UCLouvain

ELME2M

2020 - 2021

Master [120] in Electro-mechanical Engineering

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In English
Dissertation/Graduation Project : **YES** - Internship : **optional**
Activities in English: **YES** - Activities in other languages : **YES**
Activities on other sites : **optional**
Main study domain : **Sciences de l'ingénieur et technologie**
Organized by: **Louvain School of Engineering (EPL)**
Programme acronym: **ELME2M** - Francophone Certification Framework: 7

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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

- 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

Majors: Mechatronics; Energy

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 UCL 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)
- Electrical energy (transport, quality, management)
- Electro-technics (conversion, controls, activation)
- Electronics (digital electronics, instrumentation, sensors)
- Automation
- Computer sciences (real time)
- Mechanics (modeling, design)
- Thermodynamics and thermics
- Fluid dynamics and transfers
- Robotics and automation.
- Energetic systems (production, distribution, heat and energetic efficiency)

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 carryout 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 (for example in the area of thermal regulation) 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 of 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 (54 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.

For a programme-type, and regardless of the focus, options/or elective courses selected, this master will carry a minimum of 120 credits divided over two annual units, corresponding to 60 credits each.

> Core courses for the Master in Electro-mechanical Engineering *[en-prog-2020-elme2m-tronc_commun]*

Professional specialisations in electro-mechanical

> Professional Focus : Mecatronics *[en-prog-2020-elme2m-lelme220s]*
> Professional Focus : Energy *[en-prog-2020-elme2m-lelme221s]*

> List of electives *[en-prog-2020-elme2m-options]*

Options

> Major in circuits and electronic systems *[en-prog-2020-elme2m-lelme227o]*
> Major in Systems and control engineering *[en-prog-2020-elme2m-lelme230o]*
> Major in dynamics, robotics and biomechanics *[en-prog-2020-elme2m-lelme223o]*
> Major in nuclear engineering *[en-prog-2020-elme2m-lelme237o]*
> Major in aeronautics *[en-prog-2020-elme2m-lelme240o]*
> Major in design, manufacturing and mechanics of materials *[en-prog-2020-elme2m-lelme241o]*

Major in business creation and management

> Major in business risks and opportunities *[en-prog-2020-elme2m-lelme235o]*
> Major in small and medium sized business creation *[en-prog-2020-elme2m-lelme236o]*

Elective courses

> Elective courses available for Master students in electro-mechanical engineering *[en-prog-2020-elme2m-lelme231o]*
> Elective courses: transversal skills and contacts with industry *[en-prog-2020-elme2m-lelme953o]*

Preparatory Module *(only for students who qualify for the course via complementary coursework)*

> Master [120] in Electro-mechanical Engineering *[en-prog-2020-elme2m-module_complementaire]*

ELME2M Detailled programme

Programme by subject

CORE COURSES [54.0]

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

						Year 1	Year 2
O LELME2990	Graduation project/End of studies project			28 Credits			x

O Electricity and electronics courses

O LELEC2311	Physics of Electromechanical Converters	Bruno Dehez	30h+15h	4 Credits	q2	x	
O LELEC2660	Power electronics	Marc Bekemans	30h+15h	4 Credits	q1	x	
O LELEC2811	Instrumentation and sensors	David Bol (coord.) Laurent Francis	30h+30h	5 Credits	q1	x	

O Mechanical courses

O LMECA2755	Industrial automation	Bruno Dehez Paul Fisette Renaud Ronsse	30h+30h	5 Credits	q1	x	

O Religion courses for students in exact sciences (2 credits)

The students select one course between:
The student shall select

⊠ LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	15h	2 Credits	q1	x	x
⊠ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	15h	2 Credits	q1	x	x
⊠ LTECO2200	Societies-cultures-religions : Human Questions	Régis Burnet Dominique Martens	15h	2 Credits	q1 or q2	x	x

O Project (6 credits)

Les étudiants choisissent le projet qui correspond à leur finalité:

