MATS8AI PROPERTIES AND STRUCTURES OF CERAMICS

MATS8AI Properties and structures of ceramics	ECTS Credits : 2 Duration : 21 hours	Semester : S8

Person in charge:

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Keywords:
ionic pileup - sintering - densification - production - toughness

Prerequisites:

Ionic liaisons - Binary phase diagrams

General objective :

Have a global view of ceramics industry and of their properties

Contents:

Materials Engineering is an Engineering Science that takes into account not only the chemical composition, the structure of materials, but also their mode of preparation in order to reach specific properties. In some industrial sectors, the structural properties of current ceramics can compete with metals or metallic alloys. This leads to the major development of high performance massive ceramics or composite ceramics.

The objective of this course is to know the main families of industrial ceramics in the large meaning of their definition. Starting from a structural description, giving a glimpse of forming processes, underlining the relation between production conditions and microstructures obtained and presenting reachable mechanical properties.

Abilities:

Level	Description and operational verbs
Know	The main families of materials and particularly ceramics - origin of chemical liaisons and properties of ionic pileups - different processes of elaboration of ceramics.
Understand	Eutectic pileups - ion size/ coordination polyhedron relation - sintering mechanisms of ceramics (thermodynamic and kinetic) - toughness of ceramics.
Apply	Weibull statistical approach in order to evaluate the toughness of ceramics.
Analyse	Fabrication process of ceramics - fragility of ceramics - Complex structure of technical ceramics.
Summarise	The whole fabrication mechanisms of ceramics so as to get properties related with the intended application.
Assess	Pertinence of elaboration process and process parameters regarding physical and mechanical properties of ceramic material.

Assessment:

☑ Written Test	☐ Continuous Control	☐ Oral Report	☐ Project	☐ Written Report