ELME2M

2014 - 2015

Master [120] in Electro-mechanical Engineering

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In french
Dissertation/Graduation Project : **YES** - Internship : **optional**
Activities in English: **optional**
Activities on other sites : **optional**
Organized by: **Ecole Polytechnique de Louvain (EPL)**
Programme code: **elme2m** - European Qualifications Framework (EQF): 7

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Introduction

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Learning outcomes

Engineering has experienced two complementary changes. On the one hand, technological expansion has created a need for advanced specialization, which allows little space for the traditionally broad training of engineers : this is the case e.g. of nanotechnologies, information technologies, or the development of new materials.

On the other hand, this trend has led, in various application fields, to a growing integration of various disciplines : electricity or electronics, mechanics, control, computing ; examples may be found in robotics, energy management, vehicles and transport systems …

Answering the needs of present-day society therefore requires not only engineers with specialized knowledge, but also engineers who can manage the interface issues which arise when integrating various disciplines into an equipment or a system.

This second profile is that targeted by UCL's Master's in electromechanical engineering. It should be noted that the interdisciplinary training organized at UCL differs from that of other French-speaking universities where a degree in electromechanical engineering is awarded to all graduates in electrical OR mechanical engineering.

Due to the wide spectrum of disciplines integrated into the electromechanical engineering curriculum, students are required, from the outset of their Master's, to choose between two specializations, viz. Mechatronics or Energy : the first of these stresses electronics, mechanical design and control theory, the second thermodynamics, energetics and electricity.

The electromechanical engineering curriculum integrates the fields of electricity and mechanics into a coherent and balanced entity where the accent is on basic knowledge, thereby favouring the deepening or redirection of knowledge at any time in one's career. This leads to the training of engineers who are well equipped to follow the evolution of technology and adapt to the needs of the labour market.

Upon completion of their Master's, students will have mastered the mathematical and physical methods of electricity and mechanics and will have acquired advanced knowledge in mechatronics or energetics. Thanks to the various elective courses in their curriculum, students can complement their training according to their specific interests, in particular within the fields of economics and management. The pedagogy stresses project work integrating various disciplines, and this favours the development of a critical mind capable of designing, modelling, manufacturing and experimentally validating devices and systems.

The final project amounts to half the workload of the last year, and gives students the opportunity of an in-depth analysis of a given subject and, via its size and context, is a realistic introduction to the professional life of an engineer or a researcher.

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

démontrer la maîtrise d'un solide corpus de connaissances en sciences fondamentales et sciences de l'ingénieur, lui permettant d'appréhender et de résoudre des problèmes qui relèvent de l'életromécanique.

1. Identifier et mettre en oeuvre les concepts, lois, raisonnements applicables à une problématique donnée faisant appel à plusieurs disciplines de la mécanique et de l'électricité :

- L'électricité (au sens large)
- L'énergie électrique (transport, qualité, gestion...)
- L'électrotechnique (conversion, commande, actionnement...)
- L'électronique (électronique digitale, instrumentation...)
- L'automatique
- L'informatique (temps réel)
- La mécanique (modélisation, conception...)
- La thermodynamique et la thermique
- La dynamique des fluides
- La robotique et l'automatisation

2. Identifier et utiliser les outils de modélisation et de calcul adéquats pour résoudre des problématiques liées aux disciplines (ci-dessus).

3. Vérifier la vraisemblance et confimer la validité des résultats obtenus au regard de la nature du problème posé, notamment en ce qui concerne les ordres de grandeurs et les unités dans lesquelles les résultats sont exprimés.

d'organiser et de mener à son terme une démarche d'ingénierie appliquée au développement d'un produit (et/ou d'un service) répondant à un besoin ou à une problématique particulière dans le domaine de l'électromécanique.

1. Analyser le problème à résoudre ou le besoin fonctionnel à rencontrer, inventorier les fonctionnalités et contraintes, formuler le cahier des charges dans un domaine où les contraintes techniques et économiques sont prises en compte.

2. Modéliser le problème et concevoir une ou plusieurs solutions techniques en y intégrant les aspects mécaniques, électriques, électroniques ou informatiques et répondant au cahier des charges.

3. Évaluer et classer les solutions au regard de l'ensemble des critères figurant dans le cahier des charges : efficacité, faisabilité, qualité ergonomie et sécurité dans l'environnement considéré (exemples : trop couteux, trop complexes, trop dangereux, trop difficile à manipuler).

4. Implémenter et tester une solution sous la forme d'une maquette, d'un prototype et/ou d'un modèle numérique.

5. Formuler des recommandations pour améliorer une solution technique, soit pour la rejeter, soit pour expliquer les améliorations à y apporter dans la perspective d'en faire un produit opérationnel.

d'organiser et de mener à son terme un travail de recherche pour appréhender un phénomène physique ou une problématique inédite relevant de l'életromécanique.

1. Se documenter et résumer l'état des connaissances actuelles dans le domaine de la mécanique et de l'électricité.

2. Proposer une modélisation et/ou un dispositif expérimental (par exemple dans le domaine de la régulation thermique) en construisant d'abord un modèle mathématique, en réalisant à partir de celui-ci en laboratoire, un dispositif permettant de simuler le comportement du système, en testant les hypothèses qui y sont relatives.

