UCLouvain

lepl1505

2023

Project 4 (in chemistry and physics)

5.00 credits	30.0 h + 22.5 h	Q2

Teacher(s)	Nysten Bernard ;Pardoen Thomas ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	This project assumes the basic knowledge of materials, involving physical chemistry, thermodynamics, structure of matter, functional and mechanical properties, as taught in the LMAPR1805 course.
Main themes	Choice of a main constituent material of a part Critical analysis of the adequacy of the choice of this material for the specific application Description of the different stages of synthesis (e.g. material balance) and shaping of the material Study of the adequacy of properties with technological, regulatory, economic and environmental constraints Description of the property/microstructure/implementation relationships Description of property measurement techniques Comparison of properties with competing materials Proposal of an alternative solution that is more efficient, more economical, and/or more ecological.
Learning outcomes	**At the end of this learning unit, the student is able to :** **Contribution of the course to the program framework** With regard to the AA reference of the program "Bachelor in Engineering Sciences, orientation civil engineer", this course contributes to the development, acquisition and evaluation of the following learning outcomes: AA 1.1 AA 2.1, 2.2, 2.4, 2.8 AA 3.1 AA 4.2, 4.3, 4.5 AA 5.1 **Course specific learning outcomes** The skills targeted by “projects 4” consist on the one hand of transversal skills, common to all projects 4, and on the other hand of disciplinary technical skills, specific to each specialization. *Transversal skills* The 4 projects aim to acquire transversal skills close to the practice of the engineering profession in a varied disciplinary context: • analyze an existing system and improve it; • critically analyze experimental data; • distinguish between reality and the models used to describe or modify it; • understand the notion of uncertainty in the management of the project, in its realization, and in the results obtained. The project will also give pride of place to the right to make mistakes, a characteristic component of a young engineer's early career. *Disciplinary skills* At the end of the course, the student will be able to: • use the basics of a rational approach to material selection; • understand the technological and scientific aspects related to the development processes for a class of materials; • describe and analyze the stages of a material's life cycle; understand and choose means of microstructural characterization and measurement of basic functional and mechanical properties. The contribution of this teaching unit to the development and mastery of the skills and achievements of the program(s) can be accessed at the end of this sheet, in the section "Programmes/training offering this teaching unit (TU)".

Evaluation methods	Students will be assessed both as a group in oral and written form and individually in written form (examination at the same time for all students in the bachelor) on the basis of the particular objectives announced earlier. A detailed evaluation grid is given at the beginning of the term. The details of the assessment procedures are communicated at the beginning of the term and published on the course Moodle site. The final grade will be composed as follows: • The project mark, including the execution, written presentations, oral presentations and/or interactions, organisation of work and/or reflective posture on this subject, and mastering of the concepts related to the project. This mark may be individualised according to the student's involvement in the group during the term (compulsory attendance at activities, active participation in intermediate work and assessed work). The work for which this part of the mark is awarded may not be repeated in the second term. • The mark for an individual written assessment outside the term. The weighting of the individual assessment in the final mark is 25% if the assessment is passed, but increases if the assessment is failed. More specifically, it will be 100% for a mark less than or equal to 6, and will evolve linearly with the mark between 6 and 10 according to the following formula: weight = 1 - 0.75 * (mark - 6)/4. The second session will consist of an individual examination, possibly requiring the preparation of individual work beforehand.
Teaching methods	Students work in groups of 3 or 4, each supervised by one or two tutors. Each group studies one of the main constituent materials of an object, a machine, an equipment. Some tutorials are offered in the classroom or online by teachers on specific topics. Each group has access to scientific laboratories where teachers come to characterize its material and its main properties. Teaching will preferably be organized in face-to-face mode; with the implementation of co-modality if health reasons so require.
Content	The students carry out a group project of the “reverse engineering” type on an object, a device which is assigned to them by drawing lots. This project involves the following steps: • choice of a main constituent material of the object, of the device and formulation of the "materials" specifications, • critical analysis of the adequacy of the choice of this material for the specific application studied, • description of the different stages of synthesis (e.g. material balance) and shaping of the material to obtain the object, • study of the adequacy of the properties of the material with the technological, regulatory, economic, environmental constraints, • description of the properties / microstructure / implementation relationships involving the performance of experimental campaigns to be defined, • description of the techniques for measuring properties, • comparison of material properties with competing materials, • proposal of a more efficient, more economical and/or more ecological alternative solution based on a life cycle analysis.
Inline resources	Moodle website : https://moodle.uclouvain.be/course/view.php?id=1832
Bibliography	Notes des tutoriels disponibles sur le site Moodle du cours. Le livre de M. F. Ashby « Materials Selection in Mechanical Design » (Elsevier), disponible en ligne sur l’intranet UCLouvain.
Other infos	This course is part of the set of "Project 4" courses of the civil engineering baccalaureate program. The 4 projects share common transversal objectives but are available in various versions with distinct disciplinary objectives, corresponding to the program sectors. Each student chooses the project proposed by one of his courses.
Faculty or entity in charge	FYKI

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Engineering	FSA1BA	5		🔍