KIMA2M

2015 - 2016

Master [120] in Chemical and Materials 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: **kima2m** - Francophone Certification Framework: 7

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Introduction

Introduction

You

- have acquired solid knowledge of chemical or physical engineering or 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;
- want to take advantage of the most recent research advances in your area of specialisation.

Your future job

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

Your programme

- specialised training in an international environment;
- an interdisciplinary approach too problem solving, based on physics and chemistry;
- research experience: laboratories, research projects;
- experience in the industry: factory visits, industry internships, thesis-project within a company;
- the Master's degree programme Functionalised Advanced Materials & Engineering (FAME), part of the Erasmus Mundus exchange, is 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.

KIMA2M - Teaching profile

Learning outcomes

The chemical and materials engineer is trained for jobs in the design and production of materials and advanced material systems as well as the development and control of high tech processes.

Building on fundamental scientific and technical knowledge acquired during the Bachelor's and Master's degree programmes as well the relevant field of specialisation, students are qualified to be:

- a systems engineer able to design new products or objects with required properties and functions, for example an artificial mitral valve, an electro-luminescent polymer for flexible screens, a metal alloy or light composite for aeronautical applications, a nanomaterial used for memory storage.
- a process engineer able to put into place new manufacturing processes and improve or manage the operation of production facilities, for example, an extrusion line for plastics, an extraction facility for plant-based pharmaceutical compounds, a water or waste treatment plant, a production line for electronic parts and/or a production plant for pure chemical compounds.
- a combination of both, for example polymer materials for the automotive industry as well as the synthesis procedure necessary for industrialisation

Throughout these activities, chemical and materials engineers systematically take into account limits, values and rules (legal, ethical or economic).

They are autonomous, capable of managing industrial projects and comfortable working as part of a team. They are able to communicate in a foreign language, English in particular.

The job of a chemical and materials engineer ranges from research and development to production and manufacturing.

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 Confirm the validity of problem solving results.

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 procedure meeting a need or solving a particular problem (axis 2).

2.1 Analyse a realistic and/or complex problem and formulate a corresponding specifications note.
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 procedures.
2.4 Implement and test a solution in the form of a mock-up, a prototype, a lab or pilot unit 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 problem or a new problem in materials 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 or test a hypotheses relating to the phenomenon being studied.
3.3 Write a cumulative 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 team decisions and assume the consequences of these decisions (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 you are able to communicate in one or more foreign language in addition to French (axis 5).

5.1 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 your arguments and adapt to the language of your interlocutors: technicians, colleagues, clients, superiors.
5.3 Communicate through graphics and diagrams: interpret a diagram, present project results, structure information.
5.4 Read and analyse different technical documents (rules, plans, specification notes).
5.5 Draft documents that take into account contextual requirements and social conventions.
5.6 Make a convincing oral presentation 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 Rigorously apply the standards of your discipline (terminology, measurement units, quality standards and security).
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 techniques used to manufacture and classify materials as well as research and development perspectives included in a 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 (30 credits) including the graduation project (28 credits)
-a final specialisation (30 credits);
-one or more majors;
-elective courses to round out the programme.

The graduation project is normally completed during the 2nd year. However, students may (depending on their project) take these courses in the 1st or 2nd year as long as they have completed the course prerequisites. This is particularly the case for students who completed part of their education abroad

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 may count this activity toward their graduation requirements (but only if they respect programme rules). The student will also verify that he/she has obtained the minimum number of credits requested for the approval of their diploma as well as for the approval of their major (in order to include their academic distinctions in the diploma supplement).

These types of programmes will be submitted for approval by 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-2015-kima2m-lkima220t.html]*

> Professional focus *[en-prog-2015-kima2m-lkima200s]*

Options courses

> Major in chemical and environmental engineering *[en-prog-2015-kima2m-lkima221o.html]*
> Major in inorganic materials and processes *[en-prog-2015-kima2m-lkima222o.html]*
> Major in Polymers and macro-molecules *[en-prog-2015-kima2m-lkima223o.html]*
> Major in Mechanics of materials *[en-prog-2015-kima2m-lkima224o.html]*
> Major in Biomaterials *[en-prog-2015-kima2m-lkima225o.html]*
> Major in nanotechnology *[en-prog-2015-kima2m-lkima233o.html]*
> Major in small and medium sized business creation *[en-prog-2015-kima2m-lkima922r.html]*
> Major in small and medium sized business creation *[en-prog-2015-kima2m-lkima230o.html]*
> Major in business risks and opportunities *[en-prog-2015-kima2m-lkima231o.html]*
> Elective courses *[en-prog-2015-kima2m-lkima234o.html]*

