



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Chemistry and Technology of Polymers and Industrial Applications

2021-1-F5302Q009

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#### Aims

The aim of the course is to highlight the preparation and transformation processes of a few classes of polymers for applications with particular attention to functional polymers, and both up-to-date scientific methods and technological processes to improve their chemical, physical and mechanical properties.

#### Contents

The course encompasses advanced technological processes in the synthesis and transformation of polymers, including new methods of polymer synthesis, introduction to hybrid materials with particular emphasis to preparation and characterization of polymer materials endowed with heterogeneous interfaces and new functional properties.

#### Detailed program

Polymers for applications such as thermoplastic polymers, thermosetting polymers and thermoplastic elastomers.

Advanced technological processes in the synthesis and transformation of polymers with the final aim to improve their functional properties.

Polymer modifications to obtain new functional properties.

New methods for the preparation of three-dimensional polymers.

Polymer preparation in the solid state and nanostructured polymer-based materials.

Self-assembly of polymeric chains.

Self-healing polymers.

Introduction to hybrid materials and applications of nanostructured materials, such as modified clays and porous materials, to polymers for improving mechanical and optical properties. Particular attention will be paid to nanocomposites, elastomers for the automotive industry and polymers for electronic applications.

Characterization of the extended interfaces by advanced methods.

Additives for better microadhesion at the heterogeneous interfaces.

Star polymers and dendrimers as additives.

Spheripol process for polymer growth with morphology retention.

Liquid-crystal polymers with high performances.

Advanced polymeric materials for optical and structural applications.

Polymers for biomedical applications.

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The student is requested to propose a subject of his/her interest in the field to be presented to the class.

## **Prerequisites**

- Basic knowledge of macromolecular chemistry.

## **Teaching form**

Lectures , seminars on specific topics, seminar of experts in the field and visits to industrial research laboratories.

*In the COVID-19 emergency period, the lessons will be delivered in a mixed-mode: lessons recorded in live streaming and deferred. Other methods may be proposed in accordance with the University ordinances.*

## Textbook and teaching resource

1) Introduction to Physical Polymer Science, L. H. Sperling. Wiley-Interscience (2006).

2) Polymer Chemistry. S. Koltzenburg, M. Maskos, O. Nuyken. Springer (2017).

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4) Lecture Notes.

## Semester

1st year, 2nd semester.

## Assessment method

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## Office hours

By appointment.

*During the COVID-19 emergency period, the students are invited to send an email to the teacher ([angiolina.comotti@unimib.it](mailto:angiolina.comotti@unimib.it)) for an appointment. They will be contacted for a videocall.*

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