



The version you're consulting is not definitive. This programme still may change. The final version will be published on 1th June.

**At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In English**

Dissertation/Graduation Project : **YES** - Internship : **optional**

Activities in English: **YES** - Activities in other languages : **optional**

Activities on other sites : **optional**

Main study domain : **Sciences de l'ingénieur et technologie**

Organized by: **Louvain School of Engineering (EPL)**

Programme acronym: **ELEC2M** - Francophone Certification Framework: 7

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## ELEC2M - Introduction

### Introduction

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#### Introduction

This Master's degree offers you:

- Diverse professional opportunities in the industrial sector and in the multiple applications of electricity and its related fields;
- Learning how to approach a project;
- Immersion in research laboratories and high technology;
- A large choice of majors;
- The possibility to complete a part of your coursework or internship abroad (in Europe and elsewhere in the world).

#### Your profile

You:

- have solid skills in the field of electrical sciences and are capable of seeing a job through to the end;
- Wish to develop the skills that will allow you to meet future technological challenges in the scientific and technical fields linked to electricity and its applications;
- Want to design, model, carry out and validate projects by way of experiments, devices, equipment and complex systems;
- Envisage a career in research or industry.

#### Your programme

This Master's degree offers you:

- Mastery of mathematical and physical methods related to electricity (circuits and measures, electromagnetics, physical electronics);
- Advanced education in electronics, electromagnetics, communication, information technology, mathematics and system design;
- Specialisations in electronic systems, telecommunication, microwaves, information and signal processing, biomedicine, cryptography, electronics, MEMS receptors, nanotechnology and photovoltaic techniques.

## ELEC2M - Teaching profile

### Learning outcomes

An essential challenge in the training of electrical engineers is the wide variety of elements that must be mastered, which range from knowledge about hardware and software to technology and mathematics to theoretical experiments in modern electricity and its different disciplines to the ability to use a wide variety of applications on a wide scale from small (such as micro-nano-technology) to big (such as spatial communication).

This programme offers diverse professional perspectives in a variety of industrial sectors: the design and achievement [of a project], installation, real time programming, security, marketing, the analysis of given signals from electronic systems, communication networks, information or receptors, electrical equipment used in industrial production, biomedical transport, aerospace, energy and sustainable development.

This Master's programme builds on students' existing knowledge of electricity acquired as part of their Bachelor's degree program including mathematical and physical approaches to electricity (circuits and measures, electromagnetism, physical electronics) as well as key related fields (electronics, telecommunications, signals, and electrotechnology). By the end of their Master's programme in electrical engineering (ELEC), students will have acquired (through their major coursework) in-depth knowledge of the following fields: electronics, electromagnetism, communication, information technologies, mathematics, and system design.

In addition, students may choose between a more general type of major and one that is more specialized (such as a major in a specific technological field).

In its entirety, the programme offers an introduction to industrialisation and research as well as to jobs in production and design or doctoral programmes in R&D.

This Master's programme in electrical engineering is a multipurpose training programme allowing students to acquire expertise in a wide and specialized variety of fields. Its objective is to create engineers who are capable of meeting future technological challenges in the scientific and technical fields linked to electricity and in the context of the rapidly changing circumstances of Europe and the world.

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

1. Show the mastery of a solid body of knowledge in basic and engineering sciences, permitting him/her to understand and solve problems that are raised by electricity (Axis 1)

1.1 Identify and use concepts, laws and reasoning applicable to a given problem

During the first year of studies, in the required courses for the Master's degree in ELEC, we aim for a general education through different classes dealing with the following electrical subjects:

- Methods for mathematics and physics
- Electronics
- Communication
- Signal processing
- Electrotechnology, energy and automation (EEA)
- On board computing

In the major fields of study, the courses are specific to professional fields:

- Nanotechnologies
- Electronic systems and circuits
- Electric machines and control
- Electronic security and information technology
- Communication network systems
- RF systems
- Biomedicine

1.2 Identify and use modelling and calculation tools to solve problems

- Measuring devices
- Systems of complex equations
- Calculation and simulation software (Matlab, SPICE)
- CAO software (Comsol, Synopsys, Cadence, TCAD)

1.3 Verify the plausibility and confirm the validity of results; study them closely, notably by comparing them with experimental and/or theoretical results

Verify the units of different variables and the constituent terms in model equations.

Critically compare analytical/simple/approximate solutions with those obtained by more complex numerical methods.

In the first year of studies (major/minor), classes on electrical circuits and electronics, for example, address the problem of modeling by conducting experiments or simulations and formulating simple hypotheses.

During the Master's degree programme (common core courses and coursework for the major field of study), simulation (for example: Matlab) is emphasized above all and laboratories are used to carry out projects on the justification and validation of circuit choices, technologies, programmes, protocols.

