UCL Université catholique de Louvain

LMAPR2481

2010-2011

Deformation and fracture of materials

5.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Pardoen Thomas ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Main themes :	Three parts I. Reversible deformation : elasticity, thermoelasticity, viscoelasticity, anelasticity; II. Irreversible deformation : plasticity, microplasticity (dislocation theory, and hardening), viscoplasticity, creep ; III. Damage and fracture : damage mechanisms, fracture mechanics, physics of cracking, subcritical crack growth and fatigue
Aims :	Two approaches are developed in parallel. First, macroscopic laws governing the deformation and fracture of materials are presented. Second the microscopic mechanisms controlling the resistance to deformation and fracture are described. In terms of theoretical knowledge, the students are expected to know - the main mechanisms of deformation, damage and fracture of materials (involving simple mathematical models and the capacity to draw schematics) - mechanics and physics concepts such as internal stresses, plastic déformation, dislocations mechanics, stress intensity factors, energy release rates. - general articulation between the various mechanisms in terms of length and time scales, interactions and couplings, for the various classes of materials. In terms of applicative skills, the students are expected to be able to - apply the simple physical/mechanical models to simple problems; - establish a strategy of resolution for a more complex engineering problem of deformation and/or fracture. *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 :	Laboratory experiments introducing to the theoretical courses, which are supplemented by application exercices. Students are also expected to invent and solve a specific engineering problem involving deformation and/or fracture aspects.
Other infos :	MAPR 1805 Continuum mechanics and solids mechanics basics Very complete textbook
Cycle and year of study :	> Master [120] in Chemical and Materials Engineering > Master [120] in Mechanical Engineering > Master [120] in Electro-mechanical Engineering > Master [120] in Physical Engineering > Master [120] in Biomedical Engineering
Faculty or entity in charge:	FYKI