⊠ LELME2002	Project in mechatronics	Bruno Dehez Renaud Ronsse	30h+30h	6 Credits	q1+q2	x	
⊠ LELME2003	Project in energy	Francesco Contino Emmanuel De Jaeger Hervé Jeanmart	30h+30h	6 Credits	q1+q2	x	

LIST OF FOCUSES

PROFESSIONAL FOCUS : MECATRONICS [30.0]

- O Mandatory
- △ Courses not taught during 2020-2021
- ⊕ Periodic courses taught during 2020-2021
- ⊠ Optional
- ⊘ Periodic courses not taught during 2020-2021
- Activity with requisites

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

Content:

						Year 1	Year 2
O LELEC2103	Project in Electricity 3 : Electronic systems	Jean-Didier Legat Jérôme Louveaux Luc Vandendorpe	75h	5 Credits	q1+q2	x	x
O LELEC2313	Dynamic modelling and control of electromechanical converters	Emmanuel De Jaeger Bruno Dehez	30h+30h	5 Credits	q1	x	x
O LELEC2531	Design and Architecture of digital electronic systems	Jean-Didier Legat	30h+30h	5 Credits	q1	x	x
O LMECA2732	Robot modelling and control	Renaud Ronsse	30h+30h	5 Credits	q2	x	x
O LMECA2801	Machine design	Thomas Servais (compensates Benoît Raucent)	30h+30h	5 Credits	q1	x	x
O LINGI2315	Design of Embedded and real-time systems	Jean-Didier Legat	30h+30h	5 Credits	q2	x	x

PROFESSIONAL FOCUS : ENERGY [30.0]

- O Mandatory
- △ Courses not taught during 2020-2021
- ⊕ Periodic courses taught during 2020-2021
- ⊠ Optional
- ⊘ Periodic courses not taught during 2020-2021
- Activity with requisites

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

Content:

						Year 1	Year 2
O LMECA2150	Thermal cycles	Yann Bartosiewicz	30h+30h	5 Credits	q1	x	x
O LMECA2160	Combustion and fuels	Miltiadis Papalexandris	30h+30h	5 Credits	q1	x	x
O LMECA2220	Internal combustion engines	Francesco Contino Hervé Jeanmart	30h+30h	5 Credits	q2	x	x
O LMECA2322	Fluid mechanics and transfer II	Matthieu Duponcheel Grégoire Winckelmans	30h+30h	5 Credits	q1	x	x
O LELEC2520	Electric Power Systems	Emmanuel De Jaeger	30h+30h	5 Credits	q1	x	x
O LELEC2595	Electric Power Systems Quality	Emmanuel De Jaeger	30h+30h	5 Credits	q2	x	x

OPTIONS

Students complete their programme through a combination of major course work and elective classes for a minimum total of 120 credits.

Options

> Major in circuits and electronic systems *[en-prog-2020-elme2m-lelme227o]*
> Major in Systems and control engineering *[en-prog-2020-elme2m-lelme230o]*
> Major in dynamics, robotics and biomechanics *[en-prog-2020-elme2m-lelme223o]*
> Major in nuclear engineering *[en-prog-2020-elme2m-lelme237o]*
> Major in aeronautics *[en-prog-2020-elme2m-lelme240o]*
> Major in design, manufacturing and mechanics of materials *[en-prog-2020-elme2m-lelme241o]*

Major in business creation and management

> Major in business risks and opportunities *[en-prog-2020-elme2m-lelme235o]*
> Major in small and medium sized business creation *[en-prog-2020-elme2m-lelme236o]*

Elective courses

> Elective courses available for Master students in electro-mechanical engineering *[en-prog-2020-elme2m-lelme231o]*
> Elective courses: transversal skills and contacts with industry *[en-prog-2020-elme2m-lelme953o]*

OPTIONS

Students may select one of the majors suggested by the Master¿s degree programme in electrical or mechanical engineering provided that the courses in question are not already part of their course schedule. The following majors are highly recommended.