2. Organise and carry out an applied engineering process applied to the development of a product (and/or a service) corresponding to a need or a problem specific to the field of electricity (Axis 2)

2.1 Analyse a problem based on actual case studies dealt with by electrical engineers (in interdisciplinary projects) such as devices and electronic circuits and formulate corresponding specifications.

- 2.2 Model a problem and design one or several original technical solutions corresponding to the assignment specifications (i.e. analysis of existing case studies) and projects (based on new specifications).
- 2.3 Evaluate and classify solutions in light of the criteria found in the specifications, principally in the context of interdisciplinary projects and specific courses (for example MEMS design or micro-nano-manufacturing technologies).
- 2.4 Implement and test a solution in the form of a mock-up, a prototype or a numerical model in the context of achieving experimental interdisciplinary projects and for certain classes (for example, micro-nano-manufacturing technologies) as well as for numerical modeling (such as MEMS design).
- 2.5 Formulate recommendations to improve the operation of the solution under review.
3. Organize and carry out research projects in order to learn about a physical phenomenon or a new problem relating to electricity. (Axis 3)
- 3.1 When confronted with a new problem, explore the field in question by gathering necessary information through the various available resources (library, scientific articles, Internet, research assistants, industry).
- 3.2 Suggest a representative mathematical model of an underlying phenomenon and then by working either in a laboratory or via a software platform, create a device or programme that allows the experimental or virtual simulation of the system's behaviour (all the while taking influential parameters into account).
- 3.3 Write a summary report about the technical aspects of a study in a concise scientific manner; provide an overview of experimental lab results in written reports and suggest possible interpretations of the results.
4. As part of a team, carry out a multidisciplinary project keeping in mind its objectives, allocated resources and relevant constraints. (Axis 4)
- 4.1 Frame and explain project objectives taking into account the issues and constraints (emergencies, quality, resources, budget) that characterise the project.
- 4.2 Work collectively to create a project schedule and to determine team member roles in order to successfully carry out the project. This may include the organisation and planning of individual work and that of the team as well as determining the intermediate steps, division of labour, necessary documents, work schedule, and how to integrate your own investigative work into that of the group.
- 4.3 Work in a multidisciplinary environment in collaboration with other individuals who may hold different points of view or with experts possessing different specialisations all the while being able to put things in perspective in order to overcome any difficulties or conflicts in the team.
- 4.4 Make team decisions when necessary whether they be about technical solutions or about the division of labour to complete the project.
5. Communicate effectively (speaking or writing in French or a foreign language) with the goal of carrying out assigned projects. (Axis 5)
- 5.1 Identify the clients' needs: take up a sizable problem regarding an electronic component or system or communicate the functionalities of an algorithm or software program.
- 5.2 Present your arguments and convince your interlocutors (technicians, colleagues, clients, superiors) by adopting their language; from the laboratory technician to the research engineer or doctoral researcher, notably in the context of graduation projects (TFE) and experiments or APE with access to technical infrastructures or even industry internships.
- 5.3 Communicate through graphics and diagrams: interpret a diagram, present work results, structure information.
- 5.4 Read and analyse different technical documents related to the profession (standards, drawings, specifications); for example, circuit or component data sheets, communication protocols, electrical standards.
- 5.5 Draft a document that takes into account contextual requirements and the target audience: the specifications for an industrial project, the minutes for a project meeting, internship reports, graduation projects (TFE), etc.
- 5.6 Use modern communication techniques to give scientific and/or technical oral presentations in French and in English and respond to diverse questions (general or specific) generated by your presentation.
6. Demonstrate rigor, openness and critical and ethical awareness in your work: validate the socio-technical relevance of a hypothesis or a solution. (Axis 6)
- 6.1 Rigorously apply the field's standards (terms, units of measure, quality standards and security).
- 6.2 Find solutions that go beyond strictly technical issues by considering sustainable development and the socio-economic ethics of a project (for example, in the fields of photovoltaic cells or biomedical applications)
- 6.3 Demonstrate critical awareness of a technical solution in order to verify its robustness and minimize the risks that may occur during implementation. For example, the development of a solution that impacts work conditions or users' life in the biomedical field
- 6.4 Evaluate the knowledge necessary to carry out a project and independently include knowledge that has not been addressed explicitly in the course programme.

## Programme structure

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The Master's degree program is comprised of:

- a core curriculum (32 credits)
- a final specialisation (30 credits)
- one or more major or elective courses listed below

The graduation project is normally completed during the second year. However, students opt to complete the project in either the first or second year so long as they have fulfilled the necessary prerequisites. This is particularly the case for students who have completed part of their education abroad.

