PHYS2M

2013 - 2014

Master [120] in Physics

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In french
Dissertation/Graduation Project : **YES** - Internship : **NO**
Activities in English: **YES** - Activities in other languages : **NO**
Activities on other sites : **YES**
Main study domain : **Sciences**
Organized by: **Faculté des sciences (SC)**
Programme code: **phys2m** - European Qualifications Framework (EQF): 7

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PHYS2M - Admission

For the specific conditions of this program : refer to the French version

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

PHYS2M - Information

Learning outcomes

The programme for the Master in Physics provides training in the fundamental laws and essential tools of modern physics, with a focus that enables students successfully to enter either the world research (research focus) or the world of teaching (teaching focus), or the medical world (professional focus in medical physics). An opening into the industrial or medical worlds is also possible by doing the dissertation in an industrial or a hospital environment.

This training leads to the acquisition of skills such as ability to analyse a problem in physics, abstraction and modelling, rigour in reasoning and expression, a critical attitude, self-assessment and ability to communicate, including in English.

Students who aim to go on to do research should choose the **research focus**. The themes for this focus are summarized in the title : **From elementary particles to the cosmos : experience and theory, Earth and light**. These words define the essence of research done in the Department at the theoretical and experimental level : the search for elementary particles, fundamental interactions in the infinitesimal and the cosmos, changes in the nucleus and its applications, study of the atom, the molecule and properties of light. The internal and external structure of the Earth system is also studied as well as the dynamics of climate.

The **professional focus in medical physics is to prepare physicists for the profession of hospital physicist and the** radiotherapy qualification. The Master is, however, not enough: an additional year of work placement in a medical environment is necessary, together with some extra courses, to satisfy the legal requirements.

The **teaching focus** is a specially adapted programme designed for teachers at higher levels in secondary education.

Teaching method

For all the focuses, the programme comprises core subjects including the basic courses necessary for the general training and for the different focuses. The basic courses provide training in the theory but also an introduction to experimental methods and requirements. They are more advanced in nature than the introductory courses for the bachelorâ€™s degree. There are also optional subjects which deal with areas common to several focuses, either theoretical or experimental. The choice of courses should therefore be dictated by the skills that students wish to develop. The basic courses from the core subjects and the optional subjects that students can choose ensure the same high level training for all physics students.

The dissertation and the focus courses reflect different ambitions. At the end of this training, students will be in close contact with research through their dissertation. Working in a team, supervised by researchers and lecturers, they will discover, through the focus courses and activities, the aims of current research and the different objectives of the focuses. This clearly requires individual work, attendance at seminars, contacts with researchers in the field and consultation of reference works.

Students may, if they wish, replace the research focus by an exchange visit abroad under the Erasmus scheme. This is equivalent to 30 credits.

Entry to the doctoral programme is possible, irrespective of the focus.

Advanced teaching in other subjects than physics is possible for students doing the teaching focus.

Evaluation

Students will mainly be assessed on the basis of individual work (e.g. reading, consultation of databases and bibliographic references, writing monographs and reports, presentation of seminars, dissertation and work placement). Where necessary, students will also be assessed on how much they have learned from lectures. Assessment of the dissertation is done on the basis of work over the year and how it is presented both in written and oral form.

Mobility and/or Internationalisation outlook

Students doing the research focus are encouraged to do a placement outside the French Community of Belgium under a Socrates/ Erasmus exchange scheme or equivalent (Mercator, Erasmus Belgica), preferably for courses during the second semester of the first year or the first semester of the second year. The placement can either take the form of courses, for a maximum of 30 credits, or preparation for the dissertation.

Courses on special topics are given by many visiting lecturers from different foreign institutions and some Belgian ones. These courses are usually in English.

Possible trainings at the end of the programme

Whatever focus is chosen, the Master in Mathematics gives direct access to the doctorate in science.

In addition there are two specially adapted advanced training programmes for which diplomas may be awarded :

1) A year of further study at Mol, after the 120 credit Master, enables students to take the English-speaking inter-university programme entitled Master in nuclear engineering organized by the BNEN (Belgian Nuclear Higher Education Network). (The intensive courses are given in English by lecturers from different Belgian universities at the Belgian Nuclear Research Centre at Mol).

