MECA2M

2015 - 2016

Master [120] in Mechanical Engineering

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In english
Dissertation/Graduation Project : **YES** - Internship : **optional**
Activities in other languages : **YES**
Activities on other sites : **optional**
Main study domain : **Sciences de l'ingénieur et technologie**
Organized by: **Ecole Polytechnique de Louvain (EPL)**
Programme code: **meca2m** - Francophone Certification Framework: 7

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MECA2M - Introduction

Introduction

Introduction

This program trains students in the main fields of mechanical engineering: fluid mechanics, analytical and computational applied mechanics, the mechanics of materials and structures, applied dynamics, mechanical production, mechanical engineering design, mechanical manufacturing, and machines (thermal, thermodynamic, and energetic).

Through pedagogical laboratories, case studies, projects and a master's thesis, you will be a member of a research team, and you will become acquainted with the cutting edge methods used in relevant fields.

You will undertake numerous integrated projects, which will allow you to conceive, model, achieve and validate experimental systems, prototypes and devices.

Your profile

You

- Have solid skills in the field of mechanics due to your undergraduate studie
- Envisage a career in the industrial sector where you will play a role in design and research or in the organization and oversight of production;
- Wish to use your skills in the following fields: aeronautics, the spatial industry, energy, the metallurgical or plastics industry, the automotive industry, biomechanics, etc.;
- Seek a programme that will allow you to master scientific, technological and human problems that are linked to the field of mechanics.

Your future job

Civil engineers are present in all industrial sectors: the chemical industry, pharmaceutical and food industries, electronics and telecommunications industries, metallurgy, aeronautics, construction and engineering, large scale distribution, banking and consulting services, nanotechnologies and medical technologies, etc.

They play a role as researchers and developers, are responsible for production or management and hold jobs in marketing and sales (of advanced technological products).

We find civil engnieers in departments of finance, information technology, training or quality control, the public sector, higher education, or in the Ministry of equipment and transportation. (www.fabi.com)

Your programme

This Master's degree offers you:

- A versatile education in fields related to mechanics;
- A vast choice of majors directly related to the latest research advances in the field;
- Pedagogy that links theory and practice: labs, projects, case studies, etc.;
- Advanced learning of numerical methods and their applications;
- The opportunity to undertake an internship in the industrial sector;
- The possibility of completing a portion of your coursework abroad (in Europe or elsewhere in the world)

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 (36 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 UCL 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.

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

> Core courses for the Master's degree in Mechanical Engineering *[en-prog-2015-meca2m-lmeca220t.html]*

> Professional focus *[en-prog-2015-meca2m-lmeca220s]*

Options courses

> Majors *[en-prog-2015-meca2m-lmeca903r.html]*
- > Major in aeronautics *[en-prog-2015-meca2m-lmeca222o.html]*
- > Major in dynamics, robotic and biomechanics *[en-prog-2015-meca2m-lmeca223o.html]*
- > Major in energy *[en-prog-2015-meca2m-lmeca224o.html]*
- > Major in design, manufacturing and mechanics of materials *[en-prog-2015-meca2m-lmeca226o.html]*
- > Major in nuclear engineering *[en-prog-2015-meca2m-lmeca231o.html]*

> Major in small and medium sized business creation *[en-prog-2015-meca2m-lmeca229o.html]*
> Major in business risks and opportunities *[en-prog-2015-meca2m-lmeca230o.html]*
> Elective courses for the Master's degree in Mechanical Engineering *[en-prog-2015-meca2m-lmeca221o.html]*

MECA2M Detailled programme

Programme by subject

CORE COURSES

O Mandatory
X Optional
△ Courses not taught during 2015-2016
⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016
Activity with requisites

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

						Year 1	Year 2
O LMECA2990	GraduationProject/End of Studies Project	N.		28 Credits			x
O LMECA2840	Project in Mechanical Design II	Bruno Dehez, Benoît Herman, Benoît Raucent, Renaud Ronsse	30h+30h	6 Credits	1 + 2q	x	

O *Religion courses for students in natural sciences*

Select 2 credits from among

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

PROFESSIONAL FOCUS [30.0]

O Mandatory
X Optional
△ Courses not taught during 2015-2016
⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016
Activity with requisites

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	
O LMECA2322	Fluid mechanics and transfer II	Jean-François Remacle, Grégoire Winckelmans	30h+30h	5 Credits	1q	x	

						Year 1	Year 2
LMECA2755	Industrial automation	Bruno Dehez, Paul Fisette, Renaud Ronsse	30h+30h	5 Credits	1q	x	
LMECA2801	Machine design	Benoît Raucent, 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]