3. Synthétiser dans un rapport les conclusions de sa recherche, en mettant en évidence les paramètres clés et leur influence sur le comportement du phénomène étudié (choix des formes et matériaux, environnement physio-chimique, conditions d'exploitation...). Il en extrait des recommandations utiles pour développer des solutions techniques dans des problématiques concrètes de notre environnement.

de contribuer, en équipe, à la réalisation d'un projet pluridisciplinaire et de le mener à son terme en tenant compte des objectifs, des ressources, allouées et des contraintes qui le caractérisent.

1. Cadrer et expliciter les objectifs d'un projet compte tenu des enjeux et contraintes qui caractérisent l'environnement du projet.

2. S'engager collectivement dans un environnement pluridisciplinaire (mécanique et électricité) sur un plan de travail, un échéancier (environnement qui peut-être conflictuel).

3. Prendre des décisions en équipe lorsqu'il y a des choix à faire : que ce soit sur les solutions techniques ou sur l'organisation du travail pour faire aboutir le projet.

de communiquer efficacement oralement et par écrit (en français et idéalement dans une ou plusieurs langues étrangères) en vue de mener à bien les projets qui lui sont confiés.

1. Identifier les besoins du client : questionner, écouter et s'assuer de la bonne compréhension de toutes les dimensions de sa demande et pas seulement les aspects techniques.

2. Argumenter et convaincre en s'adaptant au langage de ses interlocuteurs : techniciens, collègues, clients, supérieurs hiérarchiques.

3. Communiquer sous forme graphique et schématique ; interpréter un schéma, présenter les résultats d'un travail, structurer des informations.

4. Lire, analyser et exploiter des documents techniques (normes, plans, cahier des charges...).

5. Rédiger des documents écrits en tenant compte des exigences contextuelles et des conventions sociales en la matière.

6. Faire un exposé oral convaincant, en utilisant les techniques modernes de communication.

de faire preuve de rigueur, d'ouverture, d'esprit critique et d'éthique dans son travail. Tout en tirant parti des innovations technologiques et scientifiques à sa disposition, il prendra le recul nécessaire pour valider la pertinence socio-technique d'une hypothèse ou d'une solution.

1. Appliquer les normes et s'assurer de la robustesse de la solution dans les disciplines de la mécanique et de l'électricité.

2. Relativiser les solutions en élargissant le spectre à des enjeux non-techniques (le domaine de l'énergie et du climat, la prise en compte des aspects environnementaux et sociaux).

3. Faire preuve d'esprit critique vis-à-vis d'une solution technique.

4. Autoévaluer son propre travail.

Programme structure

The curriculum of the Masterâ€™s in electromechanical engineering will require a minimum total of 120 credits covering two years, with a minimum of 60 credits per year, and comprising :

- a 60 to 65 credits core curriculum
- one of the two basic focuses, viz. mechatronics or energetics (30 credits)
- elective courses, and possibly an option

The master thesis is generally written during the last year. However, students may choose to take any given course in the first or second year, subject to possible prerequisites. This will be the case in particular for students pursuing part of their education abroad.

If, in the course of his (her) former curriculum, a student has already been credited with a subject included in the compulsory or elective curriculum, or any training deemed equivalent by the diploma committee, this subject will be replaced by elective courses, while conforming to imposed constraints. The student is responsible for checking whether the minimum total number of credits has been reached, as well as those of the specialized field, which will appear on the final diploma.

The studentâ€™s curriculum will be submitted for acceptance by the relevant diploma committee.

Whatever the focus or the options chosen, the programme of this master shall totalize 120 credits, spread over two years of studies each of 60 credits.

> Tronc commun du master ingénieur civil électromécanicien *[en-prog-2014-elme2m-lelme220t.html]*

Focuses

> Professional focus:Mecatronics *[en-prog-2014-elme2m-lelme220s]*
> Professional focus:Energy *[en-prog-2014-elme2m-lelme221s]*

Options courses

> Options *[en-prog-2014-elme2m-lelme913r.html]*
- > Option en circuits et systèmes électroniques *[en-prog-2014-elme2m-lelme227o.html]*
- > Option en MEMS & NEMS /MEMS & NEMS *[en-prog-2014-elme2m-lelme229o.html]*
- > Option en automatique et systèmes dynamiques / Systems and control *[en-prog-2014-elme2m-lelme230o.html]*
- > Option en dynamique, robotique et biomécanique *[en-prog-2014-elme2m-lelme223o.html]*
- > Option in nuclear engineering *[en-prog-2014-elme2m-lelme237o.html]*
- > Option en aéronautique *[en-prog-2014-elme2m-lelme240o.html]*
- > l'étudiant qui choisi cette option sélectionnne *[en-prog-2014-elme2m-lelme241o.html]*
- > Business risks and opportunities *[en-prog-2014-elme2m-lelme235o.html]*
- > Option en création de petites et moyennes entreprises *[en-prog-2014-elme2m-lelme236o.html]*

> Cours au choix *[en-prog-2014-elme2m-lelme2010o.html]*

ELME2M Detailled programme

Programme by subject

CORE COURSES [54.0]

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

						Year 1	2
O LELME2990	Graduation project/End of studies project	N.		28 Credits			x
O *Cours d'électricité et d'électronique*							
O LELEC2311	PHYSICS OF ELECTROMECHANICAL CONVERTERS	Bruno Dehez	30h+15h	4 Credits	2q	x	
O LELEC2660	Power electronics	Marc Bekemans	30h+15h	4 Credits	1q	x	
O LELEC2811	Instrumentation and sensors	David Bol, Laurent Francis	30h+30h	5 Credits	1q	x	