2) Students who have successfully completed the Master with a professional focus in medical physics may gain the expert qualification in radiotherapy, medical radiophysics or radiology if they undertake a further year of work placement after the 120 credit Master. This work placement will also include some additional courses required by the Federal Agency for Nuclear Control (Agence fédérale de contrôle nucléaire). This will cover or provide additional training inthe following subjects (Regulation article 51.7) :

â€¢ Principles, techniques and quality control in medical imaging

â€¢ Special issues in radioprotection etc.

â€¢ Radiochemistry, radiotoxicology and radiopharmacy

â€¢ Risk assessment for radioactive waste in the environment in both normal and accidental circumstances and emergency plan for nuclear risks.

Certificates

The course listed in the professional focus may count towards the award of the certificate of further study in radioprotection and application of ionizing radiations for those who wish to obtain a qualification in the monitoring and protection of workers and the population against the danger of ionizing radiations.

Eligibility : doctors, pharmacists, veterinary surgeons, holders of a science degree, civil engineers, agricultural engineers, industrial engineers.

Students must, among other things, take advanced course in nuclear physics and nuclear techniques :

- PHY2236 : Nuclear Detectors and Electronics and Measurement of Ionizing Radiation
- PHY2360 : Atomic, Nuclear and Radiation Physics
- PHY2340 : Production, Use, Management and Control of Radioelements

PHYS2M - Contacts

Curriculum Managment

Entite de la structure PHYS

Acronyme	**PHYS**
Dénomination	Ecole de physique
Adresse	Chemin du Cyclotron, 2 bte L7.01.04 1348 Louvain-la-Neuve Tél 010 47 32 94 - Fax 010 47 30 68
Site web	https://www.uclouvain.be/phys
Secteur	Secteur des sciences et technologies (SST)
Faculté	Faculté des sciences (SC)
Commission de programme	Ecole de physique (PHYS)

Jury

Président : **Jean Bricmont**
Secrétaire : **Philippe Ruelle**

Usefull Contacts

Secrétaire de l'Ecole de physique : **Roseline Van Dyck**

PHYS2M - Detailled programme

Programme structure

The programme comprises core subjects of 72 credits, a focus of 30 credits (research, teaching or professional in medical physics) and 18 credits for optional subjects.

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

Core study

> Tronc commun *[en-prog-2013-phys2m-lphys220t.html]*

Focuses

> Research focus *[en-prog-2013-phys2m-lphys200a]*
> Teaching focus *[en-prog-2013-phys2m-lphys200d]*
> Professional focus:Medical Physics *[en-prog-2013-phys2m-lphys200s]*

Options courses

> Physique des particules et cosmologie *[en-prog-2013-phys2m-lphys211o.html]*
> Physique statistique et physique mathématique *[en-prog-2013-phys2m-lphys214o.html]*
> Physique de la Terre, des planètes et du climat *[en-prog-2013-phys2m-lphys212o.html]*
> Lumière, atomes et molécules *[en-prog-2013-phys2m-lphys213o.html]*
> Cours au choix *[en-prog-2013-phys2m-lphys240o.html]*

Programme by subject

Core courses [60.0]

⭘ Mandatory	⛌ Optional
△ Courses not taught during 2013-2014	⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014	⧺ Two years course

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

⭘ *Cours de base (30 credits)*

comporte 30 crédits de cours à choisir parmi les cours suivants

					Year 1	Year 2
⛌ LFSAB1104	Numerical methods	Vincent Legat	30h+30h	5 Credits	1q	x
⛌ LMAPR2014	Physics of Functional Materials	Xavier Gonze, Luc Piraux, Gian-Marco Rignanese (coord.)	37.5h +22.5h	5 Credits	1q	x
⛌ LPHY2110	Phénomènes critiques (théorie statistique des champs)	Philippe Ruelle	22.5h	4 Credits	1q	x
⛌ LPHY2111	Introduction à la dynamique non linéaire	Jean Bricmont	30h+15h	5 Credits	1q	x
⛌ LPHY2120	Théorie quantique des champs I (introduction)	Jean-Marc Gérard	22.5h	4 Credits	1q	x
⛌ LPHY2121	Interactions fondamentales	Jean-Marc Gérard	22.5h	4 Credits	1q	x