If during the student's previous studies, he or she has already taken a course that is part of the programme (either required or elective) or they have participated in an academic activity that is approved by the programme commission, the student may count this activity toward their graduation requirements (but only if they respect programme rules). The student will also verify that he/she has obtained

the minimum number of credits required for the approval of their diploma as well as for the approval of their major (in order to include their academic distinctions in the diploma supplement).

These types of programmes will be submitted for approval by the relevant Master's degree programme commission.

## ELEC2M Programme

### Detailed programme by subject

#### CORE COURSES [32.0]

- 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
● LELEC2990	<a href="#">Graduation project/End of studies project</a> <i>The graduation project can be written and presented in French or English, in consultation with the supervisor. It may be accessible to exchange students by prior agreement between the supervisors and/or the two universities.</i>		EN [q1+q2] [] [25 Credits] ⊕		x
● LELEC2102	<a href="#">Project in Electrical Engineering: Integration of wireless embedded sensing systems</a> <i>The graduation project can be written and presented in French or English, in consultation with the supervisor. It may be accessible to exchange students by prior agreement between the supervisors and/or the two universities.</i>	David Bol (coord.)	EN [q1] [22.5h+22.5h] [5 Credits] ⊕ > French-friendly	x	x
● LEPL2020	<a href="#">Professional integration work</a> <i>The modules of LEPL2020 course are organized over the two annual blocks of the master's degree. It is strongly recommended that students take them from year 1, but they will only be able to register for the course at the earliest the year in which they present their final graduation project.</i>  <i>Students who have other professional integration activities in their personal programme, or who can demonstrate an equivalent activity could be exempted from this course. This equivalence is at the discretion of the examination board. Another activity should then be chosen to reach the number of ECTS required for their graduation.</i>		EN [q1+q2] [30h+15h] [2 Credits] ⊕ > French-friendly	x	x

**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 Compulsory courses (20 credits)**

○ LELEC2531	<a href="#">Electronic digital systems</a>		EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LELEC2795	<a href="#">Communication systems</a>	Jérôme Louveaux Claude Oestges (coord.) Luc Vandendorpe	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LELEC2103	<a href="#">Project in Electrical Engineering: Optimization of wireless embedded sensing systems</a>	David Bol (coord.)	EN [q2] [22.5h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
○ LELEC2900	<a href="#">Signal processing</a>	Laurent Jacques Luc Vandendorpe	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

**o Elective courses (10 credits)**

Les étudiant-e-s choisissent obligatoirement 2 cours parmi les 3 cours suivants (le cours ci-dessous qui n'aurait pas été choisi dans le cadre de la finalité peut être suivi en option parmi les cours au choix disciplinaires) :

⊗ LELEC2520	<a href="#">Electrical power systems</a>	Emmanuel De Jaeger	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2910	<a href="#">Antennas and propagation</a>	Christophe Craeye (coord.) Claude Oestges	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2330	<a href="#">Opto-electronic and power devices</a>	Denis Flandre Laurent Francis (coord.)	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

**OPTIONS**

L'étudiant-e complète son programme avec des options et/ou des cours au choix.  
 Dans la rubrique "Options et cours au choix en ingénieur civil électricien", l'étudiant-e doit sélectionner obligatoirement minimum 30 crédits parmi les cours repris dans les options et/ou les cours au choix.  
 Dans la rubrique "Options et cours au choix en connaissances socioéconomiques", l'étudiant-e valide une des deux options ou choisit obligatoirement au minimum 3 crédits parmi les cours au choix ou les cours de l'option en enjeux de l'entreprise.

Majors in electrical engineering

- > [Major in electrotechnics and electrical energy](#) [ en-prog-2024-elec2m-lelec221o ]
- > [Major in communication systems](#) [ en-prog-2024-elec2m-lelec222o ]
- > [Major in information and signal processing](#) [ en-prog-2024-elec2m-lelec224o ]
- > [Major in electronic circuits and systems](#) [ en-prog-2024-elec2m-lelec227o ]
- > [Major in cryptography and information security](#) [ en-prog-2024-elec2m-lelec235o ]
- > [Major in advanced electronic materials and devices](#) [ en-prog-2024-elec2m-lelec236o ]
- > [Disciplinary electives courses](#) [ en-prog-2024-elec2m-lelec237o ]

Options et cours au choix en connaissances socio-économiques

- > [Business risks and opportunities](#) [ en-prog-2024-elec2m-lelec230o ]
- > [Major in Interdisciplinary Program in Entrepreneurship - INEO](#) [ en-prog-2024-elec2m-lelec231o ]
- > [Cours au choix en connaissances socio-économiques](#) [ en-prog-2024-elec2m-lelec200o ]

Other elective courses

- > [Other elective courses](#) [ en-prog-2024-elec2m-lelec952o ]

**MAJORS IN ELECTRICAL ENGINEERING**

**MAJOR IN ELECTROTECHNICS AND ELECTRICAL ENERGY**

The objective of this major is to provide students with knowledge in electromechanics and control. At the end of this major, the students will have acquired a basic training in power electronics and electrical energy networks. They will master the main aspects related to the use of electricity as an energy vector.

