UCLouvain

MECA2M

2024 - 2025

Master [120] in Mechanical Engineering

MECA2M - Teaching profile

Learning outcomes

This diploma in civil engineering in mechanics aims to meet the challenges of designing and innovating, according to a polytechnical approach, complex solutions and systems linked to mechanics and its applications. This Master's degree aims to train experts in the area of mechanics and its applications and to do so in the context of the rapidly changing circumstances of Europe and the world.

The future civil engineer in mechanics will acquire the skills and knowledge to becomeA professional polytechnic engineer capable of integrating several disciplines in the areas of continuum mechanics, thermodynamics and machine design.

An individual capable of putting into practice his/her skills as well as the tools used in research and technology.

A specialist in extremely varied and specialized applied fields such as energetics, aerodynamics, automobiles, rail transport, robotics, numerical simulation, and scientific information.

A manager who can manage projects alone or in a team.

Polytechnic and multidisciplinary, the education offered by the Louvain School of Engineering privileges the acquisition of skills and knowledge that combine theory and practice and that deal with analysis, design, manufacturing, production, research and development and innovation while at the same time taking ethics and sustainable development into consideration.

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

1.Demonstrate a mastery of a solid body of knowledge in basic and engineering sciences, permitting him/her to understand and solve problems that are raised by mechanics.

1.1 Identify and apply concepts, laws, and practical reasoning to a given problem related to:

- Continuum mechanics
- Energy, thermodynamics and thermics
- Mathematical modelling and numerical simulation
- Project management
- Robotics, automated systems

1.2 Identify and use adequate modelling and calculation tools to solve these problems

1.3 Verify the plausibility and confirm the validity of results (orders of magnitude, units).

2.Organize and carry out an applied engineering procedure for the development of a product (and/or a service) that meets a need or solves a problem specific to the field of mechanics.

2.1 Analyse the problem or the operational needs that must be met, formulate the product specifications while taking technical and economic constraints into account.

2.2 Model the problem and design one or more technical solutions while integrating the mechanical aspects corresponding to the product specifications.

2.3 Evaluate and classify solutions in light of all the criteria included in the product specifications: efficiency, feasibility, quality, ergonomics, and security.

2.4 Implement and test a solution in the form of a mock up, a prototype and/or a numerical model.

2.5 Formulate recommendations to improve the operational characteristics of a proposed solution.

3.Organize and carry out a research project to understand a physical phenomenon or a new problem related to mechanics.

3.1 Document and summarize the existing knowledge in the field of mechanics.

3.2 Suggest a model and/or experimental device to simulate the performance of a system, thereby testing relevant hypotheses related to the phenomenon being studied.

3.3 Put together a summary report, which aims to explain the potentialities for theoretical and/or technical innovation resulting from the research project.

4.Contribute, as a member of a team, to the achievement of a multidisciplinary project while taking into account its objectives, allocated resources and constraints.

4.1 Create a project framework and explain the project objectives while taking into account the challenges and constraints that characterize the project's environment.

4.2 Collectively commit to a work schedule

4.3 Operate in a multidisciplinary environment with individuals who hold different points of view

4.4 Make team decisions when necessary to complete a project whether they pertain to technical solutions or to the division of labour.

5.Demonstrate effective communication skills (speaking and writing skills in French or in a foreign language) with the goal of successfully carrying out assigned projects.

5.1 Identify the client's needs: ask appropriate questions and listen to the entire request (not simply the technical aspects).

5.2 Present convincing arguments by using the language of your interlocutors (colleagues, technicians, clients, superiors).

5.3 Communicate through graphics and schemes (interpret a scheme, present a project, structure information).

5.4 Read, analyse, and use technical documents (standards, outlines, specifications).

5.5 Draft written documents that take contextual requirements and social conventions into account.

5.6 Give convincing oral presentations using appropriate communication techniques.

Display rigour, openness, and critical thinking. Be able to adopt the appropriate global point of view to validate the socio-technical relevance of a hypothesis or a solution, all the while drawing upon available technological and scientific innovations.

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 angles into consideration).

6.3 Demonstrate critical thinking vis-à-vis technical solutions.

6.4 Evaluate one's own work

Programme structure

Besides a core curriculum (33 credits) and a final specialization (30 credits), students complete their technical training by selecting courses (a minimum of 34 credits) among the following:

- Energy
- Aeronautics
- Dynamics, robotic and biomechanics
- Design, manufacturing and mechanics of materials
- Nuclear engineering

and the module of a multidisciplinary class of your choice.

In the spirit of openness, students can complete their program (a maximum of 20 credits) through multidisciplinary coursework. This includes an internship, completing a language programme, a choice of general knowledge classes or classes in human sciences. This is possible thanks to the flexibility that characterises this master's programme in civil and mechanical engineering. Based on their course choices, students will eventually select one or two majors.