						Year 1	2
⊠ LPHY2125	Mécanique quantique relativiste	Michel Herquet (compensates Fabio Maltoni), Fabio Maltoni	15h+15h	4 Credits	1q	x	
⊠ LPHY2130	Physique nucléaire I et physique du neutron	Thierry Delbar	45h	5 Credits	1q	x	
⊠ LPHY2131	Physique des particules élémentaires I	Christophe Delaere, Vincent Lemaitre	22.5h +7.5h	5 Credits	1q	x	
⊠ LPHY2137	Electronique analogique	Eduardo Cortina Gil	22.5h +22.5h	5 Credits	1q	x	
⊠ LPHY2140	Photons, atoms and molecules	André Nauts, Xavier Urbain	30h	5 Credits	1q	x	
⊠ LPHY2141	Optique et lasers	Alain Cornet	30h+10h	5 Credits	1q	x	
⊠ LPHY2150	Physique et dynamique de l'atmosphère et de l'océan I	Michel Crucifix, Thierry Fichefet	45h+9h	6 Credits	1q	x	
⊠ LPHY2153	Introduction à la physique du système climatique et à sa modélisation	Hugues Goosse, Jean-Pascal van Ypersele de Strihou	30h+15h	5 Credits	1q	x	
⊠ LPHY2160	Internal Geophysics of the Earth and planets	Nicolas Bergeot, Véronique Dehant (coord.), Pascal Rosenblatt	30h	5 Credits	1q	x	
⊠ LPHY2162	Physique de la haute atmosphère et de l'espace	Viviane Pierrard	22.5h	4 Credits	1q	x	
⊠ LPHY2171	Physique mathématique	Christophe Ringeval	30h+15h	4 Credits	1q	x	
⊠ LPHY2238	Traitement du signal et théorie de l'information	Giacomo Bruno	22.5h +15h	4 Credits	1q	x	
⊠ LPHY2371	Numerical Simulation in Physics	Michel Crucifix, Bernard Piraux	22.5h +30h	5 Credits	1q	x	
⊠ LPHY2372	Experimental methods	Krzysztof Piotrzkowski, Xavier Urbain	30h+15h	4 Credits	1q	x	

○ *Philosophie (un des trois cours suivants) : (2 credits)*

⊠ LSC2001	Introduction to contemporary philosophy	Nathalie Frogneux	30h	2 Credits	2q △	x	
⊠ LSC2220	Philosophy of science	Alexandre Guay	30h	2 Credits	2q	x	
○ LFILO2003E	Ethics in the Sciences and technics (sem)	N.		2 Credits		x	x

○ *Mémoire (28 credits)*

○ LPHY2998	Thesis tutorial	Jan Govaerts, Annick Sonck	15h	2 Credits	1q		x
○ LPHY2999	Mémoire	N.		26 Credits			x

List of focuses

RESEARCH FOCUS [30.0]

O Mandatory	⊠ Optional
△ Courses not taught during 2013-2014	⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014	⧺ Two years course

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

⊠ Physique des particules et cosmologie (30 credits)

Les étudiants choisissent des cours pour un total de 30 crédits parmi la liste de cours ci-dessous.

						Year 1	Year 2
⊠ LPHY2122	Théorie quantique des champs II	Jan Govaerts	30h	5 Credits	2q	x	
⊠ LPHY2126	Cosmologie	Christophe Ringeval	22.5h +7.5h	5 Credits	2q	x	
⊠ LPHY2133	Physique des particules élémentaires II	Krzysztof Piotrzkowski	30h	5 Credits	2q	x	
⊠ LPHY2135	Computing and numerical methods in particle physics	Giacomo Bruno, Christophe Delaere	15h +22.5h	4 Credits	2q	x	
⊠ LPHY1221	Group theory	Philippe Ruelle	22.5h +15h	5 Credits	2q	x	
⊠ LPHY2239	Acquisition des données, électronique digitale et micro-électronique	Eduardo Cortina Gil	22.5h +22.5h	6 Credits	2q	x	
⊠ LPHY2234	Physique du neutrino et astroparticules	Giacomo Bruno, Vincent Lemaitre	30h	5 Credits	2q	x	

⊠ Physique statistique et physique mathématique (30 credits)

Les étudiants choisissent des cours pour un total de 30 crédits parmi la liste de cours ci-dessous.