Students have to complete their programme with major and/or elective courses. They will select:

Majors

> Major in aeronautics *[en-prog-2015-meca2m-lmeca222o]*
> Major in dynamics, robotic and biomechanics *[en-prog-2015-meca2m-lmeca223o]*
> Major in energy *[en-prog-2015-meca2m-lmeca224o]*
> Major in design, manufacturing and mechanics of materials *[en-prog-2015-meca2m-lmeca226o]*
> Major in nuclear engineering *[en-prog-2015-meca2m-lmeca231o]*
> Major in small and medium sized business creation *[en-prog-2015-meca2m-lmeca229o]*
> Major in business risks and opportunities *[en-prog-2015-meca2m-lmeca230o]*
> Elective courses for the Master's degree in Mechanical Engineering *[en-prog-2015-meca2m-lmeca221o]*

MAJORS

One of the five main majors in mechanics (aeronautics, energy, dynamics, design and nuclear energy) will be acquired if 20 credits are part of a student's program. It is possible to credit several majors together.

MAJOR IN AERONAUTICS

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 problems of energy in aeronautics, motorisation, dynamics and the importance of materials in the design and maintenance of airplanes).

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

De 20 à 30 credits parmi

						Year 1	Year 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	2q	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	Philippe Chatelain, Christophe Craeye, Vincent Legat, Jean-François Remacle	30h+30h	5 Credits	2q	x	x

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
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

De 20 à 30 credits parmi

						Year 1	Year 2
⊠ LAUCE2185	Dynamics 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	Mechanical design in biomedical engineering	Olivier Cartiaux, Olivier Cartiaux (compensates Emilie Marchandise), Benoît Herman (compensates Benoît Raucent), Emilie Marchandise, Benoît Raucent	30h+30h	5 Credits	1q	x	x
⊠ LMECA2215	Vehicle System Dynamics	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	Multibody system Dynamics	Paul Fisette	30h+30h	5 Credits	2q	x	x
⊠ LMECA2732	Introduction to robotics	Renaud Ronsse	30h+30h	5 Credits	2q	x	x

MAJOR IN ENERGY

Open to all students of civil and mechanical engineering and electromechanical engineering, 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.

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

De 19 à 30 credits parmi

						Year 1	Year 2
⊠ LMECA2600	Introduction to nuclear engineering and reactor technology	Hamid Aït Abderrahim	30h+30h	5 Credits	1q	x	x
⊠ LENVI2007	Renewable energies	Xavier Draye, Patrick Gerin (coord.), Hervé Jeanmart, Geoffrey Van Moeseke	30h	4 Credits	1q	x	x
⊠ LMECA2160	Combustion and fuels	Miltiadis Papalexandris	30h+30h	5 Credits	1q	x	x
⊠ LMECA2325	Biomass conversion	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.	Nicolas Bronchart	30h+30h	5 Credits	2q	x	x
⊠ LMECA2771	Thermodynamics of irreversible phenomena.	Miltiadis Papalexandris	30h+30h	5 Credits	2q	x	x

MAJOR IN DESIGN, MANUFACTURING AND MECHANICS OF MATERIALS

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.

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

De 20 à 30 credits parmi

						Year 1	2
⊠ LMECA2860	Welding.	Pascal Jacques, Aude Simar	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2481	Deformation and fracture of materials	Thomas Pardoen	30h+30h	5 Credits	1q	x	x
⊠ LMECA2453	Advanced manufacturing technologies	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	30h +22.5h	5 Credits	2q	x	x

MAJOR IN NUCLEAR ENGINEERING

As with the Master's in civil electromechanical engineering with a specialization in energy as well as the Master's in civil and mechanical engineering, the goal of this major is to offer an in-depth education in the principal aspects of nuclear engineering. Entry into this programme, which is primarily overseen by the Mol Centre of Nuclear Energy, is 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.

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

O Compulsory courses for the nuclear engineering major (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 courses for the nuclear engineering major

De 6 à 12 credits parmi

⊠ LBNEN2002	Introduction to Nuclear Physics & Measurements (Centre d'étude nucléaire-Mol)	N.		6 Credits	1q		x
⊠ LBNEN2003	Safety of Nuclear Powerplants (Centre d'étude nucléaire-Mol)	N.		3 Credits	2q		x

MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

In keeping with most of the Masters' degrees in civil engineering, the goal of this major is to familiarise the civil engineering student with the specifics of small and medium sized businesses, entrepreneurship, and business development in order to develop the necessary abilities, knowledge and tools to create a business. This major is reserved for a small number of students, selection of whom is based on a written application and individual interview. The written application must be submitted before the start of the academic year for Master's 1.