MAJOR IN CIRCUITS AND ELECTRONIC SYSTEMS

The goal of this major (which it shares with Master's degree programs in electricity and electro-mechanics) is to introduce students to system design techniques, computer aided simulation, manufacturing and experimental characterisation of components and circuits (both analogue and numerical) as well as mixed systems. Emphasis is placed on practical applications and the completion of projects.

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

The student may select 15 to 30 credits from the following courses:
From 15 to 30 credits

Content:

Compulsory course in electronic circuits and systems

						Year 1	Year 2
O LELEC2532	Design and Architecture of analog electronic systems	David Bol Denis Flandre	30h+30h	5 Credits	q2	x	x

Elective courses in electronic circuits and systems

						Year 1	Year 2
⊠ LELEC2541	Advanced Transistors	Denis Flandre (coord.) Benoît Hackens Jean-Pierre Raskin	30h+30h	5 Credits	q2	x	x
⊠ LELEC2570	Synthesis of digital integrated circuits	David Bol	30h+30h	5 Credits	q1	x	x
⊠ LELEC2580	Design of RF and microwave communication circuits	Christophe Craeye Dimitri Lederer	30h+30h	5 Credits	q2	x	x
⊠ LELEC2590	Seminars in electronics and communications	Denis Flandre Isabelle Huynen Jérôme Louveaux	30h	3 Credits	q2	x	x

						Year 1	2
⊠ LELEC2620	Modeling and implementation of analog and mixed analog/ digital circuits and systems on chip	David Bol	30h+30h	5 Credits	q2	x	x
⊠ LELEC2650	Synthesis of analog integrated circuits	Denis Flandre	30h+30h	5 Credits	q1	x	x
⊠ LELEC2660	Power electronics	Marc Bekemans	30h+15h	4 Credits	q1	x	x
⊠ LELEC2700	Microwaves	Dimitri Lederer	30h+30h	5 Credits	q1	x	x
⊠ LELEC2760	Secure electronic circuits and systems	François-Xavier Standaert	30h+30h	5 Credits	q2	x	x
⊠ LELEC2811	Instrumentation and sensors	David Bol (coord.) Laurent Francis	30h+30h	5 Credits	q1	x	x
⊠ LGBIO2020	Bioinstrumentation	André Mouraux Michel Verleysen	30h+30h	5 Credits	q1	x	x

MAJOR IN SYSTEMS AND CONTROL ENGINEERING

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

The student may select:
From 15 to 30 credits

Content:

						Year 1	Year 2
⊠ LGBIO2060	Modelling of biological systems	Philippe Lefèvre	30h+30h	5 Credits	q1	x	x
⊠ LINMA2300	Analysis and control of distributed parameter systems	Denis Dochain	30h+30h	5 Credits	q1	x	x
⊠ LINMA2361	Nonlinear dynamical systems	Pierre-Antoine Absil	30h +22.5h	5 Credits	q1	x	x
⊠ LINMA2671	Advanced control and applications	Julien Hendrickx	30h+30h	5 Credits	q1	x	x
⊠ LINMA2875	System Identification	Julien Hendrickx	30h+30h	5 Credits	q2	x	x
⊠ LINMA2510	Mathematical ecology	Eric Deleersnijder (coord.) Denis Dochain Emmanuel Hanert	30h +22.5h	5 Credits	q2 ⊘	x	x

MAJOR IN DYNAMICS, ROBOTICS AND BIOMECHANICS

The goal of this major (which it shares with Master's degree programs in electricity and electro-mechanics) is to give students a complete education in this field. All phases of the mechanical manufacturing process are studied from the design stage to putting manufacturing techniques into place to production planning and the organisation of workshops. In addition, students will learn about important technological techniques (machine parts) as well as solid mechanics (elasticity and plasticity) in order to master the processing, behaviour and use of common materials. Finally, attention is paid to methods used in the fields of automation and robotics.