⊠ LINMA2380	Matrix theory	Paul Van Dooren	30h +22.5h	5 Credits	1q	x	
⊠ LMAT2130	Partial differential equations : Poisson and Laplace equations	Augusto Ponce, Jean Van Schaftingen	30h+30h	5 Credits	1q	x	
⊠ LMAT2160	Mathematics seminar	Enrico Vitale	0h+45h	6 Credits	2q	x	
⊠ LMAT2260	Topics in Complex analysis and geometry	Tom Claeys, Luc Haine	45h	6 Credits	2q	x	
⊠ LMAT2470	Processus stochastiques (statistique)	Jan Johannes	30h	5 Credits	1q	x	
⊠ LPHY2126	Cosmologie	Christophe Ringeval	22.5h +7.5h	5 Credits	2q	x	
⊠ LPHY2122	Théorie quantique des champs II	Jan Govaerts	30h	5 Credits	2q	x	
⊠ LPHY1221	Group theory	Philippe Ruelle	22.5h +15h	5 Credits	2q	x	
⊠ LMECA2771	Thermodynamics of irreversible phenomena.	Miltiadis Papalexandris	30h+30h	4 Credits	2q	x	

⊠ Physique de la terre, des planètes et du climat (30 credits)

Les étudiants choisissent des cours pour un total de 30 crédits parmi la liste de cours ci-dessous.

⊠ LMAPR2510	Mathematical ecology	Eric Deleersnijder, Emmanuel Hanert	30h +22.5h	5 Credits	2q	x	
⊠ LMECA2771	Thermodynamics of irreversible phenomena.	Miltiadis Papalexandris	30h+30h	4 Credits	2q	x	
⊠ LPHY2151	Physique et dynamique de l'atmosphère et de l'océan II	Michel Crucifix, Thierry Fichefet	30h	5 Credits	2q	x	

						Year 1	2
⊠ LPHY2161	Geodesy and GNSS (Global Navigation Satellite System)	Nicolas Bergeot (coord.), Véronique Dehant, Pascal Rosenblatt	30h	5 Credits	2q	x	
⊠ LPHY2252	Compléments de modélisation du système climatique	Michel Crucifix, Thierry Fichefet, Hugues Goosse	45h+7.5h	6 Credits	2q	x	
⊠ LPHY2253	Télédétection des changements climatiques	Didier Fussen	22.5h +15h	5 Credits	2q	x	
⊠ LPHY2126	Cosmologie	Christophe Ringeval	22.5h +7.5h	5 Credits	2q	x	

⊠ *Lumière, atomes et molécules (30 credits)*

Les étudiants choisissent des cours pour un total de 30 crédits parmi la liste de cours ci-dessous.

⊠ LPHY1221	Group theory	Philippe Ruelle	22.5h +15h	5 Credits	2q	x	
⊠ LPHY2144	Physique moléculaire	André Nauts	22.5h	4 Credits	2q	x	
⊠ LPHY2245	Lasers and applications	Alain Cornet	45h+15h	6 Credits	2q	x	
⊠ LPHY2253	Télédétection des changements climatiques	Didier Fussen	22.5h +15h	5 Credits	2q	x	
⊠ LPHY2239	Acquisition des données, électronique digitale et micro-électronique	Eduardo Cortina Gil	22.5h +22.5h	5 Credits	2q	x	
⊠ NSPHY2206	Photoémission	N.	22h+8h	3 Credits	2q	x	
⊠ NSPHY2111	Introduction à la science des couleurs	N.	22h+8h	3 Credits	2q	x	
⊠ NSPHY2214	Simulations en optique (optique numérique)	N.	8h+22h	2 Credits	2q	x	
⊠ NSPHY2215	Profils spectraux	N.	22h+8h	3 Credits	2q	x	

TEACHING FOCUS [30.0]

O Mandatory	⊠ Optional
△ Courses not taught during 2013-2014	⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014	⧺ Two years course

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

						Year 1	2
O LPHY2310	Stages d'enseignements en physique (en ce compris le séminaire d'intégration des stages)	Jim Plumat	15h+40h	7 Credits		x	x

O *Module concevoir, planifier et évaluer des pratiques d'enseignement et d'apprentissage*

