UCLouvain

PHMD2M

2024 - 2025

Master [120] in Medical Physics

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In English
Dissertation/Graduation Project : **YES** - Internship : **YES**
Activities in English: **YES** - Activities in other languages : **optional**
Activities on other sites : **YES**
Main study domain : **Sciences**
Organized by: **Faculty of Science (SC)**
Programme acronym: **PHMD2M** - Francophone Certification Framework: 7

Table of contents

PHMD2M - Introduction

Introduction

Introduction

The Master of Medical Physics is a joint programme offered by UCLouvain and KU Leuven : https://www.kuleuven.be/programmes/master-medical-physics

The Master in Medical Physics prepares you to qork as a radiotion physicist in a hospital envirnoment, in the meidcal industry, government organizations or in a research institution. A further one-year postegraduate program, consisting largely of an internship, provides access to the certificate of "expert in medical radiation physics".

Your profile

- You have solid bases in Physics and Mathematics
- You are considering a career in Medical Physics, either in an hospital, in a government agency, in the industry or in a research institute.

Your future job

- Hospital physicist. The acces to the profession is given by FANC (Federal Agency of Nuclear Control) after one year of stage (only partially included in this master)
- Physics control expert in an industry or in a government agency
- Research in Medical Physics
- Industry : Instrumentation development, construction and control of medical equipment

Your programme

The study program of 120 ECTS credits offers you :

- a balance between classroom teaching and individual study,
- a challenging research component (via the master's thesis),
- a solid practical experience (via 10 weeks of internship).

In this program, you learn about the relevant nuclear physics and nuclear chemistry aspects for a medical physicist. You also become familiar with the structure and functioning of the human body, as well as with the biological effects and health risks and safety issues related with ionising radiation. You further get acquainted with basic techniques and specialised methods in radiotherapy, radiology or nuclear medecine. During the internship in one of the recognised hospitals, you have the opportunity to specialise in one of these fields, being trained with state-of-the-art equipment for Medical Physics.

PHMD2M - Teaching profile

Learning outcomes

The program aims to provide the student with the requied knowledge to start the internship necessary to obtain the certificate of "expert in medical radiation physics" according to the guidelines of the Federal Agency for Nuclear Control, or to perform other functions related to medical physics (in industry, government institutions, scientific research, application...).

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

PHMD1 : make appropriate use of his/her in-depth knowledge of aspects of medical and biomedical sciences to act professionally in the context of medical physics.

PHMD2 : master a thorought theoretical and practical knowledge of and insight in the fundamental aspects of ionizing and non-ionizing radiation physics and of the legal aspects relevant to medical physics.

PHMD3 : mobilize the techniques and tehe mathematical methods (including ICT) related to the three specializations of medical physics, and particularly in her·his own specialization

PHMD4 : maintain and further develop her·his knowledge of most recent developments in a research domain of medical physics

Programme structure

The program will consist of

- 79 ECTS credits for courses
- 26 ECTS credits for the master's thesis
- 15 ECTS credits for two internships : in the second semester, a 9 ECTS credits internship with three times 2 weeks of clinical training in each of the three specializations (radiology, radiotherapy and nuclear medecine) ; in the fourth semester, a 6 ECTS credits internship with 4 weeks of clinical training in one fo the three specialization disciplines.

PHMD2M Programme

Detailed programme by subject

CORE COURSES

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

			Year 1	Year 2
Physics, Mathematics and Chemistry (16 credits)				
EPHMD2398	Introductory Nuclear Physics	[EN] [q1] [18h] [3 Credits]		x

				Year 1	2
LPHYS2102	Ionizing Radiation Detection and Nuclear Instrumentation	Eduardo Cortina Gil	EN [q1+q2] [26h+26h] [6 Credits]	x	
LPHMD2357	Computational and Numerical Methods for Medical Physics	John Lee Edmond Sterpin	EN [q1] [24h+10h] [4 Credits]	x	