The graduation (or end of studies) project is normally carried out at the end of the programme (second year). Depending on the students' programme, he/she may take the courses in the first or second-year if the course prerequisites allow it. This may be particularly useful for those students who pursue a portion of their studies outside of UCLouvain as part of an exchange programme.

These types of programmes will be submitted for approval by the Programme Commission of the Master's degree in question.

MECA2M Programme

Detailed programme by subject

CORE COURSES

Mandatory
Optional
Not offered in 2024-2025
Not offered in 2024-2025 but offered the following year
Offered in 2024-2025 but not the following year
Not offered in 2024-2025 or the following year
Activity with requisites
Open to incoming exchange students
Not open to incoming exchange students
[FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

				Year 1	Year 2
Mandatory	LMECA2990	GraduationProject/End of Studies Project *The graduation project can be written and presented in French or English, in consultation with the supervisor. It may be accessible to exchange students by prior agreement between the supervisors and/or the two universities.*		[EN] [q1+q2] [] [25 Credits] *> French-friendly*	x

Grégoire Winckelmans

PROFESSIONAL FOCUS [30.0]

Hervé Jeanmart

- Mandatory
- Optional
- Not offered in 2024-2025
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- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
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- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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Content:

			Year 1	Year 2
LMECA2220	Internal combustion engines	Hervé Jeanmart Maxime Pochet (compensates Francesco Contino)		
LMECA2322	Fluid mechanics II	Philippe Chatelain Eric Deleersnijder Grégoire Winckelmans		

MAJORS FOR THE MASTER'S DEGREE IN MECHANICAL ENGINEERING

MAJOR IN AERONAUTICS

MAJOR IN DYNAMICS, ROBOTIC AND BIOMECHANICS

Open to all students of civil and mechanical engineering and electromechanical engineering, classes in this major review dynamics, robotics as well as biomechanics. Whether it be an analysis of vibrations, adjustment of a robot or the design and production of components or micro-components in bioengineering (for example, artificial Implants, valves and prosthetics), this major allows students to address one or more applications from a mechanics perspective. This major is complemented by the majors in Aeronautics, Energy as well as Design, Manufacturing and Materials Mechanics especially for students interested in problems related to dynamics and robotics in aeronautics and energy. The design and the choice of materials is crucial whether it be for the adjustment of a robot or the selection of bio-materials in rehabilitation projects.

- O Mandatory
- ⊠ Optional
- △ Not offered in 2024-2025
- ⊘ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
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From 20 to 30credit(s)

MAJOR IN ENERGY

Classes in this major review the subject of energy in the real world. This subject is addressed in its entirety first by the study of production techniques and energy conversion (thermal machines, nuclear energy, renewable energy) followed by an analysis of the risks associated with energy production and the means of minimising these risks (major risks, pollution) and finally a study of energy consumption and its consequences. This major is complemented by the major in Aeronautics for those students interested in problems of energy and motorisation in aeronautics. This is also the case for the major in Dynamics, Robotics and Biomechanics as well as the major in Design, Manufacturing and Materials Mechanics for students interested in dynamics, automation, and materials used in the design and maintenance of systems of production and energy conversion.

- Mandatory
- Optional
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- Activity with requisites
- Open to incoming exchange students
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- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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From 20 to 30credit(s)

Content:

				Year 1	Year 2
LENVI2007	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin (coord.) Nicolas Parmentier (compensates Hervé Jeanmart)	EN [q1] [45h+15h] [5 Credits] > *French-friendly*	x	x
LMECA2160	Combustion and fuels	Miltiadis Papalexandris	EN [q1] [30h+30h] [5 Credits] > *French-friendly*	x	x
LELME2240	Energy systems lab.	Francesco Contino Hervé Jeanmart	EN [q2] [30h+30h] [5 Credits] > *French-friendly*	x	x
LMECA2325	Biomass conversion	Patrick Gerin Arnaud Rouanet (compensates Hervé Jeanmart)	EN [q1] [30h+30h] [5 Credits] > *French-friendly*	x	x
LELME2420	Energetics.	Véronique Dias (compensates Francesco Contino) Xavier Rixhon (compensates Hervé Jeanmart)	EN [q2] [30h+15h] [5 Credits] > *French-friendly*	x	x
LMECA2600	Introduction to nuclear engineering and reactor technology	Hamid Aït Abderrahim	EN [q1] [30h+30h] [5 Credits] > *French-friendly*	x	x
LMECA2771	Thermodynamics of irreversible phenomena.	Miltiadis Papalexandris	EN [q2] [30h+30h] [5 Credits] > *French-friendly*	x	x
LMECA2780	Introduction to Turbomachinery	Laurent Bricteux Sergio Lavagnoli	EN [q2] [30h+30h] [5 Credits] > *French-friendly*	x	x
LMECA2675					

