

## Advanced Polymer Processing Techniques and Optimization by Computer-aided Simulation

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**European credits ECTS:** 4,5

**Teaching Language:** English

**Supporting files:** Spanish and English

	Number of course slots (1h)	Number of course slots (1h)
<b>Magisterial</b>	20	
<b>Seminars</b>	3	
<b>Practical (Laboratory+Computer)</b>		10+12

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### Description

The course starts with a brief introduction to the main processing techniques for polymeric materials. The next chapters deal with the recent advances and current trends in polymer processing. The processing of elastomeric materials is specifically studied in one independent chapter. Finally, the course includes a module about the computer-aided optimization of the injection molding process, as an example, by means of a Computer Aided Engineering (CAE) simulation software. There are laboratory sessions to practice with the corresponding instrumental techniques and practical sessions dealing with the simulation software.

- To get knowledge on the use, interpretation and communication of the results obtained through simulation software of the processing of polymeric materials.
  - To gain knowledge on the state-of-the-art processing techniques of polymeric materials.
  - To know the most suitable industrial processing technique for each type of polymeric material and/or for the fabrication of polymeric parts.
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### Outline

**Part 1: Fundamentals of transformation techniques of polymeric materials**

**Part 2: Processing-structure relationship in injection-molding, extrusion and other transformation techniques**

**Part 3: Advances in injection-molding**

*Fluid assisted injection*

*Structural foams*

*Overmolding*

*Molding with lost core*  
*Injection-compression*  
*Microcellular foams*

## **Part 4: Advances in blow-molding**

*Deep-draw*  
*3D blow-molding*  
*Sequential molding*

## **Part 5: Innovations and advanced extrusion techniques**

*Thermoconforming*  
*Rotational molding*

## **Part 6: Processing of elastomeric materials**

*Formulation*  
*Mixing*  
*Conforming*

## **Part 7. Computer assisted injection-molding simulation**

*Introduction to finite elements software*  
*Materials and processing information needed for the simulation*  
*Simulation*  
*Results and discussion of the simulation*

## **Experimental practical contents**

*Software simulation training sessions.*  
*Comparison between experimental injection molding and software simulation.*  
*Processing of elastomeric materials.*  
*Blown film extrusion.*