

**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**Table of contents**

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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 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 thorough 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, the 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 the supraconductivity, instrumentation and metrology, laser physics, nuclear physics, nonlinear physics, cosmology, astrophysics, astronomy, planetology, geophysics, meteorology, climatology, oceanography and glaciology, or in fields as varied as the medical sciences, space sciences, 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 will enable him/her to contribute to the creation of tomorrow's jobs.

At the end of your Bachelor studies in physics, you

- will have received training that will allow you to learn specialized subjects in physical sciences;
- will be able to deal with advanced physics issues alone or in groups;
- will be able to analyze and model complex phenomena using your theoretical knowledge and technical skills;
- will have a sufficient level of English to understand a scientific presentation or read a scientific text in that language.

#### Your profile

You are curious and interested in understanding the physical phenomena of the world around you. You like sciences, especially physics and mathematics. You appreciate the precision and rigor of a reasoning. Making assumptions and testing them is your passion. You then have the profile to start Bachelor studies in physics.

You will have the chance to follow a personalized education with internationally recognized teachers. It is better if you already have a good level in physics and mathematics, but you have to know that the teaching restarts almost to zero. It is your desire to invest that will make the difference, we will do everything to help you !

#### 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 research (university laboratories, private laboratories, European Organization for Nuclear Research - CERN, Atomic Energy Commission, Institute for Space Aeronomy of Belgium, Royal Meteorological Institute of Belgium, Royal Observatory of Belgium, etc.) or in secondary and / or higher education (high schools).

Physicists also find jobs in the private or financial sector. Some of them work in the medical field as a hospital physicist, in the high technology industry (telecommunications, optics, aeronautics, space industry, medical equipment, etc.), in the field of energy, in the field of information technology (big data processing, design of calculation programs, etc.), for banks and insurance companies, in the field of environmental consultancy and in the sector of scientific communication and popularization.

#### Your programme

The programme of the Bachelor's in physics offers:

- a basic training in physics, mathematics and chemistry;
- specialized and advanced teaching units in physics;
- an understanding of the physicist's specific approach (observe, understand, analyze in a critical and quantitative way and model the physical phenomena of nature);
- an introduction to digital and instrumental techniques, data sciences and computer science;
- language (English) and human science teaching units;
- a lot of practical works (exercises, laboratories and personal or group projects);
- the possibility to conduct a research work;
- an additional module or minor of 30 credits.

Once graduated, you will be able to continue your training by following the Master [120] in physics.

## 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.
  - 6.5 Use a variety of media and computer tools to communicate and explain scientific concepts and results.

## 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
- △ 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...)

|  | Year |   |   |
|--|------|---|---|
|  | 1    | 2 | 3 |

### ○ Majeure (150 credits)

#### ○ Basic training in physics (34 credits)

|             |  |  |   |   |   |  |
|-------------|--|--|---|---|---|--|
| ○ LPHYS1111 | <a href="#">Mechanics 1</a>                          | Giacomo Bruno<br>Jan Govaerts            | FR [q1] [45h+45h] [9 Credits] 🌐                         | X |   |  |
| ○ LPHYS1113 | <a href="#">Mechanics 2</a>                          | Vincent Lemaitre                         | FR [q2] [30h+25h] [5 Credits] 🌐                         | X |   |  |
| ○ LMAT1261  | <a href="#">Lagrangian and Hamiltonian mechanics</a> | Christian Walmsley<br>Hagendorf          | EN [q1] [22.5h+30h] [5 Credits] 🌐<br>> English-friendly |   | X |  |
| ○ LPHYS1114 | <a href="#">Thermodynamics</a>                       | Thierry Fichet                           | FR [q2] [22.5h+20h] [5 Credits] 🌐                       | X |   |  |
| ○ LPHYS1221 | <a href="#">Electromagnetism 1</a>                   | Gwenhaël de Wasseige<br>Vincent Lemaitre | FR [q1] [52.5h+52.5h] [10 Credits] 🌐                    |   | X |  |

