KIMA2M

2014 - 2015

Master [120] in Chemical and Materials Engineering

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In french
Dissertation/Graduation Project : **YES** - Internship : **optional**
Activities in English: **YES** - Activities in other languages : **NO**
Activities on other sites : **optional**
Organized by: **Ecole Polytechnique de Louvain (EPL)**
Programme code: **kima2m** - European Qualifications Framework (EQF): 7

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Introduction

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Learning outcomes

The Master's degree in chemical and materials science engineering (KIMA) is a comprehensive and modular training which provides students with the basics of varied application fields, from chemical engineering to process engineering to nanotechnologies to the physics of advanced electronic and magnetic materials, via environmental engineering, sustainable development, and materials science engineering. This curriculum answers the needs of various technical professions and their fast-changing evolution : its comprehensiveness allows one to adapt to rapidly changing technologies and the broad diversity of job opportunities in the fields of chemistry and materials technology, while also developing cutting-edge competencies via the choice of coherent course modules (called 'options'). As a rule, this training is based on the conviction that learning through and towards research is the best way to build a student's knowledge (academic knowledge, practical knowledge, and behaviour). Throughout the training, the student will therefore have many opportunities to visit experimental laboratories. Industrial visits and a traineeship can complement the training by familiarizing the student with the day-by-day concerns of industrial life.

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

démontrer la maîtrise d'un solide corpus de connaissances en sciences fondamentales et sciences de l'ingénieur, lui permettant d'appréhender et de résoudre les problèmes relatifs aux matériaux et aux procédés.

1.1. Identifier et mettre en oeuvre les concepts, lois, raisonnements applicables à une problématique de complexité réaliste. En effet, un matériau ou un procédé industriel doit répondre à un cahier des charges multidimensionnel ; il faut donc intégrer des connaissances scientifiques et techniques de plusieurs domaines. Par exemple, le matériau d'une valve mitrale doit non seulement être léger et résistant mais aussi biocompatible ; un polymère pour l'automobile doit résister non seulement à la température, mais aussi à d'autres agressions externes comme l'huile, l'essence ou les UV ; un procédé chimique de synthèse doit intégrer les concepts thermodynamiques pour prédire l'équilibre de la réaction, mais aussi la cinétique pour établir le dimensionnement des réacteurs et l'automatique pour garantir la stabilité du fonctionnement.

1.2. Identifier, développer et utiliser les outils de modélisation et de calcul adéquats pour résoudre cette problématique

1.3. Vérifier la vraisemblance et confirmer la validité des résultats obtenus au regard de la nature du problème posé.

organiser et de mener à son terme une démarche complète d'ingénierie appliquée au développement d'un matériau, d'un système matériel complexe, d'un produit de grande pureté et/ou de composition complexe ou d'un procédé répondant à un besoin ou à un problème particulier.

2.1. Analyser un problème ou un besoin fonctionnel de complexité réaliste et formuler le cahier des charges correspondant. Un cahier des charges industriel comporte de nombreuses composantes allant des propriétés mécaniques et fonctionnelles aux aspects légaux et de sécurité, en passant par les contraintes économiques et logistiques. Par exemple, un composite pour l'aéronautique doit être léger, résistant mécaniquement et à la température, ininflammable ; il doit pouvoir être produit industriellement de manière sûre, avec une qualité garantie et à un coût acceptable. Autre exemple, une unité de craquage catalytique doit devenir de plus en plus flexible, aussi bien en termes de matière première à convertir qu'en terme des produits finaux.

2.2. Modéliser le problème et concevoir une ou plusieurs solutions techniques originales répondant à ce cahier des charges.

2.3. Evaluer et classer les solutions au regard de l'ensemble des critères figurant dans le cahier des charges : efficacité, faisabilité, qualité, sécurité et interaction/intégration avec d'autres procédés/composants.

2.4. Implémenter et tester une solution sous la forme d'une maquette, d'un prototype, d'une unité labo ou pilote et/ou d'un modèle numérique.

2.5. Formuler des recommandations pour améliorer le caractère opérationnel de la solution étudiée.

organiser et de mener à son terme un travail de recherche pour appréhender un phénomène physique ou chimique ou une problématique inédite en science et ingénierie des matériaux et des procédés.

3.1. Se documenter et résumer l'état des connaissances actuelles dans le domaine considéré. Par exemple, analyser la littérature des articles scientifiques et des brevets récents dans le domaine des polymères électroluminescents ou des procédés de polymérisation du polypropylène et rédiger un rapport de synthèse.

3.2. Proposer une modélisation et/ou un dispositif expérimental permettant de simuler et de tester des hypothèses relatives au phénomène étudié.

3.3. Mettre en forme un rapport de synthèse visant à expliciter les potentialités d'innovation théoriques et/ou technique résultant de ce travail de recherche.

contribuer, en équipe, à la programmation d'un projet et de le mener à son terme en tenant compte tenu des objectifs, des ressources allouées et des contraintes qui le caractérisent.

4.1. Cadrer et expliciter les objectifs d'un projet (en y associant des indicateurs de performance) compte tenu des enjeux et des contraintes (ressources, budget, échéance, …) qui caractérisent l'environnement du projet.

4.2. S'engager collectivement sur un plan de travail, un échéancier et des rôles à tenir.

4.3. Fonctionner dans un environnement pluridisciplinaire, conjointement avec d'autres acteurs porteurs de différents points de vue : gérer des points de désaccord ou des conflits

4.4. Prendre des décisions individuelles ou en équipe lorsqu'il y a des choix à faire : que ce soit sur les solutions techniques ou sur l'organisation du travail pour faire aboutir le projet.

communiquer efficacement oralement et par écrit en vue de mener à bien les projets qui lui sont confiés dans son environnement de travail. Idéalement, il devrait être capable de communiquer également dans une ou plusieurs langues étrangères en plus du français.

