

At Louvain-la-Neuve - 180 credits - 3 years - Day schedule - In French

Dissertation/Graduation Project : **NO** - Internship : **NO**

Activities in English: **YES** - Activities in other languages : **NO**

Activities on other sites : **NO**

Main study domain : **Sciences**

Organized by: **Faculty of Science (SC)**

Programme acronym: **PHYS1BA** - Francophone Certification Framework: 6

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PHYS1BA - Introduction

Introduction

Introduction

The physicist possesses great capacities of reasoning and abstraction. He/she continually asks questions about the physical world

PHYS1BA - Teaching profile

Learning outcomes

Understanding, explaining and applying the foundations of the scientific method and the fundamental laws of physics are the challenges that the student enrolled in the Bachelor in physics is preparing to meet in order to mobilize his/her knowledge and skills to follow the Master [120] in physics.

At the end of this programme, the student will have acquired a basic knowledge of the fundamental laws of physics and the basic concepts of mathematics necessary for the study of physics. He/she will be able to solve physics problems using mathematical and numerical tools, to analyze physical phenomena using experimental techniques, to model simple physical systems, to apply a scientific approach and to argument with rigor. He/she will have developed skills in self-reliance, communication and teamwork.

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 skills and in-depth understanding of phenomena, his/her liking for research and his/her scientific rigor will be sought not only in the scientific professions (research, development, teaching, etc.), but also more generally in the present and future Society.

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

1. Demonstrate a thorough knowledge of the fundamental laws of physics and master and use the basic concepts of mathematics.

1.1 Explain the basic concepts of general physics, microscopic physics, statistical physics, macroscopic physics, theoretical and mathematical physics, experimental physics, and numerical simulation in physics.

1.2 Use the basic tools of mathematical analysis, algebra, geometry and statistics.

1.3 Recognize the fundamental concepts of scientific theories.

1.4 Apply physical and mathematical theories to solve a problem.

1.5 Adequately employ the basic principles of experimental physics: measurements and their uncertainties, measuring instruments, basic data processing by computer tools.

1.6 Explain a measurement method.

1.7 Model simple systems and predict their evolution using numerical methods, including computer simulations.

1.8 Reconstitute the historical evolution of the basic concepts of physics.

2. Demonstrate methodological, technical, and practical skills for problem solving in physics.

2.1 Justify the choice of methods and tools used to solve known problems in physics.

2.2 Properly use instruments to perform a measurement or study a physical system.

2.3 Correctly handle computer tools to help solve problems in physics.

2.4 Apply basic tools to model simple physical systems and solve known problems in the fundamental areas of physics.

3. Describe and evaluate a scientific approach and reasoning.

3.1 Evaluate the simplicity, clarity and rigor of a scientific reasoning.

3.2 Build physical reasoning and formalize it.

3.3 Argue the validity of a scientific result.

3.4 Calculate the orders of magnitude of a problem in physics.

3.5 Recognize the analogies between different problems in physics.

3.6 Judge the relevance of a scientific approach and the interest of a physical theory.

4. Learn and act independently.

4.1 Search, with relevant references, for additional information on the basic concepts of physics.

4.2 Read and interpret this information alone.

4.3 Integrate this information in order to have a complete understanding of a concept.

4.4 Organize and manage time and study.

5. Work in a team and collaborate with students and teachers to achieve common goals and produce results.

5.1 Share knowledge and methods.

5.2 Identify individual and collective goals and responsibilities and work in accordance with these roles.

5.3 Join a team.

5.4 Recognize and respect the views and opinions of team members.

6. Communicate in French and English as part of his academic training.

6.1 Read and understand scientific texts in French and English (C1 CEFR level).

6.2 Follow a scientific presentation in English (level B2 CEFR).

6.3 Orally present a topic in a structured way in French and / or English.

6.4 Write scientific reports in a structured way and cite the sources correctly.

Programme structure

The programme leading to the Bachelor degree in physics consists of (1) a general training called major in physics (150 credits) and (2) either an additional module in physics (30 credits) or a minor or additional module in another discipline (30 credits). It is spread over three annual units of 60 credits each and allows you to address the main topics of today's physics and acquire the knowledge and skills necessary to start a Master [120] in physics. It includes many practicals (exercises, laboratories and personal or group projects) and gives you the opportunity to carry out a research work.

The programme of the major in physics includes:






- a basic training in physics (34 credits);
- an advanced training in physics (35 credits);
- a specialized training in physics (12 credits);
- a training in mathematics (38 credits);
- a training in digital and instrumental techniques, data science and computer science (15 credits);
- a training in chemistry (5 credits);
- a training in languages (English) and human sciences (11 credits).