Applications may be sent to:

Secrétariat CPME-Place des Doyens, 1

1348 Louvain-la-Neuve (tel. 010/47 84 59)

Selected students will replace their Master's thesis in the common core curriculum with a thesis specific to business creation (the number of credits remaining the same).

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

Additional information about this major may be found at http//www.uclouvain.be/cpme. This major may not be taken at the same time as a major in management. Students in this major may choose 20-25 credits from the following courses:
De 20 à 25 credits parmi

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

						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, Marine Falize (compensates Régis Coeurderoy)	30h+15h	5 Credits	1q	x	x
O LCPME2004	Advanced seminar on Enterpreneurship (in French)	Roxane De Hoe (compensates Frank Janssen), Frank Janssen	30h+15h	5 Credits	2q	x	x

⊠ Prerequisite CPME courses

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

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

MAJOR IN BUSINESS RISKS AND OPPORTUNITIES

As with most of the Master's degree programs in civil engineering, the aim of this major is to familiarise the student with the basic principles of business management.

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

This major may not be taken at the same time as the major in small and medium-sized business creation.Students in this major may choose 16-20 credits from the following courses:
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	André Nsabimana (compensates Gerrit Sarens), 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 business	Thierry Bréchet	30h	3 Credits	1q	x	x
⊠ LFSA2210	Organisation and human resources	John Cultiaux	30h	3 Credits	2q	x	x

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

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

ELECTIVE COURSES FOR THE MASTER'S DEGREE IN MECHANICAL ENGINEERING

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

⊠ Comprehensive courses

						Year 1	Year 2
⊠ LMECA1451	Mechanical manufacturing.	Laurent Delannay, Aude Simar	30h+30h	5 Credits	1q	x	x
⊠ LINMA1510	Linear Control	Denis Dochain	30h+30h	5 Credits	2q	x	x
⊠ LELEC1370	Measurements and electrical circuits	Christophe Craeye, Bruno Dehez, Claude Oestges (coord.)	30h+30h	5 Credits	2q	x	x
⊠ LELEC1530	Basic analog and digital electronic circuits	Denis Flandre, Jean-Didier Legat	30h+30h	5 Credits	1q	x	x

⊠ General knowledge courses

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

⊠ Other possible courses

Students may select up to 6 credits of university courses offered in these disciplines.
A list of interesting humanities courses is avaibles at the secretariat of the diploma committee. Students may choose a maximum of 6 credits. This possibility is however not offerred to students who have choose to specialize in Management or Company launching.

⊠ Languages

Students may select from any language course offered at the ILV for a maximum of 3 credits out of the 120 core credits needed for their Master¿s degree. Special attention is placed on the following seminars in professional development:
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. 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
⊠ LNEER2600	Professional development seminar: Dutch - upper-intermediate level	Isabelle Demeulenaere (coord.), Marie-Laurence Lambrecht	30h	3 Credits	1 ou 2q	x	x
⊠ LALLE2500	Professional development seminar German	Caroline Klein, Ann Rinder	30h	3 Credits	1 + 2q	x	x
⊠ LALLE2501	Professional development seminar-German	Caroline Klein, Ann Rinder	30h	5 Credits	1 + 2q	x	x
⊠ LESPA2600	Professional development seminar- Spanish	Carmen Vallejo Villamor	30h	3 Credits	1 ou 2q	x	x
⊠ LESPA2601	Professional development seminar- Spanish	Begona Garcia Migura, Paula Lorente Fernandez (coord.)	30h	5 Credits	1q	x	x

⊠ Company internships (10 credits)

Students enrolling in a 5 credit internship coupled with the graduation project (LFSA 2996) must round out their programme with a 5 credit course approved by the programme commission.
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.

						Year 1	2
LFSA2995	Company Internship	Claude Oestges, Jean-Pierre Raskin	30h	10 Credits	1 + 2q	x	x
LFSA2996	Company Internship	N.		5 Credits	1 + 2q	x	x

Tutor training

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

Course prerequisites

A document entitled en-prerequis-2015-meca2m.pdf specifies the activities (course units - CU) with one or more pre-requisite(s) within the study programme, that is the CU whose learning outcomes must have been certified and for which the credits must have been granted by the jury before the student is authorised to sign up for that activity.

These activities are identified in the study programme: their title is followed by a yellow square.

As the prerequisites are a requirement of enrolment, there are none within a year of a course.

The prerequisites are defined for the CUs for different years and therefore influence the order in which the student can enrol in the programme's CUs.