5.1. Identifier clairement les besoins du « client » ou de l'usager : questionner, écouter et comprendre toutes les dimensions de sa demande et pas seulement sur les aspects techniques. Par exemple un problème de dimensionnement d'une opération unitaire en génie chimique pour l'obtention des produits de grande pureté ou problème de sélection de matériau pour une application donnée.

5.2. Argumenter et convaincre des choix technologiques en s'adaptant au langage de ses interlocuteurs : techniciens, collègues, clients, supérieurs hiérarchiques.

5.3. Communiquer sous forme graphique et schématique ; interpréter un schéma, présenter les résultats d'un travail, structurer des informations.

5.4. Lire, analyser et exploiter des documents techniques normes, plans, cahier des charges.

5. 5. Rédiger des documents écrits en tenant compte des exigences contextuelles et des conventions sociales en la matière.

5.6. Faire un exposé oral convaincant en utilisant les techniques modernes de communication.

faire preuve de rigueur, d'ouverture, d'esprit critique et d'éthique dans son travail. Tout en tirant parti des innovations technologiques et scientifiques à sa disposition, il prendra le recul nécessaire pour valider la pertinence socio-technique d'une hypothèse ou d'une solution et se comporter en acteur responsable.

6.1. Appliquer les normes en vigueur dans sa discipline (terminologie, unités de mesure, normes de qualité, de sécurité et de pollution …).

6.2. Trouver des solutions qui vont au-delà des enjeux strictement techniques, en intégrant les enjeux de développement durable et la dimension éthique d'un projet (par exemple « life cycle analysis » et similaires).

6.3. Faire preuve d'esprit critique vis-à-vis d'une solution technique pour en vérifier la robustesse et minimiser les risques qu'elle présente au regard du contexte de sa mise en Œuvre (cette compétence est principalement développée dans le cadre du travail de fin d'étude tant au niveau de l'analyse critique des techniques mises en oeuvre pour la fabrication et la caractérisation de matériaux qu'au niveau des perspectives de recherche et de développement rédigées au terme du mémoire).

6.4. S'autoévaluer et développer de manière autonome les connaissances nécessaires pour rester compétent dans son domaine – « lifelong learning » (cette compétence est notamment développée dans le cadre de cours à projets nécessitant des recherches bibliographiques).

Programme structure

The Master's curriculum in chemical and materials science engineering will consist of at least 120 credits covering two years, with a minimum of 60 credits per year, and comprising :

- a core curriculum of at least 30 credits, including a final thesis and general interest electives;
- a 30-credit specialization;
- at least one option totalling at least 20 credits, to be chosen from amongst the following: chemical engineering, environment and sustainable development, inorganic materials and processes, polymers and macromolecules, mechanics of materials or nanotechnology;
- specialized elective courses, or one or more additional options (each totalling at least 20 credits, except for the management option) chosen from amongst the 10 options of the curriculum (chemical engineering, environment and sustainable development, inorganic materials and processes, polymers and macromolecules, mechanics of materials, nanotechnology, biomaterials and bioprocesses, optics, management or launching of small and medium-sized companies).

The final thesis is generally written during the last year. However, students may choose to take any given course in the first or second year, subject to possible prerequisites. This will be the case in particular for students pursuing part of their education abroad.

If, in the course of his (her) former curriculum, a student has already been credited with a subject included in the compulsory core curriculum, or any training deemed equivalent, this subject will be replaced by elective courses, while conforming to imposed constraints. The student is responsible for checking whether the minimum total number of credits has been reached, as well as those of the specialized field, which will appear on the final diploma.

The student's curriculum will be submitted for acceptance by the Applied physics and chemistry diploma committee, using an ad hoc form to be found on the website of the committee.

Whatever the focus or the options chosen, the programme of this master shall totalize 120 credits, spread over two years of studies each of 60 credits.

> Tronc commun du master ingénieur civil en chimie et science des matériaux *[en-prog-2014-kima2m-lkima220t.html]*

> Professional focus *[en-prog-2014-kima2m-lkima200s]*

Options courses

> Option en génie chimique *[en-prog-2014-kima2m-lkima220o.html]*

> Option en environnement et développement durable *[en-prog-2014-kima2m-lkima221o.html]*
> Option en matériaux et procédés inorganiques *[en-prog-2014-kima2m-lkima222o.html]*
> Option en polymères et macromolécules *[en-prog-2014-kima2m-lkima223o.html]*
> Option en mécanique des matériaux *[en-prog-2014-kima2m-lkima224o.html]*
> Option en biomatériaux et bioprocédés *[en-prog-2014-kima2m-lkima225o.html]*
> Option en nanotechnologie *[en-prog-2014-kima2m-lkima233o.html]*
> Option en technologies photovoltaïques *[en-prog-2014-kima2m-lkima235o.html]*
> Business risks and opportunities *[en-prog-2014-kima2m-lkima231o.html]*
> Option en création de petites et moyennes entreprises *[en-prog-2014-kima2m-lkima230o.html]*
> Cours au choix *[en-prog-2014-kima2m-lkima234o.html]*

KIMA2M Detailled programme

Programme by subject

CORE COURSES

O Mandatory
△ Courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015
⊠ Optional
⊘ Periodic courses not taught during 2014-2015
⧺ Two years course

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

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

O *Religion courses for student in exact sciences*

The student shall select 2 credits from amongst
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	Philippe Cochinaux	15h	2 Credits	1q	x	x

PROFESSIONAL FOCUS [30.0]

O Mandatory
△ Courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015
⊠ Optional
⊘ Periodic courses not taught during 2014-2015
⧺ Two years course

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

						Year 1	Year 2
O LMAPR2011	Methods of Physical and Chemical Analysis	Arnaud Delcorte, Jacques Devaux	30h+30h	5 Credits	1q	x	

