

**At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In English**

Dissertation/Graduation Project : **YES** - Internship : **optional**

Activities in English: **YES** - Activities in other languages : **optional**

Activities on other sites : **optional**

Main study domain :

## MECA2M - Introduction

### Introduction

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#### Introduction

This program trains students various fields of mechanical engineering: fluid mechanics, analytical and computational applied mechanics,

## 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 become a 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.

Year

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<p>○ LMECA2840</p>	<p>Project in Mechanical Design II</p>	<p>Bruno Dehez Christophe Everarts (compensates Benoît Raucent) Renaud Ronsse</p>	<p>EN [q1+q2] [30h+30h] [6 Credits]  &gt; French-friendly</p>	<p>x</p>
<p>○ LEPL2020</p>	<p>Professional integration work The modules of LEPL2020 course are organized over the two annual blocks of the master's degree. It is strongly recommended that students take them from year 1, but they will only be able to register for the course at the earliest the year in which they present their final graduation project. Students who have other professional integration activities in their personal programme, or who can demonstrate an equivalent activity could be exempted from this course. This equivalence is at the discretion of the examination board. Another activity should then be chosen to reach the number of ECTS required for their graduation.</p>		<p>EN [q1+q2] [30h+15h] [2 Credits]   &gt; French-friendly</p>	<p>x x</p>

**PROFESSIONAL FOCUS [30.0]**

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

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

Year

1 2

**o Content:**

○ LMECA2220	Internal combustion engines	Hervé Jeanmart Maxime Pochet (compensates Francesco Contino)	[q2] [30h+30h] [5 Credits] 🌐 > French-friendly
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## ***MAJORS FOR THE MASTER'S DEGREE IN MECHANICAL ENGINEERING***

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### ***MAJOR IN AERONAUTICS***

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Open to all students of civil and mechanical engineering and electromechanical engineering, classes in this major review mechanical applications of aeronautics: aeronautic structures, vibrations, aerodynamics, dynamics of flight, etc. The learning process consists of advanced classes in the mechanics of fluids and solids, with particular attention paid to numerical methods. This major is complemented by majors in Energy, Dynamics, Robotics and Biomechanics as well as Design, Manufacturing and Materials Mechanics (regarding

**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.

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- 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...)

From 20 to 30credit(s)

Year

1 2

**Content:**

⊗ LGBIO2040	<a href="#">Biomechanics</a>	<a href="#">Greet Kerckhofs</a>	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LGCIV2042	<a href="#">Dynamics of structures</a>	<a href="#">João Saraiva Esteves Pacheco De Alm</a>	🇧🇪 [q1] [30h+15h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2170	<a href="#">Numerical Geometry</a>	<a href="#">Vincent Legat Jean-François Remacle</a>	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2215	<a href="#">Vehicle System Dynamics</a>	<a href="#">Paul Fiset</a>	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2355	<a href="#">Mechanical design in biomedical engineering</a>	<a href="#">Greet Kerckhofs Ann Vankrunkelsven (compensates Benoît Raucent)</a>	🇧🇪 [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LELME2732	<a href="#">Robot modelling and control</a>	<a href="#">Nicolas Docquier (compensates Renaud Ronsse)</a>	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2802	<a href="#">Multibody system Dynamics</a>	<a href="#">Paul Fiset</a>	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LINMA2875	<a href="#">System Identification</a>	<a href="#">Gianluca Bianchin</a>	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
⊗ LMECA2335	<a href="#">Biorobotics</a>	<a href="#">Renaud Ronsse</a>	🇧🇪 [q2] [30h+30h] [5 Credits] 🌐	X	X



## ***MAJOR IN ENERGY***

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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 NUCLEAR ENGINEERING

As with the Master's in civil electromechanical engineering with a specialization in energy as well as the Master's in civil and mechanical engineering, the goal of this major is to offer an in-depth education in the principal aspects of nuclear engineering. Entry into this programme, which is primarily overseen by the Mol Centre of Nuclear Energy, is conditional on an evaluation of candidates' skills based on the rules used for ERASMUS-SOCRATES exchange students. Further information about this major may be found on Mol's website SCK-CEN.

