UCL Université catholique de Louvain

LPHY1113B

2014-2015

Physique générale 1 (1er quadrimestre)

6.0 credits	30.0 h + 50.0 h	1q

Teacher(s) :	Fichefet Thierry (coordinator) ; Deleersnijder Eric ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	1. Newton's laws of motion. 2. Statics. 3. Kinematics. 4. Dynamics of a pinpoint body. 5. Work and energy. 6. Dynamics of a system of particles. 7. Rotation of a rigid body. 8. Gravitation. 9. Mechanical oscillations. 10. Fluid mechanics. 11. Elements of thermodynamics and kinetic theory of gases. 12. Phase transitions. 13. Electrostatics. 14. Direct currents. 15. Magnetostatics.
Aims :	The objectives of this course are : - to give the student a clear, rational knowledge of the fundamental laws of nature ; - to drill him in rigorous and formal reasoning ; - to train him to the quantitative, accurate observation of phenomena and their measurement (measurement methods and instrumentation). *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 :	Topics taught during the first semester : Elements of general mechanics - Fundamental principles. - Statics. - Kinematics. - Dynamics of a pinpoint body. Work and energy. - Dynamics of a system of particles. - Gravitation. Motion of planets. - Oscillatory motion. Topics taught during the second semester : Fluid mechanics - Hydrostatics. Surface tension and capillarity. - Hydrodynamics. Laminar and turbulent flows. Viscosity. - Heat and temperature. - Gas laws. Kinetic theory of gases. - Phase transitions. Electrostatics - Coulomb's law. Electrical field and potential. - Gauss' theorem. - Electrical capacity and capacitors. - Polarization of matter. Dielectrical constant. Direct currents - Electrical power, Joule's law. - Ohm's law, resistance and resistivity. - Computation of currents and resistances (Kirchhoff). - Measurement apparatus. Internal resistances of apparatus and electrical sources. Magnetostatics - Magnetic interaction. Elements of relativity.

	- Ampère's theorem. Maxwell's equations. - Biot-Savart's law. - Computation of magnetic fields and magnetic forces. - Applications : motors, speed selector, mass spectrometer, Hall's effect. Teaching methods : - The oral presentation in the lecture hall deals with fundamental concepts of physics and specific applications. - Experiments are shown during lectures and multimedia are appropriately utilised. The use of overhead transparencies is limited. - Exercises and laboratory experimentation play a key role in the learning. Organization of the exercise and laboratory sessions : - The exercise and laboratory sessions are obligatory. - These sessions require a preliminary preparation. - Students have at their disposal specific instructions for the preparation of laboratory sessions. They may be given a written test about this preparation at the beginning of sessions. At the end of each session, students have to write a report on their results. - At the end of each exercise session, students receive a list of problems to solve by themselves for the next exercise session. Students may be called at the blackboard during a session to solve a problem or be interrogated on the matter of the previous session. - Question-answer sessions are organized at fixed dates and hours. Advise for study : The gold rule is of course a continuous work. It is important that students make every effort to regularly solve problems by themselves.
Other infos :	Prerequisite : It is supposed that the student - has a sufficient knowledge of French to follow and give structured presentations (oral or written) ; - has skills in basic mathematics (linear algebra, geometry, trigonometry, vector calculus, differential and integral calculus) ; - is familiar with graphic representation (one-dimensional, two-dimensional and three-dimensional). Evaluation : The examination on the matter taught during the first semester is written. It consists of problems similar to those solved during exercise sessions, reflection questions (true or false type) and a question on theory. It covers all the topics studied during lectures and exercises sessions. The examination on the matter taught during the second semester is oral and covers all the subjects addressed during lectures and exercise sessions. Regarding the evaluation of the laboratory sessions, the mark takes into account the work accomplished by the student throughout the year. However, at the end of the year, an oral examination on the laboratories of the second semester is organized. Recommended reading and course materials : The reference textbook is the book of Physics by Harris Benson (ed. De Boeck Université). Note that this book is also used as reference textbook for the physics course of the second year of "baccalauréat". Complementary notes on some parts of the course, supplementary exercises and a laboratory handbook are provided to the students. A scientific calculator is required for the exercise and laboratory sessions.
Cycle and year of study :	> Bachelor in Bioengineering
Faculty or entity in charge:	PHYS