O LAGRE2220	General didactics and education to interdisciplinarity	Ghislain Carlier, Myriam De Kesel, Jean-Louis Dufays, Anne Ghysselinckx, Philippe Parmentier, Marc Romainville, Bernadette Wiame	22.5h +15h	3 Credits		x	x
O LPHY2320	Didactique et épistémologie de la physique	Jim Plumat	60h	6 Credits		x	x

O Didactique et épistémologie d'une autre discipline (en ce compris le stage d'écoute) (4 credits)

un cours au choix parmi les cours suivants

⊠ LMAT2320A	Didactique et épistémologie de la mathématique (en ce compris le stage d'écoute)	Christiane Hauchart	37.5h +10h	4 Credits		x	x
⊠ LSNAT2320A	Didactique et épistémologie des sciences naturelles (mineure) en ce compris le stage d'observation	Myriam De Kesel, Bernard Tinant	37.5h +10h	4 Credits		x	x
⊠ LGEO2320A	Didactique et épistémologie de la géographie (en ce compris le stage d'écoute)	Marie-Laurence De Keersmaecker	37.5h +10h	4 Credits		x	x

O *Module comprendre et analyser l'institution scolaire et son contexte*

O LAGRE2120	The school institution and its context	Branka Cattonar, Dominique Grootaers, Christian Lannoye, Caroline Letor	22.5h +25h	4 Credits		x	x
O LAGRE2400	See specifications in french	Anne Ghysselinckx (coord.)	20h	2 Credits		x	x

O *Module animer un groupe et travailler en équipe*

O LAGRE2020	To understand the adolescent in school situation, to manage the interpersonal relationship and to animate the class group	Ann d'Alcantara, James Day, Xavier Dejemeppe, Bernard Demuysere, Jean Goossens, Christian Lannoye, Pierre Meurens, Pascale Steyns (coord.), Pascal Vekeman	22.5h +22.5h	4 Credits		x	x

PROFESSIONAL FOCUS:MEDICAL PHYSICS [30.0]

Les étudiants ayant choisi cette finalité doivent obligatoirement avoir choisi les cours PHY 2130, PHY 2236 et PHY 2340 parmi les cours de base et les cours au choix. Ils suivront aussi tous les cours repris ci-dessous.

O Mandatory	⊠ Optional
△ Courses not taught during 2013-2014	⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014	⧺ Two years course

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

						Year 1	2
O WRDTH3120	Dosimétrie en radiothérapie et contrôle de qualité	Stefaan Vynckier	30h	3 Credits		x	
O WRDTH3160	Dosimétrie informatisée en radiothérapie	Vincent Grégoire, Pierre Scalliet, Stefaan Vynckier (coord.)	30h+60h	5 Credits			x
O WRPR2330	Utilisation des radioisotopes et des molécules marquées en biologie	Bernard Gallez (coord.), Thierry Vander Borght	15h+15h	3 Credits			x
O LGBIO2050	Medical Imaging	Anne Bol, John Lee, John Lee (compensates Benoît Macq), Benoît Macq, Frank Peeters	30h+30h	5 Credits	1q	x	x
O WANAT1370	Radiologic anatomy and normal imaging	Laurence Annet, Emmanuel Coche, Etienne Danse, Thierry Duprez, Frédéric Lecouvet, Bruno Vande Berg (coord.)	30h+7.5h	3 Credits	2q	x	
O WRDTH3131	Radiobiologie	Vincent Grégoire, Pierre Scalliet (coord.)	22.5h	2 Credits			x
O WRPR2001	Notions de base de radioprotection	Vincent Grégoire (coord.), Patrick Smeesters	10h+5h	2 Credits			x
O LPHY2135	Computing and numerical methods in particle physics	Giacomo Bruno, Christophe Delaere	15h +22.5h	4 Credits	2q	x	x
O LPHY2340	Use, management and control of radio elements	Pascal Froment	22.5h	3 Credits	2q	x	x

Options [30.0]

L'étudiant complète son programme avec 30 crédits à choisir dans les options et les cours au choix ci-dessous.

L'étudiant choisit au moins 20 crédits d'une option et complète le programme de son option dans la liste des cours au choix ou d'une autre option.

