

NRGY2M - 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

- Have solid knowledge of electricity and mechanics;
- Want to improve your understanding of current technological and scientific issues;
- Want to design, model, realise and validate experimental devices and systems;
- Want to specialise in mechatronics or in energy and foresee a career in robotics and "flexible production", energy transformation and management, vehicles and transportation systems and/or aeronautics.

Your programme

This Master's degree offers:

- General knowledge of electro-mechanics based on research;
- The mastery of mathematical and physical methods used in electricity and mechanics;
- An interdisciplinary approach to problem solving with particular emphasis placed on interface problems;
- Pedagogy centred on project-based learning;
- The possibility of testing your knowledge in the job market thanks to internships in the industrial sector

NRGY2M - 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).
- Individuals with field experience capable of putting into practice their knowledge of research and technology.
- Managers in charge of projects involving teams.

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)
- Electrotechnics (conversion, controls, actuation)
- 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, electrotechnics

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 electromechanics.

(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.

4.4. Make decisions as a team when there are choices to be made: whether on technical solutions or on the organization of work to bring the project to a successful conclusion.

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. Be rigorous, open-minded and critical: 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 (52 credits)
- A final specialisation (30 credits)
- One or 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.

NRGY2M 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...)

Year

1 2

Year

1 2

LELEC2811

Instrumentation and sensors

David Bol
Laurent Francis

EN

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

Year

1 2

o Content:

				1	2
○ LELME2150	Thermal cycles	Yann Bartosiewicz	EN [q1] [30h+30h] [5 Credits] 🌐 > <i>French-friendly</i>	X	X
○ LELME2240	Energy systems lab.	Francesco Contino Hervé Jeanmart	EN [q2] [30h+30h] [5 Credits] 🌐 > <i>French-friendly</i>	X	X

LIST OF ELECTIVES

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
- 🌐 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...)

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

Year

1 2

Content:

● LGBIO2060	Modelling of biological systems	Hari Teja Kalidindi (compensates Philippe Lefèvre) Laurent Opsomer (compensates Philippe Lefèvre)	EN [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	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
● LINMA2361	Nonlinear dynamical systems	Pierre-Antoine Absil Estelle Massart			

○ LMECA2195

MAJOR IN NUCLEAR 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
- 🌐 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:

○ LMECA2600	Introduction to nuclear engineering and reactor technology	Hamid Aït Abderrahim	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
○ LBEN2001	Nuclear thermal-hydraulics (Centre d'étude nucléaire-Mol)		EN [q1] [] [5 Credits] 🌐	X	X
○ LBEN2002	Introduction to Nuclear Physics & Measurements (Centre d'étude nucléaire-Mol)		EN [q1] [] [3 Credits] 🌐	X	X
○ LBEN2003	Safety of Nuclear Powerplants (Centre d'étude nucléaire-Mol)		EN [q2] [] [5 Credits] 🌐	X	X
○ LBEN2011	Radiation protection (Centre d'étude nucléaire-Mol)		EN [q1] [] [3 Credits] 🌐	X	X

COURS AU CHOIX DISCIPLINAIRES

- 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:

⊗ LINMA2370	Modelling and analysis of dynamical systems	Jean-Charles Delvenne	EN [q1] [30h+22.5h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINMA2875	System Identification	Gianluca Bianchin	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINFO2262	Machine Learning :classification and evaluation	Pierre Dupont	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA1451	Mechanical manufacturing.	Laurent Delannay Aude Simar	FR [q2] [30h+30h] [5 Credits] 🌐	X	X
⊗ LMECA2215	Vehicle System Dynamics	Paul Fiset	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2325	Biomass conversion	Patrick Gerin Arnaud Rouanet (compensates Hervé Jeanmart)	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2410	Mechanics of Materials	Laurent Delannay Nicolas Moës (compensates Aude Simar)	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2645	Major technological hazards in industrial activity.	Aude Simar	FR [q2] [30h] [3 Credits] 🌐	X	X
⊗ LMECA2771	Thermodynamics of irreversible phenomena.	Miltiadis Papalexandris	EN [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

				Year	
				1	2
⌘ LMECA2780	Introduction to Turbomachinery	Laurent Bricteux Sergio Lavagnoli	[q2] [30h+30h] [5 Credits]  > French-friendly	x	x
⌘ LMECA2801	Machine design	Yorick Havelange (compensates Benoît Raucent) Benoît Raucent	[q1] [30h+30h] [5 Credits]  > French-friendly	x	x

OPTIONS ET COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES

BUSINESS RISKS AND OPPORTUNITIES

- 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:					
		Vincent Cassiers Werner Derycke			
● LEPL2211	Business issues introduction		Lénoît Gailly	EN [q2] [30h] [3 Credits] 🌐 > French-friendly	x x
● LEPL2212	Financial performance indicators		Anne-Catherine Provost	EN [q2] [30h+5h] [4 Credits] 🌐 > French-friendly	x x
● LEPL2214	Law, Regulation and Legal Context		Vincent Cassiers Werner Derycke	FR [q1] [30h+5h] [4 Credits] 🌐	x x

o One course between

From 3 to 5 credit(s)

One course between

**MAJOR IN INTERDISCIPLINARY PROGRAM IN ENTREPRENEURSHIP -
INEO**

Course prerequisites

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

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

NRGY2M - 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](#)
- > [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 degree may have an adapted master programme.

Bachelor in Engineering

For others institutions

[Access based on application](#)

See [Personalized access](#)

Non university Bachelors

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

Holders of a 2nd cycle University degree

Diploma.671 | -3 0 | W n

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

Denomination

Faculty

Sector

Acronym

Postal address

SST/EPL/ELME

[\(ELME\)](#)

Louvain School of Engineering [\(EPL\)](#)

Sciences and Technology [\(SST\)](#)

ELME

Place du Levant 3 - bte L5.03.02

1348 Louvain-la-Neuve

Academic supervisor: [Emmanuel De Jaeger](#)

Useful Contact(s)

- Président du jury: [Claude Oestges](#)
- Secrétaire du jury: [Bruno Dehez](#)
- Secrétariat: [Isabelle Dargent](#)

