PHYS2M1 - Introduction

Introduction

Introduction

The physicist possesses great capacities of reasoning and abstraction. He.she continually asks questions about the physical world around him.her in order to understand how it works. He.she observes, makes assumptions, formalizes concepts, and writes and solves the equations governing them in order to confront them with observations and experience. Thanks to his.her advanced and versatile scientific training, he.she contributes to the great challenges of the Society of today and tomorrow. He.she is involved in cutting-edge research and the resolution of important questions related to the genesis and evolution of the Universe, fundamental interactions between elementary particles, quantum optics, statistical physics, origins of the Earth, global climate change, sustainable development, energy choices, etc.

The skills developed by the physicist as part of his.her training, including his.her ability to model and characterize large data sets, can be valued in many professions specific to the realms of today's physics, such as superconductivity, instrumentation and metrology, laser physics, nuclear physics, nonlinear physics, cosmology, astrophysics, astronomy, planetology, geophysics, meteorology, climatology, oceanography and glaciology, or fields as diverse as medical sciences, space sciences and signal processing, but also actuarial sciences, finance, consultancy, banking and all areas where statistical methods, IT and tools related to artificial intelligence are important. Through his.her teamwork skills, the physicist also develops skills in communication, scientific popularization and management. His.her various skills enables him.her to contribute to the creation of tomorrow's jobs.

The objective the Master [120] in Physics is to enable you : (1) to master the fundamental laws and essential tools of today's physics and (2) to acquire disciplinary skills and cross-cutting essential to exercise a professional activity related to physics. It does not give access to the PhD in Science.

Your profile

You hold a Bachelor's degree in physics or a Bachelor's or Master's degree in a discipline related to physics and you want complete in one year your training in physics. You then have the profile to begin a Master [60] in Physics. You will have the chance to receive a personalized training with internationally recognized teachers.

Your future job

The training in physics aims at mastering advanced physical and mathematical tools. It develops skills such as curiosity and scientific rigor, the capacity for abstraction, the modeling of complex physical problems, the sense of precision and experimental measurement as well as the ability to work in a team and to communicate.

Thanks to this versatile training, there are many career opportunities.

One main track is to start a career in develops 9e 1 w 0 0.5 acit a 380.04299927 Tm bnities.

PHYS2M1 - Teaching profile

Learning outcomes

Observe and understand the physical reality of the world around him.her, understand it, explain it and model it, these are the challenges that the student enroled in the Master [60] in Physics is preparing to meet. This programme aims to develop mastery of the fundamental laws and essential tools of today's physics. It leads to the acquisition of skills such as the ability to analyze a physical problem, the ability of abstraction and modeling, the rigor in reasoning and expression, the autonomy and the ability to communicate, including in English.

At the end of his.her training at the Faculty of Sciences, the student will have acquired the disciplinary and cross-disciplinary knowledge, and skills needed to perform numerous professional activities. His.her modeling and in-depth understanding of phenomena, his.her liking for research and his.her scientific rigor will be sought not only in scientific professions (research, development, teaching, etc.), but also more generally in the current and future Society.

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

1. Master and use in depth the specialized knowledges of physics.

1.1 Formulate the fundamental concepts of current physical theories, highlighting their main ideas, and link these theories together.

1.2 Identify and apply physical theories to solve a problem.

1.3 Know and use adequately the principles of experimental physics : measurements, their uncertainties, measuring instruments and their calibration, the processing of data by computer tools.

