

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In englishDissertation/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 acronym: **kima2m** - Francophone Certification Framework: 7**Table of contents**

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KIMA2M - Introduction

Introduction

Introduction

In order to meet essential challenges such as energy management, communication and information, sustainable development and climate change, it is essential to foster scientific and technological creativity in the field of industrial materials and processes.

You

- have acquired solid knowledge of chemical or physical engineering and mathematics;
- are interested in research and development as well as production and management in cutting edge industries: chemistry, metals and materials, metallic products, plastics, electronics or the process industry;
- would like to take advantage of the most recent research advances in your area of specialisation.

Your futur job

Jobs in chemical and materials engineering range from research and development to production and marketing.

You can become :

- A « systems » engineer :

Who designs new products or devices with specific properties or functions, e.g. a mitral valve, an electroluminescent polymer for a flexible display, a metallic alloy or a light composite for aerospace applications, a nanomaterial usable for memory storage.

- A « process » engineer :

Who develops new production processes or manages the operation of production units, e.g. a plastics extrusion line, a factory for the extraction of a pharmaceutical compounds from a given plant l, a water or waste treatment plant, a production line for electronic components, a production unit for a high purity chemical compound, etc.

- A combination of both :

For instance, you develop a polymer material for the automotive industry and the synthesis/compounding process required for its industrial scale up.

Your programme

The master offers:

- a specialised training in an international environment; from 2015-2016, all courses organized by the programme commission (i.e. courses with LMAPR2xxx designation) are taught in English ; assistance provided as needed to French-speaking students ("French-friendly" approach).
- an interdisciplinary approach to problem solving, rooted in physics and chemistry;
- research-based training : integration of students in experimental laboratories, research projects ;
- exposure to industry : factory visits, industry internships, graduation project in a company ;
- the possibility to obtain a dual degree if you are accepted in the Master's degree programme "Functionalised Advanced Materials & Engineering" (FAME), part of the Erasmus Mundus programme. It is entirely in English and starts with a year of general training either at the National Polytechnic Institute of Grenoble (France) or at the University of Augsburg (Germany); in the second year, students specialise in a field of materials sciences at one of 7 partner universities. UCL offers a specialisation in materials and nano-structures engineering. Upon completing the programme, students are granted a dual Master's degree. More information available on the web page <https://www.uclouvain.be/master-fame.html>

KIMA2M - Teaching profile

Learning outcomes

Building on fundamental scientific and technical knowledge (physics, chemistry, mechanics, mathematics) acquired during the Bachelor's program, the master's program in chemistry and materials science enables the student to develop polytechnic as well as specialized competences relating to materials, nanotechnology, as well as chemical and environmental engineering, which will allow him/her to fill leadership positions in the design and production of advanced materials and systems as well as the development and management of advanced technological processes.

The program takes up the broad challenges confronting today's engineers, thanks to a curriculum taught entirely in English (courses with MAPR2xxx designation) with assistance provided to French-speaking students.

The program combines coherence and flexibility thanks to a modular structure : a specialized focus and a common core taken by all students, complemented by major and elective courses, which provides students with a specific focus to their training. Depending on the majors chosen, the student may become :

- A systems engineer who designs new products or devices with targeted properties and functions;
- A process or chemical engineer who develops new production processes and optimizes or manages production facilities;
- A combination of both.

Through these activities, the chemical and materials engineer systematically takes into account constraints, values and rules (legal, ethical or economic).

He/she is autonomous, capable of managing industrial projects and comfortable working as part of a team. He/she is able to communicate in a foreign language, English in particular.

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

1. demonstrate mastery of a solid body of knowledge and skills in engineering sciences allowing one to solve problems related to materials and procedures (axis 1).

- 1.1 Identify and use concepts, laws and reasoning to solve a realistic problem.
- 1.2 Identify, develop and use adequate modelling and calculation tools to solve realistic and complex problems.
- 1.3 Verify the likelihood and confirm the validity of the results relating to a given problem.

2. organise and carry out an engineering procedure for the development of a specific material, a complex material system, a high purity product and/or complex compound or a process meeting a need or solving a particular problem (axis 2).

2.1 Analyse a problem or functional requirement of realistic complexity and formulate a corresponding specifications note. An industrial specification for a material or a process contains many elements ranging from technical demands, to economic and logistic constraints as well as legal and safety aspects.

2.2 Model a problem and design one or more original technical solutions corresponding to the specifications note.

2.3 Evaluate and classify solutions with regard to all the criteria in the specifications note: efficiency, feasibility, quality, security and interaction/integration with other processes/components.

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

2.5 Come up with recommendations to improve the operationalisation of a solution under study.

3. organise and carry out a research project to understand a physical or chemical phenomenon or a new problem in materials engineering and science or chemical engineering (axis 3).

