UCLouvain

lmapr2010

2017

Polymer Materials

5 credits	45.0 h + 15.0 h	Q1

Teacher(s)	Bailly Christian ;Nysten Bernard ;Van Ruymbeke Evelyne (compensates Nysten Bernard) ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	1. Introduction : current challenges of the polymer industry 2. Morphology and properties of multicomponent polymer materials 3. Mechanical properties of polymer materials 4. Functional properties of polymer materials, in particular electrical and electronic properties 5. Polymer composites and nanocomposites 6. Additional themes depending on the interests of the students (e.g. surface properties, biological properties, environmental properties') The relative emphasis on the various themes depends on the teaching year. The scientific issues are systematically linked to technological and application aspects.
Aims	**Contribution of the course to the program objectives** With respect to the LO of the programme KIMA, this activity contributes to the development and acquisition of the following LO: • LO 1 : 1.1, 1.2 • LO 3 : 3.1, 3.3 • LO 4 : 4.1, 4.2, 4.4 • LO 5 : 5.1, 5.3, 5.4, 5.5, 5.6 **Specific learning outcomes of the course** At the end of this course, the student will be able to 1 • LO1.1. : understand the strengths and weaknesses of major classes of polymer materials for typical applications • LO1.1. : establish the link between the structure and properties of major classes of polymer materials • LO1.2. : use relevant models and theories described in literature to predict the properties of specific polymer materials • LO3.1 : document and summarize the scientific, technological and industrial state of the art for a particular class of polymer materials or a particular set of relevant properties. • LO3.3 : prepare a report on the state of the art and current challenges/perspectives for a particular class of polymer materials or set of properties. • LO4. : work in team to analyze an issue and prepare a seminar + a report for a given class of polymer materials or properties • LO5. : present and defend a seminar and a report on polymer materials in a rigorous, up to date and attractive way, with the right balance between the parts on scientific, technological and industrial practice aspects. - - - - *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	The students will be individually graded based on the objectives indicated above. More precisely, the evaluation involves the grading of : • The presentation of a project in groups of two or three on a scientifically challenging and industrially relevant issue linked to the course content. This project will carry 50% of the total mark. • An oral exam based on a list of synthetic questions prepared by the teachers and given during the year. The exam will carry 50% of the mark • The teachers have the right to reduce the weight of one part of the mark if a deep deficiency (<8/20) is found for the other.
Teaching methods	A combination of : 1. Ex cathedra courses : concepts are illustrated by concrete exemples taken from industrial practice and the experience of the teachers. 2. invited seminars 3. seminars prepared and presented by the students 4. Laboratory and plant visits

Content	1. Introduction : current challenges of the polymer industry 2. Morphology and properties of multicomponent polymer materials 3. Mechanical properties of polymer materials 4. Functional properties of polymer materials, in particular electrical and electronic properties 5. Polymer composites and nanocomposites 6. Additional themes depending on the interests of the students (e.g. surface properties, biological properties, environmental properties') The relative emphasis of the various themes depends on the teaching year. The scientific issues are systematically linked to technological and application aspects
Inline resources	Moodle website : https://moodleucl.uclouvain.be
Bibliography	Notes de cours sur Moodle, livres à la bibliothèque en fonction des besoins.
Other infos	This course requires basic knowledge of polymer physics (in particular concepts of glass transition, crystallization and melting) as well as fundamentals of materials science (thermodynamics, mechanical properties, functional properties at introductory level).
Faculty or entity in charge	FYKI

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [120] in Chemical and Materials Engineering	KIMA2M	5		