FYAP2M

2015 - 2016

Master [120] in Physical 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 : **NO**
Main study domain : **Sciences de l'ingénieur et technologie**
Organized by: **Ecole Polytechnique de Louvain (EPL)**
Programme code: **fyap2m** - Francophone Certification Framework: 7

Table of contents

FYAP2M - Introduction

Introduction

Introduction

The Master's degree programme in Physical Engineering is multidisciplinary due to the in-depth study of various fields pertaining to physics and a wide range of industrial professions and specialisations as well as research based on advanced technologies.

This Master's degree programme is founded on:

- Formal concepts associated with the field
- The use numerical simulation tools
- Experiments based on practical work

Your profile

You

- Have solid knowledge of physics and mathematics;
- Seek a programme that focuses on current technological and scientific issues and the national and international job market
- Want to participle in the design of high tech products: optics, thin strata, magnetic devices, transducers, sensors, nuclear tools, quantum physics, electronic materials, systems based on the interaction of radiation materials or objects produced from nanotechnologies

Your future job

Civil engineers are present in all industrial sectors: the chemical industry, pharmaceuticals and food production, electronics and telecommunication industry, energy, metallurgy, aeronautics, design and civil engineering, large scale distribution, banking or consulting services, nanotechnologies and medical technology, etc.

They play a role as researchers and developers overseeing production or management and holding positions in marketing and sales (of high tech products).

We find them in finance departments, information technology fields, quality control, the public sector, higher education and the Ministry of equipment and transport (www.fabi.be)

Your programme

This Master's degree offers:

- Solid training applied physics
- An interdisciplinary approach at the interface between physics and material sciences
- Experience in laboratories and with research projects
- Exposure to the industrial sector: factory visits, internships, projects carried out in companies
- The opportunity to complete coursework abroad

This Master's degree programme consists of compulsory classes that aim to round out basic knowledge as well as a large selection of elective courses grouped into five majors that may potentially be completed by classes taken at UCL.

FYAP2M - Teaching profile

Learning outcomes

Physical engineers master the physical aspects of how objects function and their interaction with the environment (waves, light, ions, electric and magnetic fields, temperature gradients). Physical engineers have dual training in experiments and simulation. They are capable of using theories and formal representations of objects thanks to numerical simulation tools. They are also capable of carrying out laboratory-based experiments. Their comprehensive understanding of physical properties allows them to make the connection between properties on an atomic scale with those that are macroscopic.

Due to the in-depth study of different fields of physics (material physics, optics, electromagnetics, electronics, mechanics, quantum physics, etc.), the Master's degree programme in physical engineering (FYAP) prepares students for numerous jobs and specialisations in the industrial sector as well as participation in research-based technological activities.

Physical engineers are called on to resolve technological problems that are often complex and multidisciplinary in nature, linked to the design and creation of materials, devices and systems. They can act as an interface between different professions that use functional materials. They are called on to innovate in a specific technological environment.

Physical engineers systematically take into account constraints, values, rules (both legal and ethical) and economics. Their solid scientific background allows them to be autonomous enough to manage complex industrial projects. They are comfortable working as part of a team and communicating effectively even in English.

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

1.Demonstrating their mastery of a solid body of knowledge in basic engineering sciences allowing them to understand and solve problems related to technological and industrial applications in the physical sciences.

1.1 Identify and use concepts, laws, and appropriate reasoning to solve a given problem (for example, identifying laws and materials to go from LED to white light; designing energy convertors based on thermoelectric elements; creating materials and devices to store and/or transfer information; designing photovoltaic panels with optimal output.)

1.2 Identify and use appropriate modelling and calculation tools to solve problems.

1.3 Verify solutions to a given problem.

2.Organise and carry out an engineering process in a high-tech field that requires the use of fundamental tools and concepts in order to solve a particular problem.

2.1 Analyse a problem and formulate a specifications note.

2.2. Model the problem and design one or more original technical solutions in response to the specifications note (for example, the optimisation and/or combination of materials for thermal insulation), develop measures for electrical and thermal classification of a given material, choose materials for light emission (LEDs) or the creation of photovoltaic panels.

2.3 Evaluate and classify solutions in terms of all the figures in specifications notes: efficiency, feasibility, quality, ergonomics, and security in the professional environment.

2.4 Implement and test a solution through a mock-up or a prototype and/or a numerical model.

2.5 Make recommendations to improve the operational character of a solution under consideration.

3.Organise and carry out a research project to understand a new technological or industrial problem in different areas of applied physics or high tech engineering.

3.1 Document and summarize the existing body of knowledge.

3.2 Suggest a model and/or an experimental device allowing for the simulation and testing of hypotheses related to the phenomenon being studied.

3.3. Write a summary report explaining the potentialities of the theoretical and/or technical innovation 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.

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, for example the division of labour among students.