- 3.1 Document and summarize the existing body of knowledge in the area under consideration.
- 3.2 Propose a model and/or an experimental device in order to simulate and test hypotheses relating to the phenomenon under study.
- 3.3 Write a summary report that explains the potential of the theoretical or technical innovations resulting from the research project

4. contribute as part of a team to the planning and completion of a project while taking into account its objectives, allocated resources, and constraints (axis 4).

4.1 Frame and explain the project's objectives (in terms of performance indicators) while taking into account its issues and constraints (resources, budget, deadlines).

4.2 Collaborate on a work schedule, deadlines and roles.

4.3 Work in a multidisciplinary environment with peers holding different points of view; manage any resulting disagreement or conflicts.

4.4 Make individual as well as team decisions when choices have to be made, whether they are about technical solutions or the division of labour to complete a project.

5. communicate effectively (orally or in writing) with the goal of carrying out assigned projects in the workplace. Ideally, the student should be able to communicate in one or more foreign languages in addition to his/her mother tongue (axis 5).

5.1 Clearly identify the needs of the client or the user: question, listen and understand all aspects of their request and not just the technical aspects.

5.2 Present arguments and adapt to the language of the interlocutors: technicians, colleagues, clients, superiors.

5.3 Communicate through graphs and diagrams: interpret a diagram, present project results, structure information.

5.4 Read and use different technical documents (rules, plans, specification notes).

- 5.5 Draft documents that take into account demands and conventions of the field.
- 5.6 Make a convincing oral presentation possibly using modern communication techniques.
6. demonstrate rigor, openness, critical thinking and a sense of ethics in your work. Using the technological and scientific innovations at your disposal, validate the socio-technical relevance of a hypothesis or a solution and act responsibly (axis 6).
- 6.1 Apply the standards of your discipline (terminology, measurement units, quality, security and environmental standards).
- 6.2 Find solutions that go beyond strictly technical issues by considering sustainable development and the ethical aspects of a project (for example, "life cycle analysis" among others).
- 6.3 Demonstrate critical awareness of a technical solution in order to verify its robustness and minimize the risks that may occur during implementation. (This skill is mainly developed during the graduation project which requires the critical analysis of implemented techniques as well as research for the Master's thesis.)
- 6.4 Evaluate oneself and independently develop necessary skills for "lifelong learning" in the field (this skill is most notably developed through projects requiring bibliographic research).

Programme structure

The Master's degree programme consists of:

- a core curriculum (35 credits) including the graduation project (28 credits), the course « molecules and materials analysis » LMAPR2011 (5 credits) and a religion course (2 credits);
- a professional focus (30 credits);
- one or more majors;
- elective courses to round out the programme.

The overwhelming majority of courses is given in English (all courses with LMAPR2xxx designation and a large proportion of the courses organized by EPL), with assistance provided to French-speaking students (« French-friendly » approach).

The student MUST choose at least one major among the six proposed in chemistry and materials.

He/she is further ALLOWED to choose a major among the two proposed in Business management and creation.

Normally, professional focus courses are taken during the first annual unit and the graduation project during the last one. However, students may (depending on their project) take these courses in the 1st or 2nd annual unit as long as they have completed the course prerequisites. This is particularly the case for students who complete part of their education abroad (ERASMUS or MERCATOR exchange, FAME dual degree).

If during the student's previous studies, he or she has already taken a course that is part of the programme (either required or elective) or they have participated in an academic activity that is approved by the programme commission, the student will replace them with other elective courses or activities that are in keeping with programme regulations.

Regardless of the focus, major /or elective courses selected, the Master's degree programme will consist of minimum of 120 credits divided over two annual units. The first annual unit has to consist of a minimum of 60 credits, the second the number of credits needed to complete the Master's degree.

The student will verify that he/she has obtained the minimum number of credits required for the approval of the diploma as well as for the approval of the major, in order to include them in the diploma supplement.

Programmes that respect the above rules will be submitted for approval to the relevant Master's degree programme commission.

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 chemical and materials engineering](#) [en-prog-2019-kima2m-lkima220t.html]

[> Professional Focus](#) [en-prog-2019-kima2m-lkima200s]

Options courses

- > [Major in chemical and materials](#) [en-prog-2019-kima2m-lkima104g.html]
 - > [Major in chemical and environmental engineering](#) [en-prog-2019-kima2m-lkima221o.html]
 - > [Major in inorganic materials and processes](#) [en-prog-2019-kima2m-lkima222o.html]
 - > [Major in Polymers and macro-molecules](#) [en-prog-2019-kima2m-lkima223o.html]
 - > [Major in Mechanics of materials](#) [en-prog-2019-kima2m-lkima224o.html]
 - > [Major in Biomaterials](#) [en-prog-2019-kima2m-lkima225o.html]
 - > [Major in nanotechnology](#) [en-prog-2019-kima2m-lkima233o.html]
- > [Major in small and medium sized business creation](#) [en-prog-2019-kima2m-lkima101g.html]
 - > [Major in small and medium sized business creation](#) [en-prog-2019-kima2m-lkima230o.html]
 - > [Major in business risks and opportunities](#) [en-prog-2019-kima2m-lkima231o.html]
- > [Elective courses](#) [en-prog-2019-kima2m-lkima105g.html]
 - > [Elective courses available for Master students in Chemical engineering](#) [en-prog-2019-kima2m-lkima952o.html]
 - > [Elective courses: transversal skills and contacts with industry](#) [en-prog-2019-kima2m-lkima937o.html]

