

MECA2M

2013 - 2014

Master [120] in Mechanical Engineering

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In frenchDissertation/Graduation Project : **YES** - Internship : **optional**Activities in English: **optional** - Activities in other languages : **NO**Activities on other sites : **NO**Main study domain : **Sciences de l'ingénieur**Organized by: **Ecole Polytechnique de Louvain (EPL)**Programme code: **meca2m** - European Qualifications Framework (EQF): 7**Table of contents**

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MECA2M - Introduction

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MECA2M - Admission

For the specific conditions of this program : refer to the French version

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

MECA2M - Information

Learning outcomes

The objective of the Master's course in Mechanical engineering is to train engineers who should be capable of mastering complex and varied scientific, technological and human problems related to mechanical engineering.

Upon graduating, students will have acquired the requisite basic knowledge in all the main fields of Mechanical engineering (fluid mechanics and transfer phenomena, computational methods in applied mechanics, mechanics of materials and structures, applied dynamics, mechanical manufacturing and production, mechanical design, thermal machinery, thermodynamics and energetics). Their education will have been both theoretical and practical, notably via laboratory and project work.

Students may choose to have a standard degree, by choosing their elective courses to make up a basic curriculum in Mechanics. They may also choose to specialize, by following one of many specific streams.

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

de 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 la mécanique.

1.1 Identifier et mettre en oeuvre les concepts, lois, raisonnements applicables à une problématique donnée relevant de :

- la mécanique des milieux
- l'énergie, la thermodynamique et la thermique
- la modélisation mathématique et la simulation numérique
- la gestion de projet
- la robotique, les systèmes et l'automatisation

1.2 Identifier et utiliser les outils de modélisation et de calcul adéquats pour résoudre ces problématique.

1.3 Vérifier la vraisemblance et confirmer la validité des résultats obtenus au regard de la nature du problème posé (ordre de grandeur, unités...).

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 la mécanique.

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

2.2. Modéliser le problème et concevoir une ou plusieurs solutions techniques en y intégrant les aspects mécaniques répondant au cahier des charges.

2.3. Évaluer et classer les solutions au regard de l'ensemble des critères figurant dans le cahier des charges : efficacité, faisabilité, qualité, ergonomie et sécurité.

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

2.5. Formuler des recommandations pour améliorer le caractère opérationnel de la solution étudiée.

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

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

3.2. Proposer une modélisation et/ou un dispositif expérimental permettant de simuler le comportement du système, en testant les hypothèses relatives au phénomène étudié.

3.3. Mettre en forme un rapport de synthèse visant à expliciter les potentialités d'innovation théoriques et/ou technique résultant de ce travail de recherche.

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.

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

- 4.2. S'engager collectivement sur un plan de travail, un échéancier.
- 4.3. Fonctionner dans un environnement pluridisciplinaire conjointement avec d'autres acteurs porteurs de différents points de vue.
- 4.4. 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.

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

- 5.1 Identifier les besoins du client : questionner, écouter les dimensions de sa demande et pas seulement les aspects techniques.
- 5.2 Argumenter et convaincre en s'adaptant au langage de ses interlocuteurs : collègues, techniciens, clients, supérieurs hiérarchiques.
- 5.3 Communiquer sous forme graphique et schématique ; interpréter un schéma, présenter un travail, structurer des informations.
- 5.4 Lire, analyser et exploiter des documents techniques (normes, plans, cahier des charges...)
- 5.5 Rédiger des documents écrits en tenant compte des exigences contextuelles et des conventions sociales en la matière.
- 5.6 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.

- 6.1. Appliquer les normes et s'assurer de la robustesse de la solution dans les disciplines de la mécanique et de l'électricité.
- 6.2. 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).
- 6.3. Faire preuve d'esprit critique vis-à-vis d'une solution technique.
- 6.4. Autoévaluer son propre travail.

Teaching method

Possibility for students to choose a strong specialization in any given field, with a varied choice of specializations within the main themes of mechanical engineering (aeronautics, mechanical manufacturing, energy, material forming, biomechanics, ...) or else to prefer a standard curriculum including elective courses.

Features intended to favour interdisciplinarity :

The curriculum is quite varied and leads to a wide range of scientific and technological fields.

