UCLouvain

lepl1201

2025

Physics I

The version you're consulting is not final. This course description may change. The final version will be published on 1st June.

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	. SOMEBODY ;Lederer Dimitri ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	The course is structured in two parts. The first addresses point mass mechanics, and the second electrostatics. The second part concludes with some elements introductory to the theory of electrical circuits. Both components of the course share a common conceptual framework, in which basic physics concepts are introduced in a unified approach (forces, potential and mechanical energies, conservation equations). The first part introduces the concepts of geometry and vector spaces necessary to express the notions of forces and torques, and in particular the conditions of static equilibrium. Next, the concepts and tools of kinematics are developed, leading to Newton's principles, their physical meaning and consequences. Finally, based on these principles, the conservation laws of linear momentum and energy are established, by also discussing their physical significance. The second part introduces the main quantities and laws relevant to electrostatics in vacuum, exploiting the physics concepts of the first part of the course. The generalisation of these laws to dielectric media is developed. Conducting materials are considered, leading to the concept of electrical resistance. Then follows an introduction to the basics of the theory of electrical circuits (Ohm's and Kirchhoff's laws, electrical capacitance and inductance).
Learning outcomes	**At the end of this learning unit, the student is able to :** **Contribution of the course to the program objectives**: Regarding the learning outcomes of the program of Bachelor in Engineering, this course contributes to the development and the acquisition of the following learning outcomes: • LO 1.1 • LO 2.3, 2.4, 2.6, 2.7 • LO 3.1, 3.2, 3.3 • LO 4.2, 4.3, 4.4 1 **Specific learning outcomes of the course**: More precisely, at the end of the course the students will be able to • Apply Newton's principles in order to either express the differential equations of a system dynamics, or determine unknown forces acting on it ; implement the time evolution equations of global quantities relevant to a system of point masses subjected to an ensemble of external and internal forces (kinetic, potential and mechanical energy, momentum) ; - Evaluate the electric field associated to an electric charge distribution, and use Gauss' law to determine electric field distributions within simple devices in vacuum and materials ; - By relying on Ohm's and Kirchhoff's laws, compute and measure the continuous electrical characteristics of simple passive and dynamical circuits.
Evaluation methods	Written exam with calculator. Practical work during the year accounts for a maximum of 10% of the final grade.
Teaching methods	The theoretical notions of mechanics and electricity covered in this course are seen during lectures, emphasizing the physical understanding of the phenomena. Importance is given to respecting a coherent formalism throughout the course and to linking the common concepts used in mechanics and electricity. The amount of material is limited in terms of knowledge, but learning requires a thorough mastery of theoretical concepts. This mastery can be acquired by solving many exercises, avoiding falling into the trap of applying ready-made recipes. Tutored practice sessions are held weekly to frame this important part of learning and find answers to comprehension questions from tutors. Two labs are also performed. The material is that covered during the lectures, with summary notes provided by the teachers which outline the important elements. Students can also refer to Young & Freedman's book as an additional resource for additional explanations and sometimes slightly different paths of presentation.
Content	The basic elements of mechanics and electricity will be covered in this course by first establishing strong connections between common concepts such as units, vectors, force, moment, energy, power Other concepts covered specifically in mechanics and electricity include

	Point mechanics - kinematics - Newton's principles - bases of gravitation - forces of friction - static equilibrium - simple problems of dynamics - Principles of conservation - basics on rigid bodies - Torques - rotating movements Electrostatics in vacuum and in matter - Electric field and potential - Electric dipoles - Ohm's and Kirchhoff's laws - Elements of electrical circuits The methods used will favor active learning from the students. The precise methods of implementing an active participation of the student in his learning are left to the teachers, in compliance with the educational orientations of the Faculty.
Inline resources	https://perso.uclouvain.be/vincent.legat/zouLab/epl1201.php
Faculty or entity in charge	BTCI

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Engineering	FSA1BA	5		🔍
Bachelor in Engineering : Architecture	ARCH1BA	5		🔍