- 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 **Compulsory courses in electrotechnics and electrical energy (4 credits)**






● LELEC2660	Power electronics		FR [q2] [30h+15h] [5 Credits] 🌐	X	X
				> French-friendly	

o **Elective courses in electrotechnics and electrical energy**

⊗ LELME2313	Dynamic modelling and control of electromechanical converters	Emmanuel De Jaeger Bruno Dehez	FR [q1] [30h+30h] [5 Credits] 🌐	X	X
				> French-friendly	

Year

1 2

⊗ LELME2311	Physics of Electromechanical Converters	Bruno Dehez	EN [q2] [30h+30h] [5 Credits]  > French-friendly	X	X
⊗ LELEC2595	Electrical power systems dynamics and quality of supply	Emmanuel De Jaeger	EN [q2] [30h+30h] [5 Credits]  > French-friendly	X	X
⊗ LELEC2753	Electrical power systems: advanced topics and smart grids	Emmanuel De Jaeger	EN [q2] [30h+15h] [5 Credits]  > French-friendly	X	X
⊗ LENVI2007	Renewable energy sources		EN [q1] [45h+15h] [5 Credits]  > French-friendly	X	X
⊗ LELEC2811	Instrumentation and sensors	David Bol Laurent Francis	EN [q1] [30h+30h] [5 Credits]  > French-friendly	X	X



## MAJOR IN COMMUNICATION SYSTEMS

The objectives of the telecommunications major are: Present the general organisation of communication networks and systems (wired or wireless) Present communications from the framework of information theory covering data compression (source-coding) and replication (channel coding) Present the different elements of modern modems, as well as systematic design methods for detection blocks and required estimates Offer a range of design tools for modems and systems Through this major, students will master important concepts about IP networks, GSM, UMTS and DSL access networks as well as new communications methods.

- 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 Compulsory courses in communication systems

The student shall select at least 15 credits among:

⊗ LELEC2880	Estimation and communication theory	Jérôme Louveaux (coord.) Luc Vandendorpe	EN [q2] [30h+30h] [5 Credits] ⊕ > French-friendly	X	X
⊗ LELEC2796	Wireless communications	Claude Oestges (coord.) Luc Vandendorpe	EN [q1] [30h+30h] [5 Credits] ⊕ > French-friendly	X	X
⊗ LELEC2350	Electromagnetic waves		EN [q2] [30h+30h] [5 Credits] ⊕ > French-friendly	X	X
⊗ LINFO2147	Communication networks [TM]		EN [q1] [30h+15h] [5 Credits] ⊕ > French-friendly	X	X
⊗ LELEC2348	Information theory and coding [TM]		EN [q2] [30h+15h] [5 Credits] ⊕ > French-friendly	X	X

#### ⊗ Elective courses in communication systems

⊗ LELEC2590	Seminars in electronics and communications	Denis Flandre Isabelle Huynen Jérôme Louveaux	EN [q2] [30h] [3 Credits] ⊕ > French-friendly	X	X
⊗ LINFO2146	Mobile and Embedded Computing	Ramin Sadre	EN [q2] [30h+15h] [5 Credits] ⊕ > French-friendly	X	X
⊗ LINMA1702	Optimization models and methods I	François Glineur	FR [q2] [30h+22.5h] [5 Credits] ⊕	X	X

**MAJOR IN INFORMATION AND SIGNAL PROCESSING**

The objective of this major is to provide students with new tools used to understand graphs, discrete mathematics, matrices, and optimisation. For example, students may use these tools when solving communication problems, analysing and recognising data and signals, cryptography and system identification.

- 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
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- [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 Compulsory courses in information and signal processing**

● LELEC2870	<a href="#">Machine learning : regression, deep networks and dimensionality reduction</a>	John Lee Michel Verleysen	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
● LELEC2885	<a href="#">Image processing and computer vision</a>	Christophe De Vleeschouwer (coord.) Laurent Jacques	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
● LELEC2348	<a href="#">Information theory and coding</a> [TM]		FR [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
● LINMA1510	<a href="#">Linear Control</a>	Gianluca Bianchin	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