Variety of teaching methods :

The pedagogy applied within this programme follows directly from that of the Bachelor's: active learning, balanced mix of group effort and individual work, time set aside for learning non-technical competencies.

This pedagogy stresses project work involving various subjects, and thereby aims to develop students' good judgment, allowing them to design, model, manufacture and experimentally assess all types of systems, prototypes, and devices.

A strong feature of the curriculum lies in the students' immersion into the instructors' research laboratories (on the occasion of course laboratory activities, case studies, projects or final theses), thereby allowing them to become familiar with cutting edge techniques and to learn the investigative approach of research work

The final thesis amounts to half the workload of the final year. It allows the student to investigate a given topic in depth and, due to its scope and context, can be considered as a true initiation to the professional life of an engineer or a researcher.

Diversity 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 will help students to build their knowledge in an iterative and progressive manner, while developing their autonomy, organizational skills, time management, and capacity to use various modes of communication, ... The most advanced computer equipment (hardware, software, networks) is made available to assist students in their work.

The company launching specialization is based on an interactive approach and problem-based learning. Throughout the curriculum, students are required to perform group activities in multi-disciplinary groups. The final thesis is also multi-disciplinary and designed in such a way that groups of three students, ideally from three different faculties, should work on a company launching project.

This Master's features a leaning towards the industrial world. One should note, in particular, the possibility of choosing a 10-credit industrial traineeship.

Evaluation

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 Faculty of Applied Sciences 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 someone's CV. The ever-increasing internationalization of research via networks linking laboratories throughout the world, speaks in favour of encouraging this mobility.

Students' 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 Master's programme, students are encouraged to take part in a 1- or 2-semester exchange scheme

Within Belgium, the Faculty of Applied Sciences 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 Master's curriculum ().

At the European level, the Faculty of Applied Sciences 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 other's Bachelor's curricula. This agreement stipulates that all Bachelors of network institutions will have access to the Master's studies in any institution on a par with local students.

Outside Europe, the Faculty of Applied Sciences is a partner in the Magalhaes network, which groups about fifteen European universities together with the best South American science and technology universities ().

Besides these network partnerships, the Faculty 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 ().

International possibilities (for UCL students)

UCL is also a partner in the TIME programme () which gives students the opportunity to obtain two engineering degrees, via a specifically tailored curriculum.

Double Master's degrees are operational with the following institutions :

- ENSMP France (subsidized by the Institut Français du Pétrole – IFP)
- Supaéro Toulouse (TIME programme)
- ENSICA Toulouse

Besides intensive courses which are one component of international relations, FAS students with outstanding results are encouraged to apply for 5- or 10-month exchange programmes. When taking place during the first Master'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 "austral" basis.

Students are informed about the various exchange programmes as from their second Bachelor'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.

The FAS's participation in the MERCATOR exchange programme should also be mentioned.

A double degree Master's with Clemson University (South Carolina) is also in preparation.

International appeal (for non residents)

The Master's in Mechanical Engineering proposes a complete and high level training in a universally recognized field, viz. "Mechanical Engineering". All the facets of the profession are covered, from the most theoretical (Fluid and solid mechanics, Transfer phenomena, System dynamics) through to the application of these theories to design, manufacturing and assembly of a wide range of products.

Applications are countless (automobile industry, aviation, machinery, energetics, etc.). Various optional streams (aeronautics, mechanical production and manufacturing, energy, polymer working, metal working, biomechanics, numerical modelling in mechanics, etc.) allow the student to develop advanced competencies in a specific field. The student can also pursue a "standard" course (without any particular specialization) via a free choice of electives. Whatever the choice, the student will be on track for a well-defined profession, that of a professional Mechanical Engineer.