#### ○ Advanced training in physics (35 credits)

|             |                                    |                                     |                                   |  |  |   |
|-------------|------------------------------------|-------------------------------------|-----------------------------------|--|--|---|
| ○ LPHYS1213 | <a href="#">Physics of fluids</a>  | Eric Deleersnijder<br>Vincent Legat | FR [q2] [37.5h+30h] [5 Credits] 🌐 |  |  | X |
| ○ LPHYS1231 | <a href="#">Special Relativity</a> | Marco Drewes                        | FR [q2] [30h+15h] [5 Credits] 🌐   |  |  | X |

|             |                     |                                 |   | 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]<br>> English-friendly |      |   | x |
| ○ LPHYS1332 | General Relativity  | Christophe Ringeval             | FR [q1] [30h+22.5h] [4 Credits]<br>> English-friendly   |      |   | x |
| ○ LPHYS1342 | Quantum Physics 2   | Christophe Ringeval             | FR [q1] [45h+22.5h] [5 Credits]<br>> English-friendly   |      |   | x |
| ○ LPHYS1343 | Statistical physics | Christian Walmsley<br>Hagendorf | FR [q2] [45h+30h] [6 Credits]<br>> English-friendly     |      |   | x |

### ○ Specialized training in physics (12 credits)

|             |   |  |   |  |  |   |
|-------------|---|--|---|--|--|---|
| ○ LPHYS1344 | Subatomic, atomic and molecular physics | Christophe Delaere<br>Matthieu Génévriez<br>Clément Lauzin | FR [q2] [45h+45h] [6 Credits]                         |  |  | x |
| ○ LPHYS1345 | Solid state physics                     | Eduardo Cortina Gil  | FR [q2] [30h+22.5h] [4 Credits]<br>> English-friendly |  |  | x |
| ○ LPHYS1351 | Personal project in physics             | Michel Crucifix<br>Matthieu Génévriez                      | FR [q1+q2] [0h+30h] [2 Credits]<br>> English-friendly |  |  | x |

### ○ Training in mathematics (38 credits)

|             |   |                   |   |   |   |  |
|-------------|---|-------------------|---|---|---|--|
| ○ LMAT1121  | Differential and integral calculus      | Tom Claeys        | FR [q1] [30h+30h] [5 Credits]                       | x |   |  |
| ○ LMAT1122  | Mathematical analysis : differentiation | Augusto Ponce     | FR [q2] [45h+45h] [8 Credits]                       | x |   |  |
| ○ LMAT1131  | Linear Algebra                          | Marino Gran       | FR [q1] [45h+45h] [8 Credits]                       | x |   |  |
| ○ LMAT1141  | Geometry I                              | Pascal Lambrechts | FR [q2] [45h+30h] [7 Credits]                       | x |   |  |
| ○ LMAT1222  | Complex analysis 1                      | Tom Claeys        | FR [q2] [30h+15h] [5 Credits]<br>> English-friendly |   | x |  |
| ○ LPHYS1202 | Mathematical methods for physics        | Céline Degrande   | FR [q1] [30h+30h] [5 Credits]                       |   | x |  |

### ○ Training in digital and instrumental techniques, data science and computer science (15 credits)

|             |  |                  |   |   |   |   |
|-------------|--|------------------|---|---|---|---|
| ○ LMAFY1101 | Data exploration and introduction to statistical inference | Anouar El Ghouch | FR [q2] [30h+30h] [5 Credits]                         | x |   |   |
| ○ LPHYS1201 | Computer Science and Numerical Methods                     | Giacomo Bruno    | FR [q1] [30h+45h] [6 Credits]                         |   | x |   |
| ○ LPHYS1303 | Numerical Simulation in Physics                            | Francesco Ragone | FR [q2] [22.5h+30h] [4 Credits]<br>> English-friendly |   |   | x |

### ○ Training in chemistry (5 credits)

|            |                   |                    |                                 |   |  |  |
|------------|-------------------|--------------------|---------------------------------|---|--|--|
| ○ LCHM1112 | General Chemistry | Yaroslav Filinchuk | FR [q1] [30h+22.5h] [5 Credits] | x |  |  |
|------------|-------------------|--------------------|---------------------------------|---|--|--|

