

UE Polymers 2 chemistry and physico-chemistry



ECTS
6 credits



Component
UFR Chimie-
Biologie

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** YACH8U24 - YACH8U29

Presentation

Description

This course gives an overview of the polymer field from the synthesis of polymers to characterization, properties, and applications of synthetic and natural polymers. All major polymerization methods, their reaction mechanisms and kinetic aspects are considered: step growth polymerization, chain growth polymerization with ionic and radical variations, insertion polymerization. A lecture portion is integrated with a laboratory component, in which experiments are conducted that are directly connected to the class work. Analysis of polymer solution properties and characterization techniques are presented : thermodynamics, polymer/solvent interactions, average molecular weight determination via osmometry, light scattering, viscosimetry and SEC.

This course is divided in two parts covering selected aspects of polymer chemistry and physical chemistry. The chemistry part aims to help students better understand contemporary polymer science focusing on syntheses and materials properties of polymers. It covers copolymer synthesis, discussing control of copolymer composition and relevant recent research such as controlled radical polymerization, supramolecular polymers and bio-based polymers. The course will also provide detailed information for polymerization techniques and polymer characterization tools.

Course parts

UE Polymers 2 chemistry and physico-chemistry - CM	Lectures (CM)	38h
UE Polymers 2 chemistry and physico-chemistry- TD	Tutorials (TD)	12h

Recommended prerequisites

Organic chemistry, physical-chemistry, basic knowledge of polymer chemistry and physical-chemistry

Period : Semester 8

Skills

Knowledge of the copolymerization methods, advanced polymerization methods, synthesis of supramolecular and biobased polymers, basement of thermo-mechanical properties of polymer and composites, introduction to more advanced properties and studies.

Bibliography

Details:

- I. Synthesis of copolymers : statistical, block and graft copolymers
 - II. Synthesis of complex macromolecular architectures
 - III. Literature based mini-project : review on macromolecular engineering through click chemistry and controlled radical polymerization methods
 - IV. Supramolecular polymers : concept, synthesis and properties
 - V. Biobased polymers
 - VI. Application of NMR to the study of polymers
- I. Bulk polymers : from simple model to dynamic mechanical analysis
 - II. Polymer Processing
 - III. The Rubber Elasticity
 - IV. Polymers and the colloidal state
 - V. Rigid polymers and mesomorphous phases, scattering techniques

Useful info

Contacts

Program director

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Place

› Grenoble

Campus

› Grenoble - Saint-Martin d'Hères