UCLouvain

lmapr2672

2019

Sintered materials and surface treatments

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h + 30.0 h	Q2

This biannual learning unit is not being organized in 2019-2020 !

Teacher(s)	Erauw Jean-Pierre ;Jacques Pascal ;Proost Joris ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	Metallic and ceramic powders: production and characterization; shaping of the semi-finished green product ; sintering process ;properties of sintered products.
Aims	Within the engineering degree program in chemistry and materials science, the course involves simultaneously four axes covering both disciplinary and transversal learning outcomes. At the end of the course, students will be able to : (Learning Outcome 1.1) • Explain the physical and physico-chemical phenomena underlying the processes of shaping of massive bodies from metal or ceramics powders via dry, wet, or plastic methods. • Describe the interactions between the critical parameters for the manufacturing of a homogeneous, high density green part • Describe the driving forces and mechanisms of material transport that govern the different stages of sintering of an aggregate of solid particles • Describe the influence of residual porosity on the mechanical behavior of sintered materials • Describe and classify the different surface treatment processes. 1 (L.O. 1.2 and 3.2) • By reclaiming the achievements of the bachelor program in mathematical concepts and in the use of computational tools, develop a mathematical model to simulate a physical phenomenon (L.O. 3.1) • Draw a state of the art in a specific technological domain based on a set of technical and scientific references (L.O. 4.2) • Conduct a project group (L.O. 5.3) • Present and defend an oral report effectively and critically - - - - *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".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Students are assessed individually in writing and orally. The exam questions are formulated to verify the acquired disciplinary learning outcomes mentioned above. The exam focuses on the response to questions relating to the understanding of the theory, and more specifically, for the written part, issues related to the ability to solve exercises of the same type as those offered during the course activities. The achievement of transversal learning outcomes is evaluated via an oral assessment on the project in groups. Each student orally presents the work of his group to a panel composed of the teacher as well as students from other groups. To encourage students to practice critical sense, the evaluation criteria are defined previously by the students.

Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The course consists of a dozen of lectures and a dozen of exercises and group work sessions. The modeling of sintering is developed in a project in groups of 4 students. On the basis of theoretical concepts, the interpretation of results of mechanical tests and / or of control data recorded in an industrial shaping process is also the subject of a project carried out in groups of 2 to 3 students. An individual work aims at drawing a state of the art in an emerging process not covered in lectures. The teachers themselves supervise the exercises and group work. They also organize one or two factory visit to illustrate the topics of the course.
Content	The course considers successively the different stages of the manufacture of sintered materials: synthesis of powders; shaping of the green aggregate, sintering, surface treatments, properties of products.
Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=10096
Bibliography	Les supports du cours sont mis à disposition des étudiants sur Moodle. Ils consistent notamment en : • Un syllabus présentant l'exposé des matières • La copie des documents power-point utilisés par les enseignants • Les énoncés des exercices • Les instructions pour le projet de groupe • Des articles de la littérature
Other infos	This course involves the knowledge of the scientific bases of metals and ceramics as well as of the thermodynamics taught in the bachelor program in civil engineering and in the core courses of the program KIMA.
Faculty or entity in charge	FYKI

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Chemical and Materials Engineering	KIMA2M	5		