					Year 1	Year 2

Cours de mécanique

LMECA2755	Industrial automation.	Bruno Dehez, Paul Fisette, Renaud Ronsse	30h+30h	5 Credits	1q	x

Religion courses for student in exact sciences

The student shall select 2 credits from amongst
The student shall select

LTECO2100	Questions of religious sciences: Biblical readings	Hans Ausloos	15h	2 Credits	1q	x	x
LTECO2200	Questions of religious sciences: reflections about Christian faith	Dominique Martens	15h	2 Credits	2q	x	x
LTECO2300	Questions of religious sciences: questions about ethics	Philippe Cochinaux	15h	2 Credits	1q	x	x

Projet (6 credits)

LELME2001	Project in Electromechanical Engineering	Yann Bartosiewicz, Emmanuel De Jaeger, Bruno Dehez, Hervé Jeanmart, Renaud Ronsse	30h+45h	6 Credits		x	

LIST OF FOCUSES

> Professional focus:Mecatronics *[en-prog-2014-elme2m-lelme220s]*
> Professional focus:Energy *[en-prog-2014-elme2m-lelme221s]*

PROFESSIONAL FOCUS:MECATRONICS [30.0]

O Mandatory
△ Courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015
⊠ Optional
⊘ Periodic courses not taught during 2014-2015
⧺ Two years course

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

						Year 1	Year 2
O LELEC2103	Project in Electricity 3 : Electronic systems	Jean-Didier Legat, Jérôme Louveaux, Luc Vandendorpe	75h	5 Credits	1 + 2q	x	x
O LELEC2313	Dynamic modelling and control of electromechanical converters	Emmanuel De Jaeger, Bruno Dehez	30h+30h	5 Credits	1q	x	x
O LELEC2531	Design and Architecture of digital electronic systems	Jean-Didier Legat	30h+30h	5 Credits	1q	x	x
O LMECA2732	Introduction to robotics	Renaud Ronsse	30h+30h	5 Credits	2q	x	x
O LMECA2801	Machine design.	Benoît Raucent, Aude Simar	30h+30h	5 Credits	1q	x	x
O LINGI2315	Design of Embedded and real-time systems	Jean-Didier Legat	30h+30h	5 Credits	2q	x	x

PROFESSIONAL FOCUS:ENERGY [30.0]

O Mandatory
△ Courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015
⊠ Optional
⊘ Periodic courses not taught during 2014-2015
⧺ Two years course

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

						Year 1	Year 2
O LMECA2150	Thermal cycles.	Yann Bartosiewicz	30h+30h	5 Credits	1q	x	x
O LMECA2160	Combustion and fuels	Miltiadis Papalexandris	30h+30h	5 Credits	1q	x	x
O LMECA2220	Internal combustion engines.	Hervé Jeanmart	30h+30h	5 Credits	2q	x	x
O LMECA2322	Fluid mechanics and transfer II.	Jean-François Remacle, Grégoire Winckelmans, Grégoire Winckelmans (compensates Jean-François Remacle)	30h+30h	5 Credits	1q	x	x
O LELEC2520	ELECTRIC POWER SYSTEMS	Emmanuel De Jaeger	30h+30h	5 Credits	1q	x	x
O LELEC2595	Power quality	Emmanuel De Jaeger	30h+30h	5 Credits	2q	x	x

OPTIONS

Les étudiants complètent leur programme pour atteindre un minimum de 120 crédits par des cours au choix ou éventuellement une option.

Options

> Option en circuits et systèmes électroniques *[en-prog-2014-elme2m-lelme227o]*
> Option en MEMS & NEMS /MEMS & NEMS *[en-prog-2014-elme2m-lelme229o]*
> Option en automatique et systèmes dynamiques / Systems and control *[en-prog-2014-elme2m-lelme230o]*
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> Business risks and opportunities *[en-prog-2014-elme2m-lelme235o]*
> Option en création de petites et moyennes entreprises *[en-prog-2014-elme2m-lelme236o]*
> Cours au choix *[en-prog-2014-elme2m-lelme2010o]*

OPTIONS

Les étudiants peuvent sélectionner une des options proposées dans les programmes de master ingénieur civil électricien ou mécanicien dans la mesure où les cours considérés ne font pas déjà partie de leur programme. Les options suivantes sont particulièrement conseillées.

OPTION EN CIRCUITS ET SYSTÈMES ÉLECTRONIQUES

L'objectif de l'option en circuits et systèmes électroniques, commune aux masters ingénieur civil électricien et électromécanicien, est d'introduire l'étudiant aux techniques de conception systématique, simulation sur ordinateur, fabrication et caractérisation expérimentale de composants et circuits électroniques de types analogique et numérique et de systèmes mixtes associant ces composants. L'accent est mis sur la pratique, les applications et la réalisation de projets.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 15 à 29 credits parmi

O Cours obligatoire en circuits et systèmes électroniques

						Year 1	Year 2
O LELEC2532	Design and Architecture of analog electronic systems	Denis Flandre, Jean-Didier Legat	30h+30h	5 Credits	2q	x	x