KIMA2M Detailed programme

Programme by subject

CORE COURSES [35.0]

- Mandatory
 Courses not taught during 2019-2020
 Periodic courses taught during 2019-2020
- Optional
 Periodic courses not taught during 2019-2020
 Activity with requisites

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

Students particularly interested in materials and molecules characterization can complete their training by taking additional major or elective courses. Specifically, these include: LMAPR2631 « surface analysis », LMAPR2642 « crystallographic and microstructural characterization of materials » and LBIRC2102A « organic analysis II, partim" (taught in French)

						Year	
						1	2
<input type="radio"/> LKIMA2990	Graduation project/End of studies project			28 Credits			x
<input type="radio"/> LMAPR2011	Molecules and materials analysis	Arnaud Delcorte Sophie Hermans	30h+30h	5 Credits	1q	x	x

Societies, Cultures, Religions (2 credits)

The students select one course between:
 The student shall select

<input type="checkbox"/> LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	15h	2 Credits	1q	x	x
<input type="checkbox"/> LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	15h	2 Credits	1q	x	x
<input type="checkbox"/> LTECO2200	Societies-cultures-religions : Human Questions	Régis Burnet Dominique Martens	15h	2 Credits	1 ou 2q	x	x

PROFESSIONAL FOCUS [30.0]

- Mandatory
 Courses not taught during 2019-2020
 Periodic courses taught during 2019-2020
- Optional
 Periodic courses not taught during 2019-2020
 Activity with requisites

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

The goal of the professional focus is to provide students with fundamental knowledge about materials as well as chemical and environmental processes. These courses are normally taken in the first semester of the first annual unit; furthermore they are intended to help students select their subsequent coursework, namely their major courses

						Year	
						1	2
<input type="radio"/> LMAPR2013	Physical Chemistry for Metals and Ceramics	Pascal Jacques	30h+30h	5 Credits	1q	x	
<input type="radio"/> LMAPR2014	Physics of Functional Materials	Xavier Gonze Luc Piraux Gian-Marco Rignanese	37.5h +22.5h	5 Credits	1q	x	

						Year	
						1	2
○ LMAPR2019	Polymer Science and Engineering	Sophie Demoustier Alain Jonas (coord.) Evelyne Van Ruymbeke	45h+15h	5 Credits	1q	x	
○ LMAPR2430	Industrial processes for the production of base chemicals	Juray De Wilde	30h +22.5h	5 Credits	1q	x	
○ LMAPR2481	Deformation and fracture of materials	Hosni Idrissi Thomas Pardoën	30h+30h	5 Credits	1q	x	
○ LMAPR2647	Sustainable treatment of industrial and domestic waste: Fundamentals	Olivier Françoisse Patricia Luis Alconero Olivier Noiset Benoît Stenuit	30h+15h	5 Credits	1q	x	

OPTIONS

The student selects at least one option among those proposed in chemistry and materials

Major in chemical and materials

- > [Major in chemical and environmental engineering](#) [en-prog-2019-kima2m-lkima221o]
- > [Major in inorganic materials and processes](#) [en-prog-2019-kima2m-lkima222o]
- > [Major in Polymers and macro-molecules](#) [en-prog-2019-kima2m-lkima223o]
- > [Major in Mechanics of materials](#) [en-prog-2019-kima2m-lkima224o]
- > [Major in Biomaterials](#) [en-prog-2019-kima2m-lkima225o]
- > [Major in nanotechnology](#) [en-prog-2019-kima2m-lkima233o]

Major in small and medium sized business creation

- > [Major in small and medium sized business creation](#) [en-prog-2019-kima2m-lkima230o]
- > [Major in business risks and opportunities](#) [en-prog-2019-kima2m-lkima231o]

Elective courses

- > [Elective courses available for Master students in Chemical engineering](#) [en-prog-2019-kima2m-lkima952o]
- > [Elective courses: transversal skills and contacts with industry](#) [en-prog-2019-kima2m-lkima937o]

MAJOR IN CHEMICAL AND ENVIRONMENTAL ENGINEERING

The objective of this major is to enable the student to master the concepts and technologies used in chemical and environmental engineering with an emphasis on the dimensioning and optimisation of processes. Particular attention is given to energy control, safety and environmental aspects. The student progressively develops a global understanding of a chemical process and an in-depth knowledge of its parts and mutual interactions.