### ○ Training in languages and human sciences (11 credits)

#### ○ English (7 credits)

|            |  |  |                                 |   |   |   |
|------------|--|--|---------------------------------|---|---|---|
| ○ LANG1861 | English: reading and listening comprehension of scientific texts | Catherine Avery (coord.)<br>Fanny Desterbecq<br>Amandine Dumont (coord.)<br>Marc Piwnik  | EN [q2] [10h] [3 Credits]       | x |   |   |
| ○ LANG1862 | English: reading and listening comprehension of scientific texts | Ahmed Adriouèche (coord.)<br>Catherine Avery<br>Amandine Dumont<br>Ariane Halleux (coord.)   | EN [q1] [30h] [2 Credits]       |   | x |   |
| ○ LANG1863 | English for Students in Sciences (Upper-Intermediate level)      | Ahmed Adriouèche (coord.)<br>Catherine Avery (coord.)<br>Amandine Dumont (coord.)<br>Sandrine Jacob (coord.)<br>Nevin Serbest<br>Florence Simon<br>Françoise Stas (coord.) | EN [q1 or q2] [30h] [2 Credits] |   |   | x |

Year

1 2 3

**o Religious sciences (2 credits)***The student chooses one teaching unit among*

|             |  |                         |                             |  |  |  |  |   |
|-------------|--|-------------------------|-----------------------------|--|--|--|--|---|
| ⌘ LTECO2100 | Sociétés, cultures, religions : Biblical readings  | Hans Ausloos            | PR [q1] [15h] [2 Credits] 🌐 |  |  |  |  | x |
| ⌘ LTECO2200 | Societies-cultures-religions : Human Questions     | Régis Burnet            | PR [q1] [15h] [2 Credits] 🌐 |  |  |  |  | x |
| ⌘ LTECO2300 | Societies, cultures, religions : Ethical questions | Marcela Lobo Bustamante | PR [q1] [15h] [2 Credits] 🌐 |  |  |  |  | x |

**o Philosophy (2 credits)**

|            |            |               |                             |  |  |  |  |   |
|------------|------------|---------------|-----------------------------|--|--|--|--|---|
| o LSC1120A | Philosophy | Charles Pence | PR [q1] [45h] [2 Credits] 🌐 |  |  |  |  | x |
|------------|------------|---------------|-----------------------------|--|--|--|--|---|

**⌘ Optional courses***These credits are not counted within the 120 required credits.*

|             |  |  |                                    |  |  |  |  |   |
|-------------|--|--|------------------------------------|--|--|--|--|---|
| ⌘ LSST1001  | IngénieuxSud                             | Stéphanie Merle<br>Jean-Pierre Raskin (coord.) | PR [q1+q2] [15h+45h] [5 Credits] 🌐 |  |  |  |  | x |
| ⌘ LSST1002M | Information and critical thinking - MOOC | Myriam De Kesel<br>Jean-François Rees          | PR [q2] [30h+15h] [3 Credits] 🌐    |  |  |  |  | x |

**o Minor or additional module (30 credits)**

*The student completes his.her training by choosing either the annual module in physics, or a minor or additional module in the list proposed for the Bachelor in physics, for a total of 30 credits. He.she distributes the teaching units according to the following model: 10 credits during the second semester of the second annual unit, 10 or 15 credits during the first semester of the third annual unit and 10 or 5 credits during the second semester of the third annual unit.*

*Maximum 1 element(s)*

## List of available minors

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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 ]
- > [Additionnal 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](#) [ en-prog-2023-lminoelec ]
- > [Minor in Applied Chemistry and Physics](#) [ en-prog-2023-minofyki ]
- > [Minor in Applied Mathematics](#) [ en-prog-2023-lminomap ]
- > [Minor in Mathematics](#) [ en-prog-2023-minmath ]
- > [Mineure Polytechnique](#) [ en-prog-2023-minpoly ]