Possible trainings at the end of the programme

Accessible complementary Master's : Nuclear engineering

Accessible Ph.D. studies : via GRASMECH doctoral school

MECA2M - Contacts

Curriculum Managment

Entite de la structure MECA

| | |
|-------------------------|---|
| Acronyme | MECA |
| Dénomination | Commission de programme - Ingénieur civil mécanicien |
| Adresse | Place du Levant, 2 bte L5.04.03 1348 Louvain-la-Neuve Tél 010 47 22 00 - Fax 010 45 26 92 |
| Secteur | Secteur des sciences et technologies (SST) |
| Faculté | Ecole Polytechnique de Louvain (EPL) |
| Commission de programme | Commission de programme - Ingénieur civil mécanicien (MECA) |

Academic Supervisor : [Vincent LEGAT](#)

Jury

Président du Jury : **Piotr SOBIESKI**

Secrétaire du Jury : **Vincent LEGAT**

Usefull Contacts

Secrétariat : **Isabelle HENNAU**

MECA2M - Detailed programme

Programme structure

The Master's curriculum in Mechanical engineering will require a minimum total of 120 credits covering two years, with a minimum of 60 credits per year, and comprising :

- a 44-credit core curriculum
- specialist courses in mechanics (30 credits)
- a possible specialization in one of the 9 suggested fields (aeronautics, mechanical production and manufacturing, energy, polymer working, metal working, biomechanics, numerical modelling in mechanics, management, setting up of small and medium-sized companies), with a maximum of 30 credits in said field
- elective courses, with a minimum total of 25 credits

The final 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 core curriculum, or any training deemed equivalent, this subject will be replaced by any elective course within the 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 student's curriculum will be scrutinized for acceptance by the Mechanical engineering 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.

Core study

> [Core curriculum](#) [en-prog-2013-meca2m-lmeca220t.html]

> [Professional focus](#) [en-prog-2013-meca2m-lmeca220s]

Options courses

> [Options](#) [en-prog-2013-meca2m-lmeca903r.html]

> [Aeronautics](#) [en-prog-2013-meca2m-lmeca222o.html]

> [Dynamics, robotics et biomécanics](#) [en-prog-2013-meca2m-lmeca223o.html]

> [Energy](#) [en-prog-2013-meca2m-lmeca224o.html]

> [Disgn, manufacturing and mechamics of materials](#) [en-prog-2013-meca2m-lmeca226o.html]

> [Option en génie nucléaire](#) [en-prog-2013-meca2m-lmeca231o.html]

> [Lauching of small and medium-sized companies \(SMC\)](#) [en-prog-2013-meca2m-lmeca229o.html]

> [Business risks and opportunities](#) [en-prog-2013-meca2m-lmeca230o.html]

> [Elective courses for the master in mecanical engineering](#) [en-prog-2013-meca2m-lmeca221o.html]

Programme by subject

Core courses

● Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

‡ Two years course

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

The student shall select

| | | | | | | | Year | |
|-------------|-------------------------------------|--|---------|------------|------|--|------|---|
| | | | | | | | 1 | 2 |
| ○ LMECA2990 | Travail de fin d'études | N. | | 28 Credits | | | x | |
| ○ LMECA2840 | Mechanical construction project II. | Bruno Dehez, Benoît Raucant, Renaud Ronsse | 45h+30h | 6 Credits | 1+2q | | 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 |

Professional focus [30.0]

○ Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

‡ Two years course

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

| | | | | | | | Year | |
|-------------|----------------------------------|--|---------|-----------|----|---|------|---|
| | | | | | | | 1 | 2 |
| ○ LMECA2150 | Thermal cycles. | Yann Bartosiewicz | 30h+30h | 5 Credits | 1q | x | | |
| ○ LMECA2322 | Fluid mechanics and transfer II. | Jean-François Remacle, Grégoire Winckelmans | 30h+30h | 5 Credits | 1q | x | | |
| ○ LMECA2755 | Industrial automation. | Bruno Dehez, Paul Fisette | 30h+30h | 5 Credits | 1q | x | | |
| ○ LMECA2801 | Machine design. | Benoît Raucant, Aude Simar | 30h+30h | 5 Credits | 1q | x | | |
| ○ LMECA2220 | Internal combustion engines. | Hervé Jeanmart | 30h+30h | 5 Credits | 2q | x | | |
| ○ LMECA2410 | Dynamics of elastic systems. | Jean-Pierre Coyette, Laurent Delannay | 30h+30h | 5 Credits | 2q | x | | |

Options [54.0]

L'étudiant complète son programme avec des options et / ou des cours au choix. Il sélectionne