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

De 20 à 30 CREDITS parmi

Year

1 2

o Contenu:

o Required courses (15 credits)

● LMAPR2118	Fluid-fluid separations	Patricia Luis Alconero Denis Mignon	30h +22.5h	5 Credits	2q	x	x
● LMAPR2330	Reactor Design	Juray De Wilde	30h+30h	5 Credits	2q	x	x
● LMAPR2648	Evaluation of sustainability in chemical and environmental engineering	Damien Debecker Olivier Françoisse Patricia Luis Alconero (coord.) Olivier Noiset	30h+15h	5 Credits	2q	x	x

⊗ Recommended courses

Students have to take in priority LINMA1510 if they didn't follow it during Bachelor. If they have already taken it they can follow LINMA2300.

Min=5 credits parmi

⊗ LINMA1510	Linear Control	Denis Dochain	30h+30h	5 Credits	2q	x	x
⊗ LINMA2300	Analysis and control of distributed parameter systems	Denis Dochain	30h+30h	5 Credits	1q	x	x
⊗ LMAPR2320	Advanced Reactor and Separation Technologies for the Production of Base Chemicals and Polymers	Juray De Wilde Patricia Luis Alconero Denis Mignon	30h+15h	5 Credits	1q	x	x

						Year	
						1	2
⊗ LMAPR2691	Technology of chemical and environmental engineering	Patricia Luis Alconero Grégoire Winckelmans	30h+15h	5 Credits	2q	x	x
⊗ LMAPR2380	Solid-fluid separation	Tom Leysens Patricia Luis Alconero	30h +22.5h	5 Credits	1q	x	x

⊗ Elective courses

Max=10 CREDITS parmi

⊗ LBIRC2102A	Organic Analysis II - partim A	Iwona Cybulska Marie-France Herent Raphaël Robiette	30h+30h	5 Credits	2q	x	x
⊗ LENVI2007	Renewable energies	Xavier Draye Patrick Gerin (coord.) Hervé Jeanmart Geoffrey Van Moeseke	30h	4 Credits	1q	x	x
⊗ LENVI2101	Sociétés, populations, environnement, développement: problématiques et approches interdisciplinaires	Denis Dochain Nathalie Frogneux Pierre-Joseph Laurent Jean-Pascal van Ypersele de Strihou (coord.)	45h	6 Credits	1q	x	x
⊗ LFSA2245	Environment and business	Jean-Pierre Tack	30h	3 Credits	1q	x	x
⊗ LINMA1702	Optimization models and methods I	François Glineur	30h +22.5h	5 Credits	2q	x	x
⊗ LMAPR2020	Materials Selection	Christian Bailly Thomas Pardoën	30h +22.5h	5 Credits	2q	x	x
⊗ LMAPR2141	Metals Processing and Recycling		30h+30h	5 Credits	2q Δ	x	x
⊗ LMECA2645	Major technological hazards in industrial activity.	Denis Dochain	30h	3 Credits	2q	x	x

MAJOR IN INORGANIC MATERIALS AND PROCESSES

This major enables the student to develop in-depth knowledge about the synthesis, processing and recycling of inorganic materials (metals, ceramics, sintered materials, inorganic glasses), their structural and functional properties, their microstructural details at different scales, and the relationship between their properties and their production methods

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

De 20 à 30 CREDITS parmi

Year

1 2

o **Contenu:**

o **Required courses**

● LMAPR2141	Metals Processing and Recycling		30h+30h	5 Credits	2q △	x	x
● LMAPR2642	Crystallographic and microstructural characterisation of materials	Hosni Idrissi Pascal Jacques	30h+30h	5 Credits	1q	x	x

⊗ **Thermodynamics and processes of elaboration**

⊗ LMAPR2672	Sintered materials and surface treatments	Jean-Pierre Erauw Pascal Jacques Joris Proost	30h+30h	5 Credits	2q ⊖	x	x
⊗ LKULH2013	Phase equilibria in inorganic materials and processes			5 Credits		x	x

⊗ **Implementation and durability**

⊗ LMAPR2420	High performance metallic materials	Pascal Jacques Aude Simar	30h+30h	5 Credits	2q ⊕	x	x
⊗ LMAPR2482	Plasticity and metal forming	Laurent Delannay Thomas Pardoën	30h +22.5h	5 Credits	2q	x	x

MAJOR IN POLYMERS AND MACRO-MOLECULES

The objective of this major is to help students master the relationships between the chemical structure of organic macro-molecules (polymers, bio-macromolecules, etc.), the microstructure of their derivative materials, the main synthesis methods and their implementation, and structural and functional properties occurring at a macroscopic and industrial level as well as at the level of nanotechnology and its applications.

