UCLouvain

FYAP2M

2019 - 2020

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 acronym: **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 profil

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 futur 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-2019-fyap2m-lfyap220t.html]*

> Professional Focus *[en-prog-2019-fyap2m-lfyap200s]*

Options courses

> Majors for the Master's degree in physics *[en-prog-2019-fyap2m-lfyap103g.html]*
> > Major in Advanced Engineering Physics *[en-prog-2019-fyap2m-lfyap221o.html]*
> > Major in nanotechnology *[en-prog-2019-fyap2m-lfyap225o.html]*
> > Major advanced electronic materials and devices *[en-prog-2019-fyap2m-lfyap223o.html]*

> Major in business creation and management *[en-prog-2019-fyap2m-lfyap104g.html]*
> > Major in small and medium sized business creation *[en-prog-2019-fyap2m-lfyap226o.html]*
> > Major in Business risks and opportunities *[en-prog-2019-fyap2m-lfyap227o.html]*

> Elective courses *[en-prog-2019-fyap2m-lfyap105g.html]*
> > Elective courses available for Master students in Physical Engineering *[en-prog-2019-fyap2m-lfyap952o.html]*
> > Elective courses: transversal skills and contacts with industry *[en-prog-2019-fyap2m-lfyap954o.html]*

FYAP2M Detailled programme

Programme by subject

CORE COURSES [45.0]

O Mandatory
△ Courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
⊠ Optional
⊘ Periodic courses not taught during 2019-2020
Activity with requisites

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

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			28 Credits			x
O LELEC1755	ELECTRICITY : ADVANCED TOPICS	Denis Flandre Danielle Janvier Claude Oestges	30h+30h	5 Credits	1q	x	

O Societies, Cultures, Religions (2 credits)

The students select one course between:
The student shall select

⊠ LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	15h	2 Credits	1q	x	x
⊠ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	15h	2 Credits	1q	x	x
⊠ LTECO2200	Societies-cultures-religions : Human Questions	Régis Burnet Dominique Martens	15h	2 Credits	1 ou 2q	x	x

PROFESSIONAL FOCUS [30.0]

O Mandatory
△ Courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
⊠ Optional
⊘ Periodic courses not taught during 2019-2020
Activity with requisites

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

O Contenu:

						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 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	Hosni Idrissi Thomas Pardoen	30h+30h	5 Credits	1q	x	x

						Year 1	Year 2
LPHYS2143	Optics and lasers	Clément Lauzin	22.5h +22.5h	5 Credits	1q	x	x
LMAPR2019A	Polymer Science and Engineering-Physics	Sophie Demoustier Alain Jonas (coord.) Evelyne Van Ruymbeke	22.5h +7.5h	3 Credits	1q	x	x
LCHM2261B	Polymer chemistry and physical chemistry (part 2 : Polymer physical chemistry)	Charles-André Fustin Jean-François Gohy Alain Jonas	22.5h +7.5h	2 Credits	1q	x	x

OPTIONS

The student may select

Majors for the Master's degree in physics

> Major in Advanced Engineering Physics *[en-prog-2019-fyap2m-lfyap221o]*
> Major in nanotechnology *[en-prog-2019-fyap2m-lfyap225o]*
> Major advanced electronic materials and devices *[en-prog-2019-fyap2m-lfyap223o]*

Major in business creation and management

> Major in small and medium sized business creation *[en-prog-2019-fyap2m-lfyap226o]*
> Major in Business risks and opportunities *[en-prog-2019-fyap2m-lfyap227o]*

Elective courses

> Elective courses available for Master students in Physical Engineering *[en-prog-2019-fyap2m-lfyap952o]*
> Elective courses: transversal skills and contacts with industry *[en-prog-2019-fyap2m-lfyap954o]*

MAJOR IN ADVANCED ENGINEERING PHYSICS

O Mandatory	⊠ Optional
△ Courses not taught during 2019-2020	⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020	Activity with requisites