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 (whether they be about technical solutions or the division of labour).

5.Communicate effectively (speaking or writing in French or a foreign language) with the goal of carrying out assigned projects.

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 (for example, select the best-suited equipment for the material concerned, select the best material according to the desired functionalities and systems integration).

5.2 Present your arguments and convince your interlocutors (technicians, colleagues, clients, superiors) of your technological choices by adopting their language.

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

5.4 Read and analyse different technical documents, plans, specification notes: progress of physical properties in function of materials, temperature, mechanical limits or external fields, phase diagrams, band structures, etc.

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 and critical and ethical awareness in your work: using the technological and scientific innovations at your disposal validate the socio-technical relevance of a hypothesis or a solution.

6.1 Rigorously apply the field's standards (terms, units of measure, quality standards and security).

6.2 Find solutions that go beyond strictly technical issues by considering sustainable development and the socio-economic ethics of a project (for example, "life cycle anaylsis").

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 through the graduation project as either a critical analysis of manufacturing and classification techniques or a discussion of research perspectives and development as part of a Master's thesis).

6.4 Evaluate oneself and independently develop necessary skills for "lifelong learning" (this skill is mainly developed as part of class projects requiring bibliographic research).

Programme structure

The student's programme includes:

- A common core curriculum (30 credits)
- A final specialisation (30 credits)
- One of more of the major courses or elective courses listed below.

The graduation project is normally completed in the second year. However, students may, depending on the nature of their project, choose to take their classes in the first or second year so long as their course prerequisites allow it. This is particularly the case for students completing part of their program 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 master of physical engineering *[en-prog-2015-fyap2m-lfyap220t.html]*

> Professional focus *[en-prog-2015-fyap2m-lfyap200s]*

Options courses

> Major in Advanced Physics *[en-prog-2015-fyap2m-lfyap221o.html]*
> Major in numerical simulation of material *[en-prog-2015-fyap2m-lfyap220o.html]*
> Major in nanotechnology *[en-prog-2015-fyap2m-lfyap225o.html]*
> Major in photovoltaic technologies *[en-prog-2015-fyap2m-lfyap229o.html]*
> Major in small and medium sized business creation *[en-prog-2015-fyap2m-lfyap226o.html]*
> Major in Business risks and opportunities *[en-prog-2015-fyap2m-lfyap227o.html]*
> Elective courses *[en-prog-2015-fyap2m-lfyap228o.html]*

FYAP2M Detailled programme

Programme by subject

CORE COURSES [45.0]

- 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...)

LECLE 1755 is not compulsory unless it was not taken in the 1st cycle.

						Year 1	Year 2
O LFYAP2990	Graduation project/End of studies project	N.		28 Credits			x
O LELEC1755	ELECTRICITY : ADVANCED TOPICS	Denis Flandre, Danielle Janvier, Claude Oestges	30h+30h	5 Credits	1q	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	Year 2
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 LMAPR2451	Atomistic and nanoscopic simulations	Jean-Christophe Charlier, Xavier Gonze, Gian-Marco Rignanese	30h+30h	5 Credits	2q	x	
O LMAPR2471	Transport phenomena in solids and nanostructures	Jean-Christophe Charlier, Luc Piraux	30h+30h	5 Credits	2q	x	
O LMAPR2481	Deformation and fracture of materials	Thomas Pardoen	30h+30h	5 Credits	1q	x	x
O LPHY2141	Optique et lasers	Alain Cornet, Clément Lauzin	30h+10h	5 Credits	1q	x	x

OPTIONS

The student may select

> Major in Advanced Physics *[en-prog-2015-fyap2m-lfyap221o]*
> Major in numerical simulation of material *[en-prog-2015-fyap2m-lfyap220o]*
> Major in nanotechnology *[en-prog-2015-fyap2m-lfyap225o]*
> Major in photovoltaic technologies *[en-prog-2015-fyap2m-lfyap229o]*
> Major in small and medium sized business creation *[en-prog-2015-fyap2m-lfyap226o]*
> Major in Business risks and opportunities *[en-prog-2015-fyap2m-lfyap227o]*
> Elective courses *[en-prog-2015-fyap2m-lfyap228o]*

MAJOR IN ADVANCED PHYSICS

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...)

