

UE Polymers 1



Level
Baccalaureate
+4



ECTS
6 credits



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** YACH7U14

Presentation

Description

Goal : Acquire knowledge concerning the methods of macromolecular synthesis and the characterization of polymers (structure and average molecular mass). The lecture part is dealing on one hand with the chemistry of polymers, and on the other hand with the study of the physical chemistry of polymers. The discussion section part includes exercises on the following topics in particular: average molecular masses, polycondensation, free-radical polymerization processes and biopolymers. These exercises allow strengthening the knowledge on these topics.

Content:

I. Part "Chemistry of Polymers"

1. Introduction: definitions, brief history, economical aspects, terminology, technical/economical classification, general features of polymers, molecular structure (stereoregularity, tacticity), state domains.

2. Biopolymers

Introduction (conformational aspects).

Outline of the different families of biopolymers (nucleic acids, proteins and peptides, polysaccharides and other biopolymers).

3. Synthetic polymers.

Introduction ; classification of polymerization reactions.

Stepwise polymerization reactions:

General features.

Main reactions used in stepwise polymerization processes.

Kinetic aspects of stepwise polymerizations.

Chain polymerization reactions.

Reaction scheme. Initiation and propagation. Termination.

Kinetic aspects of chain polymerizations.

Polymerization processes. Controlled free-radical polymerization. Insertion polymerizations

4. Synthesis of thermosetting polymers and of elastomers

II. Part "Physical chemistry of Polymers" (11h Lectures – 7.5h Discussion sections):

1. Analysis of the physico-chemical properties in solution:

- Viscosimetry, osmometry
- Light Diffusion
- GPC, thermodynamics and chain dimensions

2. Gels: Polymer gels

Course parts

UE Polymers 1 - TP

Practical work (TP)

16h

Recommended prerequisites

Prerequisites: General chemistry (batchelor program)

Period : Semester 7

Useful info

Place

➤ Grenoble

Campus

➤ Grenoble - University campus