


 Faculty of Applied Sciences

MAPR2392 Physics of polymeric materials

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s): Christian Bailly, Sophie Demoustier, Jacques Devaux, Pierre Godard, Alain Jonas, Roger Legras (coord.), Bernard Nysten

Language: French

Level: Second cycle
Aims

This course aims to provide a detailed phenomenological description of the structure and physical properties of polymeric materials. The thermodynamic properties of such materials are presented. In addition, the relationships are described between the molecular architecture of chains, the microstructure of materials and their physical properties. Practical classes are delivered, allowing students to master the main characterization techniques of polymeric materials.

Main themes

Nil

Content and teaching methods

Physical states of polymers.

Definition and properties of glasses, liquids and rubbers.

Mechanical properties of polymers: viscoelasticity, isochronal modulus-temperature curves, dynamic behavior, rubber elasticity, kinetic theory of rubbers.

Definition of melt viscosity and melt behavior.

Biphasic amorphous polymer systems: microstructure and properties.

Crystalline polymers: microstructure, crystallization kinetics, properties.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

A knowledge is required of the main concepts of thermodynamics. Practical works deal with physical means to characterize polymeric materials, and illustrate the main concepts developed in the lectures. Techniques: differential scanning calorimetry, dynamic mechanical analysis, optical and electron microscopy, X-ray scattering, viscometry,...

Other credits in programs

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| CHIM22 | Deuxième licence en sciences chimiques | | |
| FSA3DA | Diplôme d'études approfondies en sciences appliquées | (3 credits) | |
| INCH22 | Deuxième année du programme conduisant au grade d'ingénieur civil chimiste | (5 credits) | Mandatory |
| INCH23 | Troisième année du programme conduisant au grade d'ingénieur civil chimiste | (5 credits) | |
| MATR22 | Deuxième année du programme conduisant au grade d'ingénieur civil en science des matériaux | (5 credits) | Mandatory |