KIMA2M Detailled programme

Programme by subject

CORE COURSES

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

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

						Year 1	2
O LKIMA2990	Graduation project/End of studies project	N.		28 Credits			x

O *Religion courses for students in natural sciences*

Select 2 credits from among
The student shall select

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

PROFESSIONAL FOCUS [30.0]

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

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

						Year 1	2
O LMAPR2013	Physical Chemistry for Metals and Ceramics	Pascal Jacques	30h+30h	5 Credits	1q	x	
O LMAPR2014	Physics of Functional Materials	Xavier Gonze, Luc Piraux, Gian-Marco Rignanese	37.5h +22.5h	5 Credits	1q	x	
O LMAPR2019	Polymer Science and Engineering	Sophie Demoustier, Alain Jonas, Evelyne Van Ruymbeke	45h+15h	5 Credits	1q	x	
O LMAPR2430	Industrial processes for the production of base chemicals	Juray De Wilde	30h +22.5h	5 Credits	1q	x	
O LMAPR2481	Deformation and fracture of materials	Thomas Pardoen	30h+30h	5 Credits	1q	x	
O LMAPR2647	Sustainable treatment of industrial and domestic waste: Fundamentals	Jacques Devaux, Olivier Françoisse, Patricia Luis Alconero, Olivier Noiset	30h+15h	5 Credits	1q	x	

OPTIONS

Students may select at least one major from among the following: Chemical and environmental engineering, Inorganic materials and processes, Biomaterials, Polymers and macro-molecules, Mechanics of materials, and Nano-technology.

> Major in chemical and environmental engineering *[en-prog-2015-kima2m-lkima221o]*
> Major in inorganic materials and processes *[en-prog-2015-kima2m-lkima222o]*
> Major in Polymers and macro-molecules *[en-prog-2015-kima2m-lkima223o]*
> Major in Mechanics of materials *[en-prog-2015-kima2m-lkima224o]*
> Major in Biomaterials *[en-prog-2015-kima2m-lkima225o]*
> Major in nanotechnology *[en-prog-2015-kima2m-lkima233o]*

Major in small and medium sized business creation

> Major in small and medium sized business creation *[en-prog-2015-kima2m-lkima230o]*
> Major in business risks and opportunities *[en-prog-2015-kima2m-lkima231o]*
> Elective courses *[en-prog-2015-kima2m-lkima234o]*

MAJOR IN CHEMICAL AND ENVIRONMENTAL ENGINEERING

L'objectif de cette option est de permettre à l'étudiant de maîtriser les principales méthodes de traitement et de recyclage des résidus et effluents industriels, et de sélectionner les matériaux et procédés à utiliser pour une application donnée en prenant en compte les exigences du développement durable (coût écologique intégré de la production au recyclage, durabilité, etc.).

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...)

The student shall select:
De 20 à 30 credits parmi

O Required courses

						Year 1	Year 2
O LMAPR2118	Fluid-fluid separations	Patricia Luis Alconero, Denis Mignon	30h +22.5h	5 Credits	2q	x	x
O LMAPR2330	Reactor Design	Juray De Wilde	30h+30h	5 Credits	2q	x	x
O LMAPR2648	Sustainable treatment of industrial and domestic waste: Case studies	Damien Debecker, Olivier Françoisse, Patricia Luis Alconero, Olivier Noiset, Benoît Stenuit	30h+15h	5 Credits	2q	x	x

O Recommended courses

⊠ LINMA2300	Process Control	Denis Dochain	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2011	Methods of Physical and Chemical Analysis	Arnaud Delcorte, Jacques Devaux	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2320	Process development in industrial organic chemistry	Juray De Wilde, Patricia Luis Alconero, Denis Mignon	30h+15h	5 Credits	1q	x	x
⊠ LMAPR2380	Solid-fluid separation	Pierre Adam, Tom Leyssens	30h +22.5h	5 Credits	1q	x	x
⊠ LMAPR2691	Technology of chemical and environmental engineering	N.	30h+15h	5 Credits	2q ⊘	x	x

⊠ Elective courses

⊠ LENVI2007	Renewable energies	Xavier Draye, Patrick Gerin (coord.), Hervé Jeanmart, Geoffrey Van Moeseke	30h	4 Credits	1q	x	x