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

The class LMECA 2732 may not be taken as part of this major by ELME (mechatronics)students. Students majoring in this field may select:
From 20 to 30 credits

Content:

						Year 1	Year 2
⊠ LGBIO2040	Biomechanics	Greet Kerckhofs	30h+30h	5 Credits	q2	x	x
⊠ LGCIV2042	Dynamics of structures	João Saraiva Esteves Pacheco De Almeida	20h+15h	5 Credits	q1	x	x
⊠ LMECA2170	Numerical Geometry	Vincent Legat Jean-François Remacle	30h+30h	5 Credits	q1	x	x
⊠ LMECA2215	Vehicle System Dynamics	Paul Fisette	30h+30h	5 Credits	q1	x	x
⊠ LMECA2355	Mechanical design in biomedical engineering	Greet Kerckhofs Ann Vankrunkelsven (compensates Benoît Raucent)	30h+30h	5 Credits	q1	x	x
⊠ LMECA2732	Robot modelling and control	Renaud Ronsse	30h+30h	5 Credits	q2	x	x
⊠ LMECA2802	Multibody system Dynamics	Paul Fisette	30h+30h	5 Credits	q2	x	x
⊠ LINMA2875	System Identification	Julien Hendrickx	30h+30h	5 Credits	q2	x	x
⊠ LMECA2335	Biorobotics	Renaud Ronsse	30h+30h	5 Credits	q2	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.

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

Visit http://www.sckcen.be/BNEN/ for further information about course locations, hours and language. The student may select
From 16 to 21 credits

Content:

Compulsory courses for the nuclear engineering major (10 credits)

					Year 1	Year 2
O LMECA2600	Introduction to nuclear engineering and reactor technology	Hamid Aït Abderrahim	30h+30h	5 Credits	q1	x	
O LMECA2648	Nuclear thermal-hydraulics (Centre d'étude nucléaire-Mol)	Yann Bartosiewicz	40h+7.5h	5 Credits	q1		x

Elective courses for the nuclear engineering major

⊠ LBNEN2002	Introduction to Nuclear Physics & Measurements (Centre d'étude nucléaire-Mol)			3 Credits	q1		x
⊠ LBNEN2003	Safety of Nuclear Powerplants (Centre d'étude nucléaire-Mol)			5 Credits	q2		x
⊠ LBNEN2011	Radiation protection (Centre d'étude nucléaire-Mol)			3 Credits	q1	x	x

MAJOR IN AERONAUTICS

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

Open to all students of civil and mechanical engineering and electromechanical engineering, classes in this major review mechanical applications of aeronautics: aeronautic structures, vibrations, aerodynamics, dynamics of flight, etc. The learning process consists of advanced classes in the mechanics of fluids and solids, with particular attention paid to numerical methods.

From 20 to 30 credits

O Content:

						Year 1	Year 2
⊠ LGCIV2041	Numerical analysis of civil engineering structures	Luca Sgambi	20h+15h	5 Credits	q2	x	x
⊠ LMECA2195	Gasdynamics and reacting flows	Miltiadis Papalexandris	30h+30h	5 Credits	q2	x	x
⊠ LMECA2300	Advanced Numerical Methods	Philippe Chatelain Christophe Craeye (coord.) Vincent Legat Jean-François Remacle	30h+30h	5 Credits	q2	x	x
⊠ LMECA2323	Aerodynamics of external flows	Philippe Chatelain Grégoire Winckelmans	30h+30h	5 Credits	q2	x	x
⊠ LMECA2550	Aircraft propulsion systems.	Yves Marichal (compensates Philippe Chatelain)	30h+30h	5 Credits	q1	x	x
⊠ LMECA2520	Calculation of planar structures	Issam Doghri	30h+30h	5 Credits	q2	x	x
⊠ LMECA2660	Numerical methods in fluid mechanics	Grégoire Winckelmans	30h+30h	5 Credits	q2	x	x
⊠ LMECA2830	Aerospace dynamics.	Pierre Schrooyen (compensates Philippe Chatelain)	30h+30h	5 Credits	q1	x	x
⊠ LMECA2853	Turbulence.	Eric Deleersnijder Grégoire Winckelmans	30h+30h	5 Credits	q1	x	x