> Physique des particules et cosmologie *[en-prog-2013-phys2m-lphys211o]*
> Physique statistique et physique mathématique *[en-prog-2013-phys2m-lphys214o]*
> Physique de la Terre, des planètes et du climat *[en-prog-2013-phys2m-lphys212o]*
> Lumière, atomes et molécules *[en-prog-2013-phys2m-lphys213o]*
> Cours au choix *[en-prog-2013-phys2m-lphys240o]*

PHYSIQUE DES PARTICULES ET COSMOLOGIE [20.0]

O Mandatory
⊠ Optional
△ Courses not taught during 2013-2014
⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014
⧺ Two years course

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

						Year 1	Year 2
⊠ LPHY2130	Physique nucléaire I et physique du neutron	Thierry Delbar	45h	5 Credits	1q		x
⊠ LPHY2223	Interactions fortes et symétries	Pierre Artoisenet (compensates Fabio Maltoni), Céline Degrande (compensates Jean-Marc Gérard), Jean-Marc Gérard, Fabio Maltoni	30h	5 Credits	1q		x
⊠ LPHY2224	Interaction électrofaible	Jean-Marc Gérard, Fabio Maltoni, Christopher Smith (compensates Jean-Marc Gérard), Christopher Smith (compensates Fabio Maltoni)	22.5h	4 Credits	1q		x
⊠ LPHY2263	Astrophysique et éléments d'astrophysique nucléaire	Maryline Briquet	30h	5 Credits	1q		x
⊠ LPHY2502	Séminaire de cosmologie, physique des particules et phénoménologie	Eduardo Cortina Gil	0h+15h	5 Credits			x
⊠ LPHY2236	Détecteurs et électronique nucléaires et mesure des radiations ionisantes	Eduardo Cortina Gil	37.5h +55h	5 Credits	1q		x
⊠ LPHY2237	Cosmology II	Christophe Ringeval	22.5h +7.5h	5 Credits	1q		x

PHYSIQUE STATISTIQUE ET PHYSIQUE MATHÉMATIQUE [20.0]

O Mandatory
⊠ Optional
△ Courses not taught during 2013-2014
⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014
⧺ Two years course

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

						Year 1	Year 2
⊠ LINMA2361	Nonlinear systems	Pierre-Antoine Absil	30h +22.5h	5 Credits	1q		x

						Year 1	Year 2
⊠ LMAT2270	Geometry symplectic and mathematical physics	Pierre Bieliavsky	45h	5 Credits	2q △		x
⊠ LMAT2410	Partial differential equation : heat equation, brownian moves and numerical aspects	Augusto Ponce, Jean Van Schaftingen	30h+15h	5 Credits	2q		x
⊠ LPHY2212	Physique mathématique avancée	Philippe Ruelle	30h+15h	4 Credits	1q		x
⊠ LPHY2501	Séminaire de physique théorique et mathématique	Fabio Maltoni	0h+15h	5 Credits			x
⊠ LPHY2263	Astrophysique et éléments d'astrophysique nucléaire	Maryline Briquet	30h	5 Credits	1q		x
⊠ LSC2002	Elements of mathematics and physics history	Patricia De Grave	30h	4 Credits	1q		x

PHYSIQUE DE LA TERRE, DES PLANÈTES ET DU CLIMAT [20.0]

O Mandatory
⊠ Optional
△ Courses not taught during 2013-2014
⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014
⧺ Two years course

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

						Year 1	Year 2
⊠ LBIRE2103	General hydrology	Charles Bielders, Marnik Vanclooster (compensates Charles Bielders), Marnik Vanclooster (coord.)	30h +22.5h	5 Credits	1q		x
⊠ LGEO1343	Remote sensing	Eric Lambin	30h+30h	5 Credits	1q		x
⊠ LMECA1120	Introduction to finite element methods.	Vincent Legat	30h+30h	5 Credits	2q		x
⊠ LMECA2141	Rheology.	Christian Bailly, Vincent Legat	30h+30h	5 Credits	1q		x
⊠ LMECA2853	Turbulence.	Eric Deleersnijder, Grégoire Winckelmans	30h+30h	5 Credits	1q		x
⊠ LPHY2263	Astrophysique et éléments d'astrophysique nucléaire	Maryline Briquet	30h	5 Credits	1q		x
⊠ LPHY2504	Séminaire de climatologie physique et de géophysique	Thierry Fichefet	0h+15h	5 Credits		x	x

