

3.0 credits	30.0 h	2q
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Teacher(s) :	Pardoen Thomas ; Charlier Jean-Christophe ; Legras Roger (coordinator) ;
Language :	Français
Place of the course	Louvain-la-Neuve
Prerequisites :	Basic notions in chemistry, physics and thermodynamics
Main themes :	<p>The course is divided into 3 parts. The first introductive part is centred on the chemical bond concept, allowing the classification of materials. In a second part, various functional properties of materials are described. At last, the third part proposes an introduction to materials engineering for metals, ceramics and polymers, in the framework of structural properties.</p> <p>The aim of the present course consists in the illustration of the link between macroscopic properties of various classes of materials and the fundamental aspect of matter, from its atomic or molecular level to its microstructure.</p>
Aims :	<p>Provide a description of chemical bonding in relationship with materials classes, of consequent microstructures and molecular architectures, and of resulting structural and functional properties.</p> <p>Provide explanations on the influence of materials composition and processing on their microstructure and their application properties.</p> <p>The course provides a unified picture of materials, beyond specifics associated with materials classes, while explaining the particular behaviour of specific materials.</p> <p><i>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".</i></p>
Teaching methods :	Ex-cathedra lectures, with numerous industrial and academic examples.
Content :	<p>PART I: General introduction to materials science</p> <ol style="list-style-type: none"> 1. Historical and economical aspects, materials classes and selection strategy 2. Chemical bondings, main polymerisation reactions, tacticity, and molecular architecture 3. Crystalline organisation, amorphous solids, polymorphism 4. Crystalline defects <p>PART II: Materials functional properties</p> <ol style="list-style-type: none"> 1. Electrons and phonons 2. Electrical and thermal conductivity 3. Dielectric, magnetic and optical properties of materials <p>PART III: Structural properties of materials</p> <ol style="list-style-type: none"> 1. Strain behaviour 2. Relationships between defects / microstructure / structural properties for metals and ceramics 3. Relationships between molecular architecture / microstructure / structural properties for polymer materials
Cycle and year of study :	<p>> Bachelor in Engineering</p> <p>> Master [120] in Biomedical Engineering</p>
Faculty or entity in charge:	FYKI