⊠ Cours au choix circuits et systèmes électroniques

⊠ LELEC2570	Synthesis of digital integrated circuits	David Bol	30h+30h	5 Credits	1q	x	x
⊠ LELEC2590	Seminars in electronics and communications	Denis Flandre, Isabelle Huynen, Jérôme Louveaux	30h	3 Credits	2q	x	x
⊠ LELEC2620	Modeling and implementation of analog and mixed analog/ digital circuits and systems on chip	David Bol	30h+30h	5 Credits	2q	x	x
⊠ LELEC2650	Synthesis of analog integrated circuits	Denis Flandre	30h+30h	5 Credits	1q	x	x
⊠ LELEC2660	Power electronics	Marc Bekemans	30h+15h	4 Credits	1q	x	x
⊠ LELEC2760	Secure electronic circuits and systems	François-Xavier Standaert	30h+30h	5 Credits	2q	x	x

OPTION EN MEMS & NEMS /MEMS & NEMS

Cette option en micro- et nanosystèmes, commune aux masters ingénieur civil électricien et électromécanicien a pour objectif d'introduire l'étudiant aux techniques de micro et nanofabrication, de design, de simulation multiphysique et de caractérisation de micro & nano capteurs et actionneurs en technologie intégrée. Vu les applications des MEMS et NEMS dans de nombreux domaines (automobile, télécommunications, électronique, domestique, médical, etc.) l'analyse des micro et nanostructures et l'étude de leur comportement se baseront sur une approche multidisciplinaire.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 15 à 28 credits parmi

O Cours obligatoiress en MEMS & NEMS

						Year 1	Year 2
O LELEC2560	Micro and nanofabrication techniques	Vincent Bayot, Laurent Francis, Benoît Hackens, Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
O LELEC2895	Design of micro and nanosystems	Denis Flandre, Laurent Francis (coord.), Thomas Pardoen, Jean-Pierre Raskin	30h+30h	5 Credits	1q	x	x

⊠ Cours au choix en MEMS & NEMS

⊠ LELEC2590	Seminars in electronics and communications	Denis Flandre, Isabelle Huynen, Jérôme Louveaux	30h	3 Credits	2q	x	x
⊠ LMAPR2015	Physics of Nanostructures	Jean-Christophe Charlier, Xavier Gonze, Luc Piraux	37.5h +22.5h	5 Credits	1q	x	x
⊠ LMAPR2020	Materials Selection	Christian Bailly, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LPHY2246	Basses pressions et physique du vide	Laurent Francis, Benoît Hackens	30h	5 Credits	1q	x	x
⊠ LELEC2811	Instrumentation and sensors	David Bol, Laurent Francis	30h+30h	5 Credits	1q	x	x

OPTION EN AUTOMATIQUE ET SYSTÈMES DYNAMIQUES / SYSTEMS AND CONTROL

⭘ Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 15 à 30 credits parmi

⊠ Cours conseillés en automatique et systèmes dynamiques

L'étudiant sélectionne au minimum 10 crédits parmi

						Year 1	Year 2
⊠ LINMA2120	Applied mathematics research seminar	Pierre-Antoine Absil, Vincent Blondel, Philippe Chevalier, Jean-Charles Delvenne (coord.), François Glineur, Julien Hendrickx, Raphaël Jungers, Philippe Lefèvre, Yurii Nesterov, Paul Van Dooren, Mathieu Van Vyve	30h	3 Credits		x	x
⊠ LINMA2360	Project in mathematical engineering	Pierre-Antoine Absil, François Glineur (coord.), Yurii Nesterov, Paul Van Dooren	30h +22.5h	5 Credits	2q	x	x
⊠ LINMA2361	Nonlinear dynamical systems	Pierre-Antoine Absil	30h +22.5h	5 Credits	1q	x	x
⊠ LINMA2671	Automatic : Theory and implementation	Julien Hendrickx	30h+30h	5 Credits	1q	x	x
⊠ LINMA2875	System Identification	Julien Hendrickx	30h+30h	5 Credits	2q	x	x

⊠ Cours d'intérêt en automatique et systèmes dynamiques

⊠ LELEC2870	Machine Learning : regression, dimensionality reduction and data visualization	John Lee (compensates Michel Verleysen), Michel Verleysen	30h+30h	5 Credits	1q	x	x
⊠ LGBIO2060	Modelling of biological systems	Philippe Lefèvre	30h+30h	5 Credits	1q	x	x
⊠ LINGI2262	Machine Learning :classification and evaluation	Pierre Dupont	30h+30h	5 Credits	2q	x	x
⊠ LMAPR2510	Mathematical ecology	Eric Deleersnijder, Emmanuel Hanert, Thierry Van Effelterre	30h +22.5h	5 Credits	2q	x	x
⊠ LMECA2732	Introduction to robotics	Renaud Ronsse	30h+30h	5 Credits	2q	x	x

OPTION EN DYNAMIQUE, ROBOTIQUE ET BIOMÉCANIQUE

Cette option, commune aux masters ingénieur civil mécanicien et électromécanicien, a pour objectif de donner aux étudiants une formation complète dans ce domaine. Toutes les phases du processus de fabrication mécanique sont étudiées, depuis l'étape de conception et la mise en place de techniques de fabrication appropriées jusqu'à la planification de la production et l'organisation des ateliers.

