



ELME2M - Introduction

Introduction

Introduction

The Master's degree programme in electro-mechanical engineering draws equally from two fields (mechanics and electricity) and prioritises basic knowledge with the goal of deepening or reorienting students' knowledge mid-career.

By the end of the programme, students will be able to keep up with technical developments and adapt themselves to the needs of the job market.

Your profile

You

-

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

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

CORE 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...)

PROFESSIONAL FOCUS : MECATRONICS [30.0]

LELEC2531

- 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
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Year

1 2

o 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	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LELEC2531	Digital electronic systems	Martin Andraud	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

OPTIONS DU MASTER INGÉNIEUR CIVIL ÉLECTROMÉCANICIEN

o Content:

⌘ LGBIO2040	Biomechanics	Greet Kerckhofs	
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MAJOR IN DESIGN, MANUFACTURING AND MECHANICS OF MATERIALS

- 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...)

If the course LMECA1451 has not been taken during the bachelor, you must add it to your programme.
From 20 to 30credit(s)

Year

1 2

Content:

				1	2
⊗ LMAPR2483	Durability of materials	Laurent Delannay Thomas Pardoën	EN [q2] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2453	Advanced manufacturing technologies	Aude Simar	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2520	Calculation of planar structures	Issam Doghri	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2640	Mechanics of composite materials	Issam Doghri	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2860	Welding Science and Technology	Pascal Jacques Aude Simar	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2711	Quality management and control.	Alexandre Debatty Laurence Guiot (coord.)	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMAPR2020	Materials Selection	Pierre Bollen Bernard Nysten	EN [q2] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMAPR2018	Rheology	Evelyne Van Ruymbeke	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

MAJOR IN AERONAUTICS

Ouverte aux étudiant-es ingénieurs civils mécaniciens et électromécaniciens, cette option reprend des cours sur l'application de la mécanique à l'aéronautique : structures aéronautiques, vibrations, aérodynamique, dynamique du vol. Cet apprentissage se fait au travers de cours approfondis de mécanique des fluides et des solides, avec une attention particulière portée aux méthodes numériques.

- 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...)

From 20 to 30credit(s)

Year

1 2

o Content:

⊗ LGCIV2041	Numerical analysis of civil engineering structures	Hadrien Rattez João Saraiva Esteves Pacheco De Alm	🇧🇪 [q2] [20h+15h] [4 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2195	Gasdynamics and reacting flows	Miltiadis Papalexandris	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2300	Advanced Numerical Methods	Philippe Chatelain Christophe Craeye (coord.) Vincent Legat Jean-François Remacle	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2323	Aerodynamics of external flows	Philippe Chatelain Grégoire Winckelmans	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2550	Aircraft propulsion systems.	Philippe Chatelain	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2520	Calculation of planar structures	Issam Doghri	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2660	Numerical methods in fluid mechanics	Grégoire Winckelmans	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2830	Aerospace dynamics.	Philippe Chatelain	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	
⊗ LMECA2322	Fluid mechanics II	Philippe Chatelain Eric Deleersnijder Grégoire Winckelmans	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X	

MAJOR IN NUCLEAR ENGINEERING

As with the Master's in civil electromechanical engineering with a specialization in energy as well as the Master's in civil and mechanical engineering, the goal of this major is to offer an in-depth education in the principal aspects of nuclear engineering. Entry into this programme, which is primarily overseen by the Mol Centre of Nuclear Energy, is contingent on an evaluation of candidates' skills based on the rules used for ERASMUS-SOCRATES exchange students. Further information about this major may be found on Mol's website SCK-CEN.

- 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...)

Commune aux masters ingénieur civil électromécanicien, finalité spécialisée énergie, et ingénieur civil mécanicien, cette option a pour objectif d'offrir une formation approfondie dans les principaux aspects du génie nucléaire. L'accès à cette option qui est organisée pour sa plus grande partie au Centre d'énergie nucléaire de Mol est conditionnée à une évaluation des compétences des candidats suivant les règles utilisées pour les candidatures aux échanges ERASMUS-SOCRATES. Plus de détails sur cette option sont disponibles sur le site du SCK-CEN de Mol.