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

De 20 à 30 CREDITS parmi

O Contenu:

					Year 1	Year 2
⊠ Optics and photonics						
⊠ LPHYS2141	Introduction to quantum optics	Bernard Piraux Xavier Urbain	22.5h +7.5h	5 Credits	1q	x
⊠ LPHYS2246	Experimental methods in atomic and molecular physics	Clément Lauzin Xavier Urbain	30h	5 Credits	2q	x
⊠ Experimental methods						
⊠ LELEC2811	Instrumentation and sensors	David Bol (coord.) Laurent Francis	30h+30h	5 Credits	1q	x
⊠ LPHYS2245	Lasers physics	Clément Lauzin	22.5h +7.5h	5 Credits	2q	x
⊠ LPHYS2303	Cryophysics and vacuum physics	Vincent Bayot Benoît Hackens Sorin Melinte	30h+15h	5 Credits	1q	x
⊠ LPHYS2351	Superconductivity	Luc Piraux	22.5h +7.5h	5 Credits	1q	x
⊠ LPHYS2102	Detectors and sensors	Eduardo Cortina Gil Krzysztof Piotrzkowski	22.5h +7.5h	5 Credits	1q	x
⊠ LPHYS2248	Ultra-fast laser physics	Clément Lauzin	22.5h +7.5h	5 Credits	2q ⊕	x
⊠ Numerical simulations						
⊠ LMAPR2482	Plasticity and metal forming	Laurent Delannay Thomas Pardoen	30h +22.5h	5 Credits	2q	x
⊠ LMECA2300	Advanced Numerical Methods	Philippe Chatelain Christophe Craeye Vincent Legat Jean-François Remacle	30h+30h	5 Credits	2q	x
⊠ LPHYS1303	Numerical Simulation in Physics	Michel Crucifix Bernard Piraux	22.5h +30h	4 Credits	2q	x

						Year 1	Year 2

⊠ Fundamental concepts of physics

⊠ LPHYS1231	Special Relativity	Jean-Marc Gérard	30h+15h	5 Credits	2q	x	x
⊠ LPHYS1344	subatomic, atomic and molecular physics	Clément Lauzin Vincent Lemaitre Xavier Urbain	45h+45h	6 Credits	2q	x	x
⊠ LPHYS2242	Fundamentals of quantum information	Sorin Melinte Bernard Piraux	30h	5 Credits	2q ⊘	x	x
⊠ LPHYS2132A	Quantum field theory 1	Céline Degrande Marco Drewes		5 Credits	1q	x	x

MAJOR IN NANOTECHNOLOGY

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 2019-2020	⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020	Activity with requisites

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

De 20 à 30 CREDITS parmi

O Contenu:

⊠ Nano-structures and the physics of nano-materials

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

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

⊠ Nano and micro semi-conductor devices

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

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

⊠ Micro and nano-engineering

⊠ LELEC2560	Micro and Nanofabrication Techniques	Laurent Francis (coord.) Benoît Hackens Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊠ LELEC2895	Design of micro and nanosystems	Laurent Francis	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2012	Macromolecular Nanotechnology	Sophie Demoustier Karine Glinel Karine Glinel (compensates Bernard Nysten) Jean-François Gohy Bernard Nysten	45h+15h	5 Credits	2q	x	x
⊠ LMAPR2631	Surface Analysis	Arnaud Delcorte Bernard Nysten	30h+15h	5 Credits	2q	x	x

MAJOR ADVANCED ELECTRONIC MATERIALS AND DEVICES

O Mandatory	⊠ Optional
△ Courses not taught during 2019-2020	⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020	Activity with requisites

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

De 15 à 30 CREDITS parmi

O Contenu:

O Compulsory courses in advanced electronic materials and devices

Student choose at least 5 credits among:

						Year 1	Year 2
⊠ LELEC2541	Advanced Transistors	Denis Flandre (coord.) Benoît Hackens Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊠ LELEC2550	Special electronic devices	Vincent Bayot	30h+30h	5 Credits	1q	x	x
⊠ LELEC2700	Microwaves	Danielle Janvier	30h+30h	5 Credits	1q	x	x
⊠ LELEC2895	Design of micro and nanosystems	Laurent Francis	30h+30h	5 Credits	1q	x	x

⊠ Elective courses in advanced electronic materials and devices

⊠ LELEC2560	Micro and Nanofabrication Techniques	Laurent Francis (coord.) Benoît Hackens Jean-Pierre Raskin	30h+30h	5 Credits	2q	x	x
⊠ LELEC2580	Design of RF and microwave communication circuits	Christophe Craeye Danielle Janvier (coord.)	30h+30h	5 Credits	2q	x	x
⊠ LELEC2710	Nanoelectronics	Vincent Bayot (coord.) Benoît Hackens	30h+30h	5 Credits	1q	x	x
⊠ LELEC2811	Instrumentation and sensors	David Bol (coord.) Laurent Francis	30h+30h	5 Credits	1q	x	x
⊠ LMAPR2015	Physics of Nanostructures	Jean-Christophe Charlier (coord.) Xavier Gonze Luc Piraux	37.5h +22.5h	5 Credits	1q	x	x
⊠ LMAPR2020	Materials Selection	Christian Bailly Thomas Pardoen	30h +22.5h	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
⊠ LPHYS2143	Optics and lasers	Clément Lauzin	22.5h +22.5h	5 Credits	1q	x	x
⊠ LPHYS2303	Cryophysics and vacuum physics	Vincent Bayot Benoît Hackens Sorin Melinte	30h+15h	5 Credits	1q	x	x

MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

In keeping with most of the Masters' degrees in civil engineering, the goal of this major is to familiarize the civil engineering student with the specifics of entrepreneurship and business development in order to develop the necessary abilities, knowledge and tools to create a business. It is a truly interdisciplinary initiative where students from different faculties are brought together in cross-disciplinary teams to create an entrepreneurial project. The Interdisciplinary program in entrepreneurship (CPME) is spread over two years and is integrated into more than 20 Masters (8 faculties). The program includes a collective and interdisciplinary master thesis focused on an entrepreneurial project (start-up or spin-off) and realized in teams of 3 to 4 students from 3 to 4 different faculties. The access is reserved for a small number of students by a selection procedure Additional information may be found at www.uclouvain.be/cpme

O Mandatory	⊠ Optional
△ Courses not taught during 2019-2020	⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020	Activity with requisites

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

De 20 à 25 CREDITS parmi

O Contenu:

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

O LCPME2001	Entrepreneurship Theory (in French)	Blanche Havenne (compensates Frank Janssen) Frank Janssen	30h+20h	5 Credits	1q	x	
O LCPME2002	Managerial, legal and economic aspects of the creation of a company (in French)	Yves De Cordt Marine Falize	30h+15h	5 Credits	1q	x	x
O LCPME2003	Business plan of the creation of a company (in French) *Les séances du cours LCPME2003 sont réparties sur les deux blocs annuels du master. L'étudiant doit les suivre dès le bloc annuel 1, mais ne pourra inscrire le cours que dans son programme de bloc annuel 2.*	Frank Janssen	30h+15h	5 Credits	2q		x
O LCPME2004	Advanced seminar on Entrepreneurship (in French)	Frank Janssen	30h+15h	5 Credits	2q	x	x

⊠ Prerequisite CPME courses

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

O LCPME2000	Venture creation financement and management I	Yves De Rongé Olivier Giacomin	30h+15h	5 Credits	1q	x	

MAJOR IN BUSINESS RISKS AND OPPORTUNITIES

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

O Mandatory	⊠ Optional
△ Courses not taught during 2019-2020	⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020	Activity with requisites

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

De 16 à 20 CREDITS parmi

O Contenu:

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

O One course between

De 3 à 5 CREDITS parmi

⊠ LFSA2202	Ethics and ICT	Axel Gosseries Olivier Pereira	30h	3 Credits	2q	x	x
⊠ LLSMS2280	Business Ethics and Compliance Management	Carlos Desmet	30h	5 Credits	1q	x	x

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

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

ELECTIVE COURSES AVAILABLE FOR MASTER STUDENTS IN PHYSICAL ENGINEERING

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

ELECTIVE COURSES: TRANSVERSAL SKILLS AND CONTACTS WITH INDUSTRY

O Mandatory	⊠ Optional
△ Courses not taught during 2019-2020	⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020	Activity with requisites

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

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

O Contenu:

					Year 1	Year 2

O Transversal skills and contacts with industry

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

⊠ Internship

⊠ LFSA2995	Company Internship	Jean-Pierre Raskin	30h	10 Credits	1 + 2q	x	x

⊠ Professional integration activity specific to the program

⊠ LMECA2711	Quality management and control.	Nicolas Bronchart	30h+30h	5 Credits	2q	x	x

⊠ Communication

Max=8 CREDITS parmi

⊠ Languages

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

⊠ LALLE2500	Professional development seminar German	Caroline Klein Ann Rinder (coord.)	30h	3 Credits	1 + 2q	x	x
⊠ LALLE2501	Professional development seminar-German	Caroline Klein Ann Rinder (coord.)	30h	5 Credits	1 + 2q	x	x
⊠ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.) Alicia Maria Tirado Fernandez (compensates Paula Lorente Fernandez)	30h	3 Credits	1q	x	x
⊠ LESPA2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.) Alicia Maria Tirado Fernandez (compensates Paula Lorente Fernandez)	30h	5 Credits	1q	x	x
⊠ LNEER2500	Seminar of Entry to professional life in Dutch - Intermediate level	Isabelle Demeulenaere (coord.) Marie-Laurence Lambrecht	30h	3 Credits	1 ou 2q	x	x
⊠ LNEER2600	Seminar of entry to professional life in Dutch - Upper-Intermediate level	Isabelle Demeulenaere (coord.)	30h	3 Credits	1 ou 2q	x	x

⊠ Group dynamics

⊠ LEPL2351	Dynamique des groupes - Q1	Christine Jacqmot Benoît Raucent Vincent Wertz (coord.)	15h+30h	3 Credits	1q	x	x

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

Other non-disciplinary courses

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

Course prerequisites

A document entitled en-prerequis-2019-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 UCLouvain training programme, a reference framework of learning outcomes specifies the competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme's reference framework of learning outcomes in the document *"In which teaching units are the competences and learning outcomes in the programme's reference framework developed and mastered by the student?"*

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

FYAP2M - Information

Admission

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

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

SUMMARY

Specific Admission Requirements

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

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor in Engineering		Direct Access	Students who have neither major nor minor in the field of their civil engineering Master's degree may have an adapted programme.
Others Bachelors of the French speaking Community of Belgium			
Bachelor in Engineering		Direct Access	Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil enginering master degree may have an adapted master programme.
Bachelors of the Dutch speaking Community of Belgium			
Bachelor in engineering		Access with additional training	Students who have no specialisation in the field of their civil enginering master degree may have an adapted master programme with up to 60 additional credits.
Foreign Bachelors			
Bachelor in engineering	Bachelors degree of Cluster Institution	Direct Access	Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil enginering master degree may have an adapted master programme.
Bachelor in Engineering	For others institutions	Based on application: accepted, conditional on further training, or refusal	See personalized access

Non university Bachelors

> Find out more about links to the university

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
Masters			
Master in engineering		Direct Access	

Holders of a non-University 2nd cycle degree

Adults taking up their university training

> See the website Valorisation des acquis de l'expérience

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

Access on the file

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

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

Selection criteria are summarized here.

Admission and Enrolment Procedures for general registration

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 Management

Entity

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Denomination	(FYKI)
Faculty	Louvain School of Engineering (EPL)
Sector	Sciences and Technology (SST)
Acronym	FYKI
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