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## MINPHYS - Introduction

### Introduction

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#### Introduction

The minor in physics offers additional training in physics that facilitates access to the [Master \[120\] in Physics](#) and the [Master \[60\] in Physics](#)

## MINPHYS - Teaching profile

### Learning outcomes

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.

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.

### Detailed programme

#### PROGRAMME BY SUBJECT

○ Mandatory

△ Courses not taught during 2020-2021

⊕ Periodic courses taught during 2020-2021

⊗ Optional

⊖ Periodic courses not taught during 2020-2021

■ Activity with requisites

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

The student chooses 30 credits among :

Year

2 3

#### ○ Content:

⊗ LCHM1112	General Chemistry	Yaroslav Filinchuk	30h +22.5h	5 Credits	q1	x	
⊗ LPHYS1112	Mechanics 2 and thermodynamics	Thierry Fichet Vincent Lemaitre	52.5h +45h	10 Credits	q2	x	
⊗ LPHYS1112A	Mechanics 2 and thermodynamics : Mechanics 2	Thierry Fichet Vincent Lemaitre	30h +22.5h	5 Credits	q2	x	
⊗ LPHYS1112B	Mechanics 2 and thermodynamics : thermodynamics	Thierry Fichet Vincent Lemaitre	22.5h +22.5h	5 Credits	q2	x	
⊗ LPHYS1213	Physics of fluids	Eric Deleersnijder Vincent Legat	37.5h +30h	5 Credits	q2	x	

							Year	
							2	3
⊗ LPHYS1214	Astronomy and geophysics	Véronique Dehant Patricia Lampens	22.5h +15h	5 Credits	q2	x		
⊗ LPHYS1221	Electromagnetism 1	Jan Govaerts	52.5h +52.5h	10 Credits	q1	x		
⊗ LPHYS1221A	Electromagnetism 1	Jan Govaerts	40h+40h	7 Credits	q1	x		
⊗ LPHYS1231	Special Relativity	Jean-Marc Gérard	30h+15h	5 Credits	q2	x		
⊗ LPHYS1241	Quantum Physics 1	Marco Drewes	30h+30h	5 Credits	q2	x		
⊗ LPHYS1303	Numerical Simulation in Physics	Michel Crucifix Francesco Ragone (compensates Bernard Piraux)	22.5h +30h	4 Credits	q2		x	
⊗ LPHYS2211	Group theory	Philippe Ruelle	22.5h +22.5h	5 Credits	q2			x
⊗ LPHYS1322	Electromagnetism 2 <span style="background-color: yellow;">■</span>	Jan Govaerts	37.5h +22.5h	5 Credits	q1			x
⊗ LPHYS1332	General Relativity <span style="background-color: yellow;">■</span>	Jean-Marc Gérard	30h +22.5h	4 Credits	q1			x
⊗ LPHYS1342	Quantum Physics 2 <span style="background-color: yellow;">■</span>	Christophe Ringeval	45h +22.5h	5 Credits	q1			x
⊗ LPHYS1343	Statistical physics <span style="background-color: yellow;">■</span>	Christian Hagendorf	45h+30h	6 Credits	q2			x
⊗ LPHYS1344	subatomic, atomic and molecular physics <span style="background-color: yellow;">■</span>	Clément Lauzin Vincent Lemaitre Xavier Urbain	45h+45h	6 Credits	q2			x
⊗ LPHYS1345	Solid state physics <span style="background-color: yellow;">■</span>	Giacomo Bruno Christophe Delaere	30h +22.5h	4 Credits	q2			x

## 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:

- transform a prerequisite into a corequisite within the same year (to enable the student to continue his or her studies with a sufficient annual course load)
- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.

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**

- LPHYS1322** "[Electromagnétisme 2](#)" has prerequisite(s) LPHYS1221
- LPHYS1221 - [Electromagnetism 1](#)
- LPHYS1332** "[Relativité générale](#)" has prerequisite(s) LPHYS1231
- LPHYS1231 - [Special Relativity](#)
- LPHYS1342** "[Physique quantique 2](#)" has prerequisite(s) LPHYS1241
- LPHYS1241 - [Quantum Physics 1](#)
- LPHYS1343** "[Physique statistique](#)" has prerequisite(s) LPHYS1112
- LPHYS1112 - [Mechanics 2 and thermodynamics](#)
- LPHYS1344** "[Physique subatomique, atomique et moléculaire](#)" has prerequisite(s) LPHYS1241
- LPHYS1241 - [Quantum Physics 1](#)
- LPHYS1345** "[Physique de l'état solide](#)" has prerequisite(s) LPHYS1241
- LPHYS1241 - [Quantum Physics 1](#)

**THE PROGRAMME'S COURSES AND LEARNING OUTCOMES**

For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme's reference framework of learning outcomes in the document "*In which teaching units are the competences and learning outcomes in the programme's reference framework developed and mastered by the student?*"

## MINPHYS - Information

### Access Requirements

#### Specific access requirements

The minor in physics is offered to Bachelor's students in mathematics, geography, general orientation, and engineering, civil engineering orientation. It is also accessible, on the advice of the study advisor, to students who have received sufficient training in physics and mathematics.

### 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".**

### Possible trainings at the end of the programme

Bachelor's students in mathematics, geography, general orientation, and engineering, civil engineering orientation, who have followed this minor will be admitted to the Master [120] in physics and the Master [60] in physics. Their programme will usually include some of the teaching units of the Bachelor in physics that they have not followed. The same rule applies to other students who have followed this minor, with possible restrictions depending on their training. However, the student wishing to make such a change is invited to contact as soon as possible the study advisors of his school and the School of Physics.

### Contacts

#### Curriculum Management

Entity

Structure entity

Denomination

Faculty

Sector

Acronym

Postal address

SST/SC/PHYS

(PHYS)

Faculty of Science (SC)

Sciences and Technology (SST)

PHYS

Chemin du Cyclotron 2 - bte L7.01.04

1348 Louvain-la-Neuve

Tel: +32 (0) 10 47 32 94 - Fax: +32 (0) 10 47 30 68

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

Website

Academic supervisor: Michel Crucifix

Useful Contact(s)

- Philippe Ruelle
- Nathalie Micha
- Julie Genbrugge

### Practical informations

#### Registration for the minor

A registration for the 2nd annual unit via the web allows you to register for a minor (the student who wishes to change his/her choice of additional module or minor must contact the secretariat of his/her faculty). The student may defer his/her registration to a minor and proceed with this operation when he/she registers on line for the teaching units of his/her major.

When the student re-enrolls via the web the following year, he/she is automatically re-enrolled in the same minor as the previous year. At this stage, any request for change is subject to the approval of the study advisor.

**Registration for the teaching units of the minor**

The registration for the teaching units of a minor is done at the same time as the registration to the teaching units of the major. The same goes for exam registration.

**Timetable of courses and examinations**

<https://uclouvain.be/fr/facultes/sc/horaires-ti.html> (<https://uclouvain.be/fr/facultes/sc/horaires-ti.html>)