MAJOR IN DESIGN, MANUFACTURING AND MECHANICS OF MATERIALS

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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 30 credits

O Content:

						Year 1	Year 2
⊠ LMAPR2483	Durability of materials	Laurent Delannay Thomas Pardoen	30h +22.5h	5 Credits	q2	x	x
⊠ LMECA2453	Advanced manufacturing technologies	Aude Simar	30h+30h	5 Credits	q1	x	x
⊠ LMECA2520	Calculation of planar structures	Issam Doghri	30h+30h	5 Credits	q2	x	x
⊠ LMECA2860	Welding Science and Technology	Pascal Jacques Aude Simar	30h+30h	5 Credits	q1	x	x
⊠ LMECA2640	Mechanics of composite materials	Issam Doghri	30h+30h	5 Credits	q2	x	x
⊠ LMECA2711	Quality management and control.	Nicolas Bronchart	30h+30h	5 Credits	q2	x	x
⊠ LMAPR2020	Materials Selection	Pierre Bollen (compensates Bernard Nysten) Thomas Pardoen	30h +22.5h	5 Credits	q2	x	x
⊠ LMAPR2018	Rheology	Evelyne Van Ruymbeke	30h+30h	5 Credits	q2	x	x

MAJOR IN BUSINESS CREATION AND MANAGEMENT

MAJOR IN BUSINESS RISKS AND OPPORTUNITIES

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

From 17 to 20 credits

Content:

						Year 1	Year 2
O LFSA1290	Introduction to financial and accounting management	Philippe Grégoire	30h+15h	4 Credits	q2	x	x
O LFSA2140	Elements of law for industry and research	Vincent Cassiers Werner Derijcke Bénédicte Inghels	30h	3 Credits	q1	x	x
O LFSA2210	Organisation and human resources	John Cultiaux Eline Jammaers	30h	3 Credits	q2	x	x
O LFSA2230	Introduction to management and to business economics	Benoît Gailly	30h+15h	4 Credits	q2	x	x
O LFSA2245	Environment and business	Jean-Pierre Tack	30h	3 Credits	q1	x	x

O One course between

From 3 to 5 credits

⊠ LFSA2202	Ethics and ICT	Axel Gosseries Olivier Pereira	30h	3 Credits	q2	x	x
⊠ LLSMS2280	Business Ethics and Compliance Management	Carlos Desmet	30h	5 Credits	q1	x	x

⊠ Alternative to the major in business risks and opportunities for computer science students

Computer science students who have already taken courses in this field while pursuing their Bachelor's degree may choose between 16-20 credits from the courses offered in the management minor for computer sciences.

MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

In keeping with most of the EPL Masters' degrees, the goal of this major is to familiarize the student with the specifics of entrepreneurship and business development in order to develop the necessary abilities, knowledge and tools to create a business. It is a truly interdisciplinary initiative where students from different faculties are brought together in cross-disciplinary teams to create an entrepreneurial project.

The Interdisciplinary program in entrepreneurship (CPME) is spread over two years and is integrated into more than 30 Masters (9 faculties). The program includes a collective and interdisciplinary master thesis focused on an entrepreneurial project (start-up or spin-off) and realized in teams of 3 to 4 students from 3 to 4 different faculties. The access is reserved for a small number of students by a selection procedure. Additional information may be found at www.uclouvain.be/cpme.

This major is not available in English and may not be taken at the same time as the major "Business risks and opportunities".