						Year 1	2
LMAPR2013	Physical Chemistry for Metals and Ceramics	Pascal Jacques	30h+30h	5 Credits	1q	x	
LMAPR2014	Physics of Functional Materials	Xavier Gonze, Luc Piraux, Gian-Marco Rignanese	37.5h +22.5h	5 Credits	1q	x	
LMAPR2019	Polymer Science and Engineering	Sophie Demoustier, Alain Jonas, Evelyne Van Ruymbeke	45h+15h	5 Credits	1q	x	
LMAPR2330	Reactor Design	Juray De Wilde	30h+30h	5 Credits	1q	x	
LMAPR2481	Deformation and fracture of materials	Thomas Pardoen	30h+30h	5 Credits	1q	x	

OPTIONS

L'étudiant sélectionne au moins une option parmi : génie chimique, environnement et développement durable, matériaux et procédés inorganbiques, polymères et macro-molécules, mécanique des matériaux, nano-technologie.

OPTION EN GÉNIE CHIMIQUE

L'objectif de cette option est de former l'étudiant aux concepts clés de ce domaine, entre autres la conception, la régulation, l'automatisation, la maintenance, la simulation et le développement de procédés chimiques ou biochimiques industriels.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 30 credits parmi

O Cours obligatoires (20 credits)

						Year 1	Year 2
O LMAPR2118	Fluid-fluid separations	Patricia Luis Alconero, Denis Mignon	30h +22.5h	5 Credits	2q	x	x
O LMAPR2380	Solid-fluid separation	Pierre Adam, Tom Leyssens	30h +22.5h	5 Credits	1q	x	x
O LMAPR2430	Inorganic industrial chemical processes	Juray De Wilde, Mark Saeys (compensates Juray De Wilde)	30h +22.5h	5 Credits	2q	x	x
O LINMA2300	Process Control	Denis Dochain	30h+30h	5 Credits	1q	x	x

⊠ Cours particulièrement recommandés

⊠ LMAPR2320	Process development in industrial organic chemistry	Juray De Wilde, Patricia Luis Alconero, Denis Mignon	30h+15h	5 Credits	1q	x	x
⊠ LMAPR2141	Metals Processing and Recycling	Joris Proost	30h+30h	5 Credits	2q	x	x
⊠ LINMA1702	Applied mathematics : Optimization I	Vincent Blondel, François Glineur (compensates Vincent Blondel), François Glineur (coord.)	30h +22.5h	5 Credits	2q	x	x
⊠ LBIRC2106	Chemometrics	Bernadette Govaerts	22.5h +15h	3 Credits	1q	x	x

Autres cours d'intérêt

						Year 1	Year 2
LSTAT2320	Design of experiment.	Patrick Bogaert, Bernadette Govaerts	22.5h +7.5h	5 Credits	2q	x	x
LINMA2370	Modelling and analysis of dynamical systems	Jean-Charles Delvenne, Denis Dochain (coord.)	30h +22.5h	5 Credits	1q	x	x
LINMA2671	Automatic : Theory and implementation	Julien Hendrickx	30h+30h	5 Credits	1q	x	x
LMECA1120	Introduction to finite element methods.	Vincent Legat	30h+30h	5 Credits	2q	x	x
LBIRC2108	Biochemical and Microbial Engineering	Spyridon Agathos	30h +22.5h	5 Credits	2q	x	x

OPTION EN ENVIRONNEMENT ET DÉVELOPPEMENT DURABLE

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 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 29 credits parmi

O Cours obligatoires

						Year 1	Year 2
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	x
O LMAPR2648	Sustainable treatment of industrial and domestic waste: Case studies	Spyridon Agathos, Damien Debecker, Olivier Françoisse, Patricia Luis Alconero, Olivier Noiset	30h+15h	5 Credits	1q	x	x
O LMAPR2690	Valorisation and Treatment of Solid Wastes	N.	22.5h	2 Credits	1q △	x	x

⊠ Cours au choix

						Year 1	Year 2
⊠ LMAPR2020	Materials Selection	Christian Bailly, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LMAPR2510	Mathematical ecology	Eric Deleersnijder, Emmanuel Hanert, Thierry Van Effelterre	30h +22.5h	5 Credits	2q	x	x
⊠ LMECA2645	Major technological hazards in industrial activity.	Denis Dochain, Alexis Dutrieux	30h	3 Credits	2q	x	x
⊠ LFSA2245	Environment and Business	Thierry Bréchet	30h	3 Credits	1q	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 (compensates Jean-Pascal van Ypersele de Strihou), Denis Dochain, Bernard Feltz (compensates Jean-Pascal van Ypersele de Strihou), Bernard Feltz, Pierre-Joseph Laurent (compensates Jean-Pascal van Ypersele de Strihou), Pierre-Joseph Laurent, Jean-Pascal van Ypersele de Strihou	45h	9 Credits	1q	x	x

OPTION EN MATÉRIAUX ET PROCÉDÉS INORGANIQUES

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 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 30 credits parmi

O Cours obligatoires

						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, Quentin Van Overmeere	30h+30h	5 Credits	1q	x	x

⊠ Thermodynamique et procédés d'élaboration

⊠ LMAPR2430	Inorganic industrial chemical processes	Juray De Wilde, Mark Saeys (compensates Juray De Wilde)	30h +22.5h	5 Credits	2q	x	x
⊠ LMAPR2672	Processing of ceramics, powder metallurgy 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

⊠ Mise en oeuvre et durabilité

⊠ LMAPR2420	Complements of physical metallurgy	Pascal Jacques (coord.), Thomas Pardoen	30h+30h	5 Credits	2q ⊘	x	x
⊠ LMAPR2482	Plasticity and metal forming	Laurent Delannay, Thomas Pardoen (coord.)	30h +22.5h	5 Credits	2q	x	x