**⊗ Elective courses in information and signal processing**

⊗ LELEC2880	<a href="#">Estimation and communication theory</a>	Jérôme Louveaux (coord.) Luc Vandendorpe	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2050	<a href="#">Medical Imaging</a>		FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINFO2262	<a href="#">Machine Learning :classification and evaluation</a>	Pierre Dupont	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINMA1691	<a href="#">Discrete mathematics - Graph theory and algorithms</a>	Vincent Blondel Jean-Charles Delvenne	FR [q1] [30h+22.5h] [5 Credits] 🌐	X	X
⊗ LINMA1702	<a href="#">Optimization models and methods I</a>	François Glineur	FR [q2] [30h+22.5h] [5 Credits] 🌐	X	X
⊗ LINMA2111	<a href="#">Discrete mathematics II : Algorithms and complexity</a>	Vincent Blondel Jean-Charles Delvenne	FR [q1] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINMA2380	<a href="#">Matrix computations</a>	Raphaël Jungers	FR [q1] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINMA2875	<a href="#">System Identification</a>	Gianluca Bianchin	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMAT2450	<a href="#">Cryptography</a>	Olivier Pereira	FR [q1] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X

## MAJOR IN ELECTRONIC CIRCUITS AND SYSTEMS

The objective of the major in circuits and electronics systems (which it shares with other Master's degree programmes in electrical engineering) is to introduce students to techniques of system design, computer simulation, manufacturing and experimental classification of electronic circuit components both numerical and analogue as well as the mixed systems associated with these components. Emphasis is placed on the practical applications necessary to carry out 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, ...)

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

Year

1 2

### o Content:

#### o Compulsory course in electronic circuits and systems

○ LELEC2532	<a href="#">Electronic analog systems</a>	David Bol Denis Flandre (coord.)	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
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#### o Elective courses in electronic circuits and systems

⊗ LELEC2541	<a href="#">Advanced Transistors</a>	Denis Flandre Benoît Hackens Jean-Pierre Raskin	EN [q2] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2570	<a href="#">Synthesis of digital integrated circuits</a> ■	David Bol	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2580	<a href="#">Design of RF and microwave communication circuits</a>		EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2590	<a href="#">Seminars in electronics and communications</a>	Denis Flandre Isabelle Huynen Jérôme Louveaux	EN [q2] [30h] [3 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2620	<a href="#">Modeling and implementation of analog and mixed analog/digital circuits and systems on chip</a>	David Bol	EN [q2] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2650	<a href="#">Synthesis of analog integrated circuits</a> ■	Denis Flandre	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2660	<a href="#">Power electronics</a>		EN [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2700	<a href="#">Microwaves</a>		EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2760	<a href="#">Secure electronic circuits and systems</a>	François-Xavier Standaert	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2811	<a href="#">Instrumentation and sensors</a>	David Bol Laurent Francis	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGBIO2020	<a href="#">Bioinstrumentation</a>	André Mouraux Michel Verleysen	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINFO2315	<a href="#">Design of Embedded and real-time systems</a>	Cristel Pelsser	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

**MAJOR IN CRYPTOGRAPHY AND INFORMATION SECURITY**

As with most of the other Master's degree programmes in electrical engineering, computer science and applied mathematics, this major provides students with the knowledge to answer questions about information security with algorithms and mathematics as well as design and solve problems in the context of electronic circuits and 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...)

Year

1 2

**o Content:****⊗ Elective courses**

In order to validate this option INFO and MAP students have to take at least 20 credits and the ELEC, DATE and DATI students have to take at least 15 credits among:

⊗ LELEC2760	Secure electronic circuits and systems	François-Xavier Standaert	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINFO2144	Secured systems engineering	Axel Legay	FR [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINFO2347	Computer system security	Ramin Sadre	FR [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2348	Information theory and coding [TM]		FR [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMAT2440	Number theory	Pierre-Emmanuel Caprace Olivier Pereira	FR [q1] [30h+15h] [5 Credits] 🌐 > English-friendly	X	X
⊗ LMAT2450	Cryptography	Olivier Pereira	FR [q1] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2770	Privacy Enhancing technology	Olivier Pereira François-Xavier Standaert	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

## MAJOR IN ADVANCED ELECTRONIC MATERIALS AND DEVICES

- 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 Compulsory courses in advanced electronic materials and devices

Student choose at least 5 credits among:

⊗ LELEC2541	<a href="#">Advanced Transistors</a>	Denis Flandre Benoît Hackens Jean-Pierre Raskin	EN [q2] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2550	<a href="#">Special electronic devices</a>	Vincent Bayot	EN [q1] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2700	<a href="#">Microwaves</a>		EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2895	<a href="#">Design of micro and nanosystems</a>	Laurent Francis	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

