UCLouvain

lmapr2018

2019

Rheometry and Polymer Processing

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 + 22.5 h	Q2

Teacher(s)	Bailly Christian ;Van Ruymbeke Evelyne ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	*The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.*
Main themes	I. Introduction : industrial polymer processing, non Newtonian fluids, continuum mechanics refresher II. Shear viscosity, normal forces and elongational viscosity: observations and phenomenological models III. Flow through a channel IV. Capillary rheometry and extrusion defects V. Origin of viscoelastic effects; notions of rheological models; introduction to processing flow simulation VI. Cone-plate and plate-plate rheometric flow; Elongational flow VII Major industrial polymer processing operations : rheological aspects, technology and applications
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 and explain the scientific concepts underpinning polymer processing and rheometry • LO1.1. : Understand and explain the functioning of major polymer processing operations and rheometry techniques • LO1.2. : use relevant models and theories described in literature to predict the functioning of major polymer processing operations and corresponding rheometric measurements • LO3.1 : document and summarize the scientific, technological and industrial state of the art for a particular class of polymer processing operations or rheometric measurement method • LO3.3 : prepare a report on the state of the art and current challenges/perspectives for a particular class of of polymer processing operations or rheometric measurement method • LO4. : work in team to analyze an issue and prepare a seminar + a report for a given class of polymer of polymer processing operations or rheometric measurement method • LO5. : present and defend a seminar and a report on polymer processing or rheometry 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	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** 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 topic linked to the course content. This project will carry 20% of the total mark. • Few practical works and lab (10%) • Oral exam (70%)

Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** A combination of : 1. Ex cathedra courses : concepts are illustrated by concrete exemples taken from industrial practice and the experience of the teachers. 2. Rheometry laboratory and/or processing simulation project 3. seminars prepared and presented by the students 4. Laboratory and plant visits
Content	I. Introduction : industrial polymer processing, non Newtonian fluids, continuum mechanics refresher II. Shear viscosity, normal forces and elongational viscosity: observations and phenomenological models III. Flow through a channel IV. Capillary rheometry and extrusion defects V. Origin of viscoelastic effects; notions of rheological models; introduction to processing flow simulation VI. Cone-plate and plate-plate rheometric flow; Elongational flow VII Major industrial polymer processing operations : rheological aspects, technology and applications
Inline resources	Moodle website : https://moodleucl.uclouvain.be/course/view.php?id=8851
Bibliography	Notes de cours sur Moodle, livres à la bibliothèque en fonction des besoins
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 Chemistry and Bioindustries	BIRC2M	5	LMAPR2019	
Master [120] in Chemical and Materials Engineering	KIMA2M	5		