

# Physique générale I et II

## Lecturers

Pascal VANLAER (Coordinator), Michele SFERRAZZA and Sophie VAN ECK

## Course mnemonic

PHYS-F110

## Language(s) of instruction

French

## Course period

First and second terms

## Campus

Plaine

## Course content

Part I: introduction to mechanics: introduction to vectors, kinematics and dynamics of the point particle, work and energy, center of mass, conservation of momentum and of angular momentum for a system of point particles (including demonstration), dynamics of rigid bodies, change of reference frame, static equilibrium of solids and fluids, dynamics of fluids and Bernoulli theorem, oscillations and introduction to waves.

Part II : introduction to electromagnetism : Coulomb force, electrostatics, conductors, dielectrics, Ohm's law, electrical circuits with continuous currents, Lorenz force, magneto statics, dia-, para- and ferromagnetism, Laplace force, electromagnetic induction, electrical circuits with alternating currents, Maxwells equations, geometric optics, introduction to special relativity.

Laboratories: manipulations concerning mechanics, waves, basic notions of electricity and electromagnetism.

## Objectives (and/or specific learning outcomes)

Introductory course to general physics.

Part I (introduction to mechanics): lay the basis of classical mechanics in a logical manner, starting from observation, while familiarising the students to the usage of mathematics in physics.

Part II (introduction to electromagnetism): introduce the students to the physics of electricity and magnetism, while putting the emphasis on the numerous applications encountered in every day life; develop the theory from observations and foundational experiments, in a rigorous and logical manner, up to the unified formulation of electromagnetism of Maxwell.

Laboratories: introduction to the experimental method: Observation of physical phenomena; comprehension and optimisation of experimental apparatus; estimation of uncertainties. Critical presentation and analysis of the results in a lab report: precise description of the work carried out, coherence of the presented results.

## Pre-requisites and co-requisites

### Courses having this one as pre-requisit

CHIM-F206 | Mécaniques classique et quantique | 10 crédits , INFO-F207 | Informatique | 5 crédits, PHYS-F201 | Thermodynamique | 5 crédits, PHYS-F202 | Relativité, électromagnétisme et optique ondulatoire | 10 crédits, PHYS-F203 | Introduction à la mécanique quantique | 5 crédits and PHYS-F210 | Laboratoires, statistique appliquée à la physique expérimentale et projet | 10 crédits

## Teaching method and learning activities

Ex-cathedra courses, supervised exercices, laboratories

Depending on the COVID19 situation and the ULB regulations, the lecture will be given in presence, or (partially or completely) remotely. Information will be communicated and updated via UV and Gehol.

Access to the lecture via UV: click here [<https://uv.ulb.ac.be/course/view.php?id=94596>]

Access to the Teams group for remote teaching: click here [<https://teams.microsoft.com/l/team/19:fd93946ae6bc4847980bab6726b6d0e9@thread.tacv2/conversations?groupId=2bf440f0-552d-423a-88e5-d87b801588c1&tenantId=30a5145e-75bd-4212-bb02-8ff9c0ea4ae>]

## Contribution to the teaching profile

Build, maintain and develop knowledge in the field of physics.

- Identify and understand the principles underlying natural phenomena (conservation principles, symmetries,...)
- Understand the laws of nature and the properties of matter through experimentation and through theory.
- Get initiated to the mathematical, technological and experimental tools of physics.

Adopt a scientific approach to the resolution of problems.

- Formulate a problem in terms of questions solvable by a scientific approach.
- Conceive an experimental protocol, and implement it.
- Write a report presenting a problem, the models and techniques used to study it, and the results obtained.

## References, bibliography and recommended reading

Part I: "Physique: 1. Mécanique" and (for physics and math option physics only) "Physique: 3. Ondes, Benson, éditions de Boeck

PartII: "Physique: 2. Electricité et Magnétisme" and (for physics and math option physics only) "Physique: 3. Ondes, Benson, éditions de Boeck

## Course notes

Podcast, Université virtuelle and Syllabus

## Other information

### Place(s) of teaching

Plaine

### Contact(s)

Part I : Sophie Van Eck (svaneck@astro.ulb.ac.be), Nicolas Postiau (nicolas.postiau@ulb.ac.be)

Part II : Pascal Vanlaer (pascal.vanlaer@ulb.ac.be), Max Vanden Bemden (mvdbemde@ulb.ac.be)

Laboratories : Michele Sferrazza (Michele.Sferrazza@ulb.ac.be), Pascal Vanlaer (pascal.vanlaer@ulb.ac.be)

## Evaluation method(s)

Other

## Evaluation method(s) (additional information)

Exams and laboratory reports. The test of November and the exams will be written and in presence if the COVID situation and the ULB regulations allow it. If not, specific modes of evaluation will be organized; and related information will be communicated to the students ASAP.

### Determination of the mark (including the weighting of partial marks)

See detailed description available on UV, or a less detailed version in the french version of this text.

### Main language(s) of evaluation

French

## Programmes

### Programmes proposing this course at the faculty of Sciences

BA-CHIM | Bachelor in Chemistry | unit 1, BA-MATH | Bachelor in Mathematics | unit 1 and BA-PHYS | Bachelor in Physics | unit 1