Options

- > [Aeronautics](#) [en-prog-2013-meca2m-lmeca222o]
- > [Dynamics, robotics et biomécanics](#) [en-prog-2013-meca2m-lmeca223o]
- > [Energy](#) [en-prog-2013-meca2m-lmeca224o]
- > [Disgn, manufacturing and mechamics of materials](#) [en-prog-2013-meca2m-lmeca226o]
- > [Option en génie nucléaire](#) [en-prog-2013-meca2m-lmeca231o]
- > [Lauching of small and medium-sized companies \(SMC\)](#) [en-prog-2013-meca2m-lmeca229o]
- > [Business risks and opportunities](#) [en-prog-2013-meca2m-lmeca230o]
- > [Elective courses for the master in mecanical engineering](#) [en-prog-2013-meca2m-lmeca221o]

OPTIONS

L'étudiant peut choisir une ou plusieurs options parmi les suivantes.

AERONAUTICS

Ouverte aux étudiants ingénieurs civils mécaniciens et électromécaniciens, cette option reprend des cours sur l'application de la mécanique à l'aéronautique : structures aéronautiques, vibrations, aérodynamique, dynamique du vol...

Cet apprentissage se fait au travers de cours approfondis de mécanique des fluides et des solides, avec une attention particulière portée aux méthodes numériques.

Cette option est naturellement complétée par l'option en *énergie*, l'option en *dynamique, robotique et biomécanique* ainsi que l'option en *conception, fabrication et mécanique des matériaux* pour les problématiques de l'énergie dans l'aéronautique, la motorisation, les aspects dynamiques et l'importance des matériaux dans la conception et la maintenance des avions.

● Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

‡ Two years course

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

The student shall choose

De 20 à 30 credits parmi

Year

1 2

| | | | | | | | 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 | Calcul de structures planes | 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, Jean-François Remacle | 30h+30h | 5 Credits | 2q | | x | x |

DYNAMICS, ROBOTICS ET BIOMÉCANICS

Ouverte aux étudiants ingénieurs civils mécaniciens et électromécaniciens, cette option reprend des cours sur la dynamique, la robotique ainsi que la biomécanique.

Que ce soit l'analyse des vibrations, la mise au point d'un robot ou la conception et la production de composantes ou micro-composantes en bio-ingénierie (implants artificiels, valves, prothèses), cette option permet à l'étudiant d'aborder l'une ou plusieurs de ces applications sous un angle principalement mécanique.

Cette option est naturellement complétée par l'option en *aéronautique*, l'option en *énergie*, ainsi que l'option en *conception, fabrication et mécanique des matériaux* pour les étudiants intéressés dans les problématiques de la dynamique et de la robotique dans l'aéronautique et dans l'énergie. Le conception et le choix des matériaux est évidemment un point essentiel que ce soit pour la mise au point d'un robot ou le choix de bio-matériaux dans les problèmes de réhabilitation.

● Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

‡ Two years course

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

The student shall choose

De 20 à 30 credits parmi

| | | | | | | Year | |
|-------------|--|---|---------|-----------|----|------|---|
| | | | | | | 1 | 2 |
| ⊗ LAUCE2185 | Dynamic of structures | Jean-Pierre Coyette | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMECA2170 | Numerical Geometry | Vincent Legat, Jean-François Remacle | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMECA2355 | Conception mécanique en génie biomédical | Olivier Cartiaux, Emilie Marchandise, Benoît Rautent, Khanh Tran Duy (compensates Emilie Marchandise) | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMECA2215 | Dynamique des véhicules | 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 |

ENERGY

Ouverte aux étudiants ingénieurs civils mécaniciens et électromécaniciens, cette option reprend des cours sur la problématique de l'énergie dans le monde actuel.

Cette discipline est abordée dans son entièreté, d'abord par l'étude des techniques de production et de conversion d'énergie (machines thermiques, énergie nucléaire, énergies renouvelables), ensuite par l'analyse des risques associés à la production d'énergie et des moyens de les minimiser (risques majeurs, pollution), et enfin par l'étude des enjeux et conséquences de la consommation énergétique.