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

From 20 to 25 credits

O Content:

O Required courses for the major in small and medium sized businesses

O LCPME2001	Entrepreneurship Theory (in French)	Frank Janssen	30h+20h	5 Credits	q1	x	
O LCPME2002	Managerial, legal and economic aspects of the creation of a company (in French)	Yves De Cordt Marine Falize	30h+15h	5 Credits	q1	x	x
O LCPME2003	Business plan of the creation of a company (in French) *Les séances du cours LCPME2003 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.*	Frank Janssen	30h+15h	5 Credits	q2		x
O LCPME2004	Advanced seminar on Entrepreneurship (in French)	Frank Janssen	30h+15h	5 Credits	q2	x	x

⊠ Prerequisite CPME courses

Student who have not taken management courses during their previous studies must enroll in LCPME2000.

O LCPME2000	Venture creation financement and management I	Yves De Rongé Olivier Giacomin	30h+15h	5 Credits	q1	x	

ELECTIVE COURSES

The elective courses being recommended and available for Master students in biomedical engineering are listed here above, in the majors and other lists of elective courses. However, a student can further suggest other courses that would be relevant for his.her personal curriculum, pending that this is compliant with the rules for setting up a personal Master program

ELECTIVE COURSES AVAILABLE FOR MASTER STUDENTS IN ELECTRO-MECHANICAL ENGINEERING

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

Content:

						Year 1	Year 2
⊠ LELEC1930	Intoduction to telecommunication	Jérôme Louveaux	30h+15h	4 Credits	q2	x	x
⊠ LELEC2753	Electrical Power Systems: Advanced Topics	Emmanuel De Jaeger	30h+15h	5 Credits	q2	x	x
⊠ LELEC2920	Communication networks	Sébastien Lugan (compensates Benoît Macq)	30h+30h	5 Credits	q1	x	x
⊠ LENVI2007	Renewable energies	Xavier Draye Patrick Gerin (coord.) Hervé Jeanmart Geoffrey Van Moeseke	30h	4 Credits	q1	x	x
⊠ LFSA2212	Innovation classes	Benoît Macq Jean-Pierre Raskin Benoît Raucent	30h+15h	5 Credits	q1	x	x
⊠ LINMA2370	Modelling and analysis of dynamical systems	Jean-Charles Delvenne (coord.) Denis Dochain	30h +22.5h	5 Credits	q1	x	x
⊠ LMECA1451	Mechanical manufacturing.	Laurent Delannay Aude Simar	30h+30h	5 Credits	q2	x	x
⊠ LMECA2240	Testing of thermal machinery.	Francesco Contino Hervé Jeanmart	15h+15h	2 Credits	q2	x	x
⊠ LMECA2325	Biomass conversion	Patrick Gerin Hervé Jeanmart	30h+30h	5 Credits	q1	x	x
⊠ LMECA2410	Mechanics of Materials	Laurent Delannay Aude Simar	30h+30h	5 Credits	q2	x	x
⊠ LMECA2420	Advanced topics in energetics.	Yann Bartosiewicz Hervé Jeanmart	30h	3 Credits	q2	x	x
⊠ LMECA2645	Major technological hazards in industrial activity.	Denis Dochain	30h	3 Credits	q2	x	x
⊠ LMECA2771	Thermodynamics of irreversible phenomena.	Miltiadis Papalexandris	30h+30h	5 Credits	q2	x	x
⊠ LMECA2780	Introduction to Turbomachinery	Tony Arts	30h+30h	5 Credits	q2	x	x
⊠ LMECA2801	Machine design	Thomas Servais (compensates Benoît Raucent)	30h+30h	5 Credits	q1	x	x
⊠ LEPL2351	Dynamique des groupes - Q1	Christine Jacqmot Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	q1	x	x
⊠ LEPL2352	Dynamique des groupes - Q2	Christine Jacqmot Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	q2	x	x

ELECTIVE COURSES: TRANSVERSAL SKILLS AND CONTACTS WITH INDUSTRY

○ Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

The student chooses between 3 and 22 credits (max 27 if the student chooses the intership) in this list below or in the courses of the major "business risks and opportunities". An alternative is to choose the Major in small and medium sized business creation.
From 3 to 22 credits

○ Content:

○ Transversal skills and contacts with industry

The student selects min 3 credits among the courses of the majors "business risks and opportunities", "small and medium sized business creation" and courses of professional integration activity specific to the program.