(\*) *This programme is the subject of access criteria*

## 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 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...)

### o Majeure

#### o Basic training in physics

|             |                |                               |   |
|-------------|----------------|-------------------------------|---|
| ○ LPHYS1111 | Mechanics 1    | Giacomo Bruno<br>Jan Govaerts | FR [q1]<br>[45h<br>+45h] [9<br>Credits] 🌐   |
| ○ LPHYS1113 | Mechanics 2    | Vincent Lemaitre              | FR [q2]<br>[30h<br>+25h] [5<br>Credits] 🌐   |
| ○ LPHYS1114 | Thermodynamics | Thierry Fichet                | FR [q2]<br>[22.5h<br>+20h] [5<br>Credits] 🌐 |



### o Training in mathematics

|            |   |                   |   |
|------------|---|-------------------|---|
| o LMAT1121 | Differential and integral calculus      | Tom Claeys        | ES [q1]<br>[30h<br>+30h] [5<br>Credits] 🌐 |
| o LMAT1122 | Mathematical analysis : differentiation | Augusto Ponce     | ES [q2]<br>[45h<br>+45h] [8<br>Credits] 🌐 |
| o LMAT1131 | Linear Algebra                          | Marino Gran       | ES [q1]<br>[45h<br>+45h] [8<br>Credits] 🌐 |
| o LMAT1141 | Geometry I                              | Pascal Lambrechts | ES [q2]<br>[45h<br>+30h] [7<br>Credits] 🌐 |

### o Training in digital and instrumental techniques, data science and computer science

|             |  |                  |   |
|-------------|--|------------------|---|
| o LMAFY1101 | Data exploration and introduction to statistical inference | Anouar El Ghouch | ES [q2]<br>[30h<br>+30h] [5<br>Credits] 🌐 |
|-------------|--|------------------|---|

### o Training in chemistry

|            |                   |                    |   |
|------------|-------------------|--------------------|---|
| o LCHM1112 | General Chemistry | Yaroslav Filinchuk | ES [q1]<br>[30h<br>+22.5h] [5<br>Credits] 🌐 |
|------------|-------------------|--------------------|---|

### o Training in languages and human sciences

#### o English

|            |  |  |                                   |
|------------|--|--|-----------------------------------|
| o LANG1861 | English: reading and listening comprehension of scientific texts | Catherine Avery (coord.)<br>Fanny Desterbecq<br>Amandine<br>Dumont (coord.)<br>Marc Piwnik | ES [q2]<br>[10h] [3<br>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  | <a href="#">Lagrangian and Hamiltonian mechanics</a> | Christian Walmsley<br>Hagendorf          | (FR) [q1]<br>[22.5h<br>+30h] [5<br>Credits] 🌐<br>> English-<br>friendly |
| ○ LPHYS1221 | <a href="#">Electromagnetism 1</a>                   | Gwenhaël de Wasseige<br>Vincent Lemaitre | (FR) [q1]<br>[52.5h<br>+52.5h]<br>[10<br>Credits] 🌐                     |

**o Advanced training in physics**

|             |                                    |                                     |   |
|-------------|------------------------------------|-------------------------------------|---|
| ○ LPHYS1213 | <a href="#">Physics of fluids</a>  | Eric Deleersnijder<br>Vincent Legat | (FR) [q2]<br>[37.5h<br>+30h] [5<br>Credits] 🌐 |
| ○ LPHYS1231 | <a href="#">Special Relativity</a> | Marco Drewes                        | (FR) [q2]<br>[30h<br>+15h] [5<br>Credits] 🌐   |
| ○ LPHYS1241 | <a href="#">Quantum Physics 1</a>  | Marco Drewes                        | (FR) [q2]<br>[30h<br>+30h] [5<br>Credits] 🌐   |

**o Training in mathematics**

|             |  |                 |   |
|-------------|--|-----------------|---|
| ○ LMAT1222  | <a href="#">Complex analysis 1</a>               | Tom Claeys      | (FR) [q2]<br>[30h<br>+15h] [5<br>Credits] 🌐<br>> English-<br>friendly |
| ○ LPHYS1202 | <a href="#">Mathematical methods for physics</a> | Céline Degrande | (FR) [q1]<br>[30h<br>+30h] [5<br>Credits] 🌐                           |