OPTION EN POLYMÈRES ET MACROMOLÉCULES

L'objectif de cette option est de permettre à l'étudiant de maîtriser les relations entre la structure chimique des macromolécules organiques (polymères, bio-macromolécules, etc.), la microstructure des matériaux qui en dérivent, les principales méthodes de synthèse et de mise en oeuvre, et les propriétés structurelles et fonctionnelles qui en découlent, aussi bien au niveau macroscopique et industriel qu'au niveau des applications dans le domaine de la nanotechnologie.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 28 credits parmi

O Cours obligatoire

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

⊠ Compléments de science des polymères

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

⊠ Bio- et nano-technologie macromoléculaires

⊠ 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

⊠ Ingénierie des matériaux polymères

⊠ 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

OPTION EN MÉCANIQUE DES MATÉRIAUX

L'objectif de cette option est d'initier l'étudiant aux principales caractéristiques mécaniques des diverses classes de matériaux, aux conséquences de ces propriétés sur leur mise en oeuvre et leur usage, aux méthodes de simulation de ces propriétés, et aux critères permettant de sélectionner un matériau pour une application donnée.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 30 credits parmi

O Cours obligatoires

						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 (coord.)	30h +22.5h	5 Credits	2q	x	x

⊠ Matériaux composites

⊠ 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

⊠ Mécanique du solide et méthodes numériques

⊠ 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	1q	x	x

⊠ Métallurgie mécanique

⊠ LMECA2860	Welding.	Bruno de Meester de Betzenbroeck	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2420	Complements of physical metallurgy	Pascal Jacques (coord.), Thomas Pardoen	30h+30h	5 Credits	2q ⊘	x	x

OPTION EN BIOMATÉRIAUX ET BIOPROCÉDÉS

L'objectif de cette option est de donner à l'étudiant une ouverture sur les principaux concepts biochimiques et biologiques utiles pour développer des applications dans le domaine des biomatériaux, des biocapteurs et des bioprocédés.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 30 credits parmi

O Cours obligatoires

						Year 1	Year 2
O LBIR1321	Biochemistry II : metabolic pathways and their regulation	Michel Ghislain (coord.), Yvan Larondelle	30h+15h	3 Credits	1q	x	x
O LBIR1220	Biochemistry I	Michel Ghislain, Yvan Larondelle (coord.)	30h+15h	4 Credits	2q	x	x
O LGBIO2030	Biomaterials	Sophie Demoustier, Christine Dupont, Gaëtane Leloup	30h+30h	5 Credits	1q	x	x

⊠ Cours au choix

⊠ LCHM2170	Introduction to protein biotechnology	Pierre Morsomme, Patrice Soumillion	22.5h +7.5h	3 Credits	1q	x	x
⊠ LBIO1321	Molecular genetics	Bernard Hallet	35h+10h	4 Credits	1q	x	x
⊠ LBRMC2101	Genetic engineering	Marc Boutry	30h+7.5h	3 Credits	1q	x	x
⊠ LBIO1335	Immunology	Jean-Paul Dehoux	25h+15h	3 Credits	1q	x	x
⊠ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier, Karine Glinel, Jean-François Gohy, Bernard Nysten	45h+15h	5 Credits	2q	x	x
⊠ LELEC2560	Micro and nanofabrication techniques	Vincent Bayot, Laurent Francis, Benoît Hackens, Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊠ LBIRC2108	Biochemical and Microbial Engineering	Spyridon Agathos	30h +22.5h	5 Credits	2q	x	x
⊠ LFSAB1225	Introduction to biomedical engineering	Philippe Lefèvre	45h	4 Credits	2q	x	x
⊠ LGBIO2020	Bioinstrumentation	André Mouraux, Michel Verleysen	30h+30h	5 Credits	1q	x	x
⊠ LGBIO2070	Artificial organs and rehabilitation	Luc-Marie Jacquet, Philippe Lefèvre, Renaud Ronsse	30h+30h	5 Credits	2q	x	x
⊠ LBIRC2101A	Analyse biochimique et notions de génie génétique: analyse biochimique	Marc Boutry, François Chaumont, Pierre Morsomme	18.5h +22.5h	4 Credits	1q	x	x
⊠ LBIRC2101B	Analyse biochimique et notions de génie génétique: Notions de génie génétique	Marc Boutry, François Chaumont, Pierre Morsomme	18.5h +22.5h	4 Credits	1q	x	x

OPTION EN NANOTECHNOLOGIE

Commune aux masters ingénieur civil électricien, électromécanicien, physicien, en chimie et science des matériaux, cette option a pour objectif d'introduire l'étudiant à la physique et à la simulation des matériaux et des dispositifs utilisés dans le domaine de la micro- et de la nano-électronique, aux propriétés et aux méthodes de fabrication et de caractérisation des micro- et nano-structures, aux modes de fonctionnement des nano-dispositifs, ainsi qu'au développement et à l'intégration d'éléments (bio-) organiques dans les nano-systèmes.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	╪ Two years course

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

De 20 à 30 credits parmi

⊠ Physique des nano-structures et nano-matériaux

Pour participer aux cours proposés dans cette rubrique, il est recommandé d'avoir déjà suivi au préalable un cours de Physique des Matériaux, comme par exemple le cours MAPR 1492. Les cours MAPR 2451 et 2471 ne sont pas accessibles aux étudiants du master ingénieur civil physicien.

