

Polymers and composites damaging

ECTS	Course (h)
3	18

Mention du master transmettant la fiche UE :	Chimie et Sciences des Matériaux
Composante de gestion de l'UE :	Faculté des Sciences – Département de Chimie
Responsable de l'UE :	Jean-François GERARD
Statut du responsable :	PR

REQUIREMENTS

Basic knowledge in material science

Basic knowledge on polymer science including molecular architecture, morphology, processing, physics

Basic knowledge on mechanics of materials

PROGRAMM

A.- Elementary mechanisms of deformation, fracture, and mechanical damage of polymers

I.- Molecular mechanisms of deformation and fracture of polymers

II.- Crazeing and shear bands

III.- Fracture: 1/ Fracture mechanics of polymers – 2/ Fracture in dynamic mode (fatigue)

IV.- Mechanical reinforcement and impact toughness of polymers designed from deformation and fracture mechanisms.

B.- Fiber-based composite materials : Combination of polymer matrices, fibers, and interfaces /phases

I.- Reinforcement fibers : Different types, physical behaviors, and fracture mechanisms

II.- Interface/phase as a key component for the mechanical behavior and damage mechanisms of composite materials: Origin, highlighting, characterization (micromechanics of the interfaces – microcomposites and multi-fiber composites)

III. Elastic behavior of ply and laminate (introduction)

IV.- Damage and durability (aging) of composite materials : Thermal and hygroscopic effects

C.- Conclusions / Important things to remember

SPECIFIC SKILLS

- Transversal skills: Perform a bibliographic survey
- Specific skills: Be able to relate the morphologies and behaviors of polymers and composites to the elementary phenomena governing their durability