**o Training in digital and instrumental techniques, data science and computer science**

|             |  |               |   |
|-------------|--|---------------|---|
| ○ LPHYS1201 | <a href="#">Computer Science and Numerical Methods</a> | Giacomo Bruno | (FR) [q1]<br>[30h<br>+45h] [6<br>Credits] 🌐 |
|-------------|--|---------------|---|

**o Training in languages and human sciences****o English**

|            |  |  |                                     |
|------------|--|--|-------------------------------------|
| ○ LANG1862 | <a href="#">English: reading and listening comprehension of scientific texts</a> ■ | Ahmed Adriouche<br>(coord.)<br>Catherine Avery<br>Amandine Dumont<br>Ariane Halleux (coord.) | (FR) [q1]<br>[30h] [2<br>Credits] 🌐 |
|------------|--|--|-------------------------------------|

**o Religious sciences**

The student chooses one teaching unit among

|             |  |                            |                                   |
|-------------|--|----------------------------|-----------------------------------|
| ⌘ LTECO2100 | Sociétés, cultures, religions : Biblical readings  | Hans Ausloos               | FB [q1]<br>[15h] [2<br>Credits] 🌐 |
| ⌘ LTECO2200 | Societies-cultures-religions : Human Questions     | Régis Burnet               | FB [q1]<br>[15h] [2<br>Credits] 🌐 |
| ⌘ LTECO2300 | Societies, cultures, religions : Ethical questions | Marcela Lobo<br>Bustamante | FB [q1]<br>[15h] [2<br>Credits] 🌐 |

**o Minor or additional module**

The student completes his/her training by choosing either the annual module in physics, or a minor or additional module in the list proposed for the Bachelor in physics, for a total of 30 credits. He/she distributes the teaching units according to the following model: 10 credits during the second semester of the second annual unit, 10 or 15 credits during the first semester of the third annual unit and 10 or 5 credits during the second semester of the third annual unit. Maximum 1 element(s)

**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
- 🚫🌐 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 Advanced training in physics**

|             |                                     |                                 |   |
|-------------|-------------------------------------|---------------------------------|---|
| ○ LPHYS1322 | <a href="#">Electromagnetism 2</a>  | Céline Degrande                 | FR [q1]<br>[37.5h<br>+22.5h] [5<br>Credits] 🌐<br>> English-<br>friendly |
| ○ LPHYS1332 | <a href="#">General Relativity</a>  | Christophe Ringeval             | FR [q1]<br>[30h<br>+22.5h] [4<br>Credits] 🌐<br>> English-<br>friendly   |
| ○ LPHYS1342 | <a href="#">Quantum Physics 2</a>   | Christophe Ringeval             | FR [q1]<br>[45h<br>+22.5h] [5<br>Credits] 🌐<br>> English-<br>friendly   |
| ○ LPHYS1343 | <a href="#">Statistical physics</a> | Christian Walmsley<br>Hagendorf | FR [q2]<br>[45h<br>+30h] [6<br>Credits] 🌐<br>> English-<br>friendly     |

**o Specialized training in physics**

|             |   |  |  |
|-------------|---|--|--|
| ○ LPHYS1344 | <a href="#">Subatomic, atomic and molecular physics</a> | Christophe Delaere<br>Matthieu Génévriez<br>Clément Lauzin | FR [q2]<br>[45h<br>+45h] [6<br>Credits] 🌐                                |
| ○ LPHYS1345 | <a href="#">Solid state physics</a>                     | Eduardo Cortina Gil  | FR [q2]<br>[30h<br>+22.5h] [4<br>Credits] 🌐<br>> English-<br>friendly    |
| ○ LPHYS1351 | <a href="#">Personal project in physics</a>             | Michel Crucifix<br>Matthieu Génévriez                      | FR<br>[q1+q2]<br>[0h<br>+30h] [2<br>Credits] 🌐<br>> English-<br>friendly |

**o Training in digital and instrumental techniques, data science and computer science**

|             |   |                  |   |
|-------------|---|------------------|---|
| ○ LPHYS1303 | <a href="#">Numerical Simulation in Physics</a> | Francesco Ragone | FR [q2]<br>[22.5h<br>+30h] [4<br>Credits] 🌐<br>> English-<br>friendly |
|-------------|---|------------------|---|