				Year 1	2
Cours en marketing					
MGEST1108	Marketing	Nadia Sinigaglia	FR [q2] [45h+20h] [6 Credits]	x	x
MLSMM2136	Trends in Digital Marketing	Ingrid Poncin	FR [q2] [30h] [5 Credits]		x
MLSMM2134	e-Consumer Behavior	Karine Charry	FR [q2] [30h] [5 Credits]		x
Cours en Sourcing and Procurement					
LLSMS2036					

MAJOR IN INTERDISCIPLINARY PROGRAM IN ENTREPRENEURSHIP - INEO

Commune à la plupart des masters de l'EPL, cette option a pour objectif de familiariser l'étudiant·e avec les spécificités de l'entreprenariat et de la création d'entreprise afin de développer chez lui les aptitudes, connaissances et outils nécessaires à la création d'entreprise.

Cette option rassemble des étudiants de différentes facultés en équipes interdisciplinaires afin de créer un projet entrepreneurial. La formation interdisciplinaire en entrepreneuriat (INEO) est une option qui s'étend sur 2 ans et s'intègre dans plus de 30 Masters de 9 facultés/écoles de l'UCLouvain. Le choix de l'option INEO implique la réalisation d'un mémoire interfacultaire (en équipe) portant sur un projet de création d'entreprise. L'accès à cette option, ainsi qu'à chacun des cours, est limité aux étudiant·es sélectionnés sur dossier. Toutes les informations sur https://uclouvain.be/fr/etudier/ineo.

L'étudiant.e qui choisit de valider cette option doit sélectionner au minimum 20 crédits et au maximum 25 crédits. Cette option n'est pas accessible en anglais et ne peut être prise simultanément avec l'option « Enjeux de l'entreprise ».

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Content:

Required courses

				Year 1	Year 2
LINEO2001	Théorie de l'entrepreneuriat	Frank Janssen	FR [q1] [30h+20h] [5 Credits]	x	
LINEO2002	Aspects juridiques, économiques et managériaux de la création d'entreprise	Yves De Cordt Marine Falize	FR [q1] [30h+15h] [5 Credits]	x	
LINEO2003	Plan d'affaires et étapes-clefs de la création d'entreprise *Les séances du cours LINEO2003 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	FR [q2] [30h+15h] [5 Credits]		x
LINEO2004	Séminaire d'approfondissement en entrepreneuriat	Frank Janssen	FR [q2] [30h+15h] [5 Credits]	x	

Prerequisite courses

Student who have not taken management courses during their previous studies must enroll in LINEO2021.

LINEO2021	Financer son projet	Philippe Grégoire Olivier Vercruysse	FR [q2] [30h+15h] [5 Credits]	x	

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

			degree may have an adapted master programme.
Bachelor in Engineering	For others institutions	Access based on application	See personalized access

Non university Bachelors

> Find out more about links to the university

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			

Masters		
Master in Engineering		Direct access

Holders of a non-University 2nd cycle degree

Access based on validation of professional experience

> It is possible, under certain conditions, to use one's personal and professional experience to enter a university course without having the required qualifications. However, validation of prior experience does not automatically apply to all courses. Find out more about Validation of priori experience.

Access based on application

Access based on application : access may be granted either directly or on the condition of completing additional courses of a maximum of 60 ECTS credits, or refused.

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

Teaching method

Methods that promote multidisciplinary studies

The Master's degree programme in civil and mechanical engineering is directly linked to the role played by mechanical civil engineers. They are at the centre of today's industries (such as robotics, transportation, energy production, micro medical devices, and space shuttles). Mechanical engineers must design diverse products like instruments, vehicles, and machines or even bigger systems. They must also design manufacturing procedures for these products. Finally, they play a leading role in the organisation, control, upkeep and maintenance of production systems. Versatility is necessary for working in sectors such as aeronautics, energy, metallurgy, petrochemistry, automobiles and biomechanics.

The educational programme for civil and mechanical engineering is thus by nature versatile. On the one hand, the field of mechanics is vast and is linked to the majority of other engineering fields most notably electricity, materials, chemistry, civil engineering, automation and modelling. On the other hand, students gain specialised skills in an engineering field while retaining solid scientific and technical

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

To obtain a passing grade, the marks received for the teaching units are offset by their respective credits.

Mobility and/or Internationalisation outlook

Over the years, EPL has developed over a hundred partnerships with partners in more than 36 countries (EU and non-EU) to offer exchange programmes to its students. We also offer the possibility of obtaining Double degrees, Joint Degrees or Dual Masters in several fields. The EPL is currently participating in two Erasmus Mundus programmes: FAME and STRAINS.

In addition to exchange programmes under the Erasmus+ programme, numerous agreements have been established with a wide range of universities through various partner networks such as:

- TIME network (Top Industrial Managers in Europe).
- CLUSTER network
- Magalhães network
-