UCL Université catholique de Louvain

LBIR1311

2015-2016

Thermodynamics

4.0 credits	30.0 h + 15.0 h	1q

Teacher(s) :	Bartosiewicz Yann ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	Icampus
Prerequisites :	Physics and thermodynamics from previous years *The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.*
Main themes :	1. The two principles of thermodynamics and their consequences 2. The thermodynamics of gas 3. The thermodynamics of vapors 4. Engine cycles 5. Operating cycles
Aims :	Contribution of the course to the reference learning outcomes B1.1 ;1.5 ;2.1 ;4.2 b. Course-specific learning outcomes Through fundamentals concepts taught in class plus practices, the student should be able to: 1. Perform an energy balance and evaluate the losses together with the energy deterioration across a thermodynamic transformation involving heat and mechanical work exchanges; 2. To compute and propose a simple model of an engine thermal cycle involving a perfect gas or a vapor, e.g. Rankine cycles, gas turbine cycles, internal combustion engine cycles, or cogeneration; 3. To compute and propose a simple model of a refrigeration cycle, e.g. compressions machines, heat pumps or absorption; *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 :	Closed book exam made of one theoretical and one application (exercices) parts. A personal form for mathematical expressions/ formula is allowed.
Teaching methods :	Lectures are presented by using slides, particular demonstrations and details are given at the board as well as examples.
Content :	1. The two principles of thermodynamics and the related variables (internal energy, enthalpy and entropy), the work and heat concepts, the fundamental equations of shaft work, opened/closed transformations, T,s and h,s diagrams; 2. Perfect gas, properties and mixture of perfect gas, isentropic and polytropic transformations, models of compression/expansion; 3. Vaporization, triple point, critical point, vapor phase diagram, heat of vaporization, saturation conditions, overheat, properties of vapors; 4. Internal combustion engine, vapor installations, cogeneration; 5. Carnot cycle, compression cycles, absorption cycles, heat pumps;
Bibliography :	Syllabus « THERMODYNAMIQUE », BIR1311, J. Martin et P. Wauters, ed. 2012 « Fundamentals of engineering thermodynamics », M. J. Moran and H. N. Shapiro
Faculty or entity in charge:	AGRO

Programmes / formations proposant cette unité d'enseignement (UE)

Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Environmental Bioengineering	BIRE2M	4	-	
Bachelor in Bioengineering	BIR1BA	4	LCHM1211 **and** LBIR1210	