UCLouvain

FYAP2M

2020 - 2021

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

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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.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 applications technologiques et industrielles des sciences physiques.

1.1. Identifier et mettre en oeuvre de façon réaliste au vu de la complexité, les concepts, lois, raisonnements applicables à une problématique donnée (p.ex. identification des lois et matériaux pour la réalisation de LEDs à lumière blanche, pour la conception de convertisseurs d'énergie à base d'éléments thermoélectriques, pour la réalisation de supports et de dispositifs pour le stockage et/ou le transfert de l'information, pour la conception de panneaux photovoltaïques à rendement optimal ...)
1.2. Identifier 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.

2.organiser et mener à son terme une démarche complète d'ingénierie relative à une application dans le domaine des hautes technologies nécessitant les outils et concepts fondamentaux de la physique, 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.
2.2. Modéliser le problème et concevoir une ou plusieurs solutions techniques originales répondant à ce cahier des charges (p.ex. optimisation de matériaux et/ou de combinaison de ceux ci pour l'isolation thermique (batiments, ...) ou, au contraire, pour favoriser l'évacuation de la chaleur (aérospatiale, microélectronique, ...), développement de mesures de caractérisation électrique et thermique répondant à une géométrie de matériau donnée, choix des matériaux pour l'émission de lumière (LEDs) ou la réalisation de panneaux photovoltaiques...)
2.3. Evaluer et classer les solutions au regard de l'ensemble des critères figurant dans le cahier des charges : efficacité, faisabilité, qualité, ergonomie et sécurité dans l'environnement professionnel.
2.4. Implémenter et tester une solution sous la forme d'une maquette, d'un prototype et/ou d'un modèle numérique.
2.5. Formuler des recommandations pour améliorer le caractère opérationnel de la solution étudiée.

3.organiser et mener à son terme un travail de recherche pour appréhender une problématique inédite technologique ou industrielle dans différents domaines de la *physique appliquée* et de l'ingénierie de *haute technologie*.

3.1. Se documenter et résumer l'état des connaissances actuelles dans le domaine considéré.
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 théorique et/ou technique résultant de ce travail de recherche.

4.contribuer, en équipe, à la programmation d'un projet et de le mener à son terme en tenant compte 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 rôles à tenir par exemple, répartition des tâches entre étudiants dans la réalisation d'un projet
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 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.

5.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 sélectionner l'équipement d'analyse et/ou de caractérisation le plus adapté selon la nature et la géométrie d'un matériau, choisir les matériaux les plus adaptés suivant les fonctionnalités visées et l'intégration dans des systèmes, …).
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 de charge : évolution de propriétés physiques en fonction du matériau, de la température, d'une contrainte mécanique ou de champs extérieurs, diagrammes de phases, structures de bandes…
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.

6.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 et de sécurité …).
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 oeuvre (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 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-2020-fyap2m-lfyap220t.html]*

> Professional Focus *[en-prog-2020-fyap2m-lfyap200s]*

Options courses

> Majors for the Master's degree in physics *[en-prog-2020-fyap2m-lfyap103g.html]*
  > Major in Advanced Engineering Physics *[en-prog-2020-fyap2m-lfyap221o.html]*
  > Major in nanotechnology *[en-prog-2020-fyap2m-lfyap225o.html]*
  > Major advanced electronic materials and devices *[en-prog-2020-fyap2m-lfyap223o.html]*
> Major in business creation and management *[en-prog-2020-fyap2m-lfyap104g.html]*
  > Major in small and medium sized business creation *[en-prog-2020-fyap2m-lfyap226o.html]*
  > Major in Business risks and opportunities *[en-prog-2020-fyap2m-lfyap227o.html]*
> Elective courses *[en-prog-2020-fyap2m-lfyap105g.html]*
  > Elective courses available for Master students in Physical Engineering *[en-prog-2020-fyap2m-lfyap952o.html]*
  > Elective courses: transversal skills and contacts with industry *[en-prog-2020-fyap2m-lfyap954o.html]*

FYAP2M Detailled programme

Programme by subject

CORE COURSES [30.0]

O Mandatory
△ Courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021
⊠ Optional
⊘ Periodic courses not taught during 2020-2021
Activity with requisites

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

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

						Year 1	2
O LFYAP2990	Graduation project/End of studies project			28 Credits			x
O LELEC1755	Physique des dispositifs électroniques et des lignes de transmission	Denis Flandre (coord.) Claude Oestges	30h+30h	5 Credits	1q	x	

O *Religion courses for students in exact sciences (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 2020-2021
⊕ Periodic courses taught during 2020-2021
⊠ Optional
⊘ Periodic courses not taught during 2020-2021
Activity with requisites

