UCLouvain

lphy1101

2021

Physics 1

6.00 credits	30.0 h + 40.0 h	Q1

Teacher(s)	Fichefet Thierry ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	It is assumed that the student (1) has a sufficient knowledge of French to enable him or her to follow or conduct a structured discussion without ambiguity, whether orally or in writing, (2) understands basic mathematical analysis tools such as linear algebra, geometry, trigonometry and differential and integral calculus, and (3) is familiar with graphics, including three-dimensional ones.
Main themes	· Physical quantities and measurements. · Kinematics and dynamics of the particle (motion along a straight line and circular motion, relative motions, composition of motions, Newton's laws of motion, friction, gravitation, non-inertial frames of reference). · Conservation principles (work, kinetic energy, potential energy, relation between force and potential energy, conservation of mechanical energy, conservation of momentum). · Statics and dynamics of rigid bodies (rotational motion and moment of inertia, Huygens' theorem, torque, conservation of angular momentum, equilibrium). · Statics and dynamics of fluids (pressure in a fluid, law of hydrostatic equilibrium, Archimede's principle, surface phenomena, motion of a fluid and stream lines, Bernoulli's equation, viscosity).
Learning outcomes	**At the end of this learning unit, the student is able to :** a. Contribution of the teaching unit to the learning outcomes of the programme BIOL1BA: 1.2 (D, E), 1.3 (S), 3.1 (S), 3.2 (S), 3.4 (S), 4.2 (D), 4.4 (D), 5.1 (S), 5.3 (S). CHIM1BA: 1.1 (D, E), 2.1 (D, E), 3.1 (D, E), 3.3 (D, E), 4.1 (S), 4.2 (S), 4.3 (S), 5.3 (D), 5.4 (D, E). GEOG1BA: 1.1 (D, E), 3.2 (S), 3.6 (S), 7.2 (D, E), 7.3 (D, E). VETE1BA: 1.1.3 (D, E), 2.1 (D, E), 2.2 (S), 2.3 (S), 2.5 (S), 2.6 (D, E), 4.1 (D), 6.1.1 (S), 6.1.2 (S), 7.3 (S). b. Specific learning outcomes of the teaching unit At the end of this teaching unit, the student will be able to: 1 • handle the basic mathematical analysis tools of physics; • understand the fundamental laws of classical mechanics; • convert a literal statement for classical mechanics into mathematical equations and vice versa; • represent the behaviour of a simple physical system using a mathematical model and assess the latter's validity; • apply physical theories to solve a simple problem of classical mechanics and identify relevant and non-relevant data; • argue in relation to the validity of a classical mechanics result; • carry out a simple classical mechanics experiment and analyse its results, in the light of the theoretical reference framework, taking into account different sources of possible errors; • explain and justify the choice of a method of measurement in physics and apply it to obtain a result; • transpose the theoretical concepts from classical mechanics to concrete problems related to biology, chemistry, geography, and veterinary medicine.

Evaluation methods	The entrance tests to laboratories and the laboratory reports count for 20% of the final mark. This part of the mark will be used for each session and cannot be updated. The exam during the January session (and the other sessions) is written, lasts three hours and counts for 80% of the final mark. If the score obtained in the *ReflexSciences* tests (see above) is greater than or equal to 10/20 (14/20), a bonus point (two bonus points) is (are) awarded, provided that the mark obtained at the exam is greater or equal to 8.5/20. The exam includes various problems similar to those solved in the guided exercise sessions (one of these problems is taken from the list of problems proposed in the sessions) and some questions that aim to check that the concepts and developments presented during the theoretical course have well been mastered (comprehension questions, demonstrations, true or false with or without justification, multiple-choice questions or sentences to complete). All the subjects addressed during the theoretical lessons and the guided exercise sessions must be known for the exam. However, the students have access to a form with the main formulas, which is posted on the LPHY1101 MoodleUCL site. It is essential to bring a simple scientific calculator to the exam. The modalities mentioned above are valid whatever the exam session. If the sanitary conditions deteriorate, the modalities of teaching and examination will be reassessed according to the situation and the rules in force.
Teaching methods	The teaching activities include (1) the theoretical course (14 sessions of 2 hours each), (2) an introductory session of 2 hours on the practical laboratory work (mandatory), (3) guided exercise sessions (16 sessions of 2 hours each), (4) a practical laboratory work (4 sessions of 2 hours each), (5) the *ReflexSciences* tests (see below) and (6) the tutorial. It is essential to have a simple scientific calculator for the supervised exercise sessions and the practical laboratory work. The different subjects are presented in the theoretical course via slides and blackboard notes. The fundamental concepts are illustrated using applications from modern life, short films or animations, and experiments. The guided exercise sessions play an essential role in the comprehension of the theoretical course and allow the application of the studied theoretical concepts to real problems. The list of problems to be solved during an exercise session and a list of additional problems appears on the LPHY1121 MoodleUCL site approximately one week prior to the exercise session. Preparation of the problems to be solved is crucial. Participation in the practical laboratory sessions is mandatory. A description of the tasks to be carried out in the laboratory together with an introductory video appear on the LPHY1101 MoodleUCL site approximately one week prior to each session. It is essential that this description be read carefully, the video be watched and the online test be performed to access the session. A laboratory report must be written and submitted at the end of the session. This report is assessed. Each week, a *ReflexSciences* test (short video and multiple-choice questions) is proposed on the LPHY1101 MoodleUCL site. The time to answer this test is limited. The purpose is to measure the (fine) understanding of the subjects studied the previous week. Each test is corrected during the guided exercise session that follows. A tutorial, during which the students may ask their questions to the teaching team, is held each week. The best approach is to work consistently throughout the semester. In particular, it is essential that students regularly solve the exercises themselves, and do not simply read the solutions.
Content	1. Introduction 2. One-dimensional kinematics 3. Inertia and two-dimensional motion 4. Dynamics of the particle : part 1 5. Dynamics of the particle : part 2 6. Work and energy 7. Conservation of energy 8. Momentum 9. Systems of particles 10. Rigid body rotation around a fixed axis 11. Static equilibrium of a rigid body and angular momentum 12. Fluid statics 13. Fluid dynamics
Inline resources	The slides and the short films or animations projected during the theoretical course, the list of exercises to be solved, the supports for practical laboratory work, exam examples and other useful documents are made available to students on the MoodleUCL website of LPHY1101.
Faculty or entity in charge	SC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Veterinary Medicine	VETE1BA	6		
Bachelor in Chemistry	CHIM1BA	6		
Minor in Scientific Culture	MINCULTS	6		
Bachelor in Biology	BIOL1BA	6		
Bachelor in Geography : General	GEOG1BA	6		