Nuclear and Radiochemistry (3 credits)
Choose a course from

LPHYS2504	Use, management and control of radioelements	Pascal Froment	EN [q2] [22.5h] [3 Credits]		x
EPHMD2393	Nuclear and Radiochemistry		EN [q2] [18h] [3 Credits]		x

Medical oriented courses
From 20 to 23credit(s)

WRDTH2331B	Radiobiology - (partim radiobiology)		EN [q2] [22.5h] [3 Credits]		x
EPHMD2377	Radiation Epidemiology and Radiopathology		EN [q1+q2] [13h] [4 Credits]		x

Cell Biology, Anatomy and Physiology
Choose between the UCLouvain module and the KU Leuven module

Cell Biology, Anatomy and Physiology (KU Leuven) (13 credits)

EPHMD2334	Basics concepts of Cell Biology		EN [q1] [39h] [5 Credits]	x	
EPHMD2314	Human System Physiology		EN [q2] [28h+2h] [5 Credits]	x	
EPHMD2370	Human Anatomy and Histology		EN [q2] [18h] [3 Credits]	x	

Cell Biology, Anatomy and Physiology (UCLouvain) (10 credits)

LGBIO1113	Systems Anatomy and Physiology	Catherine Behets Wydemans Olivier Cornu Greet Kerckhofs	EN [q2] [30h+15h] [5 Credits]	x	
LGBIO1111	Cell biology and physiology	Charles De Smet Laurent Jacques Pascal Kienlen-Campard	FR [q2] [30h+15h] [5 Credits]	x	

Medical Information Systems (3 credits)
Choose a course from

EPHMD2376	Medical Information Systems		EN [q1] [23h] [3 Credits]		x
WFSP2253	Hospital information systems	Benoît Debande (coord.)	FR [q1] [20h] [3 Credits]		x

Medical physics and technology
From 22 to 24credit(s)

EPHMD2362	Technology and Techniques in Radiology		EN [q1] [16h+4h] [3 Credits]	x	
WRDTH3160T	Technology, Dosimetry and Treatment Planning in Radiotherapy		EN [q1] [20h] [3 Credits]	x	
WMNUC3120T	Technology and techniques in nuclear medicine - (partim theory)		EN [q1] [20h] [3 Credits]	x	
LGBIO2070	Engineering challenges in protontherapy	Guillaume Janssens John Lee Edmond Sterpin	EN [q2] [30h+30h] [5 Credits] *> French-friendly*	x	

Medical Imaging
Choose a course from

EPHMD2335	Medical Imaging and Analysis		EN [q2] [36h+20h] [6 Credits]	x	
LGBIO2050	Medical Imaging	Greet Kerckhofs John Lee Benoît Macq	EN [q1] [30h+30h] [5 Credits] *> French-friendly*	x	

Radiopharmacy
Choose a course from

EPHMD2392	Radiopharmacy		EN [q1] [9h] [3 Credits]		x
WRFAR2100	Radiochemistry, radiotoxicology & radiopharmacy	Bernard Gallez	FR [q1] [22.5h+60h] [4 Credits]		x

				Year 1	Year 2

Quality Assurances and Special Techniques (3 credits)

Choose a course from

⛒ EPHMD2372	Quality Assurance and Special Techniques in Radiology		EN [q1] [14h] [3 Credits]		x
⛒ LPHMD2373	Quality Assurance and Special Techniques in Nuclear Medicine		EN [q2] [22h] [3 Credits]		x
⛒ WRDTH3161	Quality assurance and special techniques in radiotherapy	Edmond Sterpin	EN [q2] [20h] [3 Credits]		x

Safety and Ethics

From 13 to 17credit(s)

WRDTH3120	Fundamental of dosimetry	Edmond Sterpin	EN [q1] [20h] [3 Credits]	x	

Radiation protection

Choose between the UCLouvain module and the KU Leuven module

⛒ Radiation protection (KU Leuven) (4 credits)