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

De 20 à 30 CREDITS parmi

Year

1 2

o Contenu:

o Required courses

○ LMAPR2016	Project in Polymer Science	Charles-André Fustin Alain Jonas	0h+45h	5 Credits	2q	x	x
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⊗ Polymer science complements

⊗ LCHM2261	Polymer Chemistry and Physical Chemistry	Charles-André Fustin Jean-François Gohy Alain Jonas	45h+15h	5 Credits	1q	x	x
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⊗ Macromolecular bio and nanotechnology

⊗ LCHM2170	Introduction to protein biotechnology	Pierre Morsomme Patrice Soumillion	22.5h +7.5h	3 Credits	1q	x	x
⊗ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier Karine Glinel Karine Glinel (compensates Bernard Nysten) Jean-François Gohy Bernard Nysten	45h+15h	5 Credits	2q	x	x

⊗ Polymer materials engineering

⊗ LMAPR2010	Project in materials science and engineering	Pascal Jacques Alain Jonas	0h+60h	5 Credits	1q	x	x
⊗ LMAPR2018	Rheometry and Polymer Processing	Christian Bailly Evelyne Van Ruymbeke	30h +22.5h	5 Credits	2q	x	x

MAJOR IN MECHANICS OF MATERIALS

The objective of this major is to introduce students to the principal mechanical characteristics of various categories of materials, to the consequences of these properties on their processing and use, to the methods used to simulate these properties, and to the criteria used to select materials for a given application.

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

De 20 à 30 CREDITS parmi

Year

1 2

o **Contenu:**

o **Required courses**

● LMAPR2018	Rheometry and Polymer Processing	Christian Bailly Evelyne Van Ruymbeke	30h +22.5h	5 Credits	2q	x	x
● LMAPR2020	Materials Selection	Christian Bailly Thomas Pardoën	30h +22.5h	5 Credits	2q	x	x
● LMAPR2482	Plasticity and metal forming	Laurent Delannay Thomas Pardoën	30h +22.5h	5 Credits	2q	x	x

⊗ **Composite materials**

⊗ LMECA2141	Rheology	Vincent Legat Evelyne Van Ruymbeke	30h+30h	5 Credits	1q	x	x
⊗ LMECA2640	Mechanics of composite materials	Issam Doghri	30h+30h	5 Credits	2q △	x	x

⊗ **Solid mechanics and numerical methods**

⊗ LMECA1120	Introduction to finite element methods.	Vincent Legat	30h+30h	5 Credits	2q △	x	x
⊗ LGCIV1022	Mechanics of structures	Pierre Latteur	30h+30h	5 Credits	2q	x	x
⊗ LMECA2520	Calculation of planar structures	Issam Doghri	30h+30h	5 Credits	2q △	x	x

⊗ **Mechanical metallurgy**

⊗ LMAPR2420	High performance metallic materials	Pascal Jacques Aude Simar	30h+30h	5 Credits	2q ⊕	x	x
⊗ LMECA2860	Welding.	Pascal Jacques Aude Simar	30h+30h	5 Credits	1q	x	x

MAJOR IN BIOMATERIALS

The goal of this major is to provide students with the necessary body of knowledge to understand and develop technologies related to biomaterials (implants, biocompatibility, etc.). This major is particularly well-suited for students holding a bachelor in applied chemistry and physics AND biomedical engineering.

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

KIMA students are required to enrol in LGBIO2030 and LBIR1250 except if these 1st cycle course requirements were fulfilled previously. GBIO students are required to enrol in LMAPR2481 and LMAPR1805 except if these 1st cycle course requirements were fulfilled previously.

De 20 à 30 CREDITS parmi

Year

1 2

Contenu:**Required courses (10 credits)**

● LGBIO2030	Biomaterials	Sophie Demoustier Christine Dupont	30h+30h	5 Credits	1q	x	
● LBIR1250	Biochemistry I	Michel Ghislain Yvan Larondelle (coord.)	30h+15h	5 Credits	1q	x	x

Recommended courses

⊗ LBIR1355	Métabolisme microbien et synthèse de biomolécules	Michel Ghislain (coord.) Yvan Larondelle	22.5h +15h	3 Credits	2q	x	x
⊗ LBIO1335	Immunology : basis and applications in biology	Jean-Paul Dehoux	25h+15h	3 Credits	1q	x	x
⊗ LELEC2560	Micro and Nanofabrication Techniques	Laurent Francis (coord.) Benoît Hackens Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊗ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier Karine Glinel Karine Glinel (compensates) Bernard Nysten Jean-François Gohy Bernard Nysten	45h+15h	5 Credits	2q	x	x