A cela, s'ajoutent l'enseignement des concepts technologiques indispensables (organes de machines) ainsi que les éléments de formation requis en mécanique du solide (élasticité et plasticité) pour maîtriser l'usinage et le comportement à l'usage des matériaux usuels. Enfin, une attention particulière est portée aux méthodes d'automatisation et à la robotique.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 30 credits parmi

						Year 1	2
⊠ LAUCE2185	Dynamics of structures	Jean-Pierre Coyette	30h+30h	5 Credits	1q	x	x
⊠ LMECA2170	Numerical Geometry	Vincent Legat, Vincent Legat (compensates Jean-François Remacle), Jean-François Remacle	30h+30h	5 Credits	1q	x	x
⊠ LMECA2355	Mechanical design in biomedical engineering	Olivier Cartiaux, Benoît Herman, Emilie Marchandise, Benoît Raucent, Khanh Tran Duy	30h+30h	5 Credits	1q	x	x
⊠ LMECA2215	Dynamics of transportation	Paul Fisette	30h+30h	5 Credits	1q	x	x
⊠ LGBIO2040	Biomechanics	François Henrotte (compensates Emilie Marchandise), Emilie Marchandise	30h+30h	5 Credits	2q	x	x
⊠ LINMA2875	System Identification	Julien Hendrickx	30h+30h	5 Credits	2q	x	x
⊠ LMECA2802	Mechanics of robots and multibody systems.	Paul Fisette	30h+30h	5 Credits	2q	x	x
⊠ LMECA2732	Introduction to robotics	Renaud Ronsse	30h+30h	5 Credits	2q	x	x

OPTION IN NUCLEAR ENGINEERING

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 de cette option qui est organisée pour sa plus grand 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.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	‡ Two years course

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

Please refer to http://www.sckcen.be/BNEN/ for more informations on courses localization, timetable and teaching languages

De 17 à 23 credits parmi

O Mandatory courses (11 credits)

					Year 1	Year 2
O LMECA2600	Introduction to nuclear engineering and reactor technology.	Hamid Aït Abderrahim	30h+30h	5 Credits	1q	x	
O LMECA2648	Nuclear thermal-hydraulics.	Yann Bartosiewicz	40h+7.5h	6 Credits	2q		x

O Elective course

De 6 à 12 credits parmi

⊠ LBNEN2002	Introduction to Nuclear Physics & Measurements	N.		6 Credits			x
⊠ LBNEN2003	Safety of Nuclear Powerplants	N.		3 Credits			x
⊠ LBNEN2004	Operation and control	N.		3 Credits			x

OPTION EN AÉRONAUTIQUE

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 15 à 29 credits parmi

						Year 1	2
⊠ LMECA2853	Turbulence.	Eric Deleersnijder, Grégoire Winckelmans	30h+30h	5 Credits	1q	x	x
⊠ LMECA2550	Aircraft propulsion systems.	Philippe Chatelain	30h+30h	5 Credits	1q	x	x
⊠ LMECA2520	Calculation of planar structures	Issam Doghri	30h+30h	5 Credits	1q	x	x
⊠ LMECA2830	Aerospace dynamics.	Philippe Chatelain	30h+30h	5 Credits	1q	x	x
⊠ LMECA2323	Aerodyamics of external flows.	Philippe Chatelain, Grégoire Winckelmans	30h+30h	5 Credits	2q	x	x
⊠ LMECA2195	Gasdynamics and reacting flows	Miltiadis Papalexandris	30h+30h	5 Credits	2q	x	x
⊠ LMECA2660	Numerical methods in fluid mechanics.	Grégoire Winckelmans	30h+30h	5 Credits	2q	x	x
⊠ LMECA2300	Advanced Numerical Methods	Christophe Craeye, Jonathan Lambrechts, Vincent Legat, Vincent Legat (compensates Jean-François Remacle), Jean-François Remacle	30h+30h	5 Credits	2q	x	x

L'ÉTUDIANT QUI CHOISI CETTE OPTION SÉLECTIONNNE

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 15 à 33 credits parmi

						Year 1	Year 2
⊠ LMECA2860	Welding.	Bruno de Meester de Betzenbroeck	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2481	Deformation and fracture of materials	Thomas Pardoen	30h+30h	5 Credits	1q	x	x
⊠ LMECA2453	Additional mechanical manufacturing and FAO	Aude Simar	30h+30h	5 Credits	1q	x	x
⊠ LMECA2141	Rheology.	Vincent Legat, Evelyne Van Ruymbeke	30h+30h	5 Credits	1q	x	x
⊠ LMECA2640	Mechanics of composite materials.	Issam Doghri, Frédéric Lani	30h+30h	5 Credits	2q	x	x
⊠ LMECA2330	Machine components	Laurent Delannay, Benoît Raucent, Renaud Ronsse, Thomas Servais (compensates Benoît Raucent)	30h+30h	5 Credits	2q	x	x
⊠ LMECA2131	Introduction to nonlinear solid mechanics.	Issam Doghri	30h+30h	5 Credits	2q	x	x
⊠ LMAPR2482	Plasticity and metal forming	Laurent Delannay, Thomas Pardoen (coord.)	30h +22.5h	5 Credits	2q	x	x

BUSINESS RISKS AND OPPORTUNITIES

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 16 à 20 credits parmi

						Year 1	Year 2
⊠ LFSA2140	Elements of law for industry and research	Fernand De Visscher, Werner Derijcke, Bénédicte Inghels	30h	3 Credits	1q	x	x
⊠ LFSA2230	Introduction to management and to business economics	Benoît Gailly	30h+15h	4 Credits	2q	x	x
⊠ LFSA1290	Introduction to financial and accounting management	Thomas Lambert (compensates Gerrit Sarens), Gerrit Sarens	30h+15h	4 Credits	2q	x	x
⊠ LFSA2202	Ethics and ICT	Maxime Lambrecht, Olivier Pereira	30h	3 Credits	2q	x	x
⊠ LFSA2245	Environment and Business	Thierry Bréchet	30h	3 Credits	1q	x	x
⊠ LFSA2210	Organisation and human resources	John Cultiaux	30h	3 Credits	1q	x	x

