





## ELME2M - Teaching profile

### Learning outcomes

Integrating the fields of mechanics and electricity is one of the major challenges of the civil engineering student in electro-mechanics.

The Master's degree in Electro-mechanical engineering from UCLouvain favours multidisciplinary training and the ability to solve interface problems raised by the integration of several fields. It integrates the fields of electricity and mechanics into a coherent whole and prioritises basic knowledge with the aim of deepening or reorienting students' knowledge mid-career.

Students will acquire the knowledge and skills necessary to become:

- Specialists in mechatronics (electronics, mechanical production, automation and robotics) or specialists in energy (smart grids/ energy networks, thermodynamics and energy).
- Individuals with field experience capable of putting into practice their knowledge of research and technology.
- Managers who can manage team projects

The Master's degree programme in electro-mechanical engineering prepares its students to be aware of technical progress and adapt to the needs of the job market and changes in business.

Polytechnic and multidisciplinary, the training provided by the Louvain School of Engineering privileges the acquisition of knowledge that combines theory and practice and that is open to analysis, design, manufacturing, production, research and development and innovation all the while paying attention to ethics and sustainable development.

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

1. Demonstrate mastery of a solid body of knowledge in basic science and engineering science allowing the student to learn and solve problems pertaining to electro-mechanics. (Axis 1)

1.1. Identify and use concepts, laws and appropriate reasoning from a variety of fields in mechanics and electricity to solve a given problem:

- Electricity (in the broad sense)
- Electro-technics (conversion, controls, activation)
- Electronics (digital electronics, instrumentation, sensors)
- Automation
- Computer sciences (real time)
- Mechanics (modeling, design)
- Robotics and automation.

1.2. Identify and use modelling and calculation tools to solve problems associated with the aforementioned fields.

1.3. Verify problem solving results especially with regard to orders of magnitude and/or units (in which the results are expressed).

2. Organize and carry out an applied engineering process to develop a product and/or service responding to a particular need or problem in the field of electro-mechanics. (Axis 2)

2.1. Analyse a problem, take stock of features and constraints, and formulate specifications in a field where the technical and economic limits are taken into account

2.2. Model a problem and design one or more technical solutions (drawing on the fields of mechanics, electrics, electronics, electro-technics or information technology) and respond to problem specifications.

2.3. Evaluate and classify solutions with regards to all the specification criteria: efficiency, feasibility, ergonomic quality and environmental security (for example: too expensive, too complex, too dangerous, too difficult to manipulate).

2.4. Test a solution using a mock up, a prototype or a numerical model.

2.5. Formulate recommendations to improve a technical solution.

3. Organise and carry out a research project to learn about a physical phenomenon or a new problem relating to the field of electro-mechanics. (Axis 3)

3.1. Document and summarise the existing body of knowledge in the field of mechanics and electricity

3.2. Suggest an experimental model or device by first constructing a mathematical model, then by using laboratories to create a device simulates system behaviour and tests relevant hypotheses.

3.3. Synthesize conclusions in a report that shows the key parameters and their influence on the behaviour of the phenomenon under study (choice of forms and materials, physio-chemical environment, conditions for use).

4. Contribute, through teamwork, to a multidisciplinary project and carry out the project while taking into account its objectives, resources, and constraints. (Axis 4)

4.1. Frame and explain the project's objectives taking into account the issues, constraints and domain interfaces that characterise the project's environment.

4.2. Collaborate with peers on a multidisciplinary topic (mechanics and electricity) to create a work schedule (and resolve any resulting conflicts).

4.3. Make team decisions to successfully complete the project whether they be about technical solutions or the division of labour.

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: question, listen and ensure the understanding of all the dimensions of the request and not just the technical aspects.
  - 5.2. Present your arguments and convince your interlocutors (technicians, colleagues, clients, superiors) by adopting their language.
  - 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).
  - 5.5. Draft written documents that take into account contextual requirements and social conventions.
  - 5.6. Use modern communication techniques to give convincing oral presentations.
6. Display rigour, openness, and critical thinking; validate the socio-technical relevance of a hypothesis or a solution, all the while drawing upon available technological and scientific innovations. (Axis 6)
  - 6.1. Apply standards and assure the robustness of a solution in the fields of mechanics and electricity.
  - 6.2. Put solutions into perspective by including non-technical concerns (for example, in the area of energy and climate, take environmental and social factors into consideration).
  - 6.3. Demonstrate critical thinking vis-à-vis technical solutions or methodological approach regarding the involved actors.
  - 6.4. Evaluate one's own work.