Cette option est naturellement complétée par l'option en *aéronautique* pour les étudiants intéressés dans les problématiques de l'énergie et la motorisation dans l'aéronautique. C'est aussi le cas de l'option en *dynamique, robotique et biomécanique* ainsi que de l'option en *conception, fabrication et mécanique des matériaux* pour les étudiants intéressés dans les aspects dynamiques, l'automatisation et de l'importance des matériaux dans la conception et la maintenance des systèmes de production et de conversion d'énergie.

● Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

‡ Two years course

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

The student shall choose

De 19 à 30 credits parmi

| | | | | | | Year | |
|-------------|---|--|---------|-----------|----|------|---|
| | | | | | | 1 | 2 |
| ⊗ LMECA2600 | Introduction to nuclear engineering and reactor technology. | Hamid Aït Abderrahim | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LENVI2007 | Renewable energies | André De Herde, Xavier Draye, Patrick Gerin (coord.), Hervé Jeanmart | 30h | 4 Credits | 1q | x | x |
| ⊗ LMECA2160 | Combustion and fuels | Miltiadis Papalexandris | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMECA2325 | Conversion de la biomasse | Patrick Gerin, Hervé Jeanmart | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMECA2420 | Advanced topics in energetics. | Yann Bartosiewicz, Hervé Jeanmart | 30h | 3 Credits | 2q | x | x |
| ⊗ LMECA2240 | Testing of thermal machinery. | Hervé Jeanmart | 15h+15h | 2 Credits | 2q | x | x |
| ⊗ LMECA2780 | Fluid compressors. | Tony Arts | 30h+30h | 5 Credits | 2q | x | x |
| ⊗ LMECA2711 | Quality management and control. | Thibault Valentin | 30h+30h | 5 Credits | 2q | x | x |
| ⊗ LMECA2771 | Thermodynamics of irreversible phenomena. | Miltiadis Papalexandris | 30h+30h | 5 Credits | 2q | x | x |

DISGN, MANUFACTURING AND MECHANICS OF MATERIALS

Ouverte aux étudiants ingénieurs civils mécaniciens et électromécaniciens, cette option reprend des cours sur la conception, la fabrication et l'importance des matériaux dans la mise au point d'un système mécanique. La compréhension des propriétés physiques et chimiques et du comportement des métaux, des polymères et des composites peut être abordée dans cette option. Ensuite, les grandes techniques de mise en forme de ces matériaux (moulage par injection ou compression, étirage, laminage, forgeage, extrusion, emboutissage) sont étudiées d'un point de vue thermo-mécanique et technologique. Enfin, la modélisation numérique de ces procédés est également abordée, avec une attention particulière portée aux techniques de soudure. Toutes les phases du processus de fabrication mécanique sont également 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.

Cette option est naturellement complétée par l'option en *aéronautique*, l'option en *énergie*, ainsi que l'option en *dynamique, robotique et biomécanique* pour les étudiants intéressés dans les problématiques de la conception, de la fabrication et de l'importance des matériaux que ce soit dans l'aéronautique, l'énergie, les transports ou la bio-ingénierie.

● Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊙ Periodic courses not taught during 2013-2014

‡ Two years course

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

The student select

De 20 à 30 credits parmi

| | | | | | | Year | |
|-------------|---|---|---------------|-----------|----|------|---|
| | | | | | | 1 | 2 |
| ⊗ LMECA2860 | Welding. | Bruno de Meester de Betzenbroeck | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMAPR2481 | Deformation and fracture of materials | Francis Delannay, Thomas Pardoën | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMECA2453 | Compléments de fabrication mécanique et FAO | Jean-François Debongnie | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMECA2141 | Rheology. | Christian Bailly, Vincent Legat | 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 component design. | Laurent Delannay, Benoît Raucant, Renaud Ronsse | 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 Pardoën (coord.) | 30h +22.5h | 5 Credits | 2q | x | x |

OPTION EN GÉNIE NUCLÉAIRE

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 grande partie au Centre d'énergie nucléaire de Mol est conditionnée à une évaluation des compétences des candidats suivant les règles utilisées pour les candidatures aux échanges ERASMUS-SOCRATES.

Plus de détails sur cette option sont disponibles sur le site du [SCK-CEN](#) de Mol.

● Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

‡ Two years course

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

Year

1 2

● Mandatory courses (11 credits)

| Course ID | Course Title | Instructor | Hours | Credits | 1 | 2 | X |
|-------------|---|----------------------|----------|-----------|----|---|---|
| ● LMECA2600 | Introduction to nuclear engineering and reactor technology. | Hamid Aït Abderrahim | 30h+30h | 5 Credits | 1q | | x |
| ● LMECA2648 | Nuclear thermal-hydraulics. | Yann Bartosiewicz | 40h+7.5h | 6 Credits | 2q | | x |

● Elective course

De 6 à 12 credits parmi

| | | | | | | | |
|-------------|---|----|--|-----------|--|--|---|
| ⊗ LBNEN2002 | Radiation protection and nuclear measurements | N. | | 6 Credits | | | x |
| ⊗ LBNEN2003 | Reliability and safety | N. | | 3 Credits | | | x |
| ⊗ LBNEN2004 | Operation and control | N. | | 3 Credits | | | x |

LAUNCHING OF SMALL AND MEDIUM-SIZED COMPANIES (SMC)

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'entrepreneuriat 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).

● Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊙ Periodic courses not taught during 2013-2014

‡ Two years course

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

Additional information relative to this specialization may be found at <http://www.uclouvain.be/cpme>. This specialization may not be chosen alongside the specialization in management. The student shall choose De 20 à 25 credits parmi

Year

1 2

● Compulsory courses

| | | | | | | | |
|-------------|---|------------------------------------|---------|-----------|----|---|---|
| ● LCPME2001 | Entrepreneurship Theory (in French) | Frank Janssen | 30h+20h | 5 Credits | 1q | x | |
| ● LCPME2003 | Business plan of the creation of a company (in French) | Frank Janssen | 30h+15h | 5 Credits | 2q | | x |
| ● 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 |
| ● 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.

| | | | | | | | |
|-------------|---|---|---------|-----------|------|---|--|
| ● LCPME2000 | Venture creation financement and management I | Régis Coeurderoy, Olivier Giacomini (compensates Régis Coeurderoy), Paul Vanzeveren | 30h+15h | 5 Credits | 1+2q | x | |
|-------------|---|---|---------|-----------|------|---|--|

BUSINESS RISKS AND OPPORTUNITIES

Commune à la plupart des masters ingénieur civil, cette option a pour objectif de familiariser l'étudiant avec les principes de base de la gestion des entreprises.

○ Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

⊞ Two years course

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

This specialization may not be chosen alongside the specialization in company launching (see further on). FSA 2240 is not included in this specialization for civil engineering students. The student shall choose De 16 à 20 credits parmi

| | | | | | | Year | |
|------------|--|---|---------|-----------|------|------|---|
| | | | | | | 1 | 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 | Gerrit Sarens | 30h+15h | 4 Credits | 2q | x | x |
| ⊗ LFSA2202 | Ethics and ICT | Axel Gosseries, Olivier Pereira | 30h | 3 Credits | 2q | x | x |
| ⊗ LFSA2245 | Environment and Enterprise | Thierry Bréchet | 30h | 3 Credits | 1q | x | x |
| ⊗ LFSA2210 | Organisation and human resources | John Cultiaux | 30h | 3 Credits | 1+2q | 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>

ELECTIVE COURSES FOR THE MASTER IN MECHANICAL ENGINEERING

○ Mandatory

△ Courses not taught during 2013-2014

⊕ Periodic courses taught during 2013-2014

⊗ Optional

⊖ Periodic courses not taught during 2013-2014

‡ Two years course

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

The student complete his (her) curriculum with elective courses

Year

1 2

⊗ Cours de polyvalence

| | | | | | | | |
|-------------|--|--|---------|-----------|----|---|---|
| ⊗ LMECA1451 | Mechanical manufacturing. | Laurent Delannay, Aude Simar | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LAUCE1181 | Mechanics of structures | Pierre Latteur | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LELEC2525 | Introduction to electric and electronic circuits | Jean-Didier Legat, Michel Verleysen | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LINMA1510 | Linear Control | Denis Dochain | 30h+30h | 5 Credits | 2q | x | x |