#### ⊗ Elective courses in advanced electronic materials and devices

⊗ LELEC2560	<a href="#">Micro and Nanofabrication Techniques</a>	Laurent Francis Benoît Hackens Jean-Pierre Raskin	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2580	<a href="#">Design of RF and microwave communication circuits</a>		EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2710	<a href="#">Nanoelectronics</a>	Vincent Bayot (coord.) Pascal Gehring Benoît Hackens	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2811	<a href="#">Instrumentation and sensors</a>	David Bol Laurent Francis	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMAPR2015	<a href="#">Physics of Nanostructures</a>		EN [q1] [37.5h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMAPR2020	<a href="#">Materials Selection</a>	Bernard Nysten Thomas Pardoën	EN [q2] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2300	<a href="#">Advanced Numerical Methods</a>	Philippe Chatelain Christophe Craeye (coord.) Vincent Legat Jean-François Remacle	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LPHYS2143	<a href="#">Optics and lasers</a>	Clément Lauzin	EN [q1] [22.5h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LPHYS2303	<a href="#">Cryophysics and vacuum physics</a>	Vincent Bayot Benoît Hackens Sorin Melinte	EN [q1] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2350	<a href="#">Electromagnetic waves</a>		EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

**DISCIPLINARY ELECTIVES COURSES**

- 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:**

● LELEC2520	<a href="#">Electrical power systems</a>	Emmanuel De Jaeger	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
● LELEC2910	<a href="#">Antennas and propagation</a>	Christophe Craeye (coord.) Claude Oestges	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
● LELEC2330	<a href="#">Opto-electronic and power devices</a>	Denis Flandre Laurent Francis (coord.)	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

**OPTIONS ET COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES****BUSINESS RISKS AND OPPORTUNITIES**

This major is not available in English and may not be taken at the same time as the major « Interdisciplinary program in entrepreneurship – CPME ».

- 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:**

● LEPL2211	<a href="#">Business issues introduction</a>	Benoît Gailly	EN [q2] [30h] [3 Credits] 🌐 > French-friendly	X	X
● LEPL2212	<a href="#">Financial performance indicators</a>		EN [q2] [30h+5h] [4 Credits] 🌐 > French-friendly	X	X
● LEPL2214	<a href="#">Law, Regulation and Legal Context</a>	Vincent Cassiers Werner Derycke	FR [q1] [30h+5h] [4 Credits] 🌐	X	X

**o One course between**

From 3 to 5 credit(s)

⊗ LEPL2210	<a href="#">Ethics and ICT</a>	Axel Gosseries Olivier Pereira	EN [q2] [30h] [3 Credits] 🌐 > French-friendly	X	X
⊗ LLSMS2280	<a href="#">Business Ethics and Compliance Management</a>		EN [q1] [30h] [5 Credits] 🌐	X	X

### ⌘ Cours en marketing

⌘ MGEST1108	Marketing	Nadia Sinigaglia	FR [q2] [45h+20h] [6 Credits] 🌐	X	X
⌘ MLSMM2136	Trends in Digital Marketing	Ingrid Poncin	FR [q2] [30h] [5 Credits] 🌐		X
⌘ MLSMM2134	e-Consumer Behavior	Karine Charry	FR [q2] [30h] [5 Credits] 🌐		X

### ⌘ Cours en Sourcing and Procurement

⌘ LLSMS2036	Supply Chain Procurement	Per Joakim Agrell	EN [q1] [30h] [5 Credits] 🌐	X	X
⌘ LLSMS2038	Procurement Organisation and Scope	Constantin Blome	EN [q1] [30h] [5 Credits] 🌐	X	X
⌘ LLSMS2037	Sourcing Strategy	Constantin Blome	EN [q1] [30h] [5 Credits] 🌐	X	X

### ⌘ Alternative to the major in business risks and opportunities for computer science students

Computer science students who have already taken courses in this field while pursuing their Bachelor's degree may choose between 16-20 credits from the courses offered in the management minor for computer sciences.

## MAJOR IN INTERDISCIPLINARY PROGRAM IN ENTREPRENEURSHIP - INEO

Commune à la plupart des masters de l'EPL, cette option a pour objectif de familiariser l'étudiant-e avec les spécificités de l'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

### o Content:

#### o 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	Yves De Cordt	(FR) [q1] [30h+15h] [5 Credits] ⊕	X	
○ LINEO2003	Plan d'affaires et étapes-clefs de la création d'entreprise <i>Les séances du cours LINEO2003 sont réparties sur les deux blocs annuels du master. L'étudiant doit les suivre dès le bloc annuel 1, mais ne pourra inscrire le cours que dans son programme de bloc annuel 2.</i>	Frank Janssen	(FR) [q2] [30h+15h] [5 Credits] ⊕		X
○ LINEO2004	Séminaire d'approfondissement en entrepreneuriat	Frank Janssen	(FR) [q2] [30h+15h] [5 Credits] ⊕	X	

#### ⊗ Prerequisite courses

Student who have not taken management courses during their previous studies must enroll in LINEO2021.