						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	Study of materials at the atomic scale	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 (coord.)	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- et micro-dispositifs semi-conducteurs

Pour participer aux cours proposés dans cette rubrique, il est recommandé d'avoir déjà suivi au préalable un cours d'électronique physique ou de dispositifs semiconducteurs, comme par exemple un des cours ELEC 1330 ou 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- et nano-ingénierie

⊠ LELEC2560	Micro and nanofabrication techniques	Vincent Bayot, 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
⊠ LMAPR2631	Solid surface analysis and treatment	Arnaud Delcorte, Bernard Nysten	37.5h +15h	5 Credits	2q	x	x

OPTION EN TECHNOLOGIES PHOTOVOLTAÏQUES

Cette option couvre une thématique de grande importance sociétale et industrielle. Elle est commune aux étudiants des Masters ELEC, KIMA et FYAP. A partir de connaissances de base préalables en électronique physique, l'option vise d'abord la maîtrise du fonctionnement interne des cellules photovoltaïques, et est ensuite une extension par des cours au choix, vers des aspects applicatifs ou de R&D avancée, concernant leur fabrication, les propriétés quantiques ou optiques, les matériaux en couches minces, la connexion au réseau...

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 30 credits parmi

O Cours obligatoire de l'option en technologies photovoltaïques (5 credits)

						Year 1	Year 2
O LELEC2550	Special electronic devices	Vincent Bayot (coord.), Denis Flandre, Laurent Francis, Jean-Pierre Raskin	30h+30h	5 Credits	1q	x	x

O Cours au choix de l'option en technologies photovoltaïques

De 15 à 25 credits parmi

⊠ Orientation cellules solaires

Les étudiants ne peuvent choisir simultanément les cours LELEC 2710 et LMAPR 2015

⊠ LELEC2560	Micro and nanofabrication techniques	Vincent Bayot, Laurent Francis, Benoît Hackens, Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊠ LELEC2710	Nanoelectronics	Vincent Bayot (coord.), Denis Flandre, Laurent Francis, Jean-Pierre Raskin	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2015	Physics of Nanostructures	Jean-Christophe Charlier, Xavier Gonze, Luc Piraux	37.5h +22.5h	5 Credits	1q	x	x
⊠ LPHY2141	Optique et lasers	Alain Cornet	30h+10h	5 Credits	1q	x	x

⊠ Orientation couches minces

⊠ LMAPR2020	Materials Selection	Christian Bailly, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LMAPR2672	Processing of ceramics, powder metallurgy and surface treatments	Jean-Pierre Erauw, Pascal Jacques, Joris Proost	30h+30h	5 Credits	2q ⊕	x	x
⊠ LPHY2246	Basses pressions et physique du vide	Laurent Francis, Benoît Hackens	30h	5 Credits	1q	x	x

⊠ Orientation réseau électrique

⊠ LELEC2595	Power quality	Emmanuel De Jaeger	30h+30h	5 Credits	2q	x	x
⊠ LELEC2670	Renewable and non conventional sources of electrical energy	Emmanuel De Jaeger, Pascal Jacques	30h+15h	4 Credits	2q	x	x

BUSINESS RISKS AND OPPORTUNITIES

Commune à la plupart des masters ingénieur civil, cette option a pour objectif de familiariser l'étudiant avec les principes de base de la gestion des entreprises.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 16 à 20 credits parmi

						Year 1	2
⊠ LFSA2140	Elements of law for industry and research	Fernand De Visscher, Werner Derijcke, Bénédicte Inghels	30h	3 Credits	1q	x	x
⊠ LFSA2230	Introduction to management and to business economics	Benoît Gailly	30h+15h	4 Credits	2q	x	x
⊠ LFSA1290	Introduction to financial and accounting management	Thomas Lambert (compensates Gerrit Sarens), Gerrit Sarens	30h+15h	4 Credits	2q	x	x
⊠ LFSA2202	Ethics and ICT	Maxime Lambrecht, 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	1q	x	x

⊠ Alternative to the "Business risks and opportunities" for computer science students

Computer science students who have already followed various courses of this discipline during their Bachelor's curriculum can select between 16 and 20 credits in the program "mineure en gestion pour les sciences informatiques" http://www.uclouvain.be/xprog-2013-min-lgesc100i

OPTION EN CRÉATION DE PETITES ET MOYENNES ENTREPRISES

Commune à la plupart des masters ingénieur civil, cette option a pour objectif de familiariser l'étudiant ingénieur civil avec les spécificités des P.M.E., de l'entreprenariat et de la création afin de développer chez lui les aptitudes, connaissances et outils nécessaires à la création d'entreprise. L'accès en est réservé uniquement à un nombre restreint d'étudiants sélectionnés sur base d'un dossier de motivation et d'interviews individuelles.

Les dossiers de motivation pour cette filière doivent être introduits avant la rentrée académique de Master1 auprès du :

Secrétariat CPME – Place des Doyens 1

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

Les étudiants sélectionnés remplaceront le mémoire prévu dans le tronc commun par un mémoire spécifique en création d'entreprise (nombre de crédits inchangé).

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

De 20 à 25 credits parmi

O Compulsory courses

						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	30h+15h	5 Credits	1q	x	x
O LCPME2004	Advanced seminar on Enterpreneurship (in French)	Frank Janssen	30h+15h	5 Credits	2q	x	x

⊠ Prerequisite CPME course

Students who have not taken a management course within their former curriculum shall include LCPME2000 in their current curriculum.

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

COURS AU CHOIX

L'étudiant complète son programme par des cours au choix. Ceux-ci sont sélectionnés librement parmi les programmes de sciences exactes ou médicales de l'UCL ou de la FTW/KULeuven, moyennant l'accord d'un conseiller membre de la commission de programmes en chimie et physique appliquées (FYKI). En particulier, les cours apparaissant dans les options du master ingénieur civil en chimie et science des matériaux sont aussi accessibles à titre de cours au choix. L'attention des étudiants est également particulièrement attirée sur les cours des masters ingénieur civil physicien, électricien, mécanicien ou en génie biomédical.

O Mandatory	⊠ Optional
△ Courses not taught during 2014-2015	⊘ Periodic courses not taught during 2014-2015
⊕ Periodic courses taught during 2014-2015	⧺ Two years course

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

						Year 1	Year 2
⊠ 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

⊠ Company training periods (10 credits)

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 LFSA 2996 course.
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.