It should be noted that the programme of the first annual unit of the Bachelor in physics is very similar to the one of the first annual unit of the Bachelor in mathematics.

PHYS1BA Programme

Detailed programme by subject

- Mandatory
 - ⊗ Optional
 - △
-

				Year		
				1	2	3
○ LPHYS1241	Quantum Physics 1	Marco Drewes	EN [q2] [30h+30h] [5 Credits] 		x	
○ LPHYS1322	Electromagnetism 2	Céline Degrande	FR [q1] [37.5h+22.5h] [5 Credits]  > English-friendly			x
○ LPHYS1332	General Relativity	Christophe Ringeval	FR [q1] [30h+22.5h] [4 Credits]  > English-friendly			x
○ LPHYS1342	Quantum Physics 2	Christophe Ringeval	FR [q1] [45h+22.5h] [5 Credits]  > English-friendly			x
○ LPHYS1343	Statistical physics	Christian Walmsley Hagendorf	FR [q2] [45h+30h] [6 Credits]  > English-friendly			x

List of available minors

In addition to the major in physics, the student has three possibilities :

- opting for the additional module in physics ;
- opting for a minor or additional module offered by
 - the Faculty of Sciences :
 - Minor in mathematics
 - Minor in geography
 - Minor in scientific culture
 - Additional module in statistics and data sciences

- the Louvain School of Engineering :

NB : The choice of such a minor must be done in concertation with the study advisers of the School of Physics and Louvain School of Engineering

- - Minor in computer sciences
 - Minor in engineering sciences : applied mathematics
 - Minor in engineering sciences : mechanics
 - Minor in engineering sciences : applied chemistry and physics
 - Minor in engineering sciences : electricity
 - Minor in engineering sciences : biomedical
 - Minor in engineering sciences: construction
- opting for one of the following minors proposed by the Sector of Human Sciences :
 - Minor in culture and creation
 - Minor in sustainable development (*this program is subject to access criteria*)
 - Minor in the study of the kind

- > [Minor in Culture and Creation](#) [en-prog-2023-mincucrea]
- > [Minor in Scientific Culture](#) [en-prog-2023-mincults]
- > [Minor : Issues of Transition and Sustainable Development \(*\)](#) [en-prog-2023-mindd]
- > [Minor in Gender Studies](#) [en-prog-2023-mingenre]
- > [Minor in Geography](#) [en-prog-2023-mingeog]
- > [Minor in Computer Sciences](#) [en-prog-2023-minsinf]
- > [Additional module in Physics](#) [en-prog-2023-apphys]
- > [Approfondissement en statistique et sciences des données](#) [en-prog-2023-appstat]
- > [Minor in numerical technologies and society](#) [en-prog-2023-minstic]
- > [Minor in Mechanics](#) [en-prog-2023-lminomeca]
- > [Minor in Construction](#) [en-prog-2023-lminogce]
- > [Minor in Electricity](#)

Course prerequisites

The **table** below lists the activities (course units, or CUs) for which there are one or more prerequisites within the programme, i.e. the programme CU for which the learning outcomes must be certified and the corresponding credits awarded by the jury before registering for that CU.

These activities are also identified in the **detailed programme**: their title is followed by a yellow square.

Prerequisites and student's annual programme

As the prerequisite is for CU registration purposes only, there are no prerequisites within a programme year. Prerequisites are defined between CUs of different years and therefore influence the order in which the student will be able to register for the programme's CUs.

In addition, when the jury validates a student's individual programme at the beginning of the year, it ensures its coherence, meaning that it may:

- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.
- transform a prerequisite into a corequisite if the student is in the final year of a degree course.

For more information, please consult the [Academic Regulations and Procedures](https://uclouvain.be/fr/decouvrir/rgee.html) (https://uclouvain.be/fr/decouvrir/rgee.html).

Prerequisites list

LANG1862 "English: reading and listening comprehension of scientific texts" has prerequisite(s) LANG1861

- LANG1861 - English: reading and listening comprehension of scientific texts

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.

Detailed programme per annual block

PHYS1BA - 1ST ANNUAL UNIT

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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...)