**o Training in languages and human sciences****o English**

|            |   |  |                                    |
|------------|---|--|------------------------------------|
| ○ LANG1863 | English for Students in Sciences (Upper-Intermediate level) | Ahmed Adriouèche (coord.)<br>Catherine Avery (coord.)<br>Amandine Dumont (coord.)<br>Sandrine Jacob (coord.)<br>Nevin Serbest<br>Florence Simon<br>Françoise Stas (coord.) | ES [q1 or q2]<br>[30h] [2 Credits] |
|------------|---|--|------------------------------------|

#### ○ Philosophy

|            |            |               |                              |
|------------|------------|---------------|------------------------------|
| ○ LSC1120A | Philosophy | Charles Pence | ES [q1]<br>[45h] [2 Credits] |
|------------|------------|---------------|------------------------------|

#### ⊗ Optional courses

These credits are not counted within the 120 required credits.

|             |  |  |  |
|-------------|--|--|--|
| ⊗ LSST1001  | IngénieuxSud                             | Stéphanie Merle<br>Jean-Pierre Raskin (coord.) | ES<br>[q1+q2]<br>[15h<br>+45h] [5 Credits] |
| ⊗ LSST1002M | Information and critical thinking - MOOC | Myriam De Kesel<br>Jean-François Rees          | ES [q2]<br>[30h<br>+15h] [3 Credits]       |

#### ○ Minor or additional module

The student completes his/her training by choosing either the annual module in physics, or a minor or additional module in the list proposed for the Bachelor in physics, for a total of 30 credits. He/she distributes the teaching units according to the following model: 10 credits during the second semester of the second annual unit, 10 or 15 credits during the first semester of the third annual unit and 10 or 5 credits during the second semester of the third annual unit. Maximum 1 element(s)

## 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 establishment offering full-time secondary education or an adult education centre in the French Community of Belgium and, as the case may be, approved if it was issued by an educational institution before 1 January 2008 or affixed with the seal of the French Community if it was issued after this date, or an equivalent certificate awarded by the Examination Board of the French Community during or after 1994;
2. A Certificate of Upper Secondary Education issued no later than the end of the 1992-1993 academic year, along with official documentation attesting to the student's ability to pursue higher education for students applying for a full-length undergraduate degree programme;
3. A diploma awarded by a higher education institution within the French Community that confers an academic degree issued under the above-mentioned Decree, or a diploma awarded by a university or institution dispensing full-time higher education in accordance with earlier legislation;
4. A higher education certificate or diploma awarded by an adult education centre;
5. A pass certificate for one of the [entrance examinations](https://uclouvain.be/fr/etudier/inscriptions/examens-admission.html) (https://uclouvain.be/fr/etudier/inscriptions/examens-admission.html) organized by higher education institutions or by an examination board of the French Community; this document gives admission to studies in the sectors, fields or programmes indicated therein;
6. A diploma, certificate of studies or other qualification similar to those mentioned above, issued by the Flemish Community of Belgium, the German Community of Belgium or the Royal Military Academy;
7. A diploma, certificate of studies or other qualification obtained abroad and deemed equivalent to the first four mentioned above by virtue of a law, decree, European directive or international convention;

Note:

Requests for equivalence must be submitted to the Equivalence department ([Service des équivalences](#)) of the Ministry of Higher Education and Scientific Research of the French Community of Belgium in compliance with the official deadline.

The following two qualifications are automatically deemed equivalent to the Certificate of Upper Secondary Education (Certificat d'enseignement secondaire supérieur – CESS):

- European Baccalaureate issued by the Board of Governors of a European School,
- International Baccalaureate issued by the International Baccalaureate Office in Geneva.

8. Official documentation attesting to a student's ability to pursue higher education (diplôme d'aptitude à accéder à l'enseignement supérieur - DAES), issued by the Examination Board of the French Community.

### Specific access requirements

- Access to bachelor programmes for candidates of nationality outside the European Union who are not assimilated to Belgian nationals is subject to the following criteria:
  - not have obtained a secondary education diploma for more than 3 years maximum. Example: for an admission application for the academic year 2023-2024, you must have obtained your diploma during the academic years 2020-2021, 2021-2022 ou 2022-2023. In the French Community of Belgium, the academic year runs from September 14 to September 13
  - not already hold an undergraduate degree
- Candidates, whatever their nationality, with a secondary school diploma **from a country outside the European Union**, must have obtained an average of 13/20 minimum or, failing that, have obtained this average, have passed one year of study in Belgium (for example special Maths / sciences). A non-successful year will not be taken into consideration.

- 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 1<sup>st</sup> 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 student has sufficient skills and knowledge to successfully pursue undergraduate studies.

After this assessment, the Examination Board will determine the additional courses and possible exemptions constituting the supplementary requirements for the student's admission.

## Special requirements to access some programmes

- Admission to **undergraduate studies in engineering: civil engineering and architect**

Pass certificate for the [special entrance examination for undergraduate studies in engineering: civil engineering and architect](https://uclouvain.be/fr/facultes/epl/examenadmission.html) (<https://uclouvain.be/fr/facultes/epl/examenadmission.html>).

Admission to these courses is always subject to students passing the special entrance examination. Contact the faculty office for the programme content and the examination arrangements.

- Admission to **undergraduate studies in veterinary medicine**

[Admission to undergraduate studies in veterinary medicine is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses \(non-residents\)](https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html) (<https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html>).

- Admission to **undergraduate studies in physiotherapy and rehabilitation**

[Admission to undergraduate studies in physiotherapy and rehabilitation is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses \(non-residents\)](https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html). (<https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html>)

- Admission to **undergraduate studies in psychology and education: speech and language therapy**

[Admission to undergraduate studies in psychology and education: speech and language therapy is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses \(non-residents\)](https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html) (<https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html>).

- Admission to **undergraduate studies in medicine and dental science**

[Admission to undergraduate studies in medicine and dental science is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses \(non-residents\)](https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html). (<https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html>)

Note: students wishing to enrol for a **Bachelor's degree in Medicine** or a **Bachelor's degree in dental science** must first sit an [aptitude test \(fr\)](https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html) (<https://uclouvain.be/en/study/inscriptions/etudes-contingentes.html>).

## Teaching method

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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

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**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

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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 <https://www.paristech.fr/fr/international/europe/athens>

## Possible trainings at the end of the programme

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The Bachelor's degree in physical sciences gives direct access to the :

- [Master \[120\] in Physics](#)
- [Master \[60\] in Physics](#)
- [Master \[120\] in Data Science : Statistic](#)
- [Master \[120\] in Actuarial Science](#)
- [Master \[120\] in Statistics: General](#)

It also gives access to the [Master \[120\] in Mathematics](#) (on file), after having followed and passed the minor in mathematics, and the [Master \[120\] in Statistics: Biostatistics](#) (on file), after having followed and passed the teaching unit LBIO1111 Cellular and molecular biology or LIEPR1004A Cell biology and histology elements.

In addition, UCL Masters (usually orphans) are widely available to graduates of the UCL. For example :

- the [Master \[120\] in Population and Development Studies](#) (direct access for all Bachelor's degrees),
- the [Master \[120\] in European Studies](#) (direct access for all Bachelor's degrees, after having followed and passed the minor in European studies, on file for others),
- the [Master \[120\] in Ethics](#) (access for all Bachelor's degrees after additional training).

## Contacts

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### Curriculum Management

Entity

Structure entity

Denomination

Faculty

Sector

SST/SC/PHYS

(PHYS)

Faculty of Science (SC)

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](tel:+32210473294) - Fax: [+32 \(0\) 10 47 30 68](tel:+32210473068)

<https://uclouvain.be/fr/facultes/sc/phys>

Website

Academic supervisor: Vincent Lemaitre

Jury

- Christian Walmsley Hagendorf
- Christophe Delaere
- Clément Lauzin

Useful Contact(s)

- Nathalie Micha
- Catherine De Roy