⊗ General knowledge courses

Students can also include in their curriculum any course given at UCL, KULeuven or Von Karman Institute subject to approval of the program committee. Students can also include in their curriculum any course given at UCL or FIW / KULeuven subject to approval of the Diploma committee.

| | | | | | | | |
|-------------|---|--|---------------|-----------|----|---|---|
| ⊗ LMECA2645 | Major technological hazards in industrial activity. | Denis Dochain, Alexis Dutrieux | 30h | 3 Credits | 2q | x | x |
| ⊗ LDROP2063 | Environmental Law | Nicolas de Sadeleer, Damien Jans | 30h | 5 Credits | 2q | x | x |
| ⊗ LECGE1223 | Production and Operations Management | Pierre Semal | 30h | 4 Credits | 1q | x | x |
| ⊗ LELEC2811 | Instrumentation and sensors | Laurent Francis, Ernest Matagne | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LINMA2671 | Automatic : Theory and implementation | Julien Hendrickx | 30h+30h | 5 Credits | 1q | x | x |
| ⊗ LMAPR2018 | Rheometry and Polymer Processing | Christian Bailly, Evelyne Van Ruymbeke | 30h +22.5h | 5 Credits | 2q | x | x |
| ⊗ LMAPR2510 | Mathematical ecology | Eric Deleersnijder, Emmanuel Hanert | 30h +22.5h | 5 Credits | 2q | x | x |
| ⊗ LMAPR2680 | Treatments of gaseous wastes | Jacques Devaux, Olivier Françoisse | 30h+7.5h | 4 Credits | 1q | x | x |
| ⊗ LPHY2150 | Physique et dynamique de l'atmosphère et de l'océan I | Michel Crucifix, Thierry Fichet | 45h+9h | 6 Credits | 1q | x | x |
| ⊗ LPHY2153 | Introduction à la physique du système climatique et à sa modélisation | Hugues Goosse, Jean-Pascal van Ypersele de Strihou | 30h+15h | 5 Credits | 1q | x | x |

⊗ Humanities

A list of interesting humanities courses is available at the secretariat of the program committee. Students may choose a maximum of 6 credits. This possibility is however not offered to students who have chosen to specialize in Management or Company launching.

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⊗ 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 | Seminar of professional integration: Dutch - intermediate level | Isabelle Demeulenaere (coord.), Mariken Smit | 30h | 3 Credits | | x | x |
|-------------|---|--|-----|-----------|--|---|---|

| | | | | | | Year | |
|-------------|---|--|-----|-----------|------|------|---|
| | | | | | | 1 | 2 |
| ⊗ LNEER2600 | Seminar of professional integration: Dutch - upper-intermediate level | Isabelle Demeulenaere | 30h | 3 Credits | | x | x |
| ⊗ LALLE2500 | German - Seminar of professional integration, intermediate level | Caroline Klein, Ann Rinder (coord.) | 30h | 3 Credits | 1+2q | x | x |
| ⊗ LALLE2501 | German - Seminar of professional integration, intermediate level | Caroline Klein, Ann Rinder (coord.) | 30h | 5 Credits | 1+2q | x | x |
| ⊗ LESPA2600 | Séminaire d'insertion professionnelle - espagnol | Isabel Baeza Varela, Carmen Vallejo Villamor (compensates Isabel Baeza Varela) | 30h | 3 Credits | 1q | x | x |
| ⊗ LESPA2601 | Spanish - Seminar of professional integration | Paula Lorente Fernandez (coord.) | 30h | 5 Credits | 1q | x | x |

⊗ Company training periods

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.

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| | | | | | | | |
|------------|---------------------|----------------|-----|------------|--|---|---|
| ⊗ LFSA2995 | Stage en entreprise | Claude Oestges | 30h | 10 Credits | | x | x |
| ⊗ LFSA2996 | Stage en entreprise | Claude Oestges | | 5 Credits | | x | x |

⊗ Formation au tutorat

| | | | | | | | |
|-------------|----------------|----------------|---------|-----------|----|---|---|
| ⊗ LFSA2351A | Group dynamics | Piotr Sobieski | 15h+30h | 3 Credits | 1q | x | x |
| ⊗ LFSA2351B | Group dynamics | Piotr Sobieski | 15h+30h | 3 Credits | 2q | x | x |