⊠ LFSA2995	Company Internship	Claude Oestges	30h	10 Credits		x	x
⊠ LFSA2996	Company Internship	N.		5 Credits		x	x

⊠ Sciences humaines

L'étudiant peut choisir jusqu'à 6 crédits, à l'exception des étudiants ayant choisi une option en gestion ou en création des petites et moyennes entreprises.

⊠ Langues

L'étudiant peut choisir jusqu'à 3 crédits, à l'exception des étudiants ayant choisi une option en gestion ou en création des petites et moyennes entreprises.

⊠ Autres cours

L'étudiant sélectionne librement des cours parmi les programmes de sciences exactes ou médicales de l'UCL ou de la FTW/KULeuven. Les cours apparaissant dans les options de leur programme de master sont aussi accessibles à titre de cours au choix. L'attention des étudiants est également attirée sur les cours des masters ingénieur civil physicien, en chimie et science des matériaux, électricien, mécanicien ou en génie biomédical, et de la mineure en génie biomédical.

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	A student with no major nor minor in applied chemistry and physics, nor any option deemed equivalent, as well as any student with no major in applied chemistry and physics, nor any option deemed equivalent, but with a minor in applied chemistry and physics, or any option deemed equivalent shall submit an application to the Applied chemistry and physics diploma committee) (FYKI),,including a detailed past curriculum (courses and grades by year. The committee will propose a customized curriculum by drawing on the volume of elective courses of the KIMA curriculum.
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	A student who is not a bachelor in engineering, but with a minor in applied chemistry and physics, shall submit an application to the Faculty of applied sciences, including a detailed past curriculum (courses and grades by year). The Faculty, after consulting the Applied chemistry and physics diploma committee, will decide as to the applicant's admissibility; an admitted student is, il shall complete the workload by adding to the 120 credits of the basic

			curriculum, the following extra 10 prerequisirte credits, unless proof can be given of prior equivalent courses, or in agreement with an advisor who is a member of the Applied chemistry and physics diploma committee : FSAB 1106 Applied mathematics:signals and systems [5 credits];ELEC 1755 Advanced topics in electricity [5 credits]
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	A student with no former opton in applied chemistry and physics shall submit an application to the Applied physics diploma committee, including a detailed past curriculum (courses and grades by year). The committee will propose a customized curriculum by drawing on the volume of elective courses of the applied physics curriculum, and imposing, if necessary, up to 15 additional 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	A student who is not a bachelor in engineering, but with a minor in applied chemistry and physics, shall submit an application to the Faculty of applied sciences, including a detailed past curriculum (courses and grades by year). The Faculty, after consulting the Applied chemistry and physics diploma committee, will decide as to the applicant's admissibility; an admitted student is, il shall complete the workload by adding to the 120 credits of the basic curriculum, the following extra 10 prerequisirte credits, unless proof can be given of prior equivalent courses, or in agreement with an advisor who is a member of the Applied chemistry and physics diploma committee : FSAB 1106 Applied mathematics:signals and systems [5 credits]; ELEC 1755 Advanced topics in electricity [5 credits]
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	A student with no former opton in applied chemistry and physics shall submit an application to the Applied physics diploma committee, including a detailed past curriculum (courses and grades by year). The committee will propose a customized

			curriculum by drawing on the volume of elective courses of the applied physics curriculum, and imposing, if necessary, up to 15 additional 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	A student who is not a bachelor in engineering, but with a minor in applied chemistry and physics, shall submit an application to the Faculty of applied sciences, including a detailed past curriculum (courses and grades by year). The Faculty, after consulting the Applied chemistry and physics diploma committee, will decide as to the applicant's admissibility; an admitted student is, il shall complete the workload by adding to the 120 credits of the basic curriculum, the following extra 10 prerequisirte credits, unless proof can be given of prior equivalent courses, or in agreement with an advisor who is a member of the Applied chemistry and physics diploma committee : FSAB 1106 Applied mathematics: signals and systems [5 credits]; ELEC 1755 Advanced topics in electricity [5 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	The student shall submit an application to the Faculty of applied sciences, including a detailed past curriculum (courses and grades by year). The Faculty, after consulting the relevant programme committee, will decide as to the applicant's admissibility pursuant to rules relative to links between degrees. If necessary the Faculty can propose a customized curriculum, by drawing on the volume of elective courses of the relevant engineering Master's curriculum and, if necessary, up to 15 additional credits.

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Non university Bachelors

Diploma	Access	Remarks
> Find out more about links to the university		
> BA en sciences industrielles - type long	Accès au master moyennant réussite d'une année préparatoire de max. 60 crédits	Type long

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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	

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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

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Adults taking up their university training

> See the website Valorisation des acquis de l'expérience

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

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Personalized access

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

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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.

Teaching method

. Features favouring interdisciplinarity :

The Master's in chemistry and materials science is intrinsically intedisciplinary, since it is located at the interface between chemistry and physics. It features a comprehensive base allowing the student to acquire the basics of the main application fields of applied chemistry and physics, a training through practice and cutting edge research, and various options in each field of chemistry and materials technology : polymers and macromolecules, inorganic materials and processes, mechanics of materials, chemical engineering, nanotechnology, optics, and environment and sustainable development. An integration of biotechnologies is ensured via the option in bio-materials et bio-processes, whereas management is included via options in management and the launching of small and medium-sized companies. The curriculum features a significant number of PHYS (or PHY), CHIM (or CHM), BIOL, INIS, INMA, MECA, ELEC, AMCO, BRNA and BIR courses, which testifies as to the determination to be trans-disciplinary . What's more, the curriculum permits to chooses up to 40 elective credits from amongst the UCL exact or medical sciences curricula, and up to 6 credits in the humanities, which allows a student to customize a curriculum depending on personal choices.