⊠ Internship

⊠ LFSA2995	Company Internship	Jean-Pierre Raskin	30h	10 Credits	q1+q2	x	x

⊠ Professional integration activity specific to the program

⊠ Communication

Students may select max. 8 credits of languages courses or group dynamics :
Maximum 8 credits

⊠ 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.)	30h	3 Credits	q1+q2	x	x
⊠ LALLE2501	Professional development seminar-German	Caroline Klein (coord.)	30h	5 Credits	q1+q2	x	x
⊠ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	30h	3 Credits	q1	x	x
⊠ LESPA2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	30h	5 Credits	q1	x	x
⊠ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.) Marie-Laurence Lambrecht	30h	3 Credits	q1 or q2	x	x
⊠ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.) Dag Houdmont	30h	3 Credits	q1 or q2	x	x

⊠ Group dynamics

⊠ LEPL2351	Dynamique des groupes - Q1	Christine Jacqmot Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	q1	x	x
⊠ LEPL2352	Dynamique des groupes - Q2	Christine Jacqmot Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	q2	x	x

⊠ Other non-disciplinary courses

The student may further select maximum 8 credits in other disciplines.

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 competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme's reference framework of learning outcomes in the document *"In which teaching units are the competences and learning outcomes in the programme's reference framework developed and mastered by the student?"*

ELME2M - Information

Access Requirements

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail

Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.

The admission requirements must be met prior to enrolment in the University.

SUMMARY

Specific access requirements

This programme is taught in English with no prerequisite in French. The student is supposed to have at least a B2 level in the European Framework of Reference. 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 enginering 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 engenering 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 enginering 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 (https://uclouvain.be/fr/etudier/passerelles) to the university

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
Masters			
Masters in engineering		Direct access	

Holders of a non-University 2nd cycle degree

> Find out more about links to the university

Access based on validation of professional experience

> See the website Valorisation des acquis de l'expérience

It is possible to gain admission to all masters courses via the validation of professional experience procedure.

Access based on application

Reminder : all Masters (apart from Advanced Masters) are also accessible on file.

The first step of the admission procedure requires to submit an application online: www.uclouvain.be/en/study/inscriptions/futurs-etudiants.html.

Selection criteria are summarized here (contact : epl-admission@uclouvain.be).

Admission and Enrolment Procedures for general registration

Teaching method

The majority of classes consist of lectures and tutorials. The tutors are upper-class students who have specialised tutor training (the class LFSA2351). This class provides its participants with practical tutoring techniques to help fellow students.

Methods that promote multidisciplinary studies

UCL'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 (https://uclouvain.be/fr/decouvrir/rgee.html). 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
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) *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)*	• End of the semester exam based on course exercises • Tests in some introductory classes
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)	• Report on mini project in field of study • Progress report on multidisciplinary project
Contribute, through teamwork, to a multidisciplinary project and carry out the project while taking into account its objectives, resources, and constraints. (Axis 4) *Communicate effectively (speaking or writing in French or a foreign language) with the goal of carrying out assigned projects. (Axis 5)* *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)*	• Progress report on multidisciplinary project • Report, public presentation, and yearly work for graduation project

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 teachnig 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

Since its creation, the Louvain School of Engineering (EPL) has participated in diverse exchange programs that were put into place at the European level and beyond.

Possible trainings at the end of the programme

Specialised Master's Degrees

- Specialised Master's Degree in Nanotechnology
- Specialised Master's Degree 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's degree (120) in sciences and environmental management and the Master's degree (60) in sciences and environmental management (automatic admission with possible complementary coursework)
- Different Master's degree programmes in management (automatic admission based on written application): see this list
- The Master's degree (60) in information and communication at Louvain-la-Neuve or the Master's degree (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

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Jury

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Useful Contact(s)

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