						Year 1	2
⊠ LENVI2101	Sociétés, populations, environnement, développement: problématiques et approches interdisciplinaires	Denis Dochain, Bernard Feltz, Pierre-Joseph Laurent, Jean-Pascal van Ypersele de Strihou	45h	6 Credits	1q	x	x
⊠ LFSA2245	Environment and business	Thierry Bréchet	30h	3 Credits	1q	x	x
⊠ LINMA1702	Applied mathematics : Optimization I	François Glineur	30h +22.5h	5 Credits	2q	x	x
⊠ LMAPR2020	Materials Selection	Christian Bailly, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LMAPR2141	Metals Processing and Recycling	Joris Proost	30h+30h	5 Credits	2q	x	x
⊠ LMECA2645	Major technological hazards in industrial activity.	Denis Dochain, Alexis Dutrieux	30h	3 Credits	2q	x	x

MAJOR IN INORGANIC MATERIALS AND PROCESSES

L'objectif de cette option est de développer chez l'étudiant une connaissance approfondie des méthodes de synthèse, de mise en oeuvre et de recyclage des matériaux inorganiques (métaux, céramiques et matériaux frittés, verres inorganiques), de leurs propriétés structurelles et fonctionnelles, des détails de leur microstructure à différentes échelles, et des relations entre leurs propriétés et leurs méthodes d'élaboration.

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...)

Th student shall select
De 20 à 30 credits parmi

O Required courses

						Year 1	Year 2
O LMAPR2141	Metals Processing and Recycling	Joris Proost	30h+30h	5 Credits	2q	x	x
O LMAPR2642	Characterisation of Inorganic Materials	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	N.		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 Pardoen	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 structures 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 and as well as at the level of nanotechnology.

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...)

The student shall select:
De 20 à 30 credits parmi

O Required courses

						Year 1	Year 2
O LMAPR2016	Project in Polymer Science	Charles-André Fustin, Alain Jonas	0h+45h	5 Credits	2q	x	x

⊠ Polymer science complements

						Year 1	Year 2
⊠ LCHM2261	Polymer Chemistry and Physico-Chemistry	Charles-André Fustin, Jean-François Gohy, Alain Jonas	45h+15h	5 Credits	1q	x	x

⊠ Macromolecular bio and nanotechnology

						Year 1	Year 2
⊠ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier, Karine Glinel, Jean-François Gohy, Bernard Nysten	45h+15h	5 Credits	2q	x	x
⊠ LCHM2170	Introduction to protein biotechnology	Pierre Morsomme, Patrice Soumillion	22.5h +7.5h	3 Credits	1q	x	x
⊠ LFUND2908	Théorie quantique de l'état solide organique	N.		3 Credits		x	x

⊠ Polymer materials engineering

						Year 1	Year 2
⊠ LMAPR2010	Polymer Materials	Christian Bailly, Bernard Nysten	45h+15h	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 the implementation and use of these properties, to the methods used to simulate their properties, to the criteria used to select materials for a given application.

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

O Required courses

						Year 1	Year 2
O LMAPR2018	Rheometry and Polymer Processing	Christian Bailly, Evelyne Van Ruymbeke	30h +22.5h	5 Credits	2q	x	x
O LMAPR2020	Materials Selection	Christian Bailly, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
O LMAPR2482	Plasticity and metal forming	Laurent Delannay, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x

⊠ Composite materials

⊠ LMECA2640	Mechanics of composite materials	Issam Doghri, Frédéric Lani	30h+30h	5 Credits	2q	x	x
⊠ LMECA2141	Rheology	Vincent Legat, Evelyne Van Ruymbeke	30h+30h	5 Credits	1q	x	x

⊠ Solid mechanics and numerical methods

⊠ LMECA1120	Introduction to finite element methods.	Vincent Legat	30h+30h	5 Credits	2q	x	x
⊠ LMECA2131	Introduction to nonlinear solid mechanics.	Issam Doghri	30h+30h	5 Credits	2q	x	x
⊠ LAUCE1181	Mechanics of structures	Pierre Latteur	30h+30h	5 Credits	1q	x	x
⊠ LMECA2520	Calculation of planar structures	Issam Doghri	30h+30h	5 Credits	2q	x	x

⊠ Mechanical metallurgy

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

MAJOR IN BIOMATERIALS

The objective of this major is to introduce students to the principal biochemical and biological concepts that are useful for developing applications in the field of biomaterials.

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...)

