Bachelor in Physics

Programme mnemonic
BA-PHYS

Studies level
Bachelor

Learning language
french

Schedule
office hours

Studies category / subcategory
Sciences and technics / Sciences

Campus
Plaine and Solbosch

Programme objectives

Physicists explore the world and build new knowledge from experimental observations and reasoning. To reach that goal they need to become **experts in mathematics and in computer science** but they also need to develop their **creativity and innovative capacity**. It is then that they become capable of establishing new methods and new tools to solve present and future problems rigorously and efficiently.

A degree in physics and the skills gained should render the students well versed in areas ranging from **medicine to finance** through **pure and applied sciences.**

Physics is a fascinating field, but one that will require determination and the ability to work autonomously.

Programme's added value

Physicists are trained to solve new and complex problems. Right from the first year they have to face experimental and theoretical situations. In addition to the many exercises and laboratory works (~50%), they develop projects during the "Printemps des Sciences" (Bloc 2) and under the supervision of a faculty researcher from one of the teams in the Physics Department (Bloc 3). A visit of the European laboratory of particle physics, CERN, in Geneva, is organized in Bloc 3.

ULB isthe only complete university located in the capital of Europe. Almost one third of the students are foreigners and this very valuable multi cultural environment favours its international relationships.

The ULB Physics Department has several research groups of international reputation having obtained scientific awards, some being very prestigious. It also hosts the worldwide known International Solvay Institutes for Physics and Chemistry.

In the 1st year each student may be chaperoned by older students and is entitled to individual guidance in physics, chemistry and mathematics. Each student has access to online exercises on the "Virtual University".

Facilities at your disposal:

- general physics laboratories and leading-edge research laboratories.
- the ULB physics "Experimentarium" : a museum of experiments and also an interactive, constantly evolving, laboratory.
- study rooms.
- computer rooms.
- libraries.
- online courses and practicals on the « Virtual University ».

Teaching methods

From the first year, various teaching methods are used: lectures, practicals (exercises and laboratory), interactive seminars, homework and personal work. Practicals represent about 50% of the time.

Succeed in your studies

Choose

The information and guidance counsellors at the InfOR-études [https://www.ulb.be/en/studies-info-desk-1] service will help you choose your studies throughout the year.

Succeed

Take part in preparatory courses [https://www.ulb.be/en/studies-info-desk-1] or get help to succeed [https://www.ulb.be/en/studies-info-desk-1] , before or during your studies.

Get help

Apply for financial aid, look for accommodation or a student job, get support [https://www.ulb.be/fr/aides-services-et-accompagnement/aid-services-and-support-1] for your specific needs.

International/Openness

Exchange agreements, from 6 months to one year, with other universities in Belgium and abroad have been set up for students from bloc 3 onwards (optional). Courses taken in partner universities are officially recognized by ULB at the end of the BA.

Job opportunities

If you go on to do a Master in Physics, you have the option of working in the following areas:

- Pure research (physics, biophysics, geophysics, astrophysics).
- Applied research (physics, nuclear medicine, image reconstruction, materials science, meteorology, telecommunications, energy production).
- Research and Development (various sectors of engineering, computer science, actuaries).
- Teaching (physics, mathematics, computer science).
- Consultancy.

Due to their analytical problem solving skills, physicists with a master's degree are very much in demand.

Contacts

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Jury President
Ioana Codrina MARIS

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Bachelor in Physics

At ULB, an emphasis is put on understanding the scientific method and students are well prepared for careers in both pure and applied research. Teaching follows the most recent research results.

During the three first years (BA), students receive the necessary basic education in mathematics (32%), physics (51%) and chemistry (6%). This is complemented by English (3%), computer science (5%) and some optional subjects (3%), aiming to either broaden the students' scientific culture or to increase their knowledge of English. An ability to take initiative is very important and will be exercised both when it comes to your individual work or to placement within a research team in the physics department, per your choice.

The various topics covered are:

- Classical and 20th century physics
- Quantum mechanics
- Statistical and non-linear physics
- Astronomy and astrophysics
- Fundamental interactions and materials physics

Bloc 1 | BA-PHYS

Cours obligatoires

CHIM-F101 Chimie générale | Thierry VISART DE BOCARME (Coordinator), François RENIERS and Laurence RONGY
10 credits [lecture: 72h, tutorial classes: 36h, practical work: 12h, project: 24h] first and second terms French

MATH-F101 Calcul différentiel et intégral I | Bruno PREMOSELLI (Coordinator) and Mélanie BERTELSON-VOLCKAERT
15 credits [lecture: 90h, tutorial classes: 90h] first and second terms French

MATH-F121 Géométrie analytique et calcul matriciel | Joost VERCRUYSSE (Coordinator) and Michele D'ADDERIO
5 credits [lecture: 24h, tutorial classes: 24h] first term French

MATH-F122 Algèbre linéaire | Joost VERCRUYSSE (Coordinator), Samuel FIORINI and Anna VANDEN WYNGAERD
10 credits [lecture: 54h, tutorial classes: 54h] first and second terms French

PHYS-F110 Physique générale I et II | Pascal VANLAER (Coordinator), Michele SFERRAZZA and Sophie VAN ECK
20 credits [lecture: 96h, tutorial classes: 102h, practical work: 42h] first and second terms French

