UCL Université catholique de Louvain

LBIR1311

2010-2011

Thermodynamics

4.0 credits	30.0 h + 15.0 h	1q

Teacher(s) :	Bartosiewicz Yann ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	1. Recapitulation of the two principles of thermodynamics and their consequences. 2. Transformations of gaseous systems. Application to gas compression and expansion in machines. Isentropic and polytropic efficiencies. 3. Thermodynamic study of steams. t-s, h-s and p-h diagrams. 4. Standard applications : Rankine Hirn cycle: mechanical work, power, thermal and global efficiencies ; refrigerating devices with an evaporation cycle: mechanical work, refrigerating power, efficiency coefficients. Cycles with two or three fluids in cascade. Heat pump.
Aims :	Using the scientific notions learned in previous classes, such as physics, the present set of lectures has for objectives: 1. to introduce the students to the fundamental principles of thermodynamics, their consequences, as well as their applications ; 2. to get the students to know typical fluid characteristics (e.g. units, order of magnitude,) and specific parameters of fluid evolutions, cycles, machines and devices ; 3. to help the students to acquire the logical tools necessary to solve the greater part of problems encountered in the field. *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 :	Lectures 1. Principles of thermodynamics and their consequences. Equivalence principle and the three fundamental equations of the technical thermodynamics. Mechanical work of a machine. Entropy principle and T-S diagram. Thermodynamic cycles. Representation of the thermodynamic functions. Exergy. 2. Study of gaseous systems. Thermodynamic properties of an ideal gas. Evolutions of a gaseous system. Applications to gas compression and expansion in machines. 3. Study of steams. Thermodynamic properties of steams. p-v, t-s, p-h and h-s diagrams. p-v-T and p-S-T surfaces. 4. Standard applications. The Rankine Hirn cycle and its global efficiency. The refrigerating device cycle with evaporation. Improvements of the basic cycle. Exercises: There are seven exercise periods planned. For each one the subject will be in direct link with the theory taught in class.
Other infos :	Prerequisite: Fundamental knowledge of basic physics and thermodynamics principles taught in "candidatures". Evaluation: The mark will be based on a twofold evaluation. The first part will come from the theory and the second from an imposed exercise. The evaluation of the theoretical knowledge will take the form of an oral examination (with written preparation) in a period which will also include time to solve the imposed exercise (in writing). Support: lectures notes are available at the university's publishing service CIACO (170 pages). Thermodynamic tables are in turn available at the SICI (35 pages).
Cycle and year of study :	> Bachelor in Engineering : Architecture > Master [120] in Environmental Bioengineering > Bachelor in Bioengineering
Faculty or entity in charge:	AGRO