⊠ Alternative to the "Business risks and opportunities" for computer science students

Computer science students who have already followed various courses of this discipline during their Bachelor's curriculum can select between 16 and 20 credits in the program "mineure en gestion pour les sciences informatiques" http://www.uclouvain.be/xprog-2013-min-lgesc100i

OPTION EN CRÉATION DE PETITES ET MOYENNES ENTREPRISES

Commune à la plupart des masters ingénieur civil, cette option a pour objectif de familiariser l'étudiant ingénieur civil avec les spécificités des P.M.E., de l'entreprenariat et de la création afin de développer chez lui les aptitudes, connaissances et outils nécessaires à la création d'entreprise. L'accès en est réservé uniquement à un nombre restreint d'étudiants sélectionnés sur base d'un dossier de motivation et d'interviews individuelles.

Les dossiers de motivation pour cette filière doivent être introduits avant la rentrée académique de Master1 auprès du :

Secrétariat CPME – Place des Doyens 1
1348 Louvain-la-Neuve (tél 010/47 84 59).

Les étudiants sélectionnés remplaceront le mémoire prévu dans le tronc commun par un mémoire spécifique en création d'entreprise (nombre de crédits inchangé).

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 25 credits parmi

O Compulsory courses

						Year 1	Year 2
O LCPME2001	Entrepreneurship Theory (in French)	Frank Janssen	30h+20h	5 Credits	1q	x	
O LCPME2003	Business plan of the creation of a company (in French)	Frank Janssen	30h+15h	5 Credits	2q		x
O LCPME2002	Managerial, legal and economic aspects of the creation of a company (in French)	Régis Coeurderoy, Yves De Cordt	30h+15h	5 Credits	1q	x	x
O LCPME2004	Advanced seminar on Enterpreneurship (in French)	Frank Janssen	30h+15h	5 Credits	2q	x	x

⊠ Prerequisite CPME course

Students who have not taken a management course within their former curriculum shall include LCPME2000 in their current curriculum.

						Year 1	Year 2
LCPME2000	Venture creation financement and management I	Régis Coeurderoy, Olivier Giacomin, Paul Vanzeveren	30h+15h	5 Credits	1 + 2q	x	

COURS AU CHOIX

Parmi les cours au choix, l'attention de l'étudiant est attirée sur ceux qui relèvent des domaines de l'AUTOMATIQUE, du GENIE ELECTRIQUE et du GENIE MECANIQUE. Les étudiants peuvent également choisir des enseignements en gestion, droit, économie et langues. S'ils choisissent en dehors de la liste ci-dessous, ils doivent faire approuver leur choix par la Commission de diplôme.

Ils peuvent par ailleurs effectuer un stage industriel. Pour ce dernier, ils contacteront impérativement, avant de s'inscrire, un des conseillers de la Commission de diplôme ELME pour s'assurer de la faisabilité d'un tel stage dans une entreprise qu'ils auront contactée eux-mêmes ou via un membre de la Commission de diplôme.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

						Year 1	2
⊠ LINMA2370	Modelling and analysis of dynamical systems	Jean-Charles Delvenne, Denis Dochain (coord.)	30h +22.5h	5 Credits	1q	x	x
⊠ LELEC1930	Intoduction to telecommunication	Jérôme Louveaux	30h+15h	4 Credits	2q	x	x
⊠ LELEC2753	Electrical Power Systems: in-depth questions	Emmanuel De Jaeger	30h+15h	5 Credits	2q	x	x
⊠ LELEC2920	Communication networks	Benoît Macq	30h+30h	5 Credits	1q	x	x
⊠ LMECA1451	Mechanical manufacturing.	Laurent Delannay, Aude Simar	30h+30h	5 Credits	1q	x	x
⊠ LMECA2240	Testing of thermal machinery.	Hervé Jeanmart	15h+15h	2 Credits	2q	x	x
⊠ LMECA2325	Biomass conversion	Patrick Gerin, Hervé Jeanmart	30h+30h	5 Credits	1q	x	x
⊠ LMECA2410	Dynamics of elastic systems.	Jean-Pierre Coyette, Laurent Delannay	30h+30h	5 Credits	2q	x	x
⊠ LMECA2420	Advanced topics in energetics.	Yann Bartosiewicz, Hervé Jeanmart	30h	3 Credits	2q	x	x
⊠ LMECA2645	Major technological hazards in industrial activity.	Denis Dochain, Alexis Dutrieux	30h	3 Credits	2q	x	x
⊠ LMECA2771	Thermodynamics of irreversible phenomena.	Miltiadis Papalexandris	30h+30h	4 Credits	2q	x	x
⊠ LMECA2780	Fluid compressors.	Tony Arts	30h+30h	5 Credits	2q	x	x
⊠ LMECA2801	Machine design.	Benoît Raucent, Aude Simar	30h+30h	5 Credits	1q	x	x
⊠ LFSA2351A	Group dynamics	Piotr Sobieski (coord.)	15h+30h	3 Credits	1q	x	x
⊠ LFSA2351B	Group dynamics	Piotr Sobieski (coord.)	15h+30h	3 Credits	2q	x	x
⊠ LENVI2007	Renewable energies	Xavier Draye, Patrick Gerin (coord.), Hervé Jeanmart, Geoffrey Van Moeseke	30h	4 Credits	1q	x	x

⊠ Company training periods (10 credits)

Students may include in their curriculum a company training period worth 10 credits. However, if this activity is related to their final thesis, they shall choose the 5-credit LFSA 2996 course.
Students may include in their curriculum a company training period worth 10 credits. However, if this activity is related to their final thesis, they shall choose the 5-credit FSA 2996 course.

