UCL Université catholique de Louvain

LPHY1111

2016-2017

General Physics 1

8.0 credits	45.0 h + 45.0 h	1q

Teacher(s) :	Lemaitre Vincent ; Govaerts Jan ;
Language :	Français
Place of the course	Louvain-la-Neuve
Prerequisites :	Final year secondary education level mathematics. Final year secondary education level French.
Main themes :	This course aims to introduce the fundamental concepts of physics. Mechanics. Laws of conservation in physics.
Aims :	a. Course contribution to the LO reference framework (programme LO) LO1: 1.1, 1.3, 1.4 LO2: 2.1, 2.2, 2.4 LO3: 3.1, 3.2, 3.3, 3.6 b. Specific formulation of programme LOs for this course At the end of this course, the student will be able: 1. To understand the fundamental role of the choice of reference frame in formulating the laws of motion. 2. To develop mechanical systems kinematics with the aid of vector analysis. 3. To establish and solve conditions for static equilibrium, including moments of force, for extended material systems. 4. To understand the primary meaning of Newton's Three Laws, and their expression in relation to a choice of reference frame. 5. To formulate the laws of motion using the physical quantities of momentum, angular momentum and kinetic energy, and their corresponding conservation laws. 6. To implement those laws of motion and conservation laws in the approach to modelling and solving extended mechanical systems. 7. To understand how conservation laws lead to the solution to the two-body problem, of relevance to the fundamental interaction of gravitation. 8. To understand the basic principles of Special Relativity. 9. To handle experimental equipment, carry out measurements, conduct their physical analysis, and prepare written and structured reports thereof. *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".*
Evaluation methods :	-- Mandatory test in week W5. -- Written exams: solving exercises, establishing theoretical arguments and results. -- Correction of laboratory reports. · Undertaking of the optional project, with a final oral presentation and written report, all carried out in groups of students.
Teaching methods :	Blackboard demonstrations, slide presentations, experiments during formal lectures, laboratory work, exercise sessions. Optional project in the spirit of a research project with a written report and oral presentation in groups. Although this is an introductory BAC1 course, we believe it is important to focus on physical concepts and their thorough and accurate comprehension and expression through their mathematical description, starting from simple, everyday experiments and observations of material point mechanics. One emphasizes the concepts of invariance and of the conservation of several physical quantities that themselves allow a (partial) integration of the equations of motion. Solving 'pedagogical' or even 'exam-type' exercises during formal lectures, exercise sessions and tutorials. The physical methods and mathematics techniques to be acquired are developed in the formal lectures and in exercise sessions. A list of exercises with solutions is provided to the students.
Content :	1. Mathematics of mechanics, vector analysis, kinematics; 2. Laws of static equilibrium, forces and moments of forces; 3. Newton's Laws: dynamics and applications; 4. Conservation laws and applications; 5. Two-body problem, Kepler's laws, universal gravitation, Gauss' theorem; 6. Basics of the dynamic of rigid bodies, moment of inertia; 7. Basics of fluid mechanics; 8. Basics of Special Relativity, Lorentz transformations and space-time, relativistic energy and momentum.

Faculty or entity in charge:	SC

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Bachelor in Physics	PHYS1BA	8	-	🔍
Bachelor in Mathematics	MATH1BA	8	-	🔍