Students enrolled in this major may select
De 20 à 30 credits parmi

⊠ Fundamental concepts of physics

						Year 1	Year 2
⊠ LPHY1223	Special Relativity	Jean-Marc Gérard	22.5h +15h	4 Credits	1q	x	x
⊠ LPHY1331	Elementary nuclei and particules	Vincent Lemaitre	30h +22.5h	4 Credits	2q	x	x
⊠ LPHY2120	Quantum Field Theory	Jean-Marc Gérard	22.5h	4 Credits	1q	x	x

⊠ Experimental methods

⊠ LELEC2811	Instrumentation and sensors	David Bol, Laurent Francis	30h+30h	5 Credits	1q	x	x
⊠ LPHY2245	Lasers and applications	Alain Cornet, Clément Lauzin	45h+15h	6 Credits	2q	x	x
⊠ LPHY2372	Experimental methods	Krzysztof Piotrzkowski, Xavier Urbain	30h+15h	4 Credits	1q	x	x
⊠ LPHY2273	Cryophysique et questions spéciales de supraconductivité	Vincent Bayot, Luc Piraux	45h+15h	6 Credits	1q	x	x

⊠ Advanced materials

⊠ LMAPR2010	Polymer Materials	Christian Bailly, Bernard Nysten	45h+15h	5 Credits	1q	x	x
⊠ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier, Karine Glinel, Jean-François Gohy, Bernard Nysten	45h+15h	5 Credits	2q	x	x
⊠ LMAPR2013	Physical Chemistry for Metals and Ceramics	Pascal Jacques	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2631	Surface Analysis	Arnaud Delcorte, Bernard Nysten	30h+15h	5 Credits	2q	x	x
⊠ LMAPR2642	Characterisation of Inorganic Materials	Pascal Jacques	30h+30h	5 Credits	1q	x	x

Optics and photonics

					Year 1	Year 2
LPHY2140	Photons, atoms and molecules	André Nauts, Xavier Urbain	30h	5 Credits	1q	x	x
LPHY2242	Méthodes d'analyse en physique atomique et moléculaire	Xavier Urbain	30h	5 Credits	2q	x	x

MAJOR IN NUMERICAL SIMULATION OF MATERIAL

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...)

Students enrolled in this major may select
De 20 à 30 credits parmi

						Year 1	Year 2
⊠ LMAPR2482	Plasticity and metal forming	Laurent Delannay, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LMECA1120	Introduction to finite element methods.	Vincent Legat	30h+30h	5 Credits	2q	x	x
⊠ LMECA2300	Advanced Numerical Methods	Philippe Chatelain, Christophe Craeye, Vincent Legat, Jean-François Remacle	30h+30h	5 Credits	2q	x	x
⊠ LPHY2371	Numerical Simulation in Physics	Michel Crucifix, Bernard Piraux	22.5h +37.5h	5 Credits	1q	x	x
⊠ LINMA1170	Numerical analysis	Paul Van Dooren	30h +22.5h	5 Credits	1q	x	x
⊠ LINMA1702	Applied mathematics : Optimization I	François Glineur	30h +22.5h	5 Credits	2q	x	x

MAJOR IN NANOTECHNOLOGY

As with the Master's degree programmes in electrical, electromechanical, physical, chemical and material sciences, the objective of this major is to introduce students to physics and the simulation of materials and devices used in the field of micro and nano-electronics, to the properties and methods associated with the manufacturing and classification of micro and nano-structures; to the ways in which nano-devices function as well as the development and integration of organic elements into 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 registered in this option chooses
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 PHOTOVOLTAIC TECHNOLOGIES

This major covers a range of subjects of great societal and industrial importance, which it shares with Master's degree programmes in ELEC, KIMA and FYAP. This major provides basic prerequisite knowledge of electronic physics. It also focuses on the internal functioning of photovoltaic cells and (through elective courses) their application in advanced R& D, their production, quantum or optical properties, thin strata materials, network connections, 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...)

O Compulsory courses Photovoltaic technologies (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 Elective courses in photovoltaic technologies

15-25 credits from among:
De 15 à 25 credits parmi

⊠ Solar cells

Students can not take LELEC2710 and LMAPR2015 and the same time

⊠ LELEC2560	Micro and Nanofabrication Techniques	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, Clément Lauzin	30h+10h	5 Credits	1q	x	x

⊠ Thin strata

⊠ LMAPR2020	Materials Selection	Christian Bailly, Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LMAPR2672	Sintered materials and surface treatments	Jean-Pierre Erauw, Pascal Jacques, Joris Proost	30h+30h	5 Credits	2q ⊘	x	x
⊠ LPHY2246	Basses pressions et physique du vide	Benoît Hackens, Sorin Melinte	30h	5 Credits	1q	x	x

⊠ Electrical network

⊠ 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

MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

In keeping with most of the Masters' degrees in civil engineering, the goal of this major is to familiarise the civil engineering student with the specifics of small and medium sized businesses, entrepreneurship, and business development in order to develop the necessary abilities, knowledge and tools to create a business. This major is reserved for a small number of students 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
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 civil engineering Master's degree programmes, the objective of this major is to familiarise the student with the basic principles of business management.

