

Macromolecular materials II: Processing

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European credits ECTS: 6

Teaching Language: English

Supporting files: Spanish and English

	Number of course slots (1h)	Number of course slots (1h)
Magisterial	40	
Seminars	5	
Practical		15

Description

- The subject begins with an introduction to Rheology, locating the particular features of macromolecular materials and their behaviour between elastic solids and Newtonian liquids. Rheological knowledge is the basis for the later study of methods to process or convert these materials into useful products.
- The objectives are: to provide students with the theoretical knowledge and practical experience needed to understand the behaviour of polymer flows, and use the main industrial techniques for processing these materials in the context of correlations between structure, rheology, processing and properties.

Outline

Part 1: Introduction

Basic definitions and concepts.

Non-newtonian liquids.

Viscoelastic response.

Rheology and processing.

Part 2: Flow in polymeric liquids

Simple continuous flow: pseudoplastic or shear thinning behaviour.

Oscillatory flow: dynamic viscoelasticity.

The influence of temperature and molecular parameters.

Part 3: Rheological techniques

Measurement of the effect of shear rate on the viscosity.

Measurement of the viscoelasticity.

Capillary rheometry.

Torsion rheometers.

Part 4: Operations before processing

Drying of polymers and blending in macromolecular materials (mixing and additive addition)

Part 5: Continuous processing techniques

Extrusion.

Calendering.

Applications.

Part 6: Cyclic processing techniques

Injection molding.

Blow molding.

Thermoforming.

Molding of thermoset materials.

Other cyclic processing techniques.

Applications.

Experimental practical contents

During the practical sessions, the main processing techniques for polymeric materials (injection and compression molding, extrusion...), together with the experimental conditions to be applied, will be explained and the students will learn to use the corresponding machines. The processes and functioning of the main techniques for rheological measurement in polymeric materials will also be explained and used by the students.