KIMA students are required to enrol in LGBIO2030 and LBIR1220A 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. Students shall select
De 20 à 30 credits parmi

O Required courses (10 credits)

						Year 1	Year 2
O LGBIO2030	Biomaterials	Sophie Demoustier, Christine Dupont, Gaëtane Leloup	30h+30h	5 Credits	1q	x	
O LBIR1220A	Biochimie I (partim EPL)	Michel Ghislain, Yvan Larondelle	30h+15h	5 Credits	2q	x	

O Recommended courses

⊠ LBIR1321	Biochemistry II : metabolic pathways and their regulation	Michel Ghislain (coord.), Yvan Larondelle	30h+15h	3 Credits	1q	x	x
⊠ LBIO1335	Immunology	Jean-Paul Dehoux	25h+15h	3 Credits	1q	x	x
⊠ LELEC2560	Micro and Nanofabrication Techniques	Laurent Francis, Benoît Hackens, Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊠ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier, Karine Glinel, Jean-François Gohy, Bernard Nysten	45h+15h	5 Credits	2q	x	x

⊠ Elective courses

⊠ LBIRC2101A	Analyse biochimique et notions de génie génétique: analyse biochimique	Marc Boutry, François Chaumont, Charles Hachez, Pierre Morsomme	18.5h +22.5h	4 Credits	1q	x	x
⊠ LBIRC2108	Biochemical and Microbial Engineering	Benoît Stenuit	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	Polymer Materials	Christian Bailly, Bernard Nysten	45h+15h	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

As with the Master's degree programmes in electrical, electromechanic, physical, chemical, and materials science engineering, 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.

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...)

The student shall select
De 20 à 30 credits parmi

⊠ 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

						Year 1	Year 2
⊠ LMAPR2015	Physics of Nanostructures	Jean-Christophe Charlier, 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
⊠ LPHY2273	Cryophysique et questions spéciales de supraconductivité	Vincent Bayot, Luc Piraux	45h+15h	5 Credits	1q	x	x
⊠ LFUND2908	Théorie quantique de l'état solide organique	N.		3 Credits		x	x

⊠ Nano and micro semi-conductors

To enrol in these courses, students should have already taken a course in physical electronics or in semiconductor devices such as ELEC 1300 or ELEC 1755.

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

⊠ Micro and nano-engineering

⊠ LELEC2560	Micro and Nanofabrication Techniques	Laurent Francis, Benoît Hackens, Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊠ LELEC2895	Design of micro and nanosystems	Denis Flandre, Laurent Francis (coord.), Thomas Pardoen, Jean-Pierre Raskin	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier, Karine Glinel, Jean-François Gohy, Bernard Nysten	45h+15h	5 Credits	2q	x	x

						Year 1	2
⊠ LMAPR2631	Surface Analysis	Arnaud Delcorte, Bernard Nysten	30h+15h	5 Credits	2q	x	x

MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

The goal of this major is to familiarise engineering students with the specifics of small and medium sized businesses, entrepreneurship, and business creation so they may develop the necessary skills, knowledge and tools to create a business. This major is reserved for a small number of students and selection 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 related 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...)

Further 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 programmes in civil engineering, the objective of this major is to introduce students to 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. The class FSA2240 is not included in this major for GCE students. Students selecting this major may take 16-20 credits among the following courses:

De 16 à 20 credits parmi

						Year 1	Year 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

Students round out their programme with elective courses. Students may select these courses from the courses offered in science programmes or the medical programme at UCL or FTW/KULeuven provided they been approved by an advisor-member of the programme commission for chemistry and applied physics (FYKI). Specifically, courses offered as majors in the Master's degree programme in chemical and materials engineering may also be taken as elective courses. Students should especially consider courses offered as part of the Master's degree programmes in physical, electrical, mechanical and biomedical 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...)

⊠ 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	Year 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
⊠ 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

⊠ Language courses

Students may take a maximum of 3 credits except for students who have chosen the management or CPME majors.
max=3 credits parmi

⊠ 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

⊠ Human sciences

Students may take a maximum of 6 credits except for students who have chosen the management or CPME majors.
max=6 credits parmi

⊠ Other courses

Course prerequisites

A document entitled en-prerequis-2015-kima2m.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.

KIMA2M - Information

Admission

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

A student with no major in applied chemistry and physics from UCL, nor any option deemed equivalent, shall submit an application to the Faculty of applied sciences, including a detailed past curriculum (courses and grades by year). Engineering Bachelors are exempted from this procedure, if they have a minor in applied chemistry and physics from UCL, or an option deemed equivalent. The Faculty, after consulting the Applied chemistry and physics diploma committee, will decide as to the applicant's admissibility, pursuant to rules relative to links between degrees. Moreover, the Faculty can propose a customized curriculum, by drawing on the volume of elective courses of the KIMA curriculum and, if necessary, up to 15 additional credits. For some students (e.g. bachelors in industrial engineering), the Faculty might require an additional year of studies prior to the Master's, corresponding to 60 credits of the major in applied chemistry and physics.

