



ELEC2M

ELEC2M - Introduction

Introduction

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;
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- 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

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
-

PROFESSIONAL FOCUS [30.0]

- Mandatory
- ✘ Optional
- △ Not offered in 2024-2025
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- 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

■ **Content:**

				Year
⊗ LELME2311	Physics of Electromechanical Converters	Bruno Dehez	[q2] [30h+30h] [5 Credits]  > <i>French-friendly</i>	1 2

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.

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Year

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o Content:

o Compulsory courses in information and signal processing

● LELEC2870	Machine learning : regression, deep networks and dimensionality reduction	John Lee John Lee (compensates Michel Verleysen)	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
● LELEC2885	Image processing and computer vision	Christophe De Vleeschouwer (coord.) Laurent Jacques	🇧🇪 [q1] [30h+30h] [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
● LINMA1510	Linear Control	Gianluca Bianchin	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

⌘ Elective courses in information and signal processing

⌘ LELEC2880	Estimation and communication theory	Jérôme Louveaux (coord.) Luc Vandendorpe	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⌘ LGBIO2050	Medical Imaging	Greet Kerckhofs John Lee Benoît Macq	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	LGBIO2050

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.

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Year

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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	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⌘ LINFO2144	Secured systems engineering	Axel Legay	🇧🇪 [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⌘ LINFO2347	Computer system security	Ramin Sadre	🇧🇪 [q2] [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	

DISCIPLINARY ELECTIVES COURSES

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Year

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Content:

● LELEC2520	Electrical power systems	Emmanuel De Jaeger	3.0 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X
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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 ».

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Year

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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 Vercruyse	FR [q2] [30h+15h] [5 Credits] 🌐	X	
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COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES

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Content:

⊗ LFSA2995	Company Internship	Dimitri Lederer Jean-Pierre Raskin	FR [q1+q2] [30h] [10 Credits] 🌐	X	X
⊗ LELEC2590	Seminars in electronics and communications	Denis Flandre Isabelle Huynen Jérôme Louveaux	EN [q2] [30h] [3 Credits] 🌐 > French-friendly	X	X
⊗ LEPL2021	Innovation classes for transition and sustainable development	Benoît Macq Xavier Marichal (compensates Benoît Raucent)	EN [q1] [30h+15h] [5 Credits] 🌐	X	X

OTHER ELECTIVE COURSES**OTHER ELECTIVE COURSES**

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Year

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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	Professional development seminar German	Caroline Klein (coord.) Mélanie Mottin (compensates Caroline Klein)	DE [q1+q2] [30h] [3 Credits] 🌐	X	X
⊗ LALLE2501	Professional development seminar-German	Caroline Klein (coord.) Mélanie Mottin (compensates Caroline Klein)	DE [q1+q2] [30h] [5 Credits] 🌐	X	X

				Year	
				1	2
⌘ LESP2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [30h] [3 Credits] 	x	x
⌘ LESP2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [45h] [5 Credits] 	x	x
⌘ LNEER2500					



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](#)

degree may have an adapted master programme.

Teaching method

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-