○ LINEO2021	Financer son projet		(FR) [q2] [30h+15h] [5 Credits] ⊕	X	
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**COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES**

- 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:**

⊗ LFSA2995	<a href="#">Company Internship</a>			(FR) [q1+q2] [30h] [10 Credits] 🌐	X	X
⊗ LELEC2590	<a href="#">Seminars in electronics and communications</a>	Denis Flandre Isabelle Huynen Jérôme Louveaux		(EN) [q2] [30h] [3 Credits] 🌐 > French-friendly	X	X
⊗ LEPL2021	<a href="#">Innovation classes for transition and sustainable development [C]</a>			(FR) [q1] [30h+15h] [5 Credits] 🌐	X	X

**OTHER ELECTIVE COURSES****OTHER ELECTIVE COURSES**

- 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:**

Les étudiants peuvent également inscrire à leur programme tout cours faisant partie des programmes d'autres masters de l'EPL moyennant l'approbation du jury restreint.

**⊗ Languages**

Students may select from any language course offered at the ILV. Special attention is placed on the following seminars in professional development:

⊗ LALLE2500	<a href="#">Professional development seminar German</a>	Caroline Klein (coord.)	(DE) [q1+q2] [30h] [3 Credits] 🌐	X	X
⊗ LALLE2501	<a href="#">Professional development seminar-German</a>	Caroline Klein (coord.)	(DE) [q1+q2] [30h] [5 Credits] 🌐	X	X
⊗ LESPA2600	<a href="#">Vocational Induction Seminar - Spanish (B2.2/C1)</a>	Paula Lorente Fernandez (coord.)	(ES) [q1] [30h] [3 Credits] 🌐	X	X
⊗ LESPA2601	<a href="#">Vocational Induction Seminar - Spanish (B2.2/C1) [M]</a>	Paula Lorente Fernandez (coord.)	(ES) [q1] [45h] [5 Credits] 🌐	X	X
⊗ LNEER2500	<a href="#">Seminar of Entry to professional life in Dutch - Intermediate level</a>	Isabelle Demeulenaere (coord.)	(NL) [q1 or q2] [30h] [3 Credits] 🌐	X	X

				Year	
				1	2
⊗ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.) Dag Houdmont	SE [q1 or q2] [30h] [3 Credits] 🌐	x	x

### ⊗ Group dynamics

⊗ LEPL2351	Become a tutor	Delphine Ducarme Thomas Pardoën Benoît Raucent	SE [q1] [15h+30h] [3 Credits] 🌐	x	x
⊗ LEPL2352	Become a tutor	Delphine Ducarme Thomas Pardoën Benoît Raucent	SE [q2] [15h+30h] [3 Credits] 🌐	x	x

### ⊗ Autres UEs hors-EPL

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

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## Course prerequisites

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The **table** below lists the activities (course units, or CUs) for which there are one or more prerequisites within the programme, i.e. the programme CU for which the learning outcomes must be certified and the corresponding credits awarded by the jury before registering for that CU.

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

### Prerequisites and student's annual programme

As the prerequisite is for CU registration purposes only, there are no prerequisites within a programme year. Prerequisites are defined between CUs of different years and therefore influence the order in which the student will be able to register for the programme's CUs.

In addition, when the jury validates a student's individual programme at the beginning of the year, it ensures its coherence, meaning that it may:

- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.
- transform a prerequisite into a corequisite if the student is in the final year of a degree course.

For more information, please consult the [Academic Regulations and Procedures](#).

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### # Prerequisites list

**LELEC2570** "[Synthesis of digital integrated circuits](#)" has prerequisite(s) LELEC2531

- LELEC2531 - [Electronic digital systems](#)

**LELEC2650** "[Synthesis of analog integrated circuits](#)" has prerequisite(s) LELEC2532

- LELEC2532 - [Electronic analog systems](#)

## The programme's courses and learning outcomes

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For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies 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.

## ELEC2M - 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](#)
- > [Holders of a non-University 2nd cycle 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 certificat is required for the holders of a non-Belgian degree, see selection criteria of the Accès on the file.