In addition, when the panel validates a student's individual programme at the beginning of the year, it ensures the consistency of the individual programme:

- It can change a prerequisite into a corequisite within a single year (to allow studies to be continued with an adequate annual load);
- It can require the student to combine enrolment in two separate CUs it considers necessary for educational purposes.

For more information, please consult regulation of studies and exams.

The programme's courses and learning outcomes

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

The document is available by clicking this link after being authenticated with UCL account.

MECA2M - Information

Admission

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

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCL Bachelors			
Bachelor in engineering	A major in mechanics or a minor in mechanical engineering	Direct access	Students who have neither majored nor minored in the field of their civil engineering Master's degree, must submit a written application in which they list their detailed course curriculum (list of course work and marks year by year) to the programme commission. The commission will then suggest a programme in keeping with the student's previous course of study with the possible addition of a maximum of 15 supplemental credits.
Bachelor in engineering		Access with additional training	The jury may admit candidates with excellent academic records and training on the basis of their written application provided that they integrate a maximum of 60 additional credits into their Master's degree programme. A minor in engineering sciences (mechanics) is considered an advantage for candidates seeking this type of admission.
		Direct access	
Others Bachelors of the French speaking Community of Belgium			
Bachelor's degree in engineering sciences, specialization in civil engineering	With specific options in former institution related to mechanics	Direct access	
Bachelor in engineering		Access with additional training	Students with a Bachelor's degree in engineering sciences (with a focus on mechanics engineering) who have not taken the equivalent of a minor in mechanics must submit a written application to the mechanics programme commission in which they list their detailed course curriculum (list of course work and marks year by year). The jury will suggest a programme in keeping with the student's previous course of study with

			the possible addition of a maximum of 15 supplemental credits.
Bachelors of the Dutch speaking Community of Belgium			
Bachelor's degree in engineering sciences, specialization in civil engineering	With specific options in former institution related to mechanics	Direct access	
Bachelor in engineering		Access with additional training	Students who have no specialisation in mechanics must submit a written application to the programme commission in mechanics engineering in which they list their detailed course curriculum (list of course work and marks year by year). The jury will suggest a programme in keeping with the student's previous course of study with the possible addition of a maximum of 15 supplemental credits.
Foreign Bachelors			
Bachelor's degree in engineering sciences, specialization in civil engineering	Bachelors from the Cluster network	Direct access	Conditions imposed on UCL Engineering Bachelor.
Bachelor in engineering	Other institutions	Access with additional training	Students will submit a written application for admission to EPL in which they list their detailed course curriculum (list of course work and marks year by year). The jury will determine whether the candidate may be admitted according to the regulations. Where necessary the jury may suggest a programme in keeping with the student's previous course of study with the possible addition of a maximum of 15 supplemental credits.

Non university Bachelors

Diploma	Access	Remarks
> Find out more about links to the university		
> BA en sciences industrielles - type long	Accès au master moyennant ajout de maximum 60 crédits d'enseignements supplémentaires obligatoires au programme. Voir 'Module complémentaire'	Type long

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
Civil engineers integrated into the corresponding bachelor's degree program		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 www.uclouvain.be/en-vae

Tous les masters peuvent être accessibles selon la procédure de valorisation des acquis de l'expérience.
Consult the site www.uclouvain.be/vae

Admission to all Master's programmes is based on an assessment of the student's prior experience.

Personalized access

Reminder : all Masters (apart from Advanced Masters) are also accessible on file.
Students may submit an application for admission to the Louvain School of Engineering in which they list their detailed course curriculum (list of course work and marks year by year). The School in collaboration with the relevant programme commission will determine whether the student may be admitted and their decision will respect the programme rules. When necessary, they may suggest an individualised programme consisting of a part of the elective courses in the relevant Master's degree programme in civil engineering with the possible addition of a maximum of 15 supplemental credits.

The School in collaboration with the relevant programme commission will determine whether the student may be admitted and their decision will respect the programme rules. When necessary, the jury may suggest a programme in keeping with the student's previous course of study with the possible addition of a maximum of 15 supplemental credits.

Admission and Enrolment Procedures for general registration

Supplementary classes

To enrol for this Masters, the student must have a good command of certain subjects. If this is not the case, they must add preparatory modules to their Master's programme.

O Mandatory	⊠ Optional
△ Courses not taught during 2015-2016	⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016	Activity with requisites

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

O	Supplementary classes	N.		Credits	

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 credentials. This is due to the inclusive nature of engineering majors and the flexibility that characterises each student's course schedule. Furthermore, students have the option of taking courses in non-technical fields.