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Bloc 2 | BA-PHYS

Cours obligatoires

INFO-F207 Informatique | Sébastien CLESSE (Coordinator)
5 credits [lecture: 24h, tutorial classes: 24h] first term French

LANG-F201 Anglais scientifique I | Alexander CORNFORD (Coordinator)
5 credits [tutorial classes: 48h] second term English

MATH-F201 Calcul différentiel et intégral II | Antoine GLORIA (Coordinator) and Marcelo Ribeiro De Resende Alves
10 credits [lecture: 60h, tutorial classes: 60h] first and second terms French

MATH-F204 Mécanique analytique | Frank FERRARI (Coordinator) and Glenn BARNICH
10 credits [lecture: 60h, tutorial classes: 60h] first and second terms French

PHYS-F201 Thermodynamique | Nicolas CHAMEL (Coordinator)
5 credits [lecture: 36h, tutorial classes: 24h] second term French

PHYS-F202 Relativité, électromagnétisme et optique ondulatoire | Petr TINIAKOV (Coordinator)
10 credits [lecture: 72h, tutorial classes: 48h] first and second terms French

PHYS-F203 Introduction à la mécanique quantique | Serge MASSAR (Coordinator) and Laurens Vanderstraeten
5 credits [lecture: 30h, tutorial classes: 30h] second term French

PHYS-F210 Laboratoires, statistique appliquée à la physique expérimentale et projet | Ioana Codrina MARIS (Coordinator), Juan Antonio AGUILAR SANCHEZ, Stéphane CLEMMEN and Sébastien CLESSE
10 credits [lecture: 24h, tutorial classes: 24h, practical work: 72h, project: 72h] first and second terms French

Bachelor in Physics

Bloc 3 | BA-PHYS

Cours obligatoires

MATH-F314 **Mathématiques pour la physique** | Riccardo ARGURIO (Coordinator), Denis BONHEURE, Clément CEROVECKI and Bernard KNAEPEN
10 credits [lecture: 66h, tutorial classes: 54h] first term French

PHYS-F302 **Mécanique quantique** | Frank FERRARI (Coordinator) and Sébastien CLESSE
10 credits [lecture: 66h, tutorial classes: 54h] first and second terms French

PHYS-F303 **Physique statistique** | Pierre GASPARD (Coordinator) and Bortolo MOGNETTI
10 credits [lecture: 60h, tutorial classes: 60h] first and second terms French

PHYS-F304 **Spectrophysique et Astrophysique** | Sophie VAN ECK (Coordinator) and Pierre COHEUR
5 credits [lecture: 44h, tutorial classes: 16h] second term French

PHYS-F305 **Physique des particules et Physique Nucleaire** | Laurent FAVART (Coordinator) and Michele SFERRAZZA
5 credits [lecture: 42h, tutorial classes: 18h] first and second terms French

PHYS-F308 **Soft Matter and Solid State Physics** | Patricia Maria LOSADA PEREZ (Coordinator) and Simone Simon NAPOLITANO
5 credits [lecture: 40h, tutorial classes: 20h] first and second terms English

PHYS-F311 **Laboratoires et Stage de recherche** | Simone Simon NAPOLITANO (Coordinator), Juan Antonio AGUILAR SANCHEZ, Barbara CLERBAUX, Gilles DE LENTDECKER, Patricia Maria LOSADA PEREZ, Ioana Codrina MARIS and Simona TOSCANO
10 credits [practical work: 72h, field trips: 24h] second term French

Cours optionnels

One course chosen from the following

BIOL-F102 (optional) **Biologie générale** | Patrick MARDULYN (Coordinator) and Etienne Meylan
5 credits [lecture: 48h] second term French

ENVI-F1001 (optional) **Sciences de la Terre, Environnement et Société** | Pierre REGNIER (Coordinator), Jean-Michel DECROLY and Frank PATTYN
5 credits [lecture: 48h] first and second terms French

ETHI-F201 (optional) **Sciences, éthique, histoire et société** | Grégoire WALLENBORN (Coordinator) and Eric MURAILLE
5 credits [lecture: 48h] second term French

ETHI-F301 (optional) **Science et Société : analyse de controverses scientifiques** | Patrick MARDULYN (Coordinator) and Grégoire WALLENBORN
5 credits [lecture: 24h, project: 70h] first term French

LANG-F301 (optional) **Anglais scientifique II** | Hugh MURPHY (Coordinator) and Alexander CORNFORD
5 credits [tutorial classes: 48h] first term English

PHYS-F105 (optional) **La structure de l'univers** | Alain JORISSEN (Coordinator) and Rodrigo ALVAREZ
5 credits [lecture: 48h] first term French

PHYS-F314 (optional) **Electronique** | Gilles DE LENTDECKER (Coordinator), Juan Antonio AGUILAR SANCHEZ and Yifan YANG
5 credits [lecture: 24h, tutorial classes: 6h, practical work: 30h] first term French

PHYS-F317 (optional) — How To Make (almost) Any Experiment Using Digital Fabrication | Denis TERWAGNE (Coordinator)
5 credits [lecture: 24h, practical work: 36h] first term French

PHYS-H302 (optional) — Eléments d'optique physique | Pascal KOCKAERT (Coordinator) and François LEO
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] second term French

TEMP-0000 (optional) — Cours extérieurs au programme
5 credits academic year French