. Variety of teaching situations :

The pedagogy implemented in the engineering Master's curriculum is aligned with that of the engineering Bachelor's curriculum: active learning, a balanced mix of group and individual work, and substantial time devoted to the development of non-technical competencies. A salient feature of the curriculum is the immersion of students in the research laboratories of the various instructors (during teaching laboratory sessions, case studies, projects and final thesis), which allows them to become familiar with up-to-date methods in the related fields, and to learn through the questioning approach which is inherent to research. An optional 10-credit training period, to be performed for at least 2 months in a research centre or a company, will allow a motivated student to experience a professional environment.

. Variety of learning situations :

The student will encounter a variety of pedagogical tools tailored to the various disciplines : formal lectures, individual projects in small groups, tutorials, project-based learning, case studies, experimental laboratory work, computer simulations, teachware, industrial or research training, visits to industries, individual and group work, seminars given by outside scientists, etc.

This variety of situations will help students to build their knowledge in an iterative and progressive manner, while developing their autonomy, organizational skills, time management, and capacity to use various modes of communication, etc.

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".

All learning activities are assessed as prescribed by the University internal regulations (see exam regulations), viz. written and oral exams, laboratory exams, individual or group work, public presentation of projects and final thesis.

Detailement assessment rules will be made clear by each individual instructor, at the first lecture.

Mobility and/or Internationalisation outlook

Global framework

The Faculty of Applied Sciences has taken part, since their inception, in all the various mobility programmes which have been set up at both the European and world levels.

The numerous contacts it has with professional circles, notably via its Advisory Board, have demonstrated to what extent employers are favourably impressed by a mobility experience in someone's CV. The ever-increasing internationalization of research via networks linking laboratories throughout the world, speaks in favour of encouraging this mobility.

Students' interest is aroused at the end of their Bachelor studies, notably via intensive courses such as those of the ATHENS ( ) or BEST ( ) networks.

In the course of the two-year Master's programme, students are encouraged to take part in a 1- or 2-semester exchange scheme

Within Belgium, the Faculty of Applied Sciences is involved in a privileged partnership with the Faculteit Ingenieurswetenschappen of the Katholieke Universiteit Leuven, with whom it has set up an exchange scheme relating to the first year of the Master's curriculum (https://eng.kuleuven.be/).

At the European level, the Faculty of Applied Sciences is strongly involved in the CLUSTER excellence network ( ). This network encourages internal mobility, since this is a guarantee of quality as concerns both the level of teaching and the hosting of exchange students. Moreover, Cluster partners have signed an agreement recognizing each other's Bachelor's curricula. This agreement stipulates that all Bachelors of network institutions will have access to the Master's studies in any institution on a par with local students.

Outside Europe, the Faculty of Applied Sciences is a partner in the Magalhaes network, which groups about fifteen European universities together with the best South American science and technology universities (https://www.magalhaes-network.net/).

Besides these network partnerships, the Faculty has also signed a number of individual agreements with various universities in Europe, North America or elsewhere in the world. A list of these agreements may be found on the website of UCL International Relations (https://www.uclouvain.be/international.html).

UCL is also a partner in the TIME programme ( ) which gives students the opportunity to obtain two engineeering degrees, via a specifically tailored curriculum.

Specific features of the KIMA Master's:

The Master's in chemistry and materials science engineering features two international openings, allowing a student to very easily pursue studies abroad, while ensuring a high-quality curriculum in chemistry and materials science. The integration of the Master's into these international programmes requires that some courses be taught in English. This is why, the default situation is that all first semester MAPR courses are taught in English, unless all attendees decide otherwise at the outset, out of respect for non-French speaking participants. However, all second semester MAPR courses are taught in French, unless all attendees decide otherwise at the outset.

Within the first international opening, organized by the European FAME excellence network, the student will choose a first year of Master studies in materials science either at the University of Augsburg, or at the Institut National Polytechnique de Grenoble (all courses taught in English). The student may apply for an Erasmus grant to finance mobility during that first year. It will then be back to UCL for the second year, with the possiblity of carrying out part of the final thesis at one of the partner universities (Augsburg, Grenoble, Bordeaux, Darmstadt, Aveiro, Liège, UCL). After successful completion of the curriculum, the student will be awarded a degree in chemical and materials science engineering from UCL, and also a "Master 2R Science et Génie des Matériaux" (Grenoble) or "Master in Advanced Materials Science" (Augsburg), grouped under the common title "International Master in Functional Advanced Materials and Engineering". Additional information may be found on https://www.fame-master.com/

As for the second international opening, the student will complete the last year within the framework of the European Master's in Rheology. This training comprises compulsory courses as well as group activities, on the campus of the coordinating university (Minho, Portugal) and advanced elective courses on a remote basis. The final thesis will be conducted at one of the partner universities . After successful completion of the curriculum, the student will be awarded a KIMA Master's degree from UCL, and also a European diploma in Rheology.

• International possibilities (for UCL students)

Besides intensive courses which are one component of international relations, EPL students with outstanding results are encouraged to apply for 5- or 10-month exchange programmes.

When taking place during the first Master's year, exchanges are generally 10 months long. In the second year, they only last for a semester, either as courses or else research in a foreign laboratory as a complement to the final thesis.

Some other more specific exchange programmes have been set up with South America, where the academic year is naturally on an "austral" basis.

Students are informed about the various exchange programmes as from their second Bachelor's year. They are encouraged to prepare for their exchange in a timely manner, notably by taking language courses at the Modern Languages Institute of UCL.

• International appeal (for non-résidents)

As described below, the University of Louvain (UCL) has developed a long-standing experience of greeting foreign students within the framework of international or exchange programmes. The "Master in Chemical and Materials Engineering" fits within this general tradition, and offers the student a top-notch programme in Chemical Engineering and Materials Science, encompassing a wide field of scientific activities in Applied Physics and Chemistry. Admission requires approval by the Committee for Engineering Studies in Chemistry and Physics, on the basis of a comprehensive résumé submitted by the student pursuant to the general regulations of the University of Louvain published on www.uclouvain.be.