Elective courses

⊗ LBIRC2101A	Analyse biochimique et notions de génie génétique: analyse biochimique	François Chaumont Charles Hachez Pierre Morsomme	18.5h +22.5h	4 Credits	1q	x	x
⊗ LBIRC2108	Biochemical and Microbial Engineering	Iwona Cybulska	30h +22.5h	5 Credits	2q	x	x
⊗ LGBIO2020	Bioinstrumentation	André Mouraux Michel Verleysen	30h+30h	5 Credits	1q	x	x
⊗ LGBIO1114	Artificial organs and rehabilitation	Luc-Marie Jacquet Philippe Lefèvre Renaud Ronsse	30h+30h	5 Credits	2q	x	x
⊗ LMAPR2010	Project in materials science and engineering	Pascal Jacques Alain Jonas	0h+60h	5 Credits	1q	x	x
⊗ LMAPR2018	Rheometry and Polymer Processing	Christian Bailly Evelyne Van Ruymbeke	30h +22.5h	5 Credits	2q	x	x
⊗ LMAPR2631	Surface Analysis	Arnaud Delcorte Bernard Nysten	30h+15h	5 Credits	2q	x	x

MAJOR IN NANOTECHNOLOGY

The objective of this major is to introduce students to the physics and simulation of materials and devices used in the field of micro- and nanotechnologies, to the properties and methods used to manufacture and characterise micro and nanostructures, to the ways in which nano-devices function as well as to the development and integration of (bio) organic elements in nano-systems.

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

The student choosing this major selects

De 20 à 30 CREDITS parmi

Year

1 2

o Contenu:**⊗ Nano-structures and the physics of nano-materials**

To enrol in this major, students should have already taken a physical materials class such as MAPR1492. The classes MAPR2451 and 2471 are not open to students in the Master's degree programme in physical engineering

⊗ LMAPR2015	Physics of Nanostructures	Jean-Christophe Charlier (coord.) Xavier Gonze Luc Piraux	37.5h +22.5h	5 Credits	1q	x	x
⊗ LMAPR2451	Atomistic and nanoscopic simulations	Jean-Christophe Charlier Xavier Gonze Gian-Marco Rignanese	30h+30h	5 Credits	2q	x	x
⊗ LMAPR2471	Transport phenomena in solids and nanostructures	Jean-Christophe Charlier Luc Piraux	30h+30h	5 Credits	2q	x	x
⊗ LPHYS2351	Superconductivity	Luc Piraux	22.5h +7.5h	5 Credits	1q	x	x

⊗ Nano and micro semi-conductor devices

To enrol in these courses it is recommended that students have already taken a course in physical electronics or in semiconductor devices such as ELEC 1330 or ELEC 1755 or similar.

⊗ LELEC2541	Advanced Transistors	Denis Flandre (coord.) Benoît Hackens Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊗ LELEC2550	Special electronic devices	Vincent Bayot	30h+30h	5 Credits	1q	x	x
⊗ LELEC2710	Nanoelectronics	Vincent Bayot (coord.) Benoît Hackens	30h+30h	5 Credits	1q	x	x

⊗ Micro and nano-engineering

⊗ LELEC2560	Micro and Nanofabrication Techniques	Laurent Francis (coord.) Benoît Hackens Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊗ LELEC2895	Design of micro and nanosystems	Laurent Francis	30h+30h	5 Credits	1q	x	x
⊗ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier Karine Glinel Karine Glinel (compensates Bernard Nysten) Jean-François Gohy Bernard Nysten	45h+15h	5 Credits	2q	x	x
⊗ LMAPR2631	Surface Analysis	Arnaud Delcorte Bernard Nysten	30h+15h	5 Credits	2q	x	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 familiarize the civil engineering student with the specifics of entrepreneurship and business development in order to develop the necessary abilities, knowledge and tools to create a business. It is a truly interdisciplinary initiative where students from different faculties are brought together in cross-disciplinary teams to create an entrepreneurial project. The Interdisciplinary program in entrepreneurship (CPME) is spread over two years and is integrated into more than 20 Masters (8 faculties). The program includes a collective and interdisciplinary master thesis focused on an entrepreneurial project (start-up or spin-off) and realized in teams of 3 to 4 students from 3 to 4 different faculties. The access is reserved for a small number of students by a selection procedure. Additional information may be found at www.uclouvain.be/cpme. This major is not available in English and may not be taken at the same time as the major "Business risks and opportunities".

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

De 20 à 25 CREDITS parmi

Year

1 2

○ **Contenu:**

○ **Required courses for the major in small and medium sized businesses**

○ LCPME2001	Entrepreneurship Theory (in French)	Blanche Havenne (compensates Frank Janssen) Frank Janssen	30h+20h	5 Credits	1q	x	
○ LCPME2002	Managerial, legal and economic aspects of the creation of a company (in French)	Yves De Cordt Marine Falize	30h+15h	5 Credits	1q	x	x
○ LCPME2003	Business plan of the creation of a company (in French) <i>Les séances du cours LCPME2003 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.</i>	Frank Janssen	30h+15h	5 Credits	2q		x
○ LCPME2004	Advanced seminar on Entrepreneurship (in French)	Frank Janssen	30h+15h	5 Credits	2q	x	x

⊗ **Prerequisite CPME courses**

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

○ LCPME2000	Venture creation financement and management I	Yves De Rongé Olivier Giacomini	30h+15h	5 Credits	1q	x	
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MAJOR IN BUSINESS RISKS AND OPPORTUNITIES

This major is not available in English and may not be taken at the same time as the major « Interdisciplinary program in entrepreneurship – CPME ».

