UCL Université catholique de Louvain

LMAPR2420

2012-2013

Complements of physical metallurgy

5.0 credits	30.0 h + 30.0 h	2q	Ce cours bisannuel est dispensé en 2011-2012, 2013-2014, ...

Teacher(s) :	Jacques Pascal (coordinator) ; Pardoen Thomas ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	To go deeper in and to complement the formation given in the courses MAPR 2013 "Physical-chemistry of metals and ceramics" and MAPR 2481 "Deformation and fracture of materials".
Aims :	At the end of this course, the student should be able to take benefit, in full autonomy, of the whole literature in the domain of physical metallurgy. This autonomy suppose essentially three competences : (1) the knowledge and understanding of the vocabulary and major principles of physical metallurgy; (2) to have become familiar with the practice of the basic tools for the characterisation and for the testing of properties; (3) to be able to use the theoretical principles and experimental tools in order to choose a material and to design the conditions of his processing in functions of the requirements for a particular application. *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 :	- Solutions and intermetallic compounds : Hume - Rothery rules, order - disorder transformations; - Metallic ferromagnetic materials : ferromagnetism, permanent magnets, soft magnetic materials; - Superconducting metallic compounds; - rapid solidification, metallic glasses, quasi-crystals; - High performance steels : recall of basic notions, mechanical properties, phase transformations, hardenability, annealing and tempering, surface treatments, thermomechanical treatments; - High performance aluminium alloys; - High performance non-ferrous alloys : light alloys (Mg, Ti), Cu and its alloys, low melting point alloys (Zn, Pb, Cd), alloys for high temperatures applications, superalloys; - Kinetics of structural evolution in metallic alloys. The practical work is organised in the form of a project carried out by groups of 3 or 4 students. The objective of this project is to contribute to the development of the competences mentioned in point 1 here above. In order to allow the groups to confront their knowledge and know-how to the reality of industrial problems, the subjects of the projects are proposed by industrial enterprises.
Other infos :	Nil
Cycle and year of study :	> Master [120] in Chemical and Materials Engineering
Faculty or entity in charge:	FYKI