1.4 Explain and design a measurement method and implement it.

1.5 Model complex systems and predict their evolution using numerical methods, including computer simulations.

1.6 Retrace the historical evolution of physical concepts and recognizetoricat problem. th5lc57e(putec3bration, the pross6ce tm [b0le msimulations.)] TJ

8.1 Achieve a level of expertise in a chosen field of contemporary physics.

⛒ LPHYS2122	Cosmology	Christophe Ringeval	EN [q2] [30h] [5 Credits] > *French-friendly*

⛒ Physique des particules

⛒ LPHYS2131	Fundamental interactions and elementary particles	Agni Bethani (compensates Christophe Delaere) Céline Degrande Christophe Delaere Vincent Lemaitre	EN [q1] [52.5h+7.5h] [10 Credits] > *French-friendly*
⛒ LPHYS2132	Quantum field theory 1	Céline Degrande Marco Drewes	EN [q1] [52.5h+7.5h] [10 Credits] > *French-friendly*

⛒ Physique atomique, moléculaire et optique

⛒ LPHYS2141	Introduction to quantum optics	Matthieu Génévriez Xavier Urbain	EN [q1] [22.5h+7.5h] [5 Credits] > *French-friendly*
⛒ LPHYS2143	Optics and lasers	Clément Lauzin	EN [q1] [22.5h+22.5h] [5 Credits] > *French-friendly*

⛒ Physique de la Terre, des planètes et du climat

⛒ LPHYS2161	Internal geophysics of the Earth and planets		EN [q1] [22.5h+7.5h] [5 Credits] △ > *French-friendly*
⛒ LPHYS2162	Introduction to the physics of the climate system and its modelling	Hugues Goosse Francesco Ragone	EN [q1] [22.5h+22.5h] [5 Credits] > *French-friendly*
⛒ LPHYS2163	Atmosphere and ocean : physics and dynamics		

[redacted]

[redacted]

Atmosphere and ocean : physics and dynamics EN

⛒ LPHYS2163

UE au choix [10.0]

Philippe Ruelle

UE AU CHOIX [10.0]

- 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...)

Content:

Physique statistique et mathématique

LPHYS2211	Group theory	Philippe Ruelle	EN [q2] [22.5h+22.5h] [5 Credits] > *French-friendly*
LPHYS2211	Statistical field theory	Christian Walmsley Hagendorf	EN

Physique statistique et mathématique

Physique statistique et mathématique

EN [q2] [22.5h+22.5h] [5 Credits]

Emmanuel Dekemper

⊠ Physique de la Terre, des planètes et du climat

⊠ LPHYS2260	Geodesy and GNSS (Global Navigation Satellite System)		EN [q2] [30h] [5 Credits] ⊘ > *French-friendly*
⊠ LPHYS2264	Oscillations and instabilities in the climate system	Michel Crucifix	EN [q2] [30h] [5 Credits] ⊘ > *French-friendly*
⊠ LPHYS2265	Sea ice-ocean-atmosphere interactions in polar regions	Thierry Fichefet	EN [q2] [30h] [5 Credits] ⊕ > *French-friendly*
⊠ LPHYS2266	Physics of the upper atmosphere and space	Viviane Pierrard	EN [q2] [22.5h+7.5h] [5 Credits] > *French-friendly*
⊠ LPHYS2267	Paleoclimate dynamics and modelling	Qiuzhen Yin	EN [q2] [22.5h+7.5h] [5 Credits] > *French-friendly*
⊠ LPHYS2268	Forecast, prediction and projection in climate science	François Massonnet	EN [q2] [22.5h+7.5h] [5 Credits] > *French-friendly*
⊠ LPHYS2269	Remote sensing of climate change	Emmanuel Dekemper	

Supplementary classes

To access this Master, students must have a good command of certain subjects. If this is not the case, in the first annual block of their Masters programme, students must take supplementary classes chosen by the faculty to satisfy course prerequisites.

Rem : These additional teaching units (maximum 60 credits) will be selected in the programme of the second and third annual units of the Bachelor's degree in physics, in consultation with the Study advisor, depending on the previous teaching units followed by the student and his.her training project, and will be submitted to the approval of the School of Physics.

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Enseignements supplémentaires

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.

PHYS2M1 - 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

- President: Christophe Ringeval
- Secretary: Christophe Delaere
- Study advisor: François Massonnet
- Study advisor: Gauthier Durieux

Useful Contact(s)

- Administrative manager for the student's annual program: Catherine De Roy