The research skills of the teaching team are extremely varied and range from advanced numerical simulation to aspects of energy to design techniques. Unquestionably UCL provides a wealth of education to its students. The Master's thesis (graduation project) is often the last multidisciplinary project. It is possible to choose one's advisor from among all the professors of the Louvain School of Engineering or to carry out the project at another institution such as the Von Karman Institute.

Various teaching strategies

The pedagogical approach is the same as that of the Bachelor's degree programme in engineering sciences: active learning, an equal mix of team work and individual work, and emphasis on the development of non-technical skills. An important characteristic of the programme in mechanics is the immersion of students in their professors' research laboratories, which educate students through the questioning process inherent in research.

The programme prioritises projects, including a large scale project that puts groups of students in semi-professional situations. These projects promote students' critical thinking skills, which in turn allows them to design, model, realise and validate a prototype. Furthermore, in the Small and Medium Sized Business Creation major, students complete group projects as part of multidisciplinary teams throughout the duration of their Master's degree program.

In the last year of the programme, half of the time is devoted to the graduation project, which offers students the possibility of studying a given subject in-depth and provides an introduction to the actual working life of an engineer or researcher (thanks to the size of the project and the context within which it is carried out). This project is based on a theme related to one or several of the fundamental disciplines in mechanics at the Louvain School of Engineering or the Von Karman Institute. It may also be directly linked to a company. Finally, for students majoring in Small and Medium Sized Business Creation, the graduation project has a multidisciplinary design with the goal allowing groups of three students, ideally from different academic departments, to work on a business creation project.

Diverse learning situations

Students will be confronted with various pedagogical tools adapted to different disciplines: lectures, projects, exercise sessions, problem solving sessions, case studies, experimental laboratories, internships in industry or research, group as well as individual work, and seminars. In certain areas, eLearning permits students to learn at their own pace and to carry out virtual experiments.

These diverse learning situations develop interdisciplinary skills as well as those that are non-technical. Thus, students acquire knowledge in a progressive manner all the while developing their independence, organisational and time management skills as well as their ability to communicate.

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".

Evaluation methods conform to the rules used to evaluate coursework and exams. Further details about the methods specific to each academic department may be found in their respective evaluation descriptions ("Evaluating students' knowledge").

Teaching activities are evaluated according to University rules (see the rules for evaluating coursework and exams) namely written and oral exams, laboratory exams, individual or group work, public presentations of projects and theses defences.

These diverse measures of evaluation allow for a complete assessment of the students' acquired skills. Written and oral exams are used to evaluate the knowledge acquired in Axis 1. Multiple choice questions (MCQ) may also be used to test knowledge but are less successful in testing students' ability to adapt to different situations. Thus MCQ are never used alone. Certain written exams begin with a new situation-problem and most of the questions refer to the different steps to solve this situation-problem. Thus the exam isn't a repetition or even a dissertation but an opportunity for students to use their skills to solve a new situation-problem. Thus students' skills are tested vis-à-vis the main steps in the engineering process (Axis 2). Axis 3 is mainly evaluated through seminars and the graduation project. Axes 4-6 are evaluated through various measures. For example, regarding Axis 5, written communication may be evaluated through written exams or report writing while oral communication may be evaluated by oral exams, a thesis defence, and oral presentations.

Certificate-based evaluation of learning for Axes 1 and 2 is mainly carried out though exams that take place at the end of the semester. The questions mostly have to do with the application of typical exercises. This testing is consistent with the students' acquired skills. The objectives of Axes 3-6 are most often obtained through the disciplinary mini-projects carried out in small groups. They are included in the teaching plan. When this is the case,the mini-project report is evaluated and the group mark contributes to the student's final mark. In certain instances, teaching is done through the Learning by Problem Solving method (Apprentissage par problèmes or APP); for example in the required course MECA2821. In this case the APP group reports contribute to the student's final mark.

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

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

Possible trainings at the end of the programme

Further Master's degree programmes: Master's degree in nuclear engineering

Further doctoral degree programmes: GRAMECH (GRAduate School in MECHanics)

UCL Master's degrees (about 60) are accessible to UCL Master's degree holders

For example:

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

Contacts

Curriculum Managment

Entite de la structure MECA

Acronyme	**MECA**
Dénomination	Commission de programme - Ingénieur civil mécanicien
Adresse	Place du Levant 2 bte L5.04.03
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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 : Miltiadis PAPALEXANDRIS

Jury:

Président du Jury : Jean-Didier LEGAT

Secrétaire du Jury : Miltiadis PAPALEXANDRIS

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