#### University Bachelors

Diploma	Special Requirements	Access	Remarks
<b>UCLouvain Bachelors</b>			
<a href="#">Bachelor in Engineering</a>		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.
<b>Others Bachelors of the French speaking Community of Belgium</b>			
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.
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
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.
<b>Foreign Bachelors</b>			
Bachelor in engineering	Bachelors 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

Bachelor in Engineering	For others institutions	Access based on application	degree may have an adapted master programme. See <a href="#">personalized access</a>
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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

Master in Engineering	Direct access
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## Holders of a non-University 2nd cycle degree

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

## 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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### Methods that promote multidisciplinary studies

The Master's degree programme in electrical engineering provides students with considerable technical and professional knowledge. It offers in-depth knowledge of the different subjects covered in the Bachelor's degree programme on electricity and expected of electrical engineers (electronics, electromagnetics, communication, system design). It is open to other fields such as

- Computer science, applied mathematics and automation (the latter having been studied in the Bachelor's degree programme for students enrolled in the electricity major); achieved through 32 credits of required common courses
- Electrotechnology, photovoltaic technologies, nanotechnologies, MEMS and NEMS, computer science and communication, biomedical engineering, cryptography and information security via specialised majors.

Regarding elective courses, the programme commission encourages students to broaden their training by choosing classes organised by other programme commissions. Thus the majority of suggested majors are MAPR, INGI, INMA or MATH.

Also of note are the dozen ELEC classes that are open to students enrolled in other Master's degree programmes on the condition that they have taken introductory classes on electric circuits and electronics or complementary classes in electricity.

To encourage interdisciplinary coursework, there are interdisciplinary projects regrouping a series of subjects from the common core curriculum.

### Diverse learning situations

The diverse learning situations include lectures, practical work and projects based on the following approach: modelling-simulation-realisation -experimental validation. Depending on the case, students are encouraged to work either in groups or individually. Of note is the interdisciplinary project that requires students to design, model, carry out and test a system. This project draws upon the entirety of their knowledge in the field of their final specialisation as well completes the work begun during their undergraduate studies (ELEC Bachelor's degree programme).

Furthermore, in certain subjects, e-Learning permits students to educate themselves at their own pace and carry out virtual experiments.

This variety of learning situations help students to learn in an iterative and progressive manner, all the while developing their autonomy, organisational abilities, as well as time management and communication skills. Modern information technologies (materials, software, networks) are made available to students.

For example, the major in business creation is based on an interactive approach that emphasizes problem-based learning. Throughout the programme, students enrolled in this major must carry out group work as part of multidisciplinary teams. Their interdisciplinary thesis or graduation project permits groups of three students, ideally from different academic departments, to collaborate on a business creation proposal.

The graduation project aims for the most part to integrate students into research teams at the Institute.

Thus, teaching activities are supplemented by research activities and serve as a starting point for the recruitment of researchers (often a graduation project is the starting point for a doctorate, publication or paper presentation).

Depending on the situation, students are encouraged to work either individually or in groups.

### Concrete learning: infrastructure

In ELEC courses, "concrete" learning is characterised by student access to high quality technical infrastructures:

The Marconi and Faraday pedagogical laboratories are equipped with the latest in work stations (oscilloscopes, sources, computers) and are accessible to students as part of their laboratory classes and Bachelor's and Master's degree projects. In the case of projects including the creation of a prototype by groups of students, access to prototypes of electronic cards (PCB, components, welding) is available.

R&D platforms in the areas of electronic components and communication systems (Welcome) and micro and nano-technologies (Winfab) are accessible to Master's degree students as part of certain classes and graduation projects.

Computers and work stations equipped with the most recent professional CAO software are accessible to students in the Maxwell building but also remotely from the Engineering School's computer labs. This software is largely used in classes, APE and projects: design sequences for electronic circuits and microwaves, simulation of manufacturing processes, electronic devices, etc.

## 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".***

Teaching activities are 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.

In most Master's degree classes, students are primarily evaluated on the basis of their written work, which assesses their mastery of theoretical concepts as well as their ability to solve exercises (of the same level of difficulty as in class).

Group projects are primarily used to evaluate students' ability to solve complex equations and master software. These projects generally result in a report (in the form of a scientific article or a conference paper) or an oral presentation before a jury or lecture hall about the project's results and/or progress. In either case, particular attention is paid to the project's technical qualities as well as the quality of the report's structure, the use of supporting materials, and the students' presentation skills.

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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### Accessible complementary Masters degrees:

- [Advanced Master in Nuclear Engineering](#)
- [Advanced Master in Nanotechnologies](#)

### Accessible Ph. D. curricula

The department of electrical engineering is one of those with the largest number of doctoral students. Members of the department are involved in many thematic Ph. D. schools, some of these having been active for many years, others currently being set up. A list of these thematic Ph. D. schools can be obtained from the chairperson of the Ph. D. committee relating to "Engineering sciences and the Art of building and town planning" of the Académie Universitaire Louvain or on the [FNRS Website](#)

## Contacts

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### Curriculum Management

Entity

Structure entity

Denomination

Faculty

Sector

Acronym

Postal address

SST/EPL/ELEC

(ELEC)

Louvain School of Engineering (EPL)

Sciences and Technology (SST)

ELEC

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