UCL Université catholique de Louvain

LBIR1210

2012-2013

General physics II

9.0 credits	60.0 h + 60.0 h	2q

Teacher(s) :	Maltoni Fabio ; Bertrand Bruno (coordinator) ;
Language :	Français
Place of the course	Louvain-la-Neuve
Prerequisites :	Précursory courses : PHYS 1100 'Physique générale I'
Main themes :	The first aim is to discover the beauty of the coherent explanation of the variety of electromagnetic manifestations through the Maxwell equations. The demonstration of the electromagnetic nature of light will follow. Modern Physics completes this unification with the special theory of relativity where energy an time is grouped in one four-dimension world, where energy and masse are equal. It follows in a common vision of the quantification of matter and light and of the four fundamental interactions interpreted through a propagator concept for each of them. Nuclear physics resumes the lectures describing the chart of nuclei, the decays, the energy balance in fission and fusion processes, and the numerous applications. This unified view of the physics world should sharpen the student curiosity and improve their skills and critics for the following years, in their study as well as in their professional carrier.
Aims :	To understand the time dependent electric and magnetic phenomenon. To be able to explain them thanks to the Maxwell equations. To show that the Maxwell equations also describe light as an electromagnetic wave. To compute voltages and currents in electric circuits powered with an alternate power supply. To explain and solve waves problems: interference, standing waves, polarisation, reflection, refraction, and diffraction. To use graphical method and compute mirror and lens problems. To debate and compute space-time properties in the special relativity framework, as well as the concept of mass-energy with the related relations. Be able to explain the quantification of matter. To comment the variety of nuclei, the disintegration modes, and the various applications. To compute nuclear masses, their binding energy and their radioactivity evolution. *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 :	Evaluation : Written and oral examination
Content :	Electromagnetic induction - Maxwell equations - Inductance - Magnetic field in matter, transformers. - Alternating currents - Electromagnetic waves, light in vacuum in matter, power of waves, antenna. - Reflection, refraction, polarisation, interferences, diffraction, gratings - Optics: mirrors, lenses. - Mechanical waves: standing waves, Doppler effect. - Special relativity: concepts of time, length, mass, energy, Doppler effect for electromagnetic waves.- Boltzmann distribution - Thermodynamics. - Black body radiation. - Quantum states of matter.- Is light matter?- Are particle waves? Wave length of particles - Probability wave function description of particles, Schrödinger equation. - Nuclear physics: chart of nuclei, masses, decays, fission, fusion, and nuclear reactors
Other infos :	Books : Books of physics in French or in English: Giancoli, Benson, Hecht, Serway, Young. Summary : none, but lecture's transparencies stored in the icampus web site of the UCL. Methods : Lectures in main auditorium with experimental demonstrations, followed by periodic exercises and laboratory practices
Cycle and year of study :	> Bachelor in Bioengineering > Bachelor in Chemistry
Faculty or entity in charge:	AGRO