- 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
- Personalized access

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University Bachelors

Diploma	Special Requirements	Access	Remarks
UCL Bachelors			
Bachelor in engineering	Major or minor in applied chemistry and physics	Direct access	
Bachelor in engineering		Access with additional training	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 jury 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 chemical sciences Bachelier en sciences physiques Bachelier en sciences mathématiques Bachelier en sciences biologiques Bachelier en sciences géographiques, orientation générale Bachelier en sciences de l'ingénieur, orientation bioingénieur	Minor in applied chemical and physical 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 (Applied chemistry and physics) is considered an advantage for candidates seeking this type of admission
Others Bachelors of the French speaking Community of Belgium			
Bachelor in engineering	With specific options in former institution related to applied chemistry and physics	Direct access	
Bachelor in engineering		Access with additional training	Students with a Bachelor's degree in engineering sciences (with a focus on chemical and materials engineering)

			who have not taken the equivalent of a minor in applied chemistry and physics must submit a written application to the chemical and materials engineering 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.
Bachelor in chemistry, physics, mathematics, biology or geography Bachelor in bio-engineering	With specific options in former institution related to applied chemistry and physics	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 (applied chemistry and physics) is considered an advantage for candidates seeking this type of admission.
Bachelors of the Dutch speaking Community of Belgium			
Bachelor in bio-engineering	With specific options in former institution related to applied chemistry and physics	Direct access	
Bachelor in bio-engineering		Access with additional training	Students who have no specialisation in chemical and materials engineering must submit a written application to the programme commission in chemical and materials 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.
Bachelor's degree equivalent to one of those required from graduates of the French-speaking community	With specific options in former institution related to applied chemistry and physics	Access with additional training	Students without a Bachelor's degree in engineering sciences (with a focus on chemical and materials engineering) must submit a written application 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 student may be admitted (based solely on the common Bachelor's degree training for engineering sciences with a focus on chemical and materials engineering) and their decision will be in keeping with the rules pertaining to bridge years. 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.

Foreign Bachelors			
Bachelor in bio-engineering	Bachelors from the Cluster network	Direct access	Conditions imposed on UCL engineering Bachelor.
Bachelor in bio-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"			
Engineers, bioengineers, graduates in chemistry, physics, mathematics, biology or geography, all of these being considered equivalent to the corresponding Bachelor's degree		Direct access	
Masters			
Master 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.

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

Specific procedures :

A student with no major in applied chemistry and physics from UCL, nor any option deemed equivalent, shall submit an application to the Faculty of applied sciences, including a detailed past curriculum (courses and grades by year). Engineering Bachelors are exempted from this procedure, if they have a minor in applied chemistry and physics from UCL, or an option deemed equivalent. The Faculty, after consulting the Applied chemistry and physics diploma committee, will decide as to the applicant's admissibility, pursuant to rules relative to links between degrees. Moreover, the Faculty can propose a customized curriculum, by drawing on the volume of elective courses of the KIMA curriculum and, if necessary, up to 15 additional credits. For some students (e.g. bachelors in industrial engineering), the Faculty might require an additional year of studies prior to the Master's, corresponding to 60 credits of the major in applied chemistry and physics.

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

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 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. 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

Curriculum Managment

Entite de la structure FYKI

Acronyme	**FYKI**
Dénomination	Commission de programme - Ingénieur civil en chimie et sciences des matériaux et ingénieur civil physicien
Adresse	Place Sainte Barbe 2 bte L5.02.02
	1348 Louvain-la-Neuve
	Tél 010 47 24 87 - Fax 010 47 40 28
Secteur	Secteur des sciences et technologies (SST)
Faculté	Ecole Polytechnique de Louvain (EPL)
Commission de programme	Commission de programme - Ingénieur civil en chimie et sciences des matériaux et ingénieur civil physicien (FYKI)

Academic Supervisor : Christian BAILLY

Jury:
Président du Jury : Jean-Didier LEGAT
Secrétaire du Jury : Luc PIRAUX

Usefull Contacts

Mme : #mailto:Vinciane Gandibleux: vinciane.gandibleux@uclouvain.be# (Tel: 010 47 96 23)