LUMIÈRE, ATOMES ET MOLÉCULES [20.0]

O Mandatory
⊠ Optional
△ Courses not taught during 2013-2014
⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014
⧺ Two years course

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

						Year 1	Year 2
⊠ LPHY2242	Méthodes d'analyse en physique atomique et moléculaire	Xavier Urbain	30h	5 Credits	1q		x
⊠ LPHY2243	Questions spéciales d'optique quantique	Bernard Piraux	37.5h	5 Credits	1q		x
⊠ LPHY2263	Astrophysique et éléments d'astrophysique nucléaire	Maryline Briquet	30h	5 Credits	1q		x
⊠ LPHY2246	Basses pressions et physique du vide	Laurent Francis, Benoît Hackens	30h	5 Credits	1q		x
⊠ LPHY2273	Cryophysique et questions spéciales de supraconductivité	Vincent Bayot, Luc Piraux (coord.)	45h+15h	6 Credits	1q		x
⊠ LPHY2503	Séminaire de physique atomique, moléculaire et optique	Xavier Urbain	0h+15h	5 Credits			x

						Year 1	2
NSPHY2213	Optronique	N.	22h+8h	3 Credits	1q		x
NSPHY2212	Biophotonique	N.	22h+8h	3 Credits	1q		x

COURS AU CHOIX [10.0]

O Mandatory
⊘ Optional
△ Courses not taught during 2013-2014
⊘ Periodic courses not taught during 2013-2014
⊕ Periodic courses taught during 2013-2014
⧺ Two years course

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

						Year 1	2
⊘ LPHY2505	Séminaire sur les fondements de la physique	Patricia De Grave	15h	5 Credits		x	x
⊘ LMAPR2631	Solid surface analysis and treatment	Arnaud Delcorte, Bernard Nysten	37.5h +15h	5 Credits	2q	x	x

⊘ Cours au choix recommandés pour la finalité didactique

⊘ LMAT2330	Seminar on the teaching of mathematics	Christiane Hauchart, Enrico Vitale	0h+45h	5 Credits		x	x
⊘ LCHM2330	Séminaire de didactique de la chimie	Agnès Gnagnarella, Bernard Tinant	0h+30h	5 Credits		x	x
⊘ LGEO2330	Séminaire de didactique de la géographie	Marie-Laurence De Keersmaecker	0h+30h	5 Credits		x	x
⊘ LBIO2330	Séminaire de didactique de la biologie	Myriam De Kesel	0h+30h	5 Credits		x	x

⊘ Cours au choix recommandés pour la finalité spécialisée : physique médicale

⊘ LIEPR1002	Essentials of systematic and functional anatomy	Catherine Behets Wydemans (coord.), Marc Louis	45h	6 Credits		x	x
⊘ LIEPR1004	Cell biology and fundamentals in histology	Catherine Behets Wydemans, Patrick Henriet	45h	5 Credits	2q	x	x
⊘ WRPR2002	Compléments de radioprotection	Philippe Clapuyt, François Jamar, Pierre Scalliet (coord.), Patrick Smeesters	20h+10h	3 Credits		x	x
⊘ WRDGN3120	Methods, techniques and quality controle in medical imaging	Emmanuel Coche (coord.), François Jamar, Renaud Lhommel, Nicolas Michoux, Bruno Vande Berg	25h+5h	3 Credits		x	x
⊘ LMECA2600	Introduction to nuclear engineering and reactor technology.	Hamid Aït Abderrahim	30h+30h	5 Credits	1q	x	x
⊘ WRPR3010	Questions spéciales de radioprotection	Philippe Clapuyt, François Jamar, Pierre Scalliet (coord.), Patrick Smeesters, Jean-Paul Trigaux, Stefaan Vynckier	40h	4 Credits		x	x
⊘ WMNUC2100	Master and compelmentary master	François-Xavier Hanin, Thierry Vander Borght (coord.)	15h	2 Credits	1q	x	x
⊘ LPHY2236	Détecteurs et électronique nucléaires et mesure des radiations ionisantes	Eduardo Cortina Gil	37.5h +55h	5 Credits	1q	x	x