⊠ LFSA2995	Company Internship	Claude Oestges	30h	10 Credits		x	x
⊠ LFSA2996	Company Internship	N.		5 Credits		x	x

⊠ Languages

Students may include in their electives any language course of the Institute of Modern Languages (ILV) for a maximum of 3 credits within the 120 basic credits of their Masters. Their attention is drawn to the following professional insertion seminars:
Students may include in their electives any language course of the Institute of Modern Languages (ILV) for a maximum of 3 credits within the 120 basic credits of their Master?s. Their attention is drawn to the following professional insertion seminars:

⊠ LNEER2500	Professional development seminar: Dutch - intermediate level	Isabelle Demeulenaere (coord.), Mariken Smit	30h	3 Credits	1 ou 2q	x	x

						Year 1	2
⊠ LNEER2600	Professional development seminar: Dutch - upper-intermediate level	Isabelle Demeulenaere, Marie-Laurence Lambrecht	30h	3 Credits	1 ou 2q	x	x
⊠ LALLE2500	Professional development seminar German	Caroline Klein, Ann Rinder (coord.)	30h	3 Credits	1 + 2q	x	x
⊠ LALLE2501	Professional development seminar-German	Caroline Klein, Ann Rinder (coord.)	30h	5 Credits	1 + 2q	x	x
⊠ LESPA2600	Professional development seminar - Spanish	Isabel Baeza Varela, Carmen Vallejo Villamor	30h	3 Credits	1 ou 2q	x	x
⊠ LESPA2601	Professional development seminar- Spanish	Paula Lorente Fernandez (coord.)	30h	5 Credits	1q	x	x

ELME2M - Information

Admission

General and specific admission requirements for this program must be satisfied at the time of enrolling at the university..

- University Bachelors
- Non university Bachelors
- Holders of a 2nd cycle University degree
- Holders of a non-University 2nd cycle degree
- Adults taking up their university training
- Personalized access

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University Bachelors

Diploma	Special Requirements	Access	Remarks
UCL Bachelors			
Bachelor in engineering	Major in mechanics with minor in electricity OR Major in electricity with minor in mechanics	Direct access	
Bachelor in engineering		Access with additional training	A student with a Major in mechanics or electricity, but no minor in these two disciplines, will have to take prerequisites according to the chosen minor, within a curriculum tailored to the personal situation, and with the agreement of an advisor who is a member of the Mechanical engineering diploma committee. To this end, the student may choose 15 credits amongst the electives of the Master's in electromechanical engineering.
		Direct access	
Others Bachelors of the French speaking Community of Belgium			
Bachelor in engineering	With specific options in former institution related to electricity and mechanics	Direct access	
Bachelor in engineering		Access with additional training	A student with a former option in only one of the two disciplines (mechanics and electricity) will have to take prerequisites according to the former option, within a curriculum tailored to the personal situation, and with the agreement of an advisor who is a member of the Mechanical engineering diploma committee. To this end, the student may choose 15 credits amongst the electives of the Master's in electromechanical engineering.
Bachelors of the Dutch speaking Community of Belgium			
Bachelor in engineering	With specific options in former institution related to electricity and mechanics	Direct access	

Bachelor in engineering		Access with additional training	A student with a former option in only one of the two disciplines (mechanics and electricity) will have to take prerequisites according to the former option, within a curriculum tailored to the personal situation, and with the agreement of an advisor who is a member of the Mechanical engineering diploma committee. To this end, the student may choose 15 credits amongst the electives of the Master's in electromechanical engineering.
Foreign Bachelors			
Bachelor in engineering	Bachelors from the Cluster network	Direct access	Conditions imposed on UCL Engineering Bachelor
Bachelor in engineering	Other institutions	Access with additional training	The student shall submit an application to the Faculty of applied sciences, including a detailed past curriculum (courses and grades by year). The Faculty, after consulting the relevant programme committee, will decide as to the applicant's admissibility pursuant to rules relative to links between degrees. If necessary the Faculty can propose a customized curriculum, by drawing on the volume of elective courses of the relevant engineering Master's curriculum and, if necessary, up to 15 additional credits.

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Non university Bachelors

Diploma	Access	Remarks
> Find out more about links to the university		
> BA en sciences industrielles - type long	Accès au master moyennant réussite d'une année préparatoire de max. 60 crédits	Type long

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Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
Engineers considered equivalent to corresponding bachelors		Direct access	
Masters			
Masters in engineering		Direct access	

Holders of a non-University 2nd cycle degree

Diploma	Access	Remarks
> Find out more about links to the university		
> MA en sciences de l'ingénieur industriel (toutes finalités) > MA en sciences industrielles (toutes finalités)	Accès direct au master moyennant ajout éventuel de 15 crédits max	Type long

Adults taking up their university training

> 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.

Personalized access

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

Admission and Enrolment Procedures for general registration

Teaching method

• Features favouring interdisciplinarity :

The electromechanical training at UCL is essentially interdisciplinary since it combines teaching in mechanics, electricity, control theory and computing. It also integrates non-technical disciplines (economics, management, modern languages ..) via elective courses

• Variety of teaching strategies :

Using a pedagogy stressing project work which integrates various disciplines, the training aims to develop students' good judgment, allowing them to design, model, manufacture and experimentally assess all types of electromechanical systems and devices.