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

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

Year

1 2

### Content:

#### Compulsory courses for the nuclear engineering major (10 credits)

● LMECA2600	<a href="#">Introduction to nuclear engineering and reactor technology</a>	Hamid Ait Abderrahim	EN [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	
● LMECA2648	<a href="#">Nuclear thermal-hydraulics (Centre d'étude nucléaire-Mol)</a>	Yann Bartosiewicz	EN [q1] [40h+7.5h] [5 Credits] 🌐 > French-friendly		X

#### Elective courses for the nuclear engineering major

✂ LBNE2002	<a href="#">Introduction to Nuclear Physics &amp; Measurements (Centre d'étude nucléaire-Mol)</a>		EN [q1] [] [3 Credits] 🌐		X
✂ LBNE2003	<a href="#">Safety of Nuclear Powerplants (Centre d'étude nucléaire-Mol)</a>		EN [q2] [] [5 Credits] 🌐		X
✂ LBNE2011	<a href="#">Radiation protection (Centre d'étude nucléaire-Mol)</a>		EN [q1] [] [3 Credits] 🌐	X	X

## MAJOR IN DESIGN, MANUFACTURING AND MECHANICS OF MATERIALS

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Open to civil, mechanical and electromechanical engineering students, this major reviews design, manufacturing and the importance of materials in the development of a mechanical system. It also addresses physical and chemical properties and the behaviour of metals, polymers and composites. Next, the main techniques for shaping these materials (moulding by injection or compression, stretching, laminating, forging, extrusion, embossing) are studied from the thermo-mechanical and technological point of view. Finally, numerical modelling of these procedures is tackled with particular attention paid to welding techniques. All phases of the mechanical manufacturing process are studied from the design stage to the setting up of suitable manufacturing techniques to the production schedule and organisation of working groups. This major is rounded out by those in aeronautics and energy as well as dynamics, robotics and biomechanics for students interested in issues pertaining to design, manufacturing and the importance of materials be they in aeronautics, energy, transportation or bio-engineering.

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

*From 20 to 30credit(s)*

Year

*in aeronautics, energy,*



⌘ Cours en marketing





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

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

## **COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES**

- Mandatory
  - ✘ Optional
  - △ Not offered in 2024-2025
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				Year	
				1	2
⊗ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [30h] [3 Credits] 	x	x
⊗ LESPA2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	ES [q1] [45h] [5 Credits] 	x	x
⊗ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.)	NL [q1 or q2] [30h] [3 Credits]		



## Course prerequisites

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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

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For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

## MECA2M - Information

### Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the higher education landscape and the academic organisation of courses.

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

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

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

#### SUMMARY

- > [General access requirements](#)
- > [Specific access requirements](#)
- > [University Bachelors](#)
- > [Non university Bachelors](#)
- > [Holders of a 2nd cycle University degree](#)
- > [Holders of a non-University 2nd cycle degree](#)
- > [Access based on validation of professional experience](#)
- > [Access based on application](#)
- > [Admission and Enrolment Procedures for general registration](#)

### Specific access requirements

This programme is taught in English with no prerequisite in French. A certificate is required for the holders of a non-Belgian degree, see selection criteria of the Access on the file.

#### University Bachelors

Diploma	Special Requirements	Access	Remarks
<b>UCLouvain Bachelors</b>			
<a href="#">Bachelor in Engineering</a>		Direct access	Students who have neither major nor minor in the field of their civil engineering Master's degree may have an adapted master programme.
<b>Others Bachelors of the French speaking Community of Belgium</b>			
Bachelor in Engineering		Direct access	Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil engineering master degree may have an adapted master programme.
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
Bachelor in engineering		Access with additional training	Students who have no specialisation in the field of their civil engineering master degree may have an adapted master programme with up to 60 additional credits.
<b>Foreign Bachelors</b>			
Bachelor in engineering	Bachelors degree of Cluster Institution	Direct access	Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil engineering master

Bachelor in Engineering	For others institutions	Access based on application	degree may have an adapted master programme. See <a href="#">personalized access</a>
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## 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
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## 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>

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

## Admission and Enrolment Procedures for general registration





## Contacts

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### Curriculum Management

#### Entity

Structure entity	SST/EPL/MECA
Denomination	(MECA)
Faculty	Louvain School of Engineering (EPL)
Sector	Sciences and Technology (SST)
Acronym	MECA
Postal address	Place du Levant 2 - bte L5.04.03 1348 Louvain-la-Neuve Tel: +32 (0) 10 47 22 00

Academic supervisor: [Philippe Chatelain](#)

#### Jury

- Président du Jury: [Claude Oestges](#)
- Secrétaire du Jury: [Vincent Legat](#)

#### Useful Contact(s)

- Secrétariat: [Isabelle Hennau](#)

