of large volumes of data.
- Understand specific categories of applications where these methods and techniques can be applied, such as diagnostic support, therapeutic assistance, hospital information systems, medical and biomedical imaging, smart devices, clinical trials, health data mining, as well as automated processing of the medical language.
- Formalize and structure a body of complex knowledge by using a systematic and rigorous approach to the development of high-quality medical and biomedical information systems.

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

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

Students shall select 20 to 30 credits among:

Year

1 2

### o Content:

#### o Cours obligatoires en Informatique médicale

○ LGBIO2050	Medical Imaging	Greet Kerckhofs John Lee Benoît Macq	EN
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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>.

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

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

Year

1 2

### Content:

#### Required courses

● LINEO2001	Théorie de l'entrepreneuriat	Frank Janssen	(FR) [q1] [30h+20h] [5 Credits] 🌐	x
● LINEO2002	Aspects juridiques, économiques et managériaux de la création d'entreprise			





## Course prerequisites

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There are no prerequisites between course units (CUs) for this programme, i.e. the programme activity (course unit, CU) whose learning outcomes are to be certified and the corresponding credits awarded by the jury before registration in another CU.

## The programme's courses and learning outcomes

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For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

## INFO2M - Information

### Access Requirements

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Master course admission requirements are defined by the French Community of Belgium Decree of November 21, 2015, by the French Community of Belgium of November 21, 2015.

- For others institutions [Access based on application](#) See Personalized Access

## 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

## 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](mailto:epl-admission@uclouvain.be)).

## Admission and Enrolment Procedures for general registration

## Teaching method

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### 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 an interest in the complex socio-economic context in which computer science takes place. They must dialogue with colleagues from different educational backgrounds who prioritise other aspects of a project. Thus it is imperative that students enlarge their field of vision beyond computer science.

## 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".***

Student work is evaluated according to University rules (see the rules for evaluating coursework and exams) namely written and oral exams, laboratory exams, individual or group work, public presentations of projects and theses defences. For classes taught in English, questions are in English. Students may respond in French. For classes taught in French, questions are in French. Students may ask for help translating the questions into English and respond to them in English.

Certain activities completed during the semester and supervised by a teaching team in collaboration with students do not take place outside of the class session. Thus they are not re-evaluated in a future course session.

At the beginning of the semester, professors will explain their marking scheme, which is based on the learning outcomes of the course (that it frequently shares with those of the Master's degree programme).

For more information on evaluation methods, students may consult the relevant evaluation descriptions.

To obtain a passing grade, the marks received for the teaching units are offset by their respective credits.

## Mobility and/or Internationalisation outlook

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Over the years, EPL has developed over a hundred partnerships with partners in more than 36 countries (EU and non-EU) to offer exchange programmes to its students. We also offer the possibility of obtaining Double degrees, Joint Degrees or Dual Masters in several fields. The EPL is currently participating in two Erasmus Mundus programmes: [FAME](#) and [STRAINS](#).

In addition to exchange programmes under the Erasmus+ programme, numerous agreements have been established with a wide range of universities through various partner networks such as:

- [TIME](#) network (Top Industrial Managers in Europe).
- [CLUSTER](#) network
- [Magalhães](#) network
- [Circle U](#). network through several networks and European University Alliance

So, there's no shortage of opportunities to gain an additional qualification and/or spend part of the year abroad during your two-year Master's degree! It's the perfect opportunity to discover or improve your knowledge of a foreign language, tackle subjects from a new angle and gain unique experience in Europe or the rest of the world.

If you would like more information, please visit the dedicated pages of the [EPL International Office](#) to discover all the destinations, testimonials from former students and all the procedures to follow to make these opportunities a success.

## Possible trainings at the end of the programme

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### 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

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### Curriculum Management

Entity

Structure entity

Denomination

Faculty

Sector

Acronym

Postal address

SST/EPL/INFO

[\(INFO\)](#)

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

Sciences and Technology [\(SST\)](#)

INFO

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: [Charles Pecheur](#)

Jury

- Président du Jury: [Claude Oestges](#)
- Secrétaire du Jury: [Cristel Pelsser](#)

Useful Contact(s)

- Secrétariat: [Vanessa Maons](#)