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

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

This major may not be combined with the major in Small and medium sized business creation. Students may select
De 16 à 20 credits parmi

						Year 1	2
⊠ LFSA2140	Elements of law for industry and research	Fernand De Visscher, Werner Derijcke, Bénédicte Inghels	30h	3 Credits	1q	x	x
⊠ LFSA2230	Introduction to management and to business economics	Benoît Gailly	30h+15h	4 Credits	2q	x	x
⊠ LFSA1290	Introduction to financial and accounting management	André Nsabimana (compensates Gerrit Sarens), Gerrit Sarens	30h+15h	4 Credits	2q	x	x
⊠ LFSA2202	Ethics and ICT	Axel Gosseries, Olivier Pereira	30h	3 Credits	2q	x	x
⊠ LFSA2245	Environment and business	Thierry Bréchet	30h	3 Credits	1q	x	x
⊠ LFSA2210	Organisation and human resources	John Cultiaux	30h	3 Credits	2q	x	x

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

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

ELECTIVE COURSES

Students may round out their programme with elective courses so long as they have been approved by a member of the programme commission in applied chemistry and physics (FYKI).

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-fyap2m.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.

FYAP2M - 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 (FYKI), 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 FYAP 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.

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University Bachelors

Diploma	Special Requirements	Access	Remarks
UCL Bachelors			
Bachelor in engineering [180.0]	Major or minor in applied chemistry and physics	Direct access	
Bachelor in engineering [180.0]	Major or minor in applied chemistry and physics	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 commission will then suggest a programme in keeping with the student's previous course of study with the possible addition of a maximum of 15 supplemental credits.
Bachelor in chemical sciences [180.0] Bachelier in physics [180.0] Bachelier in mathematics [180.0] Bachelier en biology [180.0] Bachelier in geography, main stream [180.0] Bachelier in bioengineering [180.0]		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 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 engineering	With specific options in former institution related to applied chemistry and physics	Direct access	
Bachelor in engineering		Access with additional training	Students who have no specialisation in chemical and materials engineering must submit a written application to the programme 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) 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 engineering	Bachelors from the Cluster network	Direct access	Conditions imposed on UCL Engineering Bachelor

Bachelor in engineering	Other institutions	Access with additional training	Students will submit a written application for admission to EPL in which they list their detailed course curriculum (list of course work and marks year by year). The jury will determine whether the candidate may be admitted according to the regulations. Where necessary the jury may suggest a programme in keeping with the student's previous course of study with the possible addition of a maximum of 15 supplemental credits.

Non university Bachelors

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

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
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 (FYKI), 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 FYAP 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

Methods that promote multidisciplinary studies

The Master's degree programme in physical engineering is interdisciplinary because acts as an interface between physics and materials science. Its versatile foundation exposes students to the wide scope of applied physics from practical training and cutting edge research to majors in the main branches of physics and materials science: nano-technologies, materials science, photovoltaics, fundamental and applied physics and light-matter interaction. Students also have the possibility of studying management thanks to majors in management and small and medium sized business creation. The programme includes a significant portion of the classes with the PHYS (or PHY) designation as well as MATH, INMA and MECA classes, which is evidence of the programme's multidisciplinary nature. Finally students are allowed to select up to 40 credits of elective courses offered as part of the programmes in natural sciences or medicine at UCL and up to 6 credits of courses in human sciences, which allows for tailor made course schedules.

Various teaching strategies

The pedagogy used in the Master's degree programme in physical engineering is consistent with that of 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. A major characteristic of the programme is the immersion of students in professors' research laboratories (and at times teaching laboratories, case studies, projects, theses) that expose students to advanced methods used in the discipline and allows them to learning by questioning, a process inherent in the research process. An optional 9-week internship of 10 credits (or 5 credits if completed alongside a thesis) places students at the centre of research and allows them to develop their skills through their contact with the professional world.

Diverse learning situations

Students will be exposed to varied pedagogical methods: lectures, projects, exercise tutorials, problem-solving sessions, case studies, experimental laboratories, computer simulations, internships in industry or research, graduation projects, group work, individual work, conferences given by outside researchers, exposure to cutting edge research, etc. This variety of teaching techniques allows students to learn in an iterative and progressive manner all the while developing their autonomy as well as their organisational, time management and communication skills.

Evaluation

The evaluation methods comply with the regulations concerning studies and exams. More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

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

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. Professors provide details about evaluation methods used in their courses at the beginning of each semester.

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

To obtain a passing grade, the marks received for the teaching units are offset by their respective credits.

Mobility and/or Internationalisation outlook

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

Possible trainings at the end of the programme

Master's degree programmes

The Master's degree programme in nanotechnology and the Master's degree in nuclear engineering are natural continuations of the M.A. in physical engineering.

Doctoral degree programmes

The Master's degree programme in physical engineering prepares students for doctoral programmes. The programme's professors are members of the MAIN ("Materials, Interfaces and Nanotechnology) doctoral programme and interested students are welcome to pursue a doctoral degree.

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 : Vinciane Gandibleux (Tel: 010 47 96 23)