○ Majeure

○ Basic training in physics

○ Training in mathematics

○ LMAT1121	Differential and integral calculus	Tom Claeys	PS [q1] [30h] +30h] [5 Credits]
○ LMAT1122	Mathematical analysis : differentiation	Augusto Ponce	PS [q2] [45h] +45h] [8 Credits]
○ LMAT1131	Linear Algebra	Marino Gran	PS [q1] [45h] +45h] [8 Credits]
○ LMAT1141	Geometry I	Pascal Lambrechts	PS [q2] [45h] +30h] [7 Credits]

PHYS1BA - 2ND ANNUAL UNIT

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊙ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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...)

o Majeure**o Basic training in physics**

● LMAT1261	Lagrangian and Hamiltonian mechanics	Christian Walmsley Hagendorf	(FR) [q1] [22.5h +30h] [5 Credits] 🌐 > English- friendly
● LPHYS1221	Electromagnetism 1	Gwenhaël de Wasseige Vincent Lemaitre	(FR) [q1] [52.5h +52.5h] [10 Credits] 🌐

o Advanced training in physics

PHYS1BA - 3RD ANNUAL UNIT

- Mandatory
 - ✘ Optional
 - △ Not offered in 2023-2024
 - Not offered in 2023-2024 but offered the following year
 - ⊕ Offered in 2023-2024 but not the following year
 - △ ⊕ Not offered in 2023-2024 or the following year
 - Activity with requisites
 - 🌐 Open to incoming exchange students
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○ LANG1863	English for Students in Sciences (Upper-Intermediate level)	Ahmed Adriouche (coord.) Catherine Avery (coord.) Amandine Dumont (coord.) Sandrine Jacob (coord.) Nevin Serbest Florence Simon Françoise Stas (coord.)	EN [q1 or q2] [30h] [2 Credits]
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○ Philosophy

○ LSC1120A	Philosophy	Charles Pence	
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PHYS1BA - Information

Access Requirements

Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.

The admission requirements must be met prior to enrolment in the University.

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

SUMMARY

- [General access requirements](#)
- [Specific access requirements](#)
- [Access based on validation of professional experience](#)
- [Special requirements to access some programmes](#)

General access requirements

Except as otherwise provided by other specific legal provisions, admission to undergraduate courses leading to the award of a Bachelor's degree will be granted to students with one of the following qualifications :

1. A Certificate of Upper Secondary Education issued during or after the 1993-1994 academic year by an.:

- For any secondary school diploma **from a European Union country**, the admission request must contain the equivalence of your diploma or, at the very least, proof of the filing of the equivalence request with the Wallonia-Brussels Federation (French Community of Belgium). For any information relating to obtaining an equivalence, please refer to [the following site](#).
- For any secondary school diploma **from a country outside the European Union**, the admission application must contain the [equivalence of your diploma](#) issued by the Wallonia-Brussels Federation (French Community of Belgium). If you have a restrictive equivalence for the programme of your choice, in addition of it, you **must** have either the [DAES](#) or a certificate of successful completion of the [examination giving access to 1st cycle studies](#) when you submit your application

Access based on validation of professional experience

Admission to undergraduate studies on the basis of accreditation of knowledge and skills obtained through professional or personal experience (Accreditation of Prior Experience)

Subject to the general requirements laid down by the authorities of the higher education institution, with the aim of admission to the undergraduate programme, the examination boards accredit the knowledge and skills that students have obtained through their professional or personal experience.

This experience must correspond to at least five years of documented activity, with years spent in higher education being partially taken into account: 60 credits are deemed equivalent to one year of experience, with a maximum of two years being counted. At the end of an assessment procedure organized by the authorities of the higher education institution, the Examination Board will decide whether a

Teaching method

During the first annual unit :

- Sessions are organized around working method issues such as how to approach different subjects and time management.
- Tutorials allow students to take stock of the subjects presented at the courses: teachers in each discipline answer questions and explain the less understood concepts.
- Compulsory tests are organized one month after the start of classes in the first semester.

During the three annual units :

- Exercise and laboratory sessions are organized in small groups and supervised by assistants. Some practicals are subject to knowledge checks at the beginning of the session and reports to be written at the end of the session.
- Personal and / or group work is planned for certain activities.
- Websites are associated with most teaching units : useful information for the student is deposited there.

Evaluation

The evaluation methods comply with the regulations concerning studies and exams (<https://uclouvain.be/fr/decouvrir/rgee.html>). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

Different modalities are implemented for the assessment of the knowledge and skills acquired during the training; they are adapted to the types of services: continuous evaluation, notably for the practicals, evaluation of the personal and group work, and global evaluation (written and / or oral) during the exam sessions.

Mobility and/or Internationalisation outlook

International mobility is recommended rather within the framework of master programmes. In special cases, however, it is possible to consider international mobility at the end of the bachelor's degree.

Moreover, participation in a short mobility can be envisaged at the end of the bachelor's degree in the framework of the Athens network