From 16 to 21 credit(s)

Year

1 2

Content:

[EB]

Compulsory courses for the nuclear engineering major (10 credits)

○ LMECA2600

Compulsory courses for the nuclear engineering major (10 credits)

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

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



OTHERS ELECTIVE COURSES

OTHERS ELECTIVE COURSES

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
UCLouvain Bachelors			
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.
Others Bachelors of the French speaking Community of Belgium			
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.
Bachelors of the Dutch speaking Community of Belgium			
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.
Foreign Bachelors			
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

Teaching method

The majority of classes consist of lectures and tutorials. The tutors are upper-class students who have specialised tutor training (the class LEPL2351). This class provides its participants with practical tutoring techniques to help fellow students.

Methods that promote multidisciplinary studies

UCLouvain's Master's degree programme in electro-mechanics is by nature multidisciplinary because it combines classes in electricity, mechanics, automation and computer sciences. It also includes non-engineering elective classes such as economics, management and languages.

Various teaching strategies

Through a pedagogy that prioritises projects that integrate several subjects, students gain critical thinking skills, which in turn allows them to design, model, and create electro-mechanic prototypes and systems.

In the last year of the programme, half of the time is devoted to the graduation project, which offers students the possibility of working as part of a research team or collaborating with the industrial sector to study a given subject in-depth. It provides an introduction to the actual working life of an engineer or researcher (thanks to the size of the project and the context within which it is carried out).

Diverse learning situations

Various pedagogical approaches are used: lectures, projects, exercise sessions, problem solving sessions, case studies, experimental laboratories, computer simulations, educational software, internships in industry or research, factory visits, seminars and group as well as individual work. In certain subjects, eLearning allows students to learn at their own pace and carry out virtual experiments.

These diverse learning situations permit students to build their knowledge in an iterative and progressive manner all the while developing their independence, organisational and time management skills as well as their ability to communicate. Students have access to the newest information technology (materials, software, networks) during their studies.

Evaluation

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".

Student work is evaluated according to University rules (see the [rules for evaluating coursework and exams](#)) namely written and oral exams, laboratory reports, individual or group work, public presentations of projects and theses defences.

ELME Evaluation Methods :

Learning outcomes	Certificate-based evaluation
<i>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)</i>	<ul style="list-style-type: none"> • End of the semester exam based on course exercises • Tests in some introductory classes
<i>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)</i>	
<i>Organise and carryout a research project to learn about a physical phenomenon or a new problem relating to the field of electro-mechanics. (Axis 3)</i>	<ul style="list-style-type: none"> • Report on mini project in field of study • Progress report on multidisciplinary project
<i>Contribute, through teamwork, to a multidisciplinary project and carry out the project while taking into account its objectives, resources, and constraints. (Axis 4)</i>	<ul style="list-style-type: none"> • Progress report on multidisciplinary project • Report, public presentation, and yearly work for graduation project
<i>Communicate effectively (speaking or writing in French or a foreign language) with the goal of carrying out assigned projects. (Axis 5)</i>	
<i>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)</i>	

In certain instances, teaching is done through multidisciplinary project, the Learning by Problem Solving method (Apprentissage par problèmes or APP), flipped classes or seminars.

The certificate-based evaluation are coherent with the teaching methods and the learning outcomes.

The formative evaluation is achieved in part during the projects via tutor feedback and above all during the graduation project.

For more information on evaluation methods, students may consult the relevant evaluation descriptions.

Mobility and/or Internationalisation outlook

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

Specialised Master's Degrees

- [Advanced Master in Nanotechnologies](#)
- [Advanced Master in Nuclear Engineering](#)
- Specialised Master's Degree in Biotechnology and Applied Biology

Doctoral Programmes

Most doctoral students study at the Institute of Information and Communication Technologies, Electronics and Applied Mathematics as well as the Institute of Mechanics, Materials and Civil Engineering. The faculty of these Institutes participate in numerous doctoral programmes. A comprehensive list is available from the President of the Third Cycle Commission.

UCL Master's degrees (about 60) are accessible to UCL Master's degree holders

For example:

- The [Master \[120\] in Environmental Science and Management](#) (automatic admission with possible complementary coursework)
- Different Master's degree programmes in management (automatic admission based on written application)
- The [Master \[60\] in Information and Communication](#) at Louvain-la-Neuve or the [Master \[60\] in Information and Communication](#) at Mons

Contacts

Curriculum Management

Entity	
Structure entity	SST/EPL/ELME
Denomination	(ELME)
Faculty	Louvain School of Engineering (EPL)
Sector	Sciences and Technology (SST)
Acronym	ELME
Postal address	Place du Levant 3 - bte L5.03.02 1348 Louvain-la-Neuve