## Programme structure

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The student's programme includes:

- A common core curriculum (57 credits)
- A final specialisation (30 credits)
- One of more of the major courses or elective courses listed below.

The graduation project is normally completed in the second year. However, students may, depending on the nature of their project, choose to take their classes in the first or second year so long as their course prerequisites allow it. This is particularly the case for students completing part of their program 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 requested 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.

## ELME2M Programme

## Detailed programme by subject

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### CORE COURSES

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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, ...)

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



**PROFESSIONAL FOCUS : MECATRONICS [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

**Content:**

Pour LINFO1361, une alternative peut être proposée pour les non-speaking French students (as Machine Learning course).

○ LELME2311	Physics of Electromechanical Converters	Bruno Dehez	20 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LELEC2531	Digital electronic systems	Martin Andraud	20 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LMECA2755	Industrial automation	Bruno Dehez Paul Fisette Renaud Ronsse	20 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LMECA2801	Machine design	Yorick Havelange (compensates) Benoît Raucent Benoît Raucent	20 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LINFO1361	Artificial intelligence	Eric Piette (compensates) Yves Deville	20 [q2] [30h+30h] [5 Credits] 🌐	X	X
○ LELME2732	Robot modelling and control	Nicolas Docquier (compensates) Renaud Ronsse	20 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

**OPTIONS**

L'étudiant-e complète son programme avec des options et/ou des cours au choix pour arriver à min. 90 crédits disciplinaires. Il n'est pas obligatoire de valider une option.

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 enjeu de l'entreprise.

Options du master ingénieur civil électromécanicien

- > Major in circuits and electronic systems [ en-prog-2024-elme2m-lelme227o ]
- > Major in Systems and control engineering [ en-prog-2024-elme2m-lelme230o ]
- > Major in dynamics, robotics and biomechanics [ en-prog-2024-elme2m-lelme223o ]
- > Major in design, manufacturing and mechanics of materials [ en-prog-2024-elme2m-lelme241o ]
- > Major in aeronautics [ en-prog-2024-elme2m-lelme240o ]
- > Major in nuclear engineering [ en-prog-2024-elme2m-lelme237o ]
- > Cours au choix disciplinaires [ en-prog-2024-elme2m-lelme238o ]

Options et cours au choix en connaissances socio-économiques

- > Business risks and opportunities [ en-prog-2024-elme2m-lelme232o ]
- > Major in Interdisciplinary Program in Entrepreneurship - INEO [ en-prog-2024-elme2m-lelme233o ]
- > Cours au choix en connaissances socio-économiques [ en-prog-2024-elme2m-lelme239o ]

Others elective courses

- > Others elective courses [ en-prog-2024-elme2m-lelme231o ]



## MAJOR IN SYSTEMS AND CONTROL ENGINEERING

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

The student may select:  
From 15 to 30credit(s)

Year

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### Content:

⊗ LGBIO2060	Modelling of biological systems	Hari Teja Kalidindi (compensates) Philippe Lefèvre Laurent Opsomer (compensates) Philippe Lefèvre	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINMA2300	Analysis and control of distributed parameter systems	Pierre-Antoine Absil Laurent Jacques (coord.) Estelle Massart Geovani Nunes Grapiglia	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINMA2361	Nonlinear dynamical systems	Pierre-Antoine Absil Estelle Massart			



o **Content:**

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## MAJOR IN INTERDISCIPLINARY PROGRAM IN ENTREPRENEURSHIP - INEO

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

[Company Internship](#)

- 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

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**o Content:**

⊗ LFSA2995	<a href="#">Company Internship</a>	
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## OTHERS ELECTIVE COURSES

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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

## o Content:

Les étudiant-es 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
⊗ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [30h] [3 Credits] 🌐	X	X

## Course prerequisites

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

## The programme's courses and learning outcomes

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

## ELME2M - 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 certificate is required for the holders of a non-Belgian degree, see selection criteria of the Access on the file.

#### University Bachelors

Diploma	Special Requirements	Access	Remarks
<b>UCLouvain Bachelors</b>			
Bachelor in Engineering		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	Bachelor 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

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

### Non university Bachelors

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

### Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
<b>Masters</b>			



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).

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