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

O *Contenu:*

						Year 1	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	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)	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-2020-fyap2m-lfyap221o]*
> Major in nanotechnology *[en-prog-2020-fyap2m-lfyap225o]*
> Major advanced electronic materials and devices *[en-prog-2020-fyap2m-lfyap223o]*

Major in business creation and management

> Major in small and medium sized business creation *[en-prog-2020-fyap2m-lfyap226o]*
> Major in Business risks and opportunities *[en-prog-2020-fyap2m-lfyap227o]*

Elective courses

> Elective courses available for Master students in Physical Engineering *[en-prog-2020-fyap2m-lfyap952o]*
> Elective courses: transversal skills and contacts with industry *[en-prog-2020-fyap2m-lfyap954o]*

MAJOR IN ADVANCED ENGINEERING PHYSICS

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	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	x
⊠ LPHYS2246	Experimental methods in atomic and molecular physics	Clément Lauzin Xavier Urbain	30h	5 Credits	2q	x	x
⊠ Experimental methods						
⊠ LELEC2811	Instrumentation and sensors	David Bol (coord.) Laurent Francis	30h+30h	5 Credits	1q	x	x
⊠ LPHYS2245	Lasers physics	Clément Lauzin	22.5h +7.5h	5 Credits	2q	x	x
⊠ LPHYS2303	Cryophysics and vacuum physics	Vincent Bayot Benoît Hackens Sorin Melinte	30h+15h	5 Credits	1q	x	x
⊠ LPHYS2351	Superconductivity	Luc Piraux	22.5h +7.5h	5 Credits	1q	x	x
⊠ LPHYS2102	Detectors and sensors	Eduardo Cortina Gil Krzysztof Piotrzkowski	22.5h +7.5h	5 Credits	1q	x	x
⊠ LPHYS2248	Ultra-fast laser physics	Clément Lauzin	22.5h +7.5h	5 Credits	2q ⊘	x	x
⊠ Numerical simulations						
⊠ LMAPR2483	Durability of materials	Laurent Delannay Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LMECA2300	Advanced Numerical Methods	Philippe Chatelain Christophe Craeye (coord.) Vincent Legat Jean-François Remacle	30h+30h	5 Credits	2q	x	x

						Year 1	2
⊠ LPHYS1303	Numerical Simulation in Physics	Michel Crucifix Bernard Piraux Francesco Ragone (compensates Bernard Piraux)	22.5h +30h	4 Credits	2q	x	x

⊠ 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

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 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	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.

					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
⊠ 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 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	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:

⊠ 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	Dimitri Lederer	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 Dimitri Lederer	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	Pierre Bollen (compensates Bernard Nysten) Bernard Nysten Thomas Pardoen	30h +22.5h	5 Credits	2q	x	x
⊠ LMECA2300	Advanced Numerical Methods	Philippe Chatelain Christophe Craeye (coord.) 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 EPL Masters' degrees, the goal of this major is to familiarize the 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 30 Masters (9 faculties). The program includes a collective and interdisciplinary master thesis focused on an entrepreneurial project (start-up or spin-off) and realized in teams of 3 to 4 students from 3 to 4 different faculties. The access is reserved for a small number of students by a selection procedure. Additional information may be found at www.uclouvain.be/cpme.

This major is not available in English and may not be taken at the same time as the major "Business risks and opportunities".

O Mandatory	⊠ Optional
△ Courses not taught during 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	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

						Year 1	Year 2
O LCPME2001	Entrepreneurship Theory (in French)	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 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	Activity with requisites

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

De 17 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 2020-2021	⊘ Periodic courses not taught during 2020-2021
⊕ Periodic courses taught during 2020-2021	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

Students may select max. 8 credits of languages courses or group dynamics :
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 (coord.)	30h	3 Credits	1 + 2q	x	x
⊠ LALLE2501	Professional development seminar-German	Caroline Klein (coord.)	30h	5 Credits	1 + 2q	x	x
⊠ LESPA2600	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	30h	3 Credits	1q	x	x
⊠ LESPA2601	Vocational Induction Seminar - Spanish (B2.2/C1)	Paula Lorente Fernandez (coord.)	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 Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	1q	x	x
⊠ LEPL2352	Dynamique des groupes - Q2	Christine Jacqmot Claude Oestges Benoît Raucent Vincent Wertz	15h+30h	3 Credits	2q	x	x

Year
1 2

⊠ Other non-disciplinary courses

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

Course prerequisites

A document entitled en-prerequis-2020-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 Access on the file.

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_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	on_the_file	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 (contact : epl-admission@uclouvain.be).

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

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

- Président du Jury: Jean-Didier Legat
- Secrétaire du Jury: Luc Piraux

Useful Contact(s)

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