EPHMD2397	Radiation Protection		EN [q1+q2] [18h] [4 Credits]	x	

⛒ Radiation protection (UCLouvain) (8 credits)

WRPR2001	Notions de base de radioprotection	Pascal Carlier François Jamar (coord.) Renaud Lhommel	FR [q1] [10h+5h] [2 Credits]	x	
WRPR2002	Compléments de radioprotection	Dana Ioana Dumitriu Olivier Gheysens François Jamar (coord.)	FR [q2] [20h+10h] [3 Credits]	x	
WRPR3010	Questions spéciales de radioprotection	Nathalie De Patoul Dana Ioana Dumitriu Damien Dumont Olivier Gheysens François Jamar (coord.) Renaud Lhommel Sébastien Lichtherte Edmond Sterpin Aude Vaandering	FR [q2] [40h] [3 Credits]	x	

Philosophy, Sustainability and Ethics (6 credits)

Choose between the UCLouvain module and the KU Leuven module

⛒ Philosophy, Sustainability and Ethics (KU Leuven) (6 credits)

EPHMD2354	Science and Sustainabilty: a socio-ecological approach		EN [q1] [24h] [3 Credits]		x
EPHMD2379	Ethics and Law in Biomedical Research		EN [q2] [20h] [3 Credits]		x

⛒ Philosophy, Sustainability and Ethics (UCLouvain) (6 credits)

WFSP2108	Bioethics	Jean-Philippe Cobbaut Alain Loute (coord.)	FR [q2] [30h] [4 Credits]		x

Select (2 credits)

⛒ LSC2001	Introduction to contemporary philosophy	Peter Verdée Peter Verdée (compensates Charles Pence)	FR [q2] [30h] [2 Credits]		x
⛒ LSC2220	Philosophy of science	Alexandre Guay	EN [q2] [30h] [2 Credits]		x
⛒ LFILO2003E	Ethics in the Sciences and technics (sem)		FR [q2] [15h+15h] [2 Credits]		x

Internships and Master's thesis (11 credits)

This internship will be completed by a second one which is part of the professional focus.

The Thesis Tutorial supports the thesis which is part of the professional focus.

LPHMD2366	Internship 1		EN [q2] [] [9 Credits]	x	
LPHYS2197	Thesis tutorial	Ahmed Adrioueche Gwenhaël de Wasseige	EN [q1] [15h] [2 Credits] > *French-friendly*		x

PROFESSIONAL FOCUS [30.0]

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Professional Focus : Medical Physics

				Year 1	Year 2
LPHMD2371	Internship 2		[EN] [q2] [] [6 Credits]		x
LPHMD2199	Master Thesis		[EN] [q1+q2] [] [24 Credits]		x

Course prerequisites

There are no prerequisites between course units (CUs) for this programme, i.e. the programme activity (course unit, CU) whose learning outcomes are to be certified and the corresponding credits awarded by the jury before registration in another CU.

The programme's courses and learning outcomes

For each UCLouvain training programme, a reference framework of learning outcomes specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

PHMD2M - Information

Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the higher education landscape and the academic organisation of courses.

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

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

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

SUMMARY

Specific access requirements

The Master of Medical Physics is an interuniversity master and is organized jointly by UCLouvain and KU Leuven. Students have to enroll at both universities but apply for admission at UCLouvain and if accepted first enroll at UCLouvain and only later at KU Leuven. The tuition fee is paid at UCLouvain.

Direct admission on the basis of the following degree, or a similar degree, obtained at a Belgian university:

- Bachelor of Physics

Access based on application

After admission procedure on the basis of the following degree, or a similar degree, obtained at a **Belgian university - with a limited preparatory program:**

- Bachelor of Engineering Sciences
- Bachelor of Chemistry
- Bachelor of Industrial Engineering: nuclear technology
- Bachelor of Bio-Science Engineering.

Holders of these degrees obtained at a Belgian university should add almost two courses to their programme as a preparatory programme, which can be combined with the master programme itself.