To facilitate the integration of foreign students, courses are given in English during the first and third semesters of the Master's (this rule may be relaxed for some courses at the onset of the semester, if so decided by ALL participating students). This allows non-French-speaking students to begin their Master's studies under the best conditions, while upgrading their knowledge of French by following French-as-a-Foreign-Language classes (see below) or by immersion into the student life of Louvain-la-Neuve. However, the courses of the second and fourth semesters are given in French (unless decided otherwise by all participating students), which provides foreign students with a unique opportunity to master French, one of the important official languages of the European Union.

The curriculum consists of a large number of elective courses which allow students to set up a customized programme based on their previous learning experience, and comprises an optional traineeship in industry, 30 credits of work in research laboratories, and projects giving a more practical bent to the training. The instructors of the Master's in Chemical and Materials Science Engineering are recognized scientists, with track records of excellence in applied chemistry and physics, as testified by their integration into European networks of excellence (FAME, NANOBEAMS, NANOQUANTA), their participation in international research programmes, their numerous contracts with European industrial companies, and their large number of publications in high ranking scientific journals including Nature, Science, Nature Materials, Physical Review Letters, Journal of the American Chemical Society, Nano Letters, etc. This not only ensures that the most recent scientific advances in the fields of chemistry and physics are passed on to the students, but also that students are introduced to typical industrial concerns, issues and recent developments.

The programme can also be taken as part of the International Master's in Functional Advanced Materials and Engineering which is currently being considered for support within the Erasmus Mundus frame. In addition, the final year of the Master's may be super-imposed on the second year of the European Master's in Rheology. Ask for updated information on these possibilities from the person in charge of the programme at Louvain.

Services offered by the University to foreign students

About 1000 European and third-country students are welcomed each year in Louvain-la-Neuve, amounting to almost 19% of Louvain's students. A series of administrative units from Schools and University Central Services are responsible for foreign students. These units benefit from support from the International Relations Office (Administration des relations internationales, ADRI) for the follow-up of application files and for grant management. The University web site provides answers to frequently asked questions about housing, admission, rules, curricula and names of responsible officers or Faculty members.

Arriving visiting students may obtain useful information by reading the "Guide for the visiting exchange student" published on the web site of ADRI (https://www.uclouvain.be/en-etudiantinternational.html). This comprehensive guide, which is regularly updated and available in French and English, provides information on practical issues such as housing, language courses, admission and registration, student assistance, cost of living, student clubs, health insurance, University structure, etc. In addition, the registration service of UCL sends to registered students, well before their arrival in Belgium, all the paperwork needed to obtain a visa, apply for housing, and solve specific legal issues.

Once arrived in Belgium, and upon final registration, students also receive a copy of the "Guide pratique de l'étudiant", which lists useful addresses and links for residents of Louvain-la-Neuve. Finally, the Student Assistance Service provides help to students in need of social, medical, financial or cultural assistance.

The campus of Louvain-la-Neuve benefits from numerous extra-curricular activities organized by student societies. Some students elect to live in community apartments (or "community-kots") devoted to the development of specific projects (in culture, sports, politics, etc.). A few of these "community-kots" are dedicated to helping foreign students to socialize in Louvain-la-Neuve. Furthermore, disabled persons benefit from special support from the University and specialized "community-kots", and the whole campus is wheelchair-friendly.

Numerous computer rooms and libraries are available to registered students. Free language classes are provided by the ILV (Institut des Langues Vivantes) during the course semesters; alternatively, students may pay to access language classes organized during the course semesters or holiday periods by the independent CLL (Centre de langues de Louvain-la-Neuve). Fee reductions are available for Erasmus Mundus students. A few "community-kots" also propose language support and discussion panels. Finally, classes of French as a Foreign Language (FFL) are organized by the ILV and are freely accessible to students who take these classes as part of their curriculum.

• Partner programmes

- With European institutions

International Master ‘s in "Functional Advanced Materials and Engineering" (FAME) (120 credits)

One of the openings of Master’s in Chemical and Materials Science engineering is the International Master ‘s in "Functional Advanced Materials and Engineering", set up by seven partner universities within the framework of the FAME European excellence network, which was awarded the Erasmus Mundus label by the European Commission. Our wish is that the Authorities of UCL also award the label of UCL international Master’s. Students making this choics will perform their first year of Master studies either at the University of Augsburg, or at the Institut National Polytechnique de Grenoble, and will then return to UCL for their second year. The final thesis will be carried out in collaboration with Louvain at one of the seven partner universities. Registration for this Master’s is detailed in the appended Erasmus Mundus project. It is coordinated by INPG, and entails a slightly higher fee (1000 €/an).

- TIME programme with :

- Ecole Centrale Paris
- Supaero Toulouse
- Universidad Politecnica de Madrid
- Politecnico di Milano
- Politecnico di Torino

-The EPL has also signed a specific convention with the Institut Français du Pétrole (https://www.ifp.fr/) which allows the possibility of combining the second Master’s year with the first year of the complementary programme at IFP.

Possible trainings at the end of the programme

Accessible complementary Master’s degrees: Master’s degrees in nanotechnology, polymers, nuclear engineering, biotechnology and applied biology, once they have been set up, will be natural extensions of the curriculum.

Accessible Ph. D. curricula : by virtue of its training towards and via research, the Master’s in chemical and materials science engineering gives its students an excellent preparation towards Ph. D. studies. Instructors involved in the Master’s are members of the CHIM ("molecular, supramolecular and functional chemistry ") and MAIN ("materials, interfaces and nanotechnology"), doctoral schools, which are there to welcome students who wish to further their studies via a Ph. D.

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