UCL Université catholique de Louvain

LFSAB1201

2013-2014

Physics 1

6.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Keunings Roland ; Legat Jean-Didier (coordinator) ; Raucent Benoît ;
Language :	Français
Place of the course	Louvain-la-Neuve
Prerequisites :	No prerequisite.
Main themes :	Main themes The course is structured in two parts. The first (3 ECTS) addresses point mass mechanics, and the second (3 ECTS) 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 three conservation laws of momentum, angular 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).
Aims :	*The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Content :	Introductory course to point mass mechanics, and to electrostatics. This activity must bring students to a level where they are 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, angular 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. Part 1 : Point mass mechanics - Geometry and vector spaces - forces - torques - static equilibrium - Kinematics - Newton's principles - Conservation laws Part 2 : Electrostatics, basics of circuit theory - Electrostatics in vacuum - Electrostatics in matter - Ohm's and Kirchhoff's laws - Basics of electrical circuits
Cycle and year of study :	> Bachelor in Engineering : Architecture > Bachelor in Engineering
Faculty or entity in charge:	BTCI