After admission procedure on the basis of the following degree, or a similar degree, obtained at a **Belgian university - with a more extended preparatory programme** that is tuned to the background of the student and approved by the programme responsible:

- other bachelor degrees (e.g. Bachelor in Biomedical Science) obtained at a Belgian university.

Students with a degree obtained at an non-Belgian institution

The program in medical physics in co-graduation UCLouvain - KU Leuven, specific information is applicable : https://wet.kuleuven.be/english/students/how-to-apply-for-the-master-medical-physics

- **Diploma and grade requirements** :admission decision on individual basis. Students who wish to be admitted are invited to consult the criteria for the evaluation of application.
- **Language requirements** : All applicants must prove their proficiency in English. The accepted English proficiency tests are:
  - TOEFL iBT: minimum overall score of 94, with minimum subscores of 19 for Reading, 18 for Listening, 19 for Speaking and 21 for Writing
  - IELTS Academic test: minimum overall score of 7.0, with minimum subscores of 6.5 for Reading, 6.0 for Listening, 6.0 for Speaking and 6.0 for Writing
  - Advanced or Proficiency Cambridge Certificates: minimum score of 185, with at least 176 for reading and 169 for listening, speaking and writing.

The following applicants are exempted from submitting an English proficiency certificate:

- Applicants who have obtained a previous university degree taught in English in **Australia, English-speaking Canada, Ireland, New Zealand, the United Kingdom and the United States of America.** Their diploma and transcripts suffice, provided they confirm that the entire university study was completely taught in English in one of the previous countries.
- Applicants who have obtained a Belgian diploma.

Absolutely no other diplomas will be accepted as evidence even if the applicant has followed an exclusively English-taught programme.

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
		Direct access	
		Access based on application	
		Access based on application	
		Access based on application	
Others Bachelors of the French speaking Community of Belgium			
		Access based on application	
		Access based on application	
Bachelors of the Dutch speaking Community of Belgium			
		Direct access	
		Access based on application	
		Access based on application	
		Access based on application	
Foreign Bachelors			

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			
		-	

Access based on validation of professional experience

> It is possible, under certain conditions, to use one's personal and professional experience to enter a university course without having the required qualifications. However, validation of prior experience does not automatically apply to all courses. Find out more about Validation of priori experience.

Access based on application

Access based on application : access may be granted either directly or on the condition of completing additional courses of a maximum of 60 ECTS credits, or refused.

Admission and Enrolment Procedures for general registration

Teaching method

The Master of Medical Physics is a joint program of UCLouvain and KU Leuven. By joining efforts, the two universities offer a multidisiplinar and complete program in Medical Physics. The lectures are given by professors and professionals with a large experience in theri respective fields.

KU Leuven and UCLouvain have a large experience in research in the fields of Sub-Atomic and Medical physics. The researchers of both institutions work in collaboration with international institutions (CERN, GANIL, PSI, IAEA, ...) and with a large number of hospitals and industries across the world.

Together with their respective hospitals UZ Leuven (University Hospital Leuven) and Cliniques universitaires Saint-Luc (at Woluwe), they have extensive clinical expertise in different medical imaging techniques, nuclear medicine and the various forms of radiotherapy, as well as expertise in both education and research and development around these medical technologies.

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".

Contacts

Curriculum Management

Entity

Structure entity	SST/SC/PHYS
Denomination	(PHYS)
Faculty	Faculty of Science (SC)
Sector	Sciences and Technology (SST)
Acronym	PHYS
Postal address	Chemin du Cyclotron 2 - bte L7.01.04 1348 Louvain-la-Neuve Tel: +32 (0) 10 47 32 94 - Fax: +32 (0) 10 47 30 68
Website	https://uclouvain.be/fr/facultes/sc/phys

Academic supervisor: Eduardo Cortina Gil

Useful Contact(s)

- Administrative manager for the student's annual program and Secretary of the School of physics: Catherine De Roy