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

De 16 à 20 CREDITS parmi

Year

1 2

○ **Contenu:**

○ LFSA1290	Introduction to financial and accounting management	Philippe Grégoire	30h+15h	4 Credits	2q	x	x
○ LFSA2140	Elements of law for industry and research	Vincent Cassiers Werner Derijcke Bénédicte Inghels	30h	3 Credits	1q	x	x
○ LFSA2210	Organisation and human resources	John Cultiaux Éline Jammaers	30h	3 Credits	2q	x	x
○ LFSA2230	Introduction to management and to business economics	Benoît Gailly	30h+15h	4 Credits	2q	x	x
○ LFSA2245	Environment and business	Jean-Pierre Tack	30h	3 Credits	1q	x	x

○ **One course between**

De 3 à 5 CREDITS parmi

⊗ LFSA2202	Ethics and ICT	Axel Gosseries Olivier Pereira	30h	3 Credits	2q	x	x
⊗ LLSMS2280	Business Ethics and Compliance Management	Carlos Desmet	30h	5 Credits	1q	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 AVAILABLE FOR MASTER STUDENTS IN CHEMICAL ENGINEERING

The elective courses being recommended and available for Master students in chemical engineering are listed here above, in the majors and other lists of elective courses. However, a student can further suggest other courses that would be relevant for his/her personal curriculum, pending that this is compliant with the rules for setting up a personal Master program

ELECTIVE COURSES: TRANSVERSAL SKILLS AND CONTACTS WITH INDUSTRY

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

The student selects between 3 and 22 credits (max 27 if the student selects the internship) in this list below or in the courses of the major "business risks and opportunities". An alternative is to select the Major in small and medium sized business creation.

Year

1 2

o Contenu:

o Transversal skills and contacts with industry

The student selects min 3 credits among the courses of the majors "business risks and opportunities", "small and medium sized business creation" and courses of professional integration activity specific to the program.

⊗ Internship

⊗ LFSA2995	Company Internship	Jean-Pierre Raskin	30h	10 Credits	1 + 2q	X	X
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⊗ Professional integration activity specific to the program

⊗ LMECA2711	Quality management and control.	Nicolas Bronchart	30h+30h	5 Credits	2q	X	X
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⊗ Communication

Max=8 CREDITS parmi

⊗ Languages

Students may select from any language course offered at the ILV. Special attention is placed on the following seminars in professional development:

⊗ LALLE2500	Professional development seminar German	Caroline Klein Ann Rinder (coord.)	30h	3 Credits	1 + 2q	X	X
⊗ LALLE2501	Professional development seminar-German	Caroline Klein Ann Rinder (coord.)	30h	5 Credits	1 + 2q	X	X
⊗ LESP2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.) Alicia Maria Tirado Fernandez (compensates Paula Lorente Fernandez)	30h	3 Credits	1q	X	X
⊗ LESP2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.) Alicia Maria Tirado Fernandez (compensates Paula Lorente Fernandez)	30h	5 Credits	1q	X	X
⊗ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.) Marie-Laurence Lambrecht	30h	3 Credits	1 ou 2q	X	X
⊗ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.)	30h	3 Credits	1 ou 2q	X	X

⊗ Group dynamics

⊗ LEPL2351	Dynamique des groupes - Q1	Christine Jacqmot Benoît Raucent Vincent Wertz (coord.)	15h+30h	3 Credits	1q	X	X
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						Year	
						1	2
⌘ LEPL2352	Dynamique des groupes - Q2	Christine Jacqmot Benoît Raucent Vincent Wertz (coord.)	15h+30h	3 Credits	2q	x	x

⌘ **Other non-disciplinary courses**

The student may further select maximum 8 credits in other disciplines.

Course prerequisites

A document entitled (nb: [not available](#) for this programme kima2m) specifies the activities (course units - CU) with one or more prerequisite(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](https://uclouvain.be/fr/decouvrir/rgee.html) (<https://uclouvain.be/fr/decouvrir/rgee.html>).

The programme's courses and learning outcomes

For each UCLouvain 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?"*

KIMA2M - Information

Admission

General (<https://uclouvain.be/en/study/inscriptions/admission-requirements-master-s-degree.html>) and specific admission requirements for this program must be satisfied at the time of enrolling at the university.

