





## ELEC2M - Teaching profile

### Learning outcomes

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An essential challenge in the training of electrical engineers is the wide variety of elements that must be mastered, which range from

- 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.

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.

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**PROFESSIONAL FOCUS [30.0]**

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- Mandatory
- ⊗ Optional
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- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

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**o Content:**

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**o Compulsory courses (20 credits)**

○ LELEC2531	Digital electronic systems	Martin Andraud	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	x	x
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## 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.

### Majors in electrical engineering

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- > [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

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- > [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

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

## MAJORS IN ELECTRICAL ENGINEERING

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### MAJOR IN ELECTROTECHNICS AND ELECTRICAL ENERGY

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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.

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- Activity with requisites
- ⊗ Open to incoming exchange students
- ⊗ Not open to incoming exchange students
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Click on the course title to see detailed informations (objectives, methods, evaluation...)





## MAJOR IN COMMUNICATION SYSTEMS

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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

## 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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Year

1 2

### o Content:

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**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

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	Jérôme Louveaux Benoît Macq Olivier Pereira	FR [q2] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMAT2440	Number theory	Pierre-Emmanuel Caprace Olivier Pereira	FR [q2] [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



## ***DISCIPLINARY ELECTIVES COURSES***

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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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### 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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**COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES**

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**o 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) Viktória Nagy (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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**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**



## Course prerequisites

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## 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

Bachelor in Engineering	For others institutions

degree may have an adapted master programme.

## 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
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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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Academic supervisor: [Jérôme Louveaux](#)

Jury

- Président: [Claude Oestges](#)
- Secrétaire du Jury: [Jérôme Louveaux](#)

Useful Contact(s)

- Secrétariat: [Isabelle Dargent](#)