The final thesis amounts to half the workload of the final year. It allows the student to

Join a research team or to collaborate with the industrial world so as to investigate a given topic in depth. Due to its scope and context, it can be considered as a true initiation to the professional life of an engineer or a researcher.

• Variety of learning situations

The student will encounter diverse pedagogical tools adapted to various disciplines : formal lectures, project work, tutorials, problem-based learning, case studies, laboratory work, computer simulations, computer tutorials, industrial and research training, construction site and factory visits, cultural trips, group and personal activities, seminars, …). For some subjects, e-learning will allow students to learn at their own rhythm and to experience virtual experimentation.

This variety of situations helps students build their knowledge in an iterative and progressive manner, while developing their autonomy, and their organizational, time management and communication skills. The most advanced computing tools (hardware, software, networks) are at their disposal.

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".

All learning activities are assessed as prescribed by the University internal regulations (see exam regulations), viz. written and oral exams, laboratory exams, individual or group work, public presentation of projects and final thesis.

Mobility and/or Internationalisation outlook

Global framework

The Louvain School of Engineering (EPL) has taken part, since their inception, in all the various mobility programmes which have been set up at both the European and world levels.

The numerous contacts it has with professional circles, notably via its Advisory Board, have demonstrated to what extent employers are favourably impressed by a mobility experience in someoneâ€™s CV. The ever-increasing internationalization of research via networks linking laboratories throughout the world, speaks in favour of encouraging this mobility.

Studentsâ€™ interest is aroused at the end of their Bachelor studies, notably via intensive courses such as those of the ATHENS ( ) or BEST ( ) networks.

In the course of the two-year Masterâ€™s programme, students are encouraged to take part in a 1- or 2-semester exchange scheme

Within Belgium, the Louvain School of Engineering is involved in a privileged partnership with the Faculteit Ingenieurswetenschappen of the Katholieke Universiteit Leuven, with whom it has set up an exchange scheme relating to the first year of the Masterâ€™s curriculum (https://eng.kuleuven.be/).

At the European level, the Louvain School of Engineering is strongly involved in the CLUSTER excellence network ( ). This network encourages internal mobility, since this is a guarantee of quality as concerns both the level of teaching and the hosting of exchange students. Moreover, Cluster partners have signed an agreement recognizing each otherâ€™s Bachelorâ€™s curricula. This agreement stipulates that all Bachelors of network institutions will have access to the Masterâ€™s studies in any institution on a par with local students.

Outside Europe, the Louvain School of Engineering is a partner in the Magalhaes network, which groups about fifteen European universities together with the best South American science and technology universities (https://www.magalhaes-network.net/).

Besides these network partnerships, the School has also signed a number of individual agreements with various universities in Europe, North America or elsewhere in the world. A list of these agreements may be found on the website of UCL International Relations (https://www.uclouvain.be/international.html).

International possibilities (for UCL students)

UCL is also a partner in the TIME programme ( ) which gives students the opportunity to obtain two engineering degrees, one at UCL and the other in one of the following institutions :

- Ecole Centrale Paris
- Supaero Toulouse
- Universidad Politecnica de Madrid
- Politecnico di Milano
- Institut Français du Pétrole

Besides intensive courses which are one component of international relations, EPL students with outstanding results are encouraged to apply for 5- or 10-month exchange programmes.
When taking place during the first Masterâ€™s year, exchanges are generally 10 months long. In the second year, they only last for a semester, either as courses or else research in a foreign laboratory as a complement to the final thesis.

Some other more specific exchange programmes have been set up with South America, where the academic year is naturally on an â€œaustralâ€# basis.

Students are informed about the various exchange programmes as from their second Bachelorâ€™s year. They are encouraged to prepare for their exchange in a timely manner, notably by taking language courses at the Modern Languages Institute of UCL.

Possible trainings at the end of the programme

- Accessible complementary Masterâ€™s degrees:
â€¢ Masterâ€™s in nuclear engineering
â€¢ Masterâ€™s in nanotechnology
â€¢ Masterâ€™s in biotechnology and applied biology (Science sector)
- Accessible Ph. D. curricula

The Institute for Information and Communication Technologies, Electronics and Applied Mathematics are two of those with the largest number of doctoral students. Members of the institute are involved in many thematic Ph. D. schools, some of these having been active for many years, others currently being set up. A list of these thematic Ph. D. schools can be obtained from the chairperson of the Ph. D. committee.

Contacts

Curriculum Managment

Entite de la structure ELME

Acronyme	**ELME**
Dénomination	Commission de programme - Ingénieur civil électromécanicien
Adresse	Place du Levant, 3 bte L5.03.02
	1348 Louvain-la-Neuve
Secteur	Secteur des sciences et technologies (SST)
Faculté	Ecole Polytechnique de Louvain (EPL)
Commission de programme	Commission de programme - Ingénieur civil électromécanicien (ELME)

Academic Supervisor : Hervé JEANMART

Jury

Président du Jury : **Jean-Didier LEGAT**
Secrétaire du Jury - Energie : **Hervé JEANMART**
Secrétaire du Jury - Mécatronique : **Hervé JEANMART**

Usefull Contacts

Secrétariat : **Isabelle DARGENT**