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

SUMMARY

- > [Specific Admission Requirements](#)
- > [University Bachelors](#)
- > [Non university Bachelors](#)
- > [Holders of a 2nd cycle University degree](#)
- > [Holders of a non-University 2nd cycle degree](#)
- > [Adults taking up their university training](#)
- > [Access on the file](#)
- > [Admission and Enrolment Procedures for general registration](#)

Specific Admission Requirements

This programme is taught in English with no prerequisite in French. The student is supposed to have at least a B2 level in the European Framework of Reference. A certificate is required for the holders of a non-Belgian degree, see selection criteria of the [personalized access](#).

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor in engineering		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.
Others Bachelors of the French speaking Community of Belgium			
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.
Bachelors of the Dutch speaking Community of Belgium			
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.
Foreign Bachelors			
Bachelor in Engineering	Bachelor 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 degree may have an adapted master programme.

For others institutions

Based on application: accepted, See [Personalized access](#) conditional on further training, or refusal

Non university Bachelors

> Find out more about [links](https://uclouvain.be/fr/etudier/passerelles) (https://uclouvain.be/fr/etudier/passerelles) 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

Adults taking up their university training

> See the website [Valorisation des acquis de l'expérience](https://uclouvain.be/fr/etudier/vae) (https://uclouvain.be/fr/etudier/vae)

It is possible to gain admission to all masters courses via the validation of professional experience procedure.

Access on the file

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

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

[Selection criteria are summarized here.](#)

Admission and Enrolment Procedures for general registration

Teaching method

A variety of teaching methods

The teaching methods used in the Master's degree programme in chemical and materials engineering are in keeping with those used in the Bachelor's degree programme in engineering sciences: active learning, an equal mix of group work and individual work, and emphasis on the development of non-technical skills. An important characteristic of the programme is the immersion of students in the research laboratories of the professors who teach in the programme (lab work, case studies, projects and theses), which allows students to learn cutting edge methods used in their field and to learn from the questioning process inherent in research. In addition, there is an optional 10 credit internship carried out over at least 9 months in a research centre or company that allows motivated students to get experience in the professional world.

Diverse learning situations

Students are exposed to a variety of pedagogies: lectures, projects, exercise and problem-solving sessions, case studies, experimental laboratories, computer simulations, educational software, internships in industry or research, factory visits, graduation trips, individual or group work, seminars given by visiting scientists. This variety of pedagogies helps students to build their knowledge in an iterative and progressive manner all the while developing their independence, organisational and time management skills as well as their ability to communicate.

Interdisciplinary Methods

The Master's degree in chemical and materials engineering is by its very nature interdisciplinary because it serves as an interface between chemistry and physics. It has an interdisciplinary foundation, which provides students with an introduction to the large array of applications used in applied physics and chemistry and training through practical work and cutting edge research as well as major courses in chemistry and material technologies: polymers and macromolecules, inorganic materials and processes, materials mechanics, chemical engineering, nanotechnologies and environmentalism and sustainable development. The programme is open to biotechnology with majors in biomaterials and bioprocesses as well as to business management with majors in management and small and medium sized business creation. The programme is composed of a significant number of classes such as PHYS (or PHY), CHIM (or CHM), BIOL, INMA, MECA, ELEC, BRNA and BIR, which shows that the programme is open and interdisciplinary. Finally, the programme allows students to select up to 40 credits of elective courses from the medical and science programmes and up to 6 credits of classes in the humanities and social sciences, which allow students to create a personalised programme of study.

Evaluation

The evaluation methods comply with the regulations concerning studies and exams (<https://uclouvain.be/fr/decouvrir/rgee.html>). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

Student work is 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. Details about evaluation methods for each teaching unit are explained by the professors at the beginning of the semester.

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

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

Accessible specialised Master's degrees

The Master's degree in nanotechnology and the Master's degree in nuclear engineering are natural extensions of the programme.

Accessible doctoral degrees

The Master's degree programme in chemistry and materials engineering also prepares students for doctoral programmes. Programme professors are members of doctoral programmes such as CHIM (molecular, supramolecular and functional chemistry), MAIN (materials, interfaces and nanotechnologies) and GEPROC (process engineering). These programmes are suitable for students who would like to continue their studies at the doctoral level.

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

Attention, you are currently reading an archived page: below contact informations were for program study 2019-2020 only. To get current contact informations please got to [current program study site](#).

Curriculum Management

Entity

Structure entity

Denomination

Faculty

Sector

Acronym

Postal address

SST/EPL/FYKI

(FYKI) (<https://uclouvain.be/repertoires/entites/fyki>)

Louvain School of Engineering (EPL) (<https://uclouvain.be/repertoires/entites/epl>)

Sciences and Technology (SST) (<https://uclouvain.be/repertoires/entites/sst>)

FYKI

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Jury

- Jean-Didier Legat
- Jean-Christophe Charlier

Useful Contact(s)

- Vinciane Gandibleux

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