



## 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,



- 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.

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

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#### CORE COURSES [32.0]

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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
- ⊗ 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] ⊗	1	x
● LELEC2102					

## PROFESSIONAL FOCUS [30.0]

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

Year

1 2

### o Content:

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#### o Compulsory courses (20 credits)

## OPTIONS

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*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.*

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⌘ LELME2311	Physics of Electromechanical Converters	
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## 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.

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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	🇫🇷 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2796	Wireless communications	Claude Oestges (coord.) Luc Vandendorpe	🇫🇷 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗		Christophe Craeye	🇫🇷 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINFO2147	Communication networks	Cristel Pelsser	🇫🇷 [q1] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELEC2348	Information theory and coding	Jérôme Louveaux Benoît Macq Olivier Pereira	🇫🇷 [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X

## MAJOR IN INFORMATION AND SIGNAL PROCESSING

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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.

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

Year

1 2

### o Content:

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## ***MAJOR IN ADVANCED ELECTRONIC MATERIALS AND DEVICES***

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- Mandatory
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  - △ ⊕
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### ⌘ 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 Antony Paulraj	EN [q1] [30h] [5 Credits] 🌐	X	X
⌘ LLSMS2038	Procurement Organisation and Scope	Constantin Blome Canan Kocabasoglu Hillmer (compensates Constantin Blome)	EN [q1] [30h] [5 Credits] 🌐	X	X
⌘ LLSMS2037	Sourcing Strategy	Constantin Blome Michael Henke	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

## 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 ».

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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 Marine Falize	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	Philippe Grégoire Olivier Vercruysse	FR [q2] [30h+15h] [5 Credits] 🌐	X	
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	Vocational Induction Seminar - Spanish (B2/C1)	Paula Lorente Fernandez (coord.)	[q1] [45h] [5 Credits]		
⊗ LESP2601	Vocational Induction Seminar - Spanish (B2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [45h] [5 Credits]	X	X
⊗ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.)	NL [q1 or q2] [30h] [3 Credits]	X	X
⊗ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.) Dag Houdmont	NL [q1 or q2] [30h] [3 Credits]	X	X

⊗ Group dynamics Q q 1 0 0 1 8.503 29.10-68 51 -2.417 1 cm 0 0 m 127.558998 m 19u8 mr 0 -1 6 22.7280006425899  
Dag Houdmont

## 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.

## ELEC